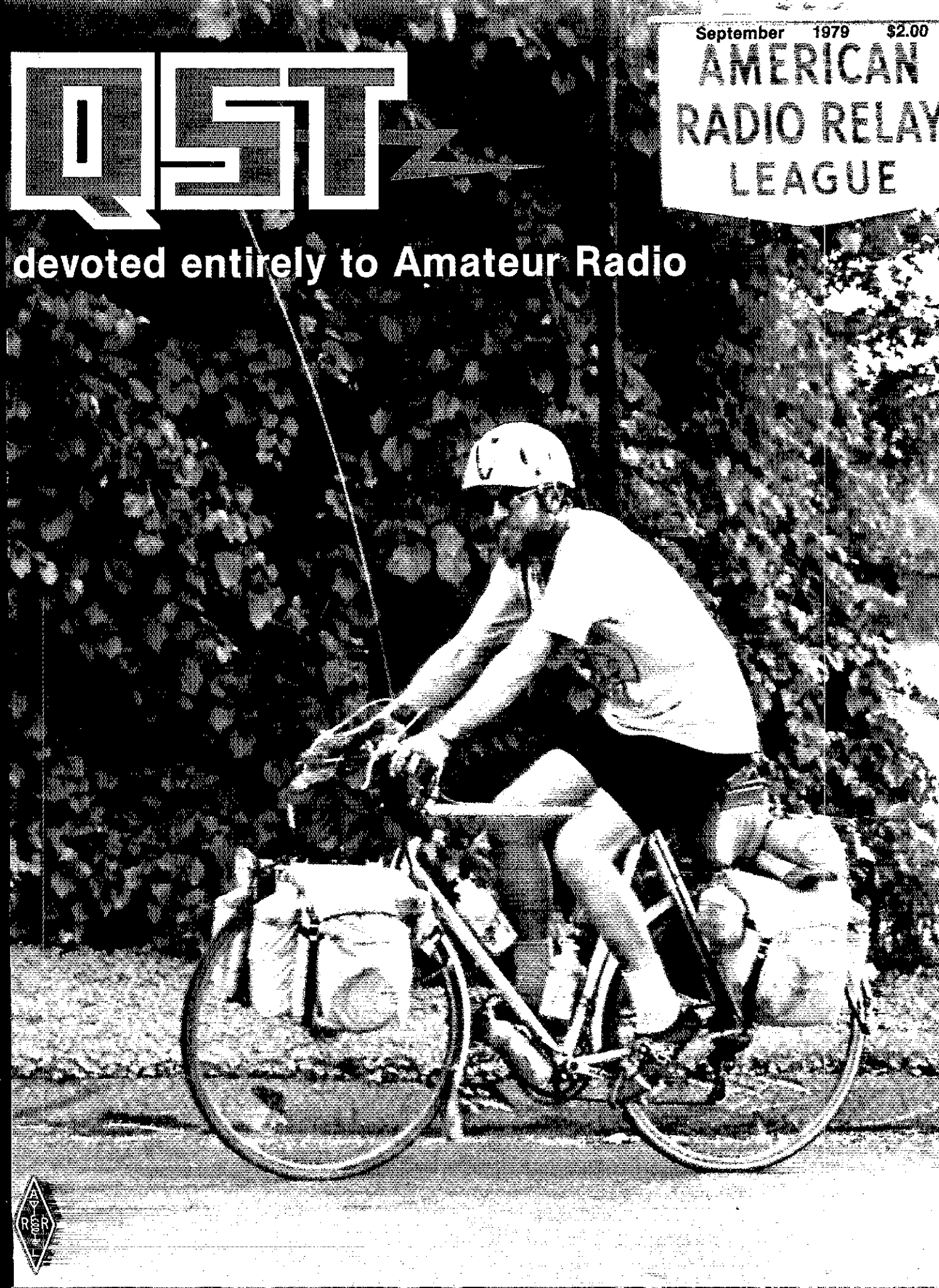
September 1979 $2.00

# QST

AMERICAN RADIO RELAY LEAGUE

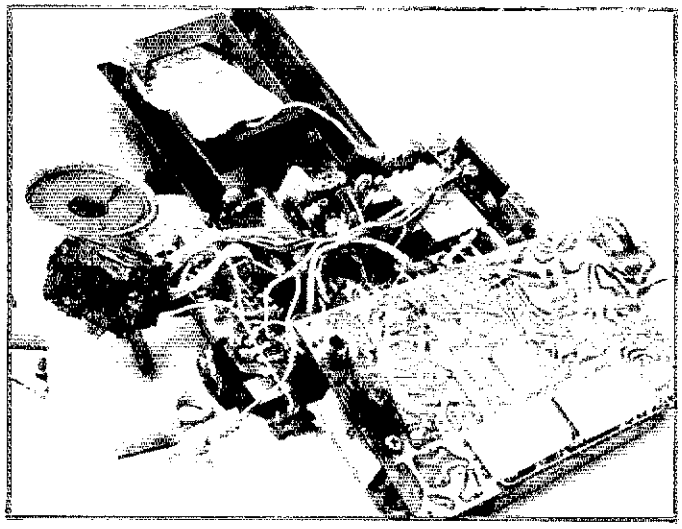
devoted entirely to Amateur Radio



# PROVEN DEPENDABILITY

# ...THE TEMPO S-1 KEEPS WORKING WHEN THE GOING GETS TOUGH

Shown with accessory touch tone pad


This S-1 was in a motorhome that was totally destroyed by fire. When the owner probed around in the ashes he found his S-1, burned almost beyond recognition, BUT STILL OPERATING. Since then we cleaned it up, replaced the case and controls, tuned it, and now it's back on the air...as good as new.

The Tempo line also features a fine line of extremely compact UHF and VHF pocket receivers. They're low priced, dependable, and available with CTCSS and 2-tone decoders. The Tempo FMT-2 & FMT-42 (UHF) provide excellent mobile communication and features a remote control head for hide-away mounting.
The Tempo FMH-42 (UHF) and the *NEW* FMH-12 and FMH-15 (VHF) micro hand held transceivers provide 6 channel capability, dependability plus many worthwhile features at a low price. FCC type accepted models also available.
Please call or write for complete information. Also available from Tempo dealers throughout the U.S. and abroad.

**By now most of you have heard the same words of praise on the air that we (gratefully) receive over and over. The quality that is built into the S-1 has been attested to by the outstanding performance and dependability of the thousands of units in daily use. The high level of innovative engineering that brought forth the Amateur world's first hand held synthesized radio also designed into this compact beauty exciting performance and features at a very affordable price. A price that also includes a ni-cad battery pack, charger, and a telescoping whip antenna. The optional touchtone pad shown in the illustration adds greatly to its convenience. In addition we offer superior quality 30 and 80 watt solid state matching power amplifiers that give the S-1 the flexibility of operating as a portable, mobile, or base station rig. Remember...the Tempo S-1 is the original and proven 800 channel synthesized hand held transceiver. Don't be fooled by substitutes.**

**SPECIFICATIONS**

| | |
|---|---|
| Frequency Coverage | 144 to 148 MHz |
| Channel Spacing: | Receive every 5 kHz, transmit Simplex or ±600 kHz |
| Power Requirements: | 9.6 VDC |
| Current Drain: | 17 ma-standby<br>500 ma-transmit |
| Batteries: | 8 cell ni-cad pack included |
| Antenna Impedance: | 50 ohms |
| Dimensions: | 40 mm x 62 mm x 165 mm (1.6" x 2.5" x 6.5") |
| RF Output: | Better than 1.5 watts |
| Sensitivity: | Better than .5 microvolts |

**Price...** $349.00
With touch tone pad. . $399.00

**SUPPLIED ACCESSORIES**
Telescoping whip antenna, ni-cad battery pack, charger

**OPTIONAL ACCESSORIES**
Touch tone pad (not installed): $39 • Tone burst generator: $29.95 • CTCSS sub-audible tone control: $29.95 • Rubber flex antenna: $8 • Leather holster: $16 • Cigarette lighter plug mobile charging unit: $6 • Matching 30 watt output 13.8 VDC power amplifier (S30): $89 • Matching 80 watt output power amplifier (S80): $149

**NEW TOLL FREE ORDER NUMBER: (800) 421-6631**
For all states except California.
Calif. residents please call collect on our regular numbers.

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Prices subject to change without notice.

# *We're convinced...we've built the world's finest amplifier in its class!*


HENRY RADIO 51 YEARS OF SERVICE

## HENRY RADIO'S

# 1KD-5

## THE NEWEST MEMBER OF THE FAMOUS HENRY RADIO FAMILY OF FINE AMPLIFIERS

**The 2KD-5 and 2K-4A linear amplifiers completely fulfill the needs of discriminating amateurs who want the very best and are willing to pay the price. But we have long felt that many amateurs would be satisfied with less power if they could still have the same high quality and dependability. The 1KD-5 fulfills that need beautifully.**

- **Quality that is unmatched in any other linear in its class. The same high standards of engineering and construction as the 2KD-5 and 2K-4A. Heavy duty components guarantee years of trouble free, dependable performance.**
- **Smaller and lighter. Weighs about 27 pounds less . . . easier to take along on vacation trips and DXpeditions.**
- **Less expensive. If your budget is limited, but you still want a GOOD quality linear to kick your signal way up, with sharp, clear signals, the 1KD-5 will give you just about everything you want . . . and without sacrificing quality.**

**GENERAL INFORMATION**

The 1KD-5 is a 1200 watt PEP input (700 watt PEP nominal output) RF linear amplifier, covering the 80, 40, 20 and 15 meter amateur bands. (10 meters on units shipped outside the U.S.)
Tube Complement: Eimac 3-500Z glass envelope triode operating in a grounded grid circuit.
ALC Circuit: ALC Circuit to prevent overdrive from high power exciters, also boosts average talk power.
Type of Emission: SSB, CW, RTTY or AM
Antenna Relay: DC relay system for hum-free operation, requires shorting contact to ground during transmit to key amplifier into transmit.
Power Output Indicator: Self-contained relative RF power meter.
Tank Circuit: Pi-L place circuit with a rotary silver plated tank coil for greatest efficiency and maximum attenuation of unwanted harmonics.
Input Circuits: Cathode Pi input matching circuits for maximum drive and linearity.
Power Supply: Conservative power supply with solid state rectifiers for reliable, long term operation.
Dimensions: 8.75" high x 14" wide x 15" deep. Weight: 48 pounds.

Price $695.00

**2K-4A** floor console linear amplifier . . . still the "workhorse" of Amateur Radio. Engineering, construction and features second to none. Provides a long life of reliable service while its heavy duty components allow it to loaf along at full legal power. $1195.00

**2KD-5** desk model linear amplifer . . . lighter, more compact and less expensive, but still a heavy duty, high quality linear that will operate at full legal power month after month for years to come. $945.00

**Tempo 2002** amplifier for 2-meter operation. 2000 watts PEP input on SSB or 1000 watts input on FM or CW. $795.00

**Tempo VHF/UHF** solid state power amplifiers for use in most land mobile applications. Call or write for list of models available.

**Tempo 100AL10** VHF linear amplifier Power output of 100 watts (nom.) with only 10 watts (nom.) in. $209.00

**3K-A** linear amplifier (for export and military use only) Superior quality, extremely reliable. At least three kilowatt PEP input on SSB . . . 2000 watt PEP output. $1595.00

**4K-ULTRA** linear amplifier (for export and military use only) For the most demanding operation . . . SSB, CW, FSK or AM. For general coverage operation from 3.0 to 30 MHz, but can be modified for operation on frequencies up to 100 MHz. 100 watts drive delivers 4000 watts PEP input. $3450.00

**All of the above except the 2002, 3K-A & 4K-ULTRA are available at Tempo dealers throughout the U.S.**

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931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
Butler, Missouri 64730 816/679-3127

**Henry Radio**

**Prices subject to change without notice.**

# ICOM

# and 6 meters: Nobody Does It Better.

ICOM's new **IC-551** is the all mode 6 meter unit in a compact, easy to use instrument, which uses a built-in microprocessor for frequency control and scanning. The no backlash, no delay dual VFO light chopper system, similar to the **IC-701** and the **IC-211**, is included as a standard feature at no extra cost, and provides split frequency operation as well as completely variable offsets.

For quick access to DX excitement, three memories are provided for programmed beacon watching. The **IC-551** can scan three memories and be programmed to stop on the first one heard. When not scanning, the three memories and two VFO's provide five different frequencies for the operator to select.

The new **IC-551** uses ICOM's famous 100 Hz step digital tuning system, with a fluorescent readout similar to ICOM's RM2 microprocessor. ICOM's dual VFO, single knob tuning spins through the 6 meter band at 10 KHz or 1 KHz steps at the touch of the high speed tuning button and/or mode switch. Your 6 meter operations have never been easier.

■ Two Digital VFO's Standard ■ AC/DC Power Supply Built-in ■ Variable Output from 1 to 10 watts ■ Dial Lock Switch for Mobile Use ■ Pulse Noise Blanker Standard ■ Variable Scan Speed ■ Optional FM Unit ■ Optional RF Speech Processor and Variable Bandpass Module (similar to the **IC-701** . . . makes 10 watts sound like 25) ■ Optional VOX Unit with **Microdelay™**


**The new IC-551, 50 MHz Band Transceiver. At your dealer now.**

All ICOM radios significantly exceed FCC regulations limiting spurious emissions. Specifications subject to change without notice. © 1979, ICOM East, Inc.

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3331 Towerwood Drive
Dallas, Texas 75234
(214) 620-2780

**ICOM CANADA**
708 Victoria Drive
Vancouver B.C. V5P 3Y9
Canada
(604) 321-1833

Phone numbers for parts orders. **ICOM West, Inc.,** (206) 747-9020, **ICOM East, Inc.,** (800) 527-7425 (orders only), Texas Residents call (214) 620-2780

**ICOM INFORMATION SERVICE**
3331 Towerwood Dr., Suite 304 H Q S W Z
Dallas, Texas 75234

**Please send me: ☐ IC-551 specifications sheet; ☐ full-color ICOM Product Line Catalog; ☐ List of Authorized ICOM Dealers.**

NAME _____ CALL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

You may send a machine copy of this form.

September 1979
*Volume LXIII Number 9*

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**Offices**

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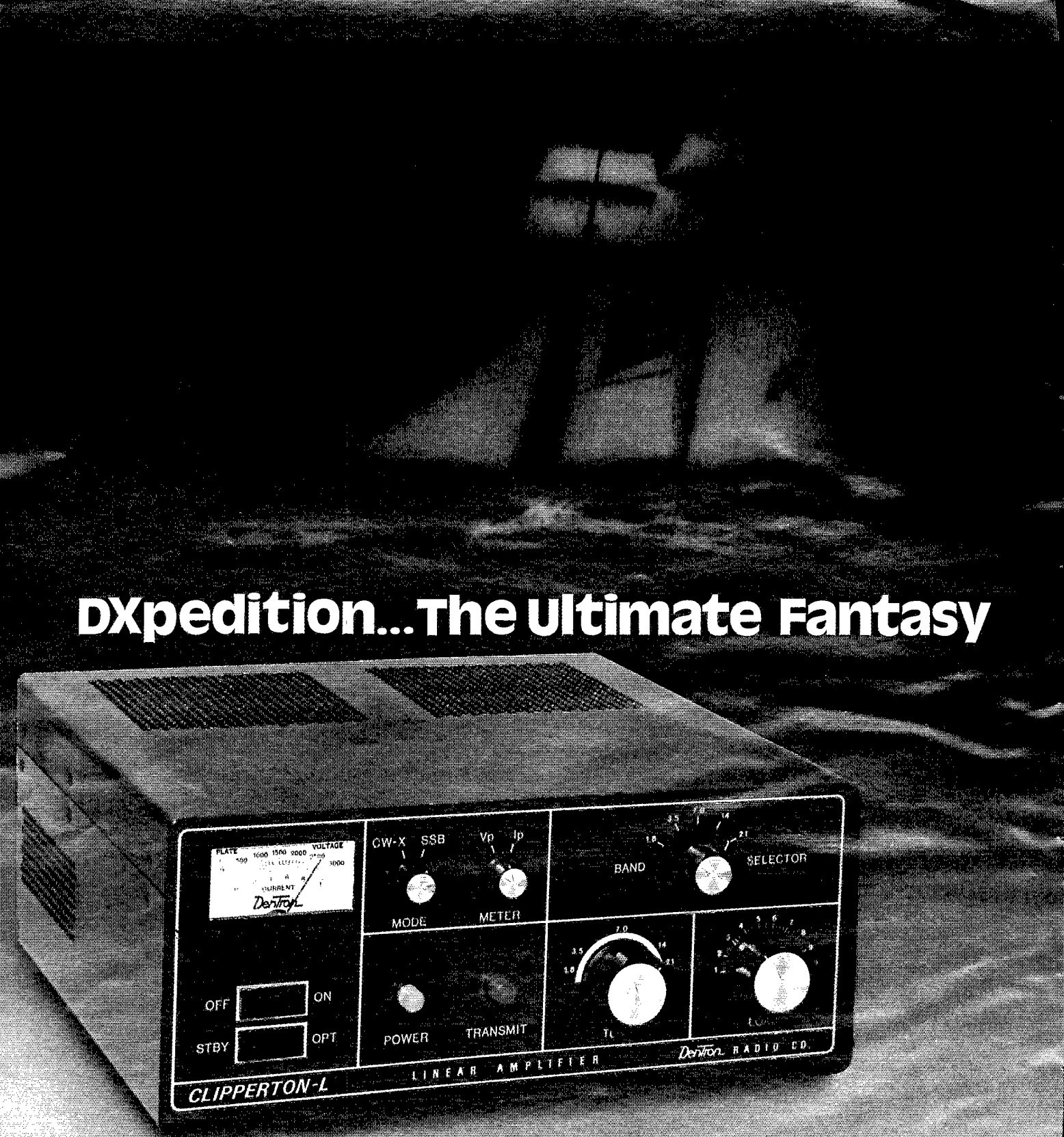
**THE COVER**

Ah summer! Dave Howerton, WA7ABI, was none the worse for wear after crossing the continent on two wheels, with 2 meters his only companion. See page 32. (W1YL photo.)

# Contents

# DXpedition...The Ultimate Fantasy




Clipper ships sailing to foreign shores. Sixteen amateurs primed for adventure, coming together as the first group in 20 years to set foot on the remote French island, Clipperton. Their goal: 30,000 QSO's in just 7 days.

If you're like most of us, a rare DXpedition is more a dream than a reality, but the Clipperton Linear Amplifier from DenTron brings the thrill of a DXpedition to you.

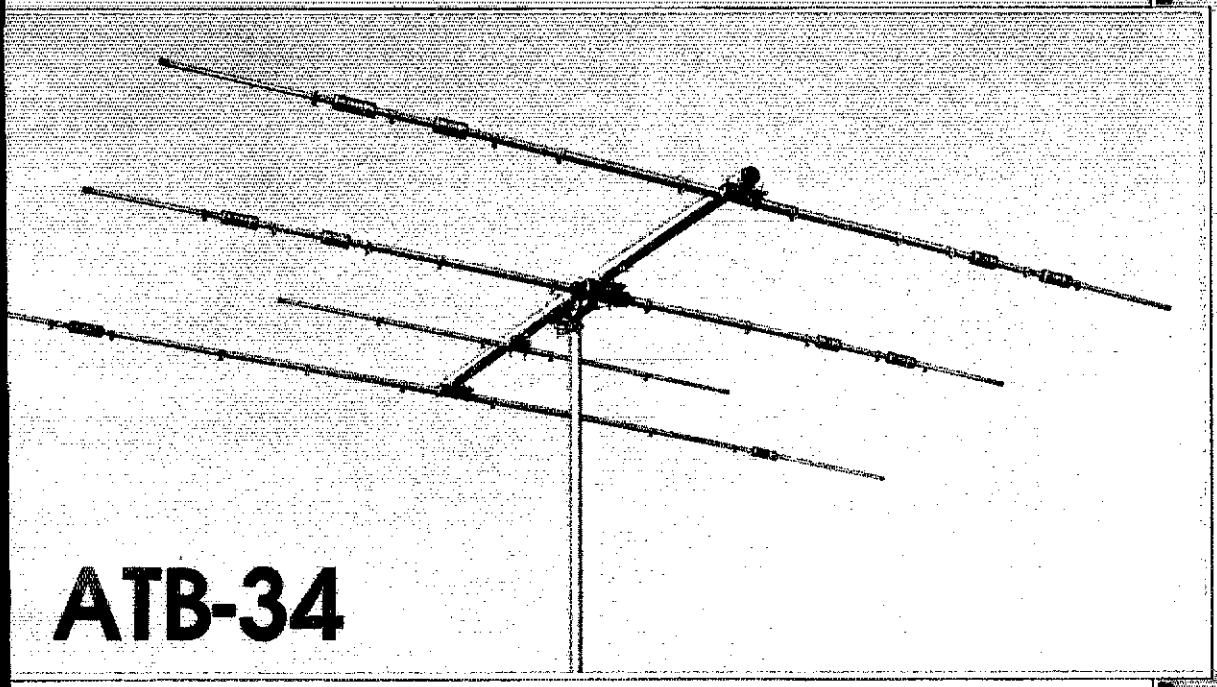
The Clipperton-L™ was inspired by the famous DXpedition on which 3 MLA-2500's were used. We built the Clipperton with 4 rugged, economical, 572 B's in the final to provide a full 2KW PEP on SSB and 1KW CW on 15 through 160 meters. With features like hi-lo power selector for equal efficiencies at 1 or 2 KW, a power transformer that is vacuum impregnated, wide spaced tuning and loading capacitors, built-in ALC and an improved whisper-quiet cooling system, the excitement of crashing a pile-up can be yours.

**Clipperton-L suggested price $699.50.**
**FCC type accepted.**

DenTron
Radio Co., Inc.
2100 Enterprise Parkway
Twinsburg, Ohio 44087
(216) 425-3173

**Dedicated to making amateur radio more fun.**

# CUSHCRAFT IS THE HF MULTI-BAND ANTENNA COMPANY.



## ATB-34

Punch through the pile-ups with an ATB-34, the only three band beam to give you real full size performance. We invite a full comparison and ask you to check ATB-34 element lengths, check the trap design and construction. Check the spacing and the specially developed balun. All of these features add up to the no compromise performance that you expect from Cushcraft.

SPECIFICATIONS

| | |
|---|---|
| Gain | • |
| F/B Ratio Avg. | • |
| 3dB Beam Width | 62° |
| Nominal Impedance | 50 ohms |
| Power Handling | 2000 Watts PEP |
| Boom Length | 18' |
| Longest Element | 32'8" |
| Turning Radius | 18'9" |
| Wind Area | 5.4 Ft.$^2$ |
| Weight | 42 lbs. |
| Maximum Mast O.D. | 2.25" |

*Antenna gain specifications cannot be published in QST. For complete information on all Cushcraft antennas, see your dealer or write for a free A-9 catalog.

## ATV-5

Cushcraft vertical antennas are designed to meet the exacting demands of your amateur radio station. They give top performance in easy to use packages. They can be installed at ground level or roof top.

Durability is guaranteed with double wall seamless aluminum base sections and fiberglass high Q traps. If you are interested in local contacts or long path DX communications, a Cushcraft vertical antenna is your best choice.

| ATV-3 | ATV-4 | ATV-5 |
|---|---|---|
| 10-15-20 Meters | 10-15-20-40 Meters | 10-15-20-40-80 Meters |
| Height 13'7" (4.2m.)* | Height 19'2" (5.9m.)* | Height 24'9" (7.4m.)* |

ALL MODELS

Power Handling 2000 Watts, Nominal Impedance 50 ohms, Maximum Mast Size 1¾" O.D. Termination: accepts PL-259

*Nominal height when set for phone operation.

**IN STOCK WITH DEALERS WORLDWIDE** **UPS SHIPPABLE**

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THE ANTENNA COMPANY

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# TS-520SE

# "Cents-ability" in a quality HF Rig!

**The TS-520SE is an economical new version of the TS-520S...the world's most popular 160-10 meter Amateur transceiver. Now anyone can easily afford a high quality HF transceiver, providing 200 watts PEP input on SSB and 160 watts DC on CW!**

**The TS-520SE is a high-quality 160-10 meter SSB/CW transceiver intended for ham-shack use. The following changes were made to produce the new "SE" model:**

- Replaced the heater switch with a CW WIDE/NARROW bandwidth switch, for use with the optional CW-520 500-Hz CW filter. A big improvement for the CW operator!
- Removed DC converter terminals. Now it operates strictly on 120 VAC and is not intended for mobile use.
- Removed transverter terminals. Now it is strictly a 160-10 meter SSB/CW transceiver.

**All other proven features and high quality of the TS-520S have been retained in the TS-520SE, including:**

- Effective noise blanker.
- Three-position (OFF, FAST, SLOW) amplified-type AGC circuit.
- RIT control.
- Eight-pole crystal filter.
- Built-in 25 kHz calibrator.
- Front-panel carrier level control.
- Semi-break-in CW with sidetone.
- VOX/PTT/MANUAL operation.
- TUNE position for low-power tune up.
- Built-in speaker.
- Built-in cooling fan.
- 20-dB RF attenuator.
- Provisions for four fixed channels.
- Speech processor consisting of a very effective audio compression amplifier.

**The TS-520SE functions with many popular accessories, including:**

- DG-5 digital frequency display/counter.
- VFO-520S remote VFO.
- SP-520 external speaker.
- CW-520 500-Hz CW filter.
- AT-200 antenna tuner/SWR and RF power meter/antenna switch.
- TL-922A linear amplifier.
- MC-50 dynamic microphone.
- SM-220 Station Monitor with BS-5 pan display module.

## SPECIFICATIONS FOR THE TS-520SE

| | |
|---|---|
| **GENERAL:** | |
| Frequency Range: | 1.8- 2.0 MHz (160 m)<br>3.5- 4.0 MHz (80/75 m)<br>7.0- 7.3 MHz (40 m)<br>14.0-14.35 MHz (20 m)<br>21.0-21.45 MHz (15 m)<br>28.0-28.5 MHz )<br>28.5-29.1 MHz (10 m)<br>29.1-29.7 MHz )<br>15.0 MHz, receive only (WWV) |
| Modes: | SSB (USB, LSB), CW |
| Antenna Impedance: | 50-75 ohms |
| Frequency Stability: | Within ±1 kHz during one hour after one minute of warm-up, and within 100 Hz during any 30-minute period thereafter |
| Power Requirements: | 120 VAC, 50/60 Hz: 200 W (transmit) |
| Dimensions: | 13-1/8 inches wide, 5 inches high, 13-3/16 inches deep |
| Weight: | 35.2 pounds |
| **TRANSMITTER:** | |
| Input Power: | 200 W PEP (SSB), 160 W DC (CW) |
| Carrier Suppression: | Better than 40 dB |
| Unwanted Sideband Suppression: | Better than 50 dB |
| Spurious Radiation: | Better than -40 dB |
| Microphone Impedance: | 50 k ohms |
| AF Response: | 400-2,600 Hz |
| **RECEIVER:** | |
| Sensitivity: | 0.25 µV for 10 dB (S + N)/N |
| Selectivity: | SSB: 2.4 kHz/-6 dB, 4.4 kHz/-60 dB<br>CW: 0.5 kHz/-6 dB, 1.5 kHz/-60 dB<br>(with optional CW filter) |
| Image Ratio: | Better than 50 dB |
| IF Rejection: | Better than 50 dB |
| Audio Output: | 1.5 W (8-ohm load with less than 10% distortion) |
| AF Output Impedance: | 4-16 ohms |

*Ask your Authorized Kenwood Dealer about the amazing TS-520SE and its surprisingly affordable price!*

KENWOOD

*pacesetter in amateur radio*

**TRIO-KENWOOD COMMUNICATIONS INC.**
1111 WEST WALNUT/COMPTON, CA 90220

# WHERE RELIABILITY AND ACCURACY COUNT

## INTERNATIONAL CRYSTALS 70 KHz to 160 MHz

### CRYSTAL TYPES

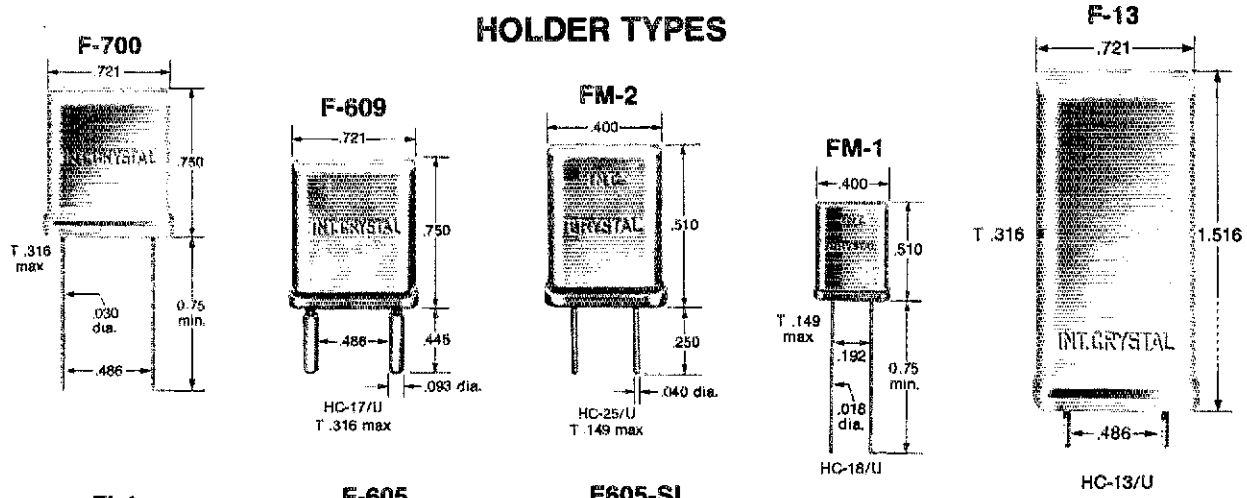
(GP) for "General Purpose" applications
(CS) for "Commercial" equipment
(HA) for "High Accuracy" close temperature tolerance requirements

International Crystals are available from 70 KHz to 160 MHz in a wide variety of holders.

WRITE FOR INFORMATION

**International Crystal Manufacturing Co., Inc. guarantees every crystal against defective materials and workmanship for an unlimited time, when used in equipment for which they were specifically made.**

### HOLDER TYPES

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THE AMERICAN RADIO RELAY LEAGUE, INC.

# "It Seems to Us..."

The American Radio Relay League, Inc., is a noncommercial association of radio amateurs, bonded for the promotion of interest in Amateur Radio communication and experimentation, for the relaying of messages by radio, 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.

It is an incorporated association without capital stock, chartered under the laws of Connecticut, its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worthwhile amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in Amateur Radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut 06111.



## Too Much of a Good Thing?

The bond of fraternalism in Amateur Radio is strong, and nowhere is this more evident than in the increasing number of hamfests and conventions that are being sponsored each year. Throughout the year, but especially during the traditional vacation months, each weekend sees a multitude of Amateur Radio gatherings throughout Canada and the United States. Generally, sufficient coordination takes place so that there is no direct conflict with two hamfests or conventions being held in the same area on the same weekend. However, some other problems have begun to make themselves evident.

A year ago, troubled by the proliferation of hamfests and conventions, the League's Board recommended that clubs and other groups considering sponsorship of such events make an effort to hold joint affairs with other groups in the general area. Although not articulated in the motion (no. 71 of the July 1978 meeting), the Board was concerned that the ever-increasing number of hamfests and conventions might dilute the attendance at and effectiveness of such meetings.

But the trend continues and, during informal discussion at the Board meeting this past July, a number of directors again expressed concern over the number of hamfests and conventions that are being sponsored these days.

There are several reasons for this concern. As the number of hamfests and conventions grows, it becomes more difficult to arrange for attendance by representatives of the League, either directors or staff. Obviously, such ARRL participation is not always critical, but League representatives *can* make a contribution in terms of presenting informative talks on either amateur regulatory matters or on technical topics, because amateur meetings are educational as well as fraternal.

For another thing, and this is especially true with the larger meetings, as the number of them increases it becomes ever more difficult for representatives of the Amateur Radio industry to attend with their displays of the latest in amateur equipment. Industry budgets have their limits, too, and when there are too many hamfests/conventions in a given area, or in a given month, one or more of those meetings may have to be slighted. When that happens, we amateurs are the losers. There was a considerable amount of comment at the recent National Convention in Baton Rouge on the part of the exhibitors that there are simply too many Amateur Radio hamfests/conventions taking place, which puts a strain on the personnel and budget of the industry people. Some of the industry people in fact place the blame on the League for having okayed too many hamfests/conventions.

Finally, we have the energy problem, the shortage of gasoline. True, the shortages of petroleum products may come and go, but the prices of those products go steadily upward. Furthermore, the effects of the shortages and the price increases have already been felt in the recreation and resort industry. As an example, it was reported at a recent ARRL Executive Committee meeting that a convention, scheduled for 1981 and previously ARRL-approved, has canceled its plans, citing energy problems and the drop-off in tourists and those others who are willing to drive long and expensive miles to attend such affairs.

Thus, we in Amateur Radio have got to decide whether we might not be doing ourselves and our country a favor by cutting down on the numbers of hamfests and conventions that are scheduled, in order to solve some of the problems that have been briefly outlined above.

The League's Board has taken no formal action to limit the number of conventions and hamfests that it will approve, but it has expressed the hope that you, the membership, will understand its concern and back off a bit on the number of hamfests/conventions which are being sponsored. — *Richard L. Baldwin, W1RU*

# League Lines...

WARC opens this month in Geneva! Meet your IARU WARC team on page 66.

The ARRL Long-Range Planning Committee, created by the League's Board of Directors, has been instructed to assess the future of the Amateur Radio Service . . . to identify if possible the opportunities and the obstacles that lie ahead and what we should be doing to prepare for them. It is a new undertaking and a large order. Many of you already have written to LRPC, but the members of the committee will need all of the assistance a concerned and thoughtful membership can provide. Please read again the editorial on page 9 of April QST, and address a letter with your views to Vic Clark, W4KFC, Chairman, LRPC, 12927 Popes Head Rd., Clifton, VA 22024.

The first 70-cm Worked All States has been accomplished by Mike Vestal, WØYZS, with a contact with WA7DKZ, in Wyoming, on July 16. Vhfers worldwide congratulate WØYZS on the competence, skill and perseverance which culminated in this historic feat.

"League Lines" boo-boo. Last month we gave the wrong dates that W1AW and Hq. will be closed. All facilities at League hq. will be closed on August 30 (employees' outing), September 3 (Labor Day), November 22 (Thanksgiving), and December 24 and 25 (Christmas). (These are the correct dates! --Ed.)

The ARRL Technical Department has openings for experienced, capable and inspired technical editors and lab technicians. Career-minded persons may contact W1FB or K1TD at Hq. for details.

Announcing a new column in QST! Starting this month, there will be a column devoted entirely to Amateur Radio instruction -- "In Training." It will bring all the latest news of interest to the Amateur Radio instructor and will feature new ideas in training, passing along activities that have been successful for other instructors and, of course, new ideas from the ARRL Club and Training Department. See page 108.

This month's "How's DX?" column includes a report on DX operating procedures and guidelines. It was compiled by John Kanode, N4MM, chairman of the DX Operating and Ethics Subcommittee of the ARRL DX Advisory Committee. Following these procedures will make DX operating more pleasurable for all of us.

"Canadian NewsFronts" does not appear in this issue. It will resume its monthly schedule in October QST.

Has the local Kiwanis or Scout group asked you to talk on Amateur Radio? How did you respond? Please don't neglect our award-winning film, "Moving up to Amateur Radio." An outline of remarks accompanies the film. If you can show the film once a month, you can keep it several months. Write Club and Training Department, ARRL hq.

The new edition of the ARRL Net Directory is now available. Listing over 800 public service nets by location and frequency, this newly revised booklet is also packed with information on all the in's and out's of traffic handling and net operation. You may obtain a copy by sending a self-addressed 9 X 12-inch envelope with 41 cents U.S. postage to ARRL Net Directory, 225 Main St., Newington, CT 06111.

Attention SCMs! Will you help Hq. in revising its call letter license plate file? Please send info. from your state about the availability of plates, initial fees and the yearly fees thereafter to K1CE, Membership Services Dept. Thanks.

Last call for nominations in ARRL elections, and for voting rights in the balloting to begin October 1. Both matters must be taken care of by September 10 (arrival at Hq., not postmark!) See "Happenings" July or August QST for details.

# Printed Line Techniques Applied to VHF Amplifier Design

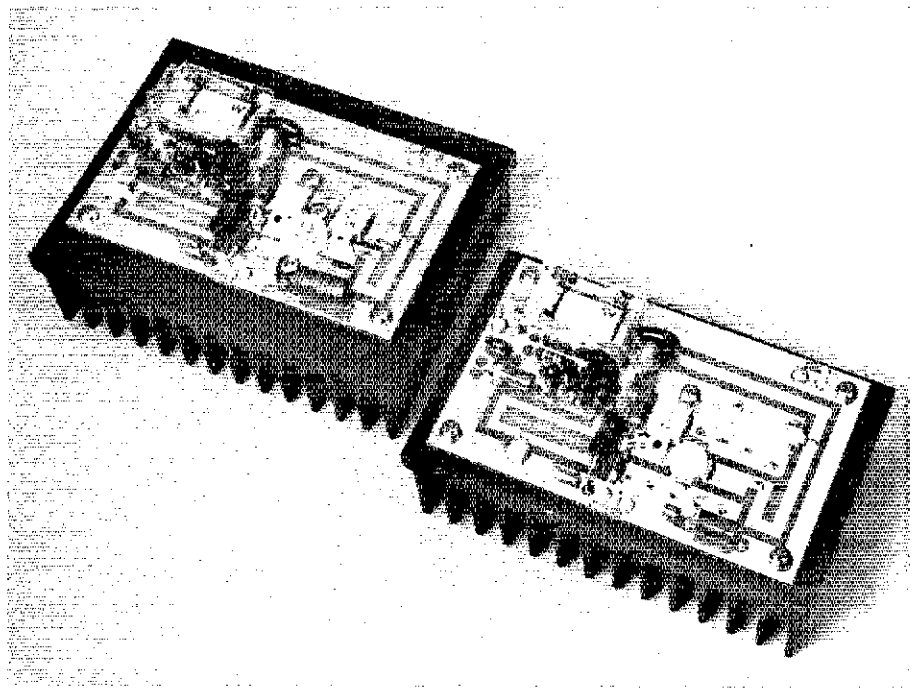
Here is a simple design technique for impedance matching in a solid-state vhf amplifier. The 144-MHz amplifiers use etched lines for impedance matching.

By Helge Granberg,* K7ES/OH2ZE

Modern vhf solid-state amplifiers are designed almost exclusively with lumped-constant LC matching networks. Broadband transformer matching is feasible when extremely wide bandwidth is required. Transmission lines for impedance transformation usually require 1/4-wave electrical lengths, making designs bulky at vhf unless materials with high dielectric constants are used. Transmission lines can be in the form of coaxial cable or printed lines (striplines) on a circuit board with a continuous ground plane separated by suitable dielectric material.

This article describes a simplified technique using printed or etched lines for impedance matching in solid-state vhf amplifiers. The lines are, in fact, high-impedance transmission lines that are treated as inductors for the purpose of design calculation. They have the advantage of repeatability and easy access for designing multielement networks. Network calculations can be done in the same manner as if lumped-constant, wire-wound inductors were used.

A design example shows an optimized 35-watt amplifier that yields over 10 dB of power gain across the 2-meter amateur band.[1] A new, inexpensive, noninternally matched transistor, the MRF240, is employed. It has good linear characteristics for ssb operation. A higher power version, with the same board layout, is designed around the MRF247, with some compromise in the impedance matching.[2]



The completed 144-MHz amplifiers — on the left the 75-watt version, and on the right the 35-watt version. Connections to the power supply are made at the bottom set of terminals. Rf-input connections to the amplifiers are made at the terminals shown at the upper left. Output connections are made at the upper right set of terminals. In the prototype of the 35-watt amplifier a ferrite inductor was used for L3; this was later changed to an air-core inductor.

An rf-sensing T-R switch is incorporated, allowing applications as a booster amplifier for hand-held transceivers and mobile radios. Both designs are biased for Class AB linear operation.

## Design Considerations

Input- and output-impedance matching in transistor amplifiers is required to transform the source impedance (usually 50 ohms resistive) to the low complex input impedance of the device. The output load impedance, which is a function of the supply voltage and power level, must also be matched to a 50-ohm load, except in multistage driver designs.

At vhf, the input and output

*Motorola Semiconductor Products, P. O. Box 2953, Phoenix, AZ 85062

[1]Notes appear on page 16.

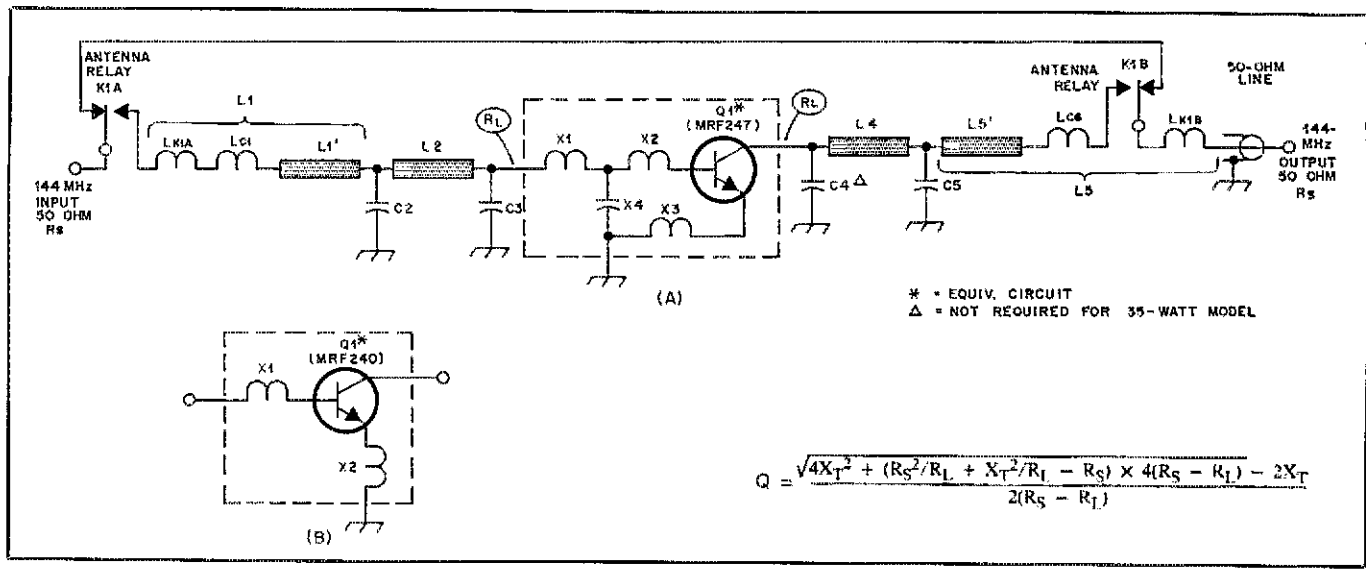



Fig. 1 — Schematic diagram of the 35-watt (and 75-watt) amplifier. The dashed line represents the enclosure of Q1; X1 and X2 are internal reactances. The various inductors and capacitors are discussed in the text.

C4 — Chip-type capacitor (see caption Fig. 5), not required for 35-watt amplifier.

L1' — Etched inductor, 24 nH for 35-watt amplifier, 22 nH for 75-watt amplifier. The exact value depends on the lead inductance of C2.

L2 — Etched inductor, 16 nH for 35-watt amplifier, 18 nH for 75-watt amplifier. The exact value depends on the lead inductance of C3.

L4 — Etched inductor, 20 nH for 35-watt amplifier, 14 nH for 75-watt amplifier. The exact value depends on the lead inductance of C4.

L5' — Etched inductor, 34 nH for 35-watt amplifier, 40 nH for 75-watt amplifier. The exact value depends on the lead inductance of C5.

$L_{C1}$ — Lead inductance of capacitor C1, 12 nH for capacitor used.

$L_{C6}$ — Lead inductance of capacitor C6, 12 nH for capacitor used.

$L_{K1A}$ — Inductance of antenna-relay contacts K1A, 37 nH for relay used.

$L_{K1B}$ — Inductance of relay contacts K1B, 37 nH for relay used.

impedances of a power transistor usually contain inductive reactance (designated as +jX in data sheets), becoming capacitive (−jX) at lower frequencies. For transistors such as MRF240, 2N6084 and 2N5591, the crossover point is around 100 MHz. This point is determined by the transistor size, geometry and package type. Smaller devices can be capacitive up to uhf.

Since the bandwidth required to cover the 2-meter band is only a fraction of an octave, impedance matching can be done adequately with two-section networks. In Fig. 1, X1 (representing the −jX input of the transistor) and C3 are not part of the input matching network. C1 and C6 are dc blocking capacitors with measured parasitic inductances of around 12 nH at the center frequency when the lead lengths are 0.1 inch.[3] This inductance, as well as the relay inductance, is added to the values of L1 and L5.

If the relay K1 is used in a 50-ohm system, it will result in a power loss of 0.3 dB because of the impedance mismatch. This can be minimized if the relay inductance is used as part of a resonant circuit, but the series inductance (37 nH per contact pair) obviously will limit the upper frequency range.

The simplest approach to matching-network design is to have a purely resistive source and load, by balancing the +jX with an equal amount of −jX. This is not always practical, however, especially when maximum bandwidth is required; in this case, only part of the +jX may be canceled, leaving the base and collector still inductively reactive. In any case, it may be considered that part of the impedance matching occurs within the device package itself. This is more obvious with internally matched devices, to be discussed later.

### A 35-Watt Linear Amplifier

The MRF240 was chosen for the 35-watt-amplifier application because of its ruggedness in withstanding load mismatches, and its inherently high power gain for a noninternally matched device. This transistor is rated for an output power of 35 watts and a power gain of 8 dB at 175 MHz. A typical power gain at 145 MHz is 10 to 11 dB. At this frequency, the input and output impedances of the MRF240 are 0.6 + j0.8 ohm and 2.0 + j0.1 ohms, respectively.

Before the matching networks are designed, the values of C3 and C4 must be established to cancel the +jX components at the base and collector. For the input, the series impedance 0.6 + j0.8 must be converted to parallel form, either by using a Smith Chart or the appropriate equations.[4,5] The corresponding numbers are $R_p$ = 1.67 ohms and $X_p$ = 1.25 ohms inductive. The effective value required for C3 is −j1.25 ohms, or 880 pF.

All capacitors have a series +jX component, normally called parasitic inductance. This may amount to only a small fraction of a microhenry, but at vhf this effect is definitely large enough to be taken into consideration. This parasitic inductance results in an increased effective value of capacitance, and is dependent on the frequency and the impedance level.

Unencapsulated mica capacitors, widely used in vhf power applications, range from 1 to 2 nH in parasitic inductance for single-plate types up to about 390 pF, depending on the mounting technique. Assuming a parasitic inductance of 1.5 nH, the equivalent low-frequency value can be calculated from Eq. 1 (see appendix) as

$$C\ (\text{nominal}) = \frac{C}{1 + [(2\pi f)^2 LC] \times 10^{-9}}$$

$$= \frac{880}{1 + (910^2 \times 1.5 \times 880) \times 10^{-9}}$$

$$= 420\ \text{pF}$$

Thus, for the required 880 pF, an unencapsulated mica capacitor with an equivalent low-frequency value of 420 pF should be used. The closest standard value is 390 pF.

Similarly, converting the output impedance numbers 2.0 + j0.1 to parallel form, $R_p$ = 2.01 ohms and $X_p$ = 40.1 ohms inductive. $X_p$ represents a capacitance of 27 pF for C4. This large reactance in parallel with the low collector impedance has no noticeable effect, and was omitted in later functional tests of the unit. It is easy to see from a Smith Chart that the resistive components of 1.67 ohms and 2.01 ohms remain unchanged,

and can be treated as a purely resistive load and source for the matching-network calculations.

At high frequencies, the base-emitter impedance of the transistor die itself is always lower than the collector output impedance. With power devices, both can be as low as a fraction of an ohm. The input impedance is increased by the base and emitter bonding wire and package-lead frame inductances, which are effectively in series with the base. (See Fig. 1, X1 and X2.) The collector normally has much less series inductance, since it is attached directly to the package bonding pad.

From the foregoing, it can be seen that part of the matching network is actually built into the transistor package, and it is obvious that the amplifier bandwidth cannot be accurately determined by calculating the Q values of the external matching networks alone.

As an approximation, the 3-dB bandwidth can be used to obtain a starting point. Assuming a 15-MHz bandwidth at ±1.5 dB is desired at a 145-MHz center frequency, a loaded Q of approximately 9 is required. For simplicity, this number is applied to both the input and output network design.

### *Component Values*

In Fig. 1, X1, X2 and X3 represent the +jX impedance component of the transistor, and are shown only to give an idea of the internal structure of the transistor. The values of L1, L2 and C2 can be obtained from Eq. 2 in the appendix, or from Terman, page 12, network D.[6] From Eq. 2, assuming Q = 9,

$$X_{L1} = R_S B = 50 \times 1.32 = 66 \text{ ohms}$$
$$X_{L2} = R_L Q = 1.67 \times 9 = 15 \text{ ohms}$$
$$X_{C2} = \frac{A}{Q + B} = \frac{137}{9 + 1.32} = 13.3 \text{ ohms}$$

where

$$A = 1.67 \times (1 + 9^2) = 137$$
$$B = \sqrt{A/50 - 1} = 1.32$$
$$R_S = 50 \text{ ohms}, R_L = 1.67 \text{ ohms}$$

Then from Eqs. 3 and 4, we obtain L1 = 73 nH, L2 = 16 nH, and C2 = 82 pF.

Subtracting the 37-nH relay inductance and the 12-nH parasitic inductance of the blocking capacitor C1 from the total value of L1, we obtain L1′ = 24 nH. This means that the total printed-line inductance must be L1′ + L2, which is 24 + 16 or 40 nH.

By calculating the values of the output network in similar fashion, the values for L4, L5 and C5 are obtained as 20 nH, 83 nH, and 70 pF respectively. (For these calculations $R_S$ = 50 and $R_L$ = 2.01. $X_{L5}$ is computed from the equation for $X_{L1}$ and $X_{L4}$ from that for $X_{L2}$.) L5′ becomes 34 nH.

C2 and C5 are unencapsulated mica capacitors, as in C3, but the former are smaller in size. Consequently their parasitic inductance is only about 1 nH. The equivalent values for C2 and C5 are thus 77 pF and 66 pF as derived using Eq. 1. These are nonstandard values, but a 68-pF marked value can be used for both.

Inductors L1′, L2, L4 and L5′ are comprised of etched lines on the circuit board. To determine their widths and lengths, the inductance of each line for a given unit length must be established. From the tables[7] it can be extrapolated that the inductance of no. 25 round wire is 24 nH per inch; no. 26 wire has nearly 26 nH per inch. When a ground plane is 0.15 inch (3.8 mm) below (which in this case is the heat sink), and the side grounds are an equal distance away, the inductance is about half these values, as verified by measurement.

If the circuit board is made of one-ounce copper-clad material (one ounce of copper per square foot), the copper thickness is 1.4 mils.[8] With a 1-mil solder plating, the total thickness is 2.4 mils, and a 100-mil-wide strip would be equivalent to a no. 26 round wire having a cross-sectional area of 240 square mils. Similarly, a 130-mil-wide strip would be equivalent to a no. 25 round wire with an area of 312 square mils. A wider line would have lower loss, but would also be physically longer for a given inductance. As a compromise, a narrow line was used for the input in this design, and a wider line for the output where the losses caused by high rf current are more evident. Bends in the line have a minimal effect on the inductance compared to the presence of the ground plane.

From the above, the resulting inductance for the 100-mil and 130-mil lines are 12 nH and 13 nH per inch, respectively. This means that for L1 + L2 a total length of 3.1 inches is required, and for L4 + L5 the total length must be 4.4 inches. Then, for L2 = 16 nH, C2 should be located 1.3 inches (33.0 mm) from the transistor base along the input line. For L4 = 20 nH, C5 should be 1.6 inches (40.6 mm) from the collector along the output line.

The completed 35-watt amplifier is shown in the accompanying photos. Fig. 2 shows the power output and the collector efficiency as a function of the power input.

### A 75-Watt Linear Amplifier

The MRF247 employed in the 75-watt amplifier is a version of the well-known MRF245, which has been reprocessed to improve the linearity. It is a much larger device than the MRF240, resulting in lower input and output impedances. However, it employs internal base matching with a built-in MOS capacitor to bring the base impedance up to a level where external low-loss matching networks can be realized.

In Fig. 1, the dashed line encircles the specially designed T matching network, including the metal-oxide capacitor X4. X1, X2 and X3 represent the bonding wires whose inductances can be varied by controlling the loop heights. This network will be part of the total matching network designed to match the transistor to function in a practical circuit.

The internal matching still leaves the input impedance inductively reactive. A complete cancellation of the inductive component would be impossible because of X1.

The MRF247 input impedance under forward-biased conditions (100 mA) is 0.45 + j0.85 ohm at 145 MHz, which translates to 2.06 and +j1.09 ohms in parallel form. A capacitive reactance of −j1.09 ohms, converting to 1018 pF, is required for C3. The nominal-value equivalent using Eq. 1 is obtained as 450 pF.

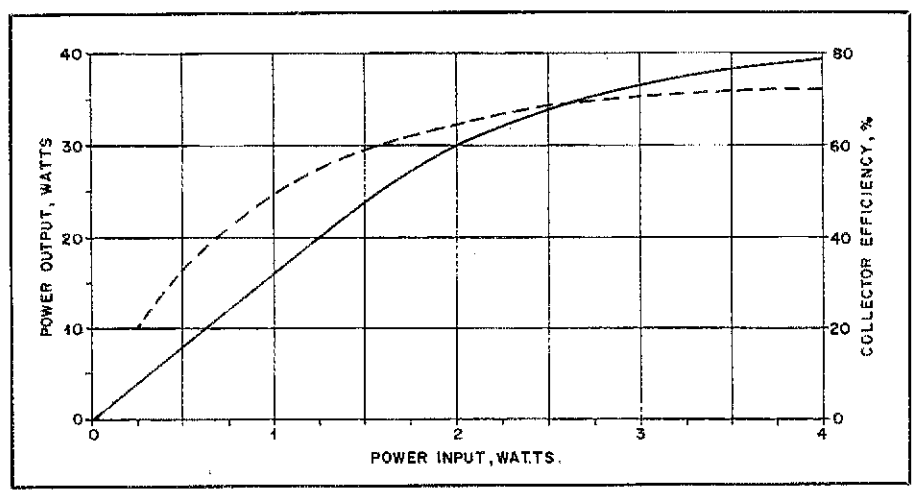
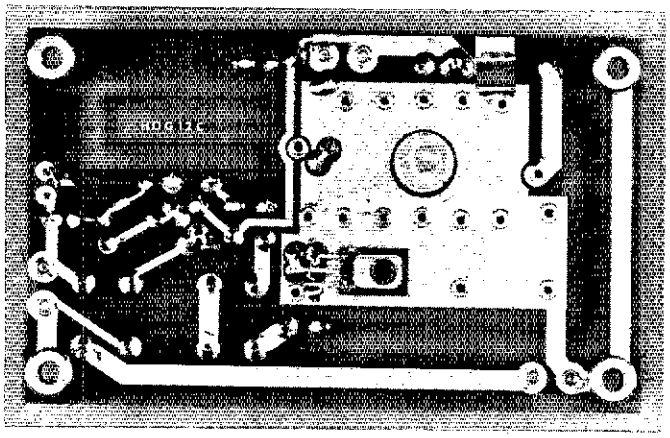
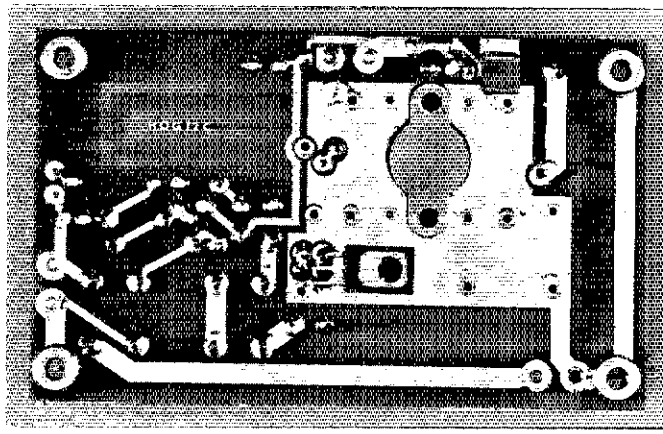



Fig. 2 — Power output as a function of power input (driving power) for the 35-watt MRF240 amplifier, represented by the solid line. The dashed line shows collector efficiency as a function of power input.



Bottom view of the 35-watt amplifier. Note the placement of Q2 and C1.



Bottom view of the 75-watt amplifier.

Since the remaining resistive component of the base impedance, 2.06 ohms, is only slightly higher than that of the MRF240, only minor changes are necessary in the input matching network. When L1 + L2 is fixed (and only their ratio can be varied), the resulting Q will be lower for the increased $R_L$. If only L1 + L2 is known, the Q can be calculated with the equation in Fig. 1 as

$$\frac{\sqrt{26244 + (1214 + 3185 - 50)(192)}}{95.88} - \frac{162}{95.88} = \frac{928 - 162}{95.88} = 7.99$$

with $X_T = X_{L1} + X_{L2} = 81$ ohms, $R_S = 50$ ohms and $R_L = 2.06$ ohms.

Then, with Eqs. 1 through 4, the values for L1, L2 and C2 can be calculated as L1 = 71 nH, L2 = 18 nH and C2 = 63 pF (the nearest standard is 56 pF). The position of C2 will be approximately 1.6 inches (40.6 mm) from the transistor base. (See the line-inductance calculations for the 35-watt amplifier.)

The measured output impedance of the MRF247 is 0.65 + j0.45 ohm, which is much lower and more reactive than the values shown for the MRF240. The output matching must also be done with the existing total line inductance, L4 + L5. It can be expected that a greater compromise will be necessary in the output matching, regarding the network bandwidth.

The above impedance numbers convert to 0.96 and −j1.39 in parallel form. Since −j1.39 ohms is equivalent to 790 pF, a nominal value of 400 pF (C4) is required at the collector. To find the Q, $X_T = X_{L4} + X_{L5} = 94$ ohms, $R_S = 0.96$ ohm and $R_L = 50$ ohms. From Eq. 5, we find that the Q is 13.7; the component values are L4 = 13 ohms = 14 nH, L5 = 81 ohms = 89 nH and C5 = 11.8 ohms = 93 pF. A practical value of 82-91 pF can be used for C5, and it should be located 1.1 inches (27.9 mm) along the output line from the collector, in order to give the above inductances for L4 and L5.

Although the output Q is higher than the value calculated earlier for the 35-watt unit, the total bandwidth of this version is greater, as shown in Fig. 3. The input matching network is usually dominant in determining the total bandwidth, since the required impedance transformation ratio is greater than that at the output. (The output circuit has a secondary effect.) The internal matching elements of the device make the total effective Q lower than the calculated value. A higher output Q usually results in higher collector efficiency and better harmonic suppression, but at the same time the circulating rf current will increase, increasing the overall circuit loss. (This is especially noticeable at higher power levels.) Without knowing all the internal parameters of the transistor,

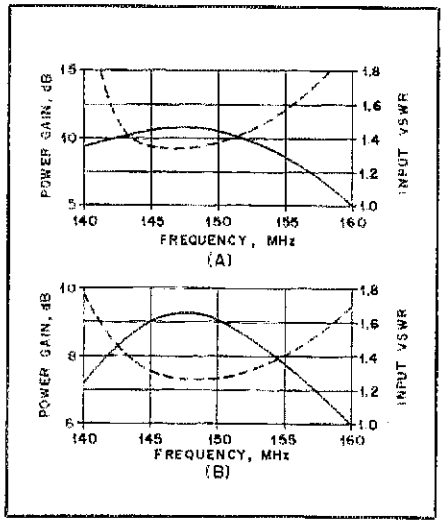



Fig. 3 — At A, the input VSWR (broken line) and power gain (solid line) are shown as a function of frequency for the 35-watt amplifier. At B, the same data are illustrated for the 75-watt amplifier.

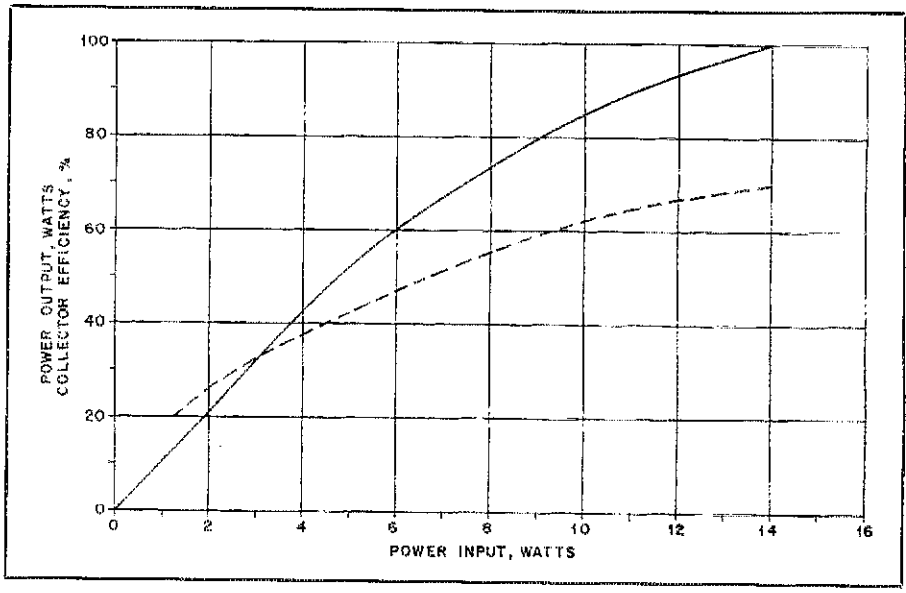



Fig. 4 — The solid line shows the power output as a function of the input (driving) power for the 75-watt amplifier. The dashed line represents the collector efficiency as a function of power input.

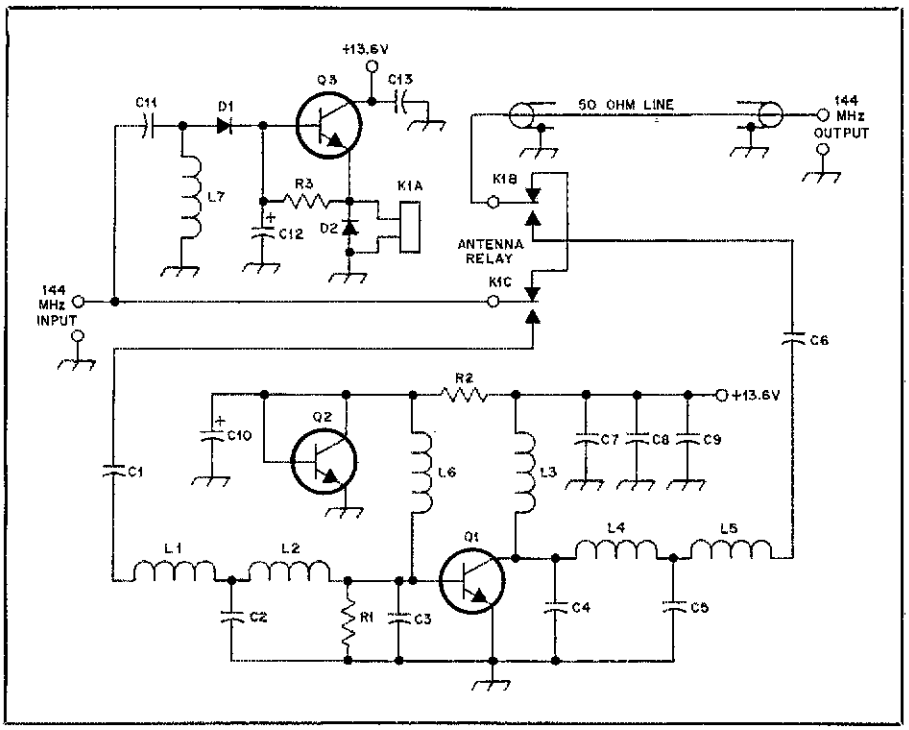



Fig. 5 — Schematic diagram of rf-sensing T-R switch and rf power amplifier.

C1, C6, C13 — 1000-pF dipped mica capacitor.
C2 — 56-pF or 68-pF chip-type capacitor Electro Motive Corp. type MCM01/010, see text.
C3, C4 — 390-pF chip-type capacitor, Electro Motive Corp. type EMJ 101, see text.
C5 — 68-pF chip-type capacitor, Electro Motive Corp. type MCM01/010, see text.
C7 — 1000-pF ceramic chip capacitor.
C8 — 0.01-μF ceramic disc capacitor.
C9 — 0.1-μF ceramic disc capacitor.
C10 — 220-μF, 6-volt tantalum capacitor.
C11 — 3-pF dipped mica capacitor.
C12 — 10-μF, 25-volt tantalum capacitor.
D1 — 1N914 or 1N4148, silicon switching diode.
D2 — 1N4001, silicon rectifier, 50 PRV, 1 A.
K1 — 12-volt relay, Arrow NF2-12, Omron LZN2-UA-DC12, or equiv.
L1, L2, L4, L5 — See text.
L3 — 12 turns of no. 16 enameled wire on 1/4-inch (ID) (6.35 mm) form.
L6 — 10 μH, molded choke.
L7 — 0.33 μH, molded choke..
Q1 — See text.
Q2 — 2N5590, npn silicon rf power transistor.
Q3 — 2N4401, npn silicon switching transistor.
R1 — 10 ohms, 1/4-watt carbon.
R2 — 120 to 200 ohms, 3 watt.
R3 — 3.3 kΩ, 1/2 watt.

the extent of this effect is difficult to determine. See Fig. 4.

### Class-AB Biasing and Miscellaneous

The biasing system, as shown in Fig. 5, uses Q2 as a forward-biased transistor to provide a voltage source of 0.6 to 0.7 volt. The voltage drop can be adjusted by selecting a proper $h_{FE}$ for Q2. For the 2N5190 series, $h_{FE}$ is typically 80-100, although the minimum specification is 20-25.

Typical $h_{FE}$ values for the MRF240 and MRF247 are 50-60, and the worst-case collector currents are around 4 A and 9 A respectively. The minimum base currents are 80 mA and 180 mA ($I_C/h_{FE}$). The value for R2 is found from the following equation

$$R2 = \frac{V_{CC} - V_{BE}\,(Q2)}{I_E\,(Q2)}$$

and is found to be 160 ohms for the MRF240 and 75 ohms for the MRF247. The bias current, which should not exceed 50 mA for the MRF240 and 150 mA for the MRF247, can be further adjusted by varying the value of R2. However, the minimum $I_E$ should be maintained at Q2.

It should be noted that since Q2 is attached to the heat sink for temperature-tracking purposes, its collector must be electrically isolated from ground. The anodized surface of the heat sink is usually sufficient for this; if desired, a separate insulating washer can be employed.

Regarding the 0.3-dB relay-insertion loss mentioned earlier, this will amount to a VSWR of 1.7. However, the reflected power is only 0.2 percent (VSWR = 1.1) in the straight-through mode, as when receiving. Thus most of the relay losses are caused by contact resistance and the dielectric characteristics of the insulation, and not by impedance mismatches.

Both amplifier designs can be used for fm transmission without modifications. The bias networks can be omitted and L6 connected to ground, changing the operation to Class C. This will result in an increase in the input VSWR because it will increase the input impedance of the device. For 145-150 MHz coverage, however, the VSWR will remain less than 1.5.

The two amplifiers may be cascaded with a 4- to 6-dB attenuator between units. This provides a power gain of around 20 dB. The most convenient components for the attenuator are thin-film devices, such as the Motorola MAR-100 series (the MAR-106 gives 6-dB attenuation). These are made for heat-sink mounting and can dissipate up to 50 watts.

The rf-sensitive T-R relay unit requires 400 to 500 mW for the relay to switch. At this drive level, without the attenuator, the second amplifier will produce full power output.

The T-R diagram (Fig. 5) incorporates one of the standard circuits popular with mobile add-on amplifiers. Part of the rf input signal is rectified by D1. The resulting dc turns on Q3, activating the relay. L7 and R3 provide the bias for D1 and Q3, and D2 suppresses inductive transients produced by the relay coil. A time constant for ssb operation is provided by C12; the value can be changed according to individual requirements. For fm, this capacitor can be omitted, along with the bias network.

The repeatability of these amplifiers has been demonstrated by constructing more than half a dozen units. A two-tone IMD test done on both amplifiers showed third-order distortion products to be down approximately 33 dB from PEP output. Capacitors C2 and C5 were simply located within the marked areas on the circuit board (see the parts layout, Fig. 6, and the photograph). On these capacitors, 20-percent tolerance can be allowed; this may necessitate minor adjustment of each individual unit for optimum performance.

### Appendix

$$C_{equiv} = \frac{C \times 10^9}{1 + [(2\pi f)^2 LC]} \qquad \text{(Eq. 1)}$$

where
C = required capacitance in pF
L = parasitic inductance in nH
f = frequency in MHz

$$X_{L1} = R_S B \qquad \text{(Eq.2)}$$
$$X_{L2} = R_L Q$$
$$X_{C2} = A/(Q + B)$$

where
$A = R_L(1 + Q^2)$
$B = \sqrt{A/R_S - 1}$
$R_S$ = source impedance in ohms
$R_L$ = load impedance in ohms
$X_{L1}$ = reactance of L1 in ohms
$X_{L2}$ = reactance of L2 in ohms
$X_{C2}$ = reactance of C2 in ohms

$$L = (X_L/2\pi f) \times 10^3 \qquad \text{(Eq.3)}$$

where

$X_L$ = inductive reactance in ohms
L = inductance in nH
f = frequency in MHz

$$C = \frac{1}{2\pi f X_c} \times 10^6 \qquad \text{(Eq. 4)}$$

where

$X_c$ = capacitive reactance in ohms
C = capacitance in pF
f = frequency in MHz

**Notes**

[1]At the time of publication complete parts kits are available from Aztec Electronics, 8225 E. Meadowbrook, Scottsdale, AZ 85251. These kits include heat sink, case and semiconductors.
[2]See note 1.
[3]mm = inches × 25.4.
[4]Davis, "Matching Network Design with Computer Solutions," AN-267, Motorola Semiconductor Products, Inc.
[5]Beccioline, "Impedance Matching Networks Applied to RF Power Transistors," AN-721, Motorola Semiconductor Products, Inc.
[6]Terman, *Sc. D. Radio Engineers Handbook*, McGraw-Hill Co., Inc.
[7]Kochen, "Practical VHF and UHF Coil Winding Data," *Ham Radio*, April 1971.
[8]mm = mils × 0.0254; grams = ounces × 28.349; one foot = 12 inches — see note 3.

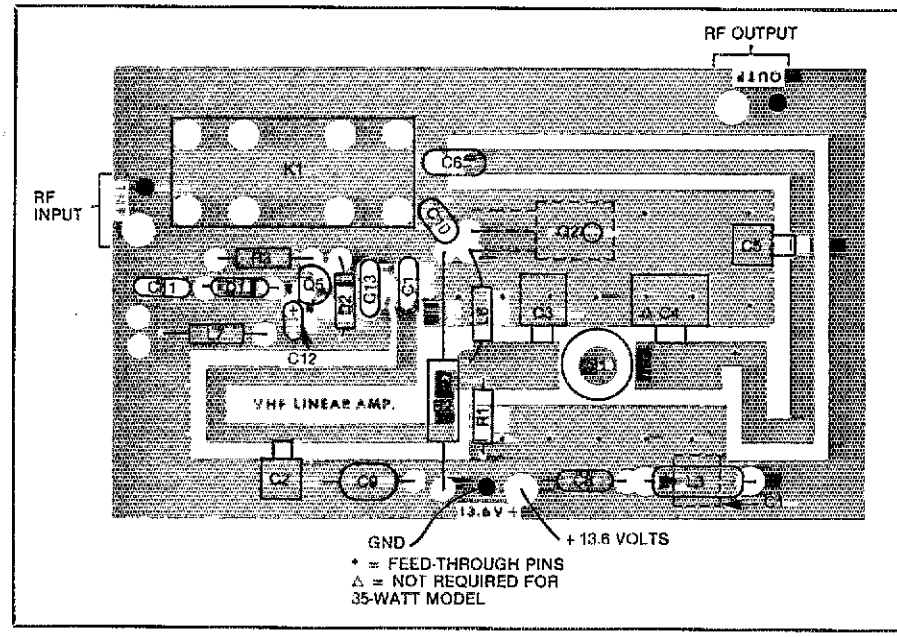



Fig. 6 — Parts-placement guide for the 144-MHz amplifier and rf-sensing circuit as viewed from the top side of the board. The board is double sided (patterns on both sides). Shaded areas represent copper foil on the top side. The etching patterns appear in the "Hints and Kinks" section of this issue. Parts represented by a broken outline are mounted under the board. * = feed-through pins (through-board connections). Δ = parts not required for 35-watt version of the amplifier.

# Strays

## HALL OF FAME NOMINATIONS SOLICITED

☐ At its July meeting, the ARRL Board of Directors elected Hiram Percy Maxim, W1AW, first president of the League, as the Charter Member of the ARRL Hall of Fame. Several other valid nominations have been made, and will be carried over to next year. Further nominations are solicited in accordance with the guidelines listed below. Nominations must be received by December 31, 1979, to be considered by the Board in 1980.

Pay close attention to the eligibility requirements and the nominating procedure described below. The Board has asked that the Headquarters staff be as responsive as possible to requests from members for background information on possible nominees. If you know someone whose contributions to Amateur Radio have been truly outstanding, but you do not know enough of the details to document his or her qualifications, perhaps Headquarters can help.

### Hall of Fame Guidelines

1) Purpose: The American Radio Relay League has established its hall of fame to honor those members and others who have made important, substantial, or outstanding contributions in the field of amateur radio; to ensure that these contributions will not be forgotten by future generations of amateurs; and to motivate today's amateurs to establish high levels of achievement and dedication as their personal goals.

2) Eligibility: Nominees for the ARRL Hall of Fame should be those radio amateurs and others whose achievements or personal dedication have earned for them the lasting respect and admiration of the amateur community. Nominations should be based upon achievements or activities which occurred at least six years prior to submission of the nomination. Nominations may be based upon outstanding technical or operating achievements, important personal contributions to the League or to amateur radio, or substantial contributions over an extended period of time.

3) Nominating procedure: (a) Nominations may be submitted at any time to the Secretary, ARRL. Nominations received in any calendar year will be considered at the Second Meeting of the Board of Directors in the following year. (b) Election to the ARRL Hall of Fame is a high honor which is not bestowed lightly; therefore, nominations should fully and clearly document the qualifications of the nominee. The nomination must be signed by at least five Full Members of the League. (c) The nominations received during a calendar year will be reported to the membership via the League's journal, *QST*, no later than April of the following year. The membership will be asked to submit comments or additional information on the nominations. All relevant information on nominations will be made available to each director no later than 30 days prior to the Second Meeting of the Board.

4) Elections: Each director shall cast a single, secret ballot for not more than three nominees. A nominee shall be declared elected to the hall of fame upon receiving the votes of not less than 12 directors during a single balloting.

5) Award: A suitable award shall be devised and presented at an appropriate time and place, and with all due ceremony. A list of members of the ARRL Hall of Fame shall be displayed in the lobby or museum at ARRL headquarters.

# The Low-Bander's Special

## Some simple "mods" to an SB-200 amplifier and you're ready to roll on 40, 80 and 160 meters. No need to buy a high-priced linear amplifier just to work "top band"!

By Doug DeMaw,* W1FB

If you're one of those amateurs who wrote to the ARRL Technical Information Service for circuit information on 160-meter amplifiers, this article is for you! To participate in this project it will be necessary to acquire, by whatever upright means possible, a Heath SB-200 or SB-201 amplifier. This can mean a search of *QST* Ham Ads and other such listings for a used-equipment bargain. If you're a skilled orator, some well-executed "lip service" may provide the verbal arm twistin' needed to dislodge a used SB-200 from a friend's shack at a bargain price! The same oral gymnastics can be used at flea markets if need be. The alternative is to buy a new SB-201 kit for top dollar. Even that approach makes more sense than starting an amplifier from scratch with all-new parts!

The components marked with an asterisk in Fig. 1 are needed for the changes described here. The habitual parts scrounger should be more than mildly enthusiastic about this project, as it will challenge his or her skill at the flea market bartering tables and in surplus stores.

The only trauma to be faced is the actual "disembowelment" of the rf section of the SB-200 to be modified. Heath did a superb job of compact packaging when that unit was laid out. A wistful tear or two may form as the cutters and pliers are applied, but that brief sorrow will be more than replaced by joy and pride when the amplifier is finished and ready to use. The end result is a 1200-watt PEP linear amplifier for 40, 80 and 160 meters. This writer elected to eliminate the 20-, 15- and 10-meter bands because the 150-watt exciter has proved to be ample for most operating on these bands.

There are specific FCC power limits imposed for operation on 160 meters. They vary from one U.S. area to another. *This amplifier should be used only as day and nighttime rules permit.* Chapter 1 of *The Radio Amateur's Handbook* lists the 160-meter frequency allocations and power limits for Canada and the USA.

Front view of the modified SB-200 linear amplifier. A small false panel covers the original panel holes and adds a contrasting green color to the white front panel. Green Dymo tape labels identify the control functions.

### Pertinent Thoughts

A skilled innovator could surely make the modified SB-200 work on all of the bands from 160 to 10 meters. The major requirement would be to incorporate a more complicated band-switching method. Some of the fixed-value capacitors in the pi network would have to be switched in and out for the various bands in order to provide the correct LC ratios for proper loaded Q and impedance transformation. An early effort to use the original band switch and enjoy coverage of 160 through 15 meters was short-lived. The switch became badly charred because of arcing, causing a chain reaction that burned out the plate rf choke and several fixed-value capacitors.

The changes described here are based on a loaded Q of 10 (plate tank) and a plate impedance of 2500 ohms, per the Class B amplifier equation

$$R_L = \frac{\text{Plate Voltage}}{1.57 \times \text{Plate Current}}$$

where current is in amperes, $R_L$ is in ohms, and plate voltage is in volts. Based on this data, the $X_c$ of C6 is 240 Ω, the required $X_L$ for the plate inductor is 263 Ω and the $X_c$ of the combined output capacitance of the pi network is 48 Ω. These requirements are met on 80 and 40 meters, but on 160 meters a bit of

*Senior Technical Editor, ARRL

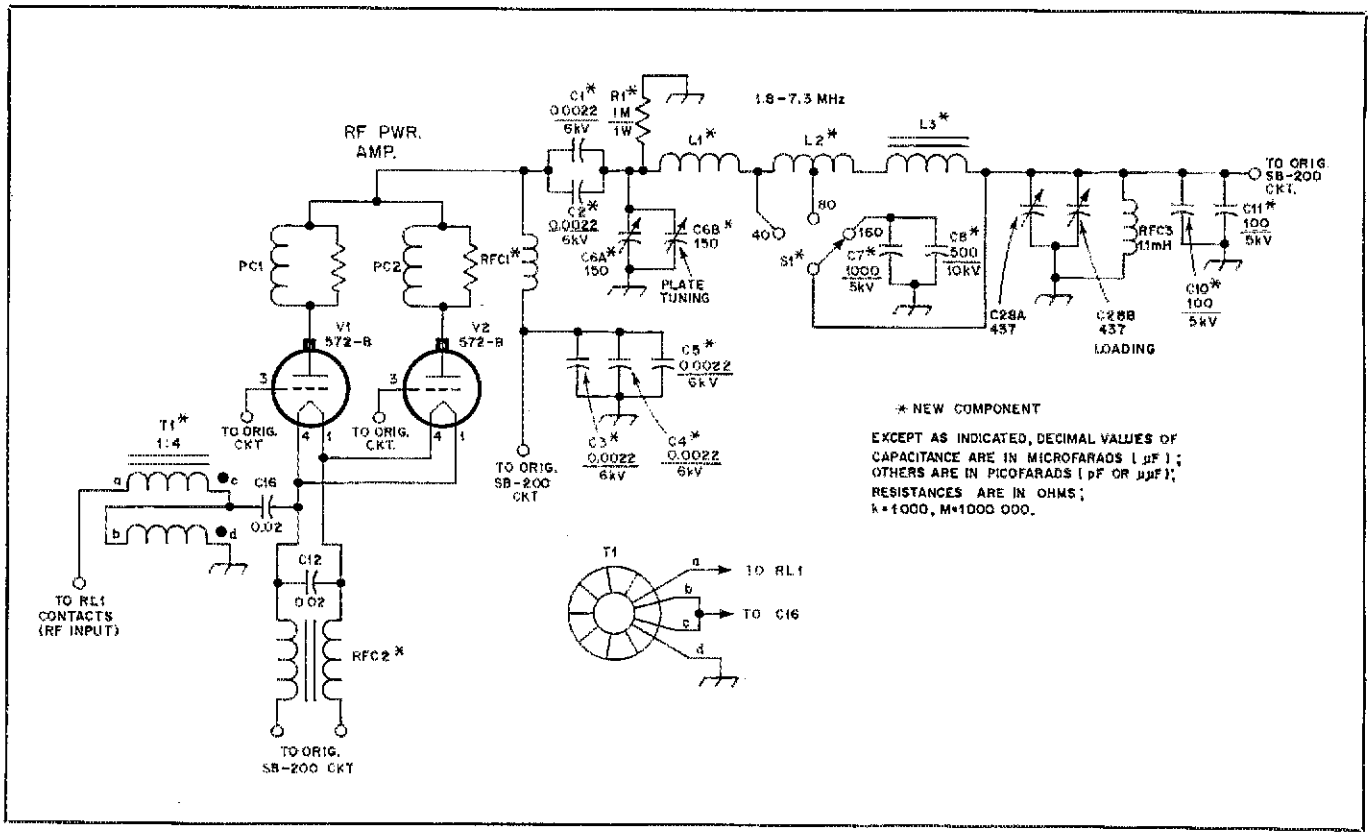



Fig. 1 — Schematic diagram of the revised SB-200 amplifier circuit. Original parts retain their Heath identification numbers. All others have ARRL-assigned numbers.

C1-C5, incl. — Disc-ceramic HV type such as Sprague 60GA-D22.

C6 — Transmitting variable, 300 pF or greater max. capacitance. Split-stator, 150 pF per section, surplus unit used (see text).

C7, C10, C11 — Ceramic transmitting capacitor, Erie type 850 or equiv. Surplus transmitting mica capacitors also suitable.

C8 — TV-type 500-pF HV doorknob capacitor or Erie type 850 unit.

L1 — 6-μH inductor. Use 12 turns of a B&W 3026 Miniductor coil, or form air-wound coil of 12 turns no. 14 wire, 2 in (51 mm) dia by 1-1/2 in (38 mm) long.

L2 — 17-μH inductor, tapped at 6 μH. Use 15 close-wound turns of no. 14 enamel wire on L3 end of coil, and 12 space-wound turns on L1 end of coil. Tap at junction of two halves of L2. Use original Heath coil form (see text).

L3 — See text; 18 turns no. 14 enam. wire on Amidon T200-2 toroid. Wrap toroid core with 3-M glass tape or equiv. before adding winding (5 μH).

RFC1 — Transmitting-type rf plate choke, solenoidal wound. Must be capable of handling 500 mA or greater. An ohmite equivalent was used in this example (part no. unknown, but rated from 160 through 10 meters at 1 A), although a B&W type 800 is suitable.

RFC2 — Bifilar-wound filament choke. Amidon filament choke kit or Amidon 30-61-4 ferrite rod ($\mu_i$ = 125), 4 inches (100 mm) long and 0.5 inch (13 mm) dia wound full of no. 12 enamel wire.

S1 — Single-pole, four-position (90° indexing) ceramic-wafer rotary switch. One position unused. (See text.)

T1 — Broadband 4:1 toroidal transformer. Use three stacked Amidon FT-82-43 (950 $\mu_i$) toroid cores. Winding consists of 15 bifilar turns of no. 22 enam. wire. A hand drill can be used to twist the wires 8 times per inch.

"fudging" was necessary in order to use the 300-pF plate-tuning capacitor (C6) specified in Fig. 1. Because of this, L3 was added to give an extra 5 μH of tank inductance beyond the computed value of 23 μH. A 400-pF variable capacitor could also be used for C6 and would provide the desired 368 pF on 160 meters, thereby eliminating the need for L3. A surplus 500-pF vacuum-variable capacitor would also be an excellent choice for C6. With the 300-pF capacitor (C6) shown in Fig. 1, it would be possible to eliminate L3 and switch in a 100-pF fixed-value transmitting-type capacitor across C6 for operation on 1.8 MHz. This would ensure the optimum LC ratio, but would complicate the band-switching format.

The proper reactance of bypass and coupling capacitors must be observed on all bands. This means that some of the original SB-200 parts just won't "cut it" on 160 meters. The same is true of the plate and filament rf chokes. This is the reason for increasing the values of RFC1 and RFC2, as well as C1 through C5.

## The New Circuit

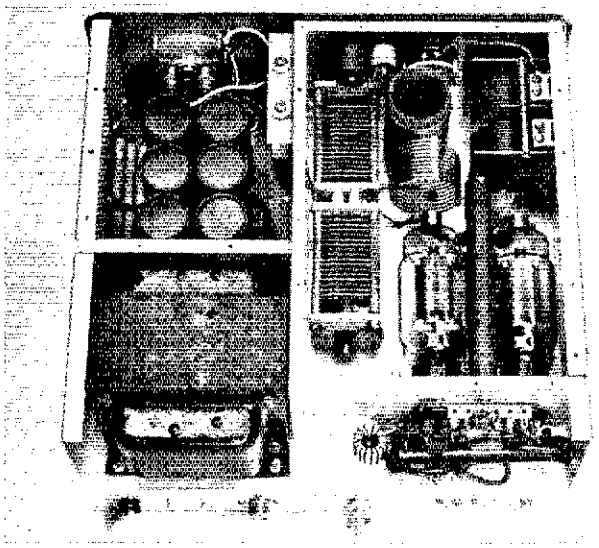
Fig. 1 shows the circuit after the changes have been made. Parts designated with an asterisk have been added; the others retain their Heath identification numbers and were not removed from the SB-200.

There are no changes in the grid circuit of the 572Bs. Similarly, no changes are made below RFC2 in the filament circuit, or below RFC1/C3, C4 and C5 in the plate circuit.

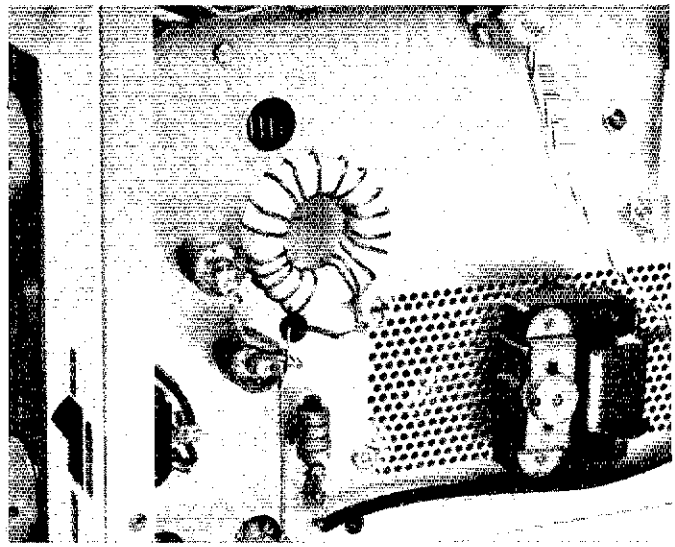
The average input impedance of the 572Bs in grounded-grid service is close to 200 Ω at peak excitation. This makes it practical to substitute T1, a broadband 4:1 transformer, for the numerous band-switched L and pi networks in the original input circuit. Final performance checks show the input SWR of the amplifier at less than 1.5:1 for the three bands, while using T1.

A 1-MΩ resistor (R1) is connected in parallel with C6 for damping high rf peaks. This addition proved beneficial in preventing flashover at the plates of C6 when the amplifier was not coupled tightly enough to the load during tune-up. Had a capacitor with wider plate spacing been available for use at C6, the resistor would not have been needed.

C10 and C11 have been added to provide ample maximum capacitance at the



This photograph shows the placement of the plate-tank inductors (top center). The new plate rf choke is mounted above and between the tubes on the rear deck of the amplifier. The compartment at the lower right houses the 4:1 broadband input transformer (left) and the new filament choke (lower center). The two-section variable capacitor at the left in the upper right-hand compartment is used with the sections in parallel.



This photograph shows the 18-turn toroidal inductor (L3) which is mounted below the chassis near the two high-voltage transmitting capacitors (see text). The T200-2 toroid core is wrapped with 3-M glass tape. This coil is used during operation on 160 meters. The striped piece of wire at the upper right is the new HV lead to the plate rf choke. It is routed through the chassis near the tube sockets.

output of the pi network on 1.8 MHz. Their combined value is low enough so that the network constants are not impaired on 80 and 40 meters. Capacitors C7 and C8 are added for operation on 160 meters. *It is stressed herewith that the modified amplifier is intended to be used only with antenna loads of between 40 and 60 ohms.* If the antenna system presents impedances outside this range, the use of a Transmatch is recommended.

### Physical Changes

All of the parts except for the tube sockets, fan and C28 are removed from the upper main rf compartment. The exact placement of C6 and S1 will depend on the size of the parts selected for the project. Try to locate a ceramic wafer switch that has large contacts and provides plenty of space between the switch contacts and the metal mounting frame. This will prevent arcing and burned contacts.

The plate spacing of C6 should be 1/8 inch (3 mm) or greater to prevent flashover. A long, narrow capacitor is preferred. Such types are found frequently in surplus stores and at flea markets. Many vacuum variable capacitors will fit into the space available for C6.

A false panel was made from aluminum and affixed to the front panel of the SB-200. It covers the holes through which the old band switch and plate-tuning capacitor were mounted. The plate measures 3-1/2 × 8 inches (89 × 203 mm), is painted Hunter Green and drilled to accommodate C6, S1 and C28. Epoxy cement was used as the bonding agent. The original front panel was painted with three coats of white spray-on enamel before the smaller panel was glued in place. These colors complement the pale gray-green cabinet of the SB-200. Labels were made of green Dymo label-maker tape.

### Other Changes

The new plate rf choke is mounted above and parallel with V1 and V2. Remember to leave ample clearance for the amplifier top cover. T1 is located on the back side of the vertical partition which supports V1 and V2. L3, C10 and C11 are under the chassis near RFC3. The plate HV lead is routed to the rear of the main rf compartment (below chassis) and brought up to the B+ end of RFC1 through a grommet inserted in a new hole on the main deck of the rf compartment.

The original fiberglass coil form (L2) is rewound with no. 14 enameled wire as indicated in Fig. 1. It is attached to the main chassis near the front panel and S1 by means of two no. 6 spade bolts. The lower end of L2 is connected to L3 by passing a lead through a grommet which is installed near the base of L2. *Note*: If L2 is wound full of turns, it may be possible to eliminate L3 from the circuit. C7 and C8 are attached to the inner front panel just above C6. A ceramic standoff post is placed behind C28 for use as an attachment point for L1. The same method is used below the chassis for supporting one end of L3. The other lead on L3 is soldered to C10.

### Final Comments

The efficiency of this modified amplifier is 60 percent. Intermodulation distortion is −31 dB and all spurious output suppression is greater than that required by current FCC regulations (better than 40 dB down from carrier value). There is no evidence of excessive component heating, resonance drift or instability. Oh yes, the plates of the 572Bs run red at full power, but don't fret — they turn crimson in the original SB-200 circuit, too! ham

## Strays

### JY AWARDS

☐ The following awards are issued by JY1, His Majesty King Hussein I of Jordan to any amateur who qualifies. The Silver Award is earned by sending photocopies of QSL cards (or certification) from six different JY prefixes. Enclose 10 IRCs. The Arabian Knights Award is issued to amateurs who have proof of having worked 10 Arab countries, one of which is JY1 or JY2, since January 1, 1971. Send applications for each award with photocopies of QSL cards or certification, along with 10 IRCs, to JY1 Award Manager, P. O. Box 1055, Amman, Jordan.

The Coral Award will be issued to amateurs who visit Jordan and make a QSO from Aqaba.

### I would like to get in touch with . . .

☐ U.S. hams willing to exchange use of cars and trailer homes for one year, beginning in February 1980, when I'll be touring the United States. Contact Bruce M. Plowman, VK3QC, P. O. Box 454, Wangaratta 3677, Victoria, Australia.

# Ionospheric Ducting at HF

## You may have joked about "pipe-line" contacts before, but don't laugh; they may exist. Magnetic fields around the earth's tectonic plates may, in part, be responsible.

By Vit. Kanevsky, UL7GW

*This presentation was translated from the U.S.S.R. journal* Radio, *March 1979, by Ned Raub, WIRAN, 12 Deerfield Rd., Waterford, CT 06385. Because of his on-the-air acquaintance with the author and his personal interest in the subject matter, Raub has taken care to prepare an accurate (rather than a silky smooth) translation for this* QST *presentation.*

According to generally accepted theory, extended DX propagation of short waves (beyond 10,000 km)[1] arises as a consequence of repeated reflections between the ionosphere and earth's surface. Yet on the low-frequency bands, because of intense absorption of radio waves in the lower ionosphere (D and E layers) such reflection is necessarily accompanied by excessive energy loss. Accordingly, on these bands multihop long-distance contacts by small powerful amateur stations are — as a rule — not successful.

It is just possible there is anomalous propagation of radio waves without intervening reflections from the earth's surface, somehow inside an ionosphere waveguide. Yet in the literature there is no indication of how such a condition arises nor the possibility of prediction of such resulting radio contacts.

### Observations

In the course of amateur contacts from Alma-Ata between 1965 and 1976, it was noticed that propagation of radio waves, seemingly without intermediate reflections, could be observed on all high-frequency bands alike, consistently in specific directions for intervals of time to the extent of all periods observed. Regular and persistent use of the bands provided the opportunity of carrying out more than 2000 extended-DX radio contacts on just the 3.5- and 7-MHz bands. The observation was carried out through the course of the entire 11-year sunspot cycle.

In Alma-Ata there were three sharply defined paths of anomalous propagation: northwest/southeast, latitudinal and meridional. How I explained this is that the centers of these paths coincide with tectonic buildup of the earth's crust: first, with the zone of deep cleavage in the Chuilyski Mountains northwest of Alma-Ata; second, along the sharply delineated line of the geomagnetic equator, coinciding with the cleavage of Zaidyski Ala-Tau; and third, passing along the central-Kazakhstan fault, crossing Lake Baikal toward the like-named oriental cities. On the map (Fig. 1) there is evidently a coincidence of the axes of anomalous propagation with the regional fault lines in regions of the earth, e.g., Appalachian Mountains and the Sierra-Nevada Mountains in North America; in the Cordilleras and fault of the lower reaches of the Paraná River in South America.

This sort of coincidence is scarcely possible by chance. There exists a possibility that tectonic abnormalities in the earth's crust (and resulting aberrations in the planet's magnetic field) invite corresponding distortions in the homogeneity of the ionosphere, and that this leads to a phenomenon favorable for extended-DX propagation.

Extended-distance propagation of radio waves was chosen for qualitative assessment. In my opinion the only proof via amateur methods is a list of contacts with these same geographical regions of the earth. It is feared that this factor influences the nonuniform distribution of amateur stations, and verification of activity of amateurs at one time of day by averaging data is not hard evidence.

Thus, for example, in the USA in the states of Illinois, Ohio, Michigan and Florida, amateur stations are extraordinarily numerous. Yet, at the time of propagation, a signal received from one of them does not result in a contact. There were, in truth, 10 contacts with the state of Florida, but only with one and the same amateur (W4BGO). It appears that he is in the western part of the state, in the path of anomalous propagation.

It is also possible to talk about contacts via short-wave radio in South America. With radio stations in Rio de Janeiro and Sao Paulo, there were in passing, about three to five completed contacts all-time at 21 MHz. But with Buenos Aires, Montevideo and Rosario, found to be along the path of anomalous propagation, 99, 21 and 27 contacts, respectively.

I established that the change of active radio stations in the course of 24 hours leads only to decreasing numbers of contacts during less-than-favorable periods in comparison with more favorable conditions. At the time of contests when amateurs work concertedly around the clock, stations from regions reached via anomalous propagation appear and disappear in exactly predicted intervals of time. This is usually noticed at 3.5 and 7 MHz.

It was also noticed that in the course of a 24-hour cycle, one observes several periods of anomalous propagation of radio waves. Thus, at 1000 to 1300 UTC, there arrive maximum numbers of contacts with South America. Maximum numbers of contacts with Africa are customarily at 2250 to 0300 UTC. In earlier hours, there come solid contacts with southeast Africa and areas of southern South America along the meridian line. After 0000 UTC, the majority of contacts fade along longitudinal lines at

[1]km × 0.621 = statute miles;
km × 0.539 = nautical miles

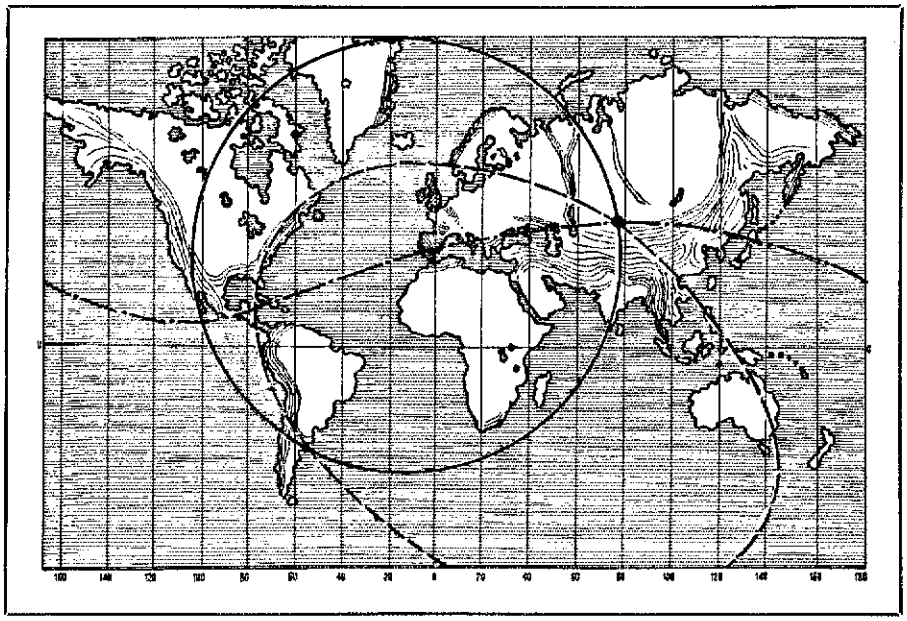


Fig. 1 — The regional tectonic areas on earth, showing the directions or trends of anomalous radiowave diffusion.

0130 to 0200 UTC. Propagation along the meridional path brings stations from the Pacific coasts of USA and Canada. Usual contacts with W6/W7 and VE7 along the southwest line are only possible at 14 and 21 MHz and on isolated days in the middle of winter (22 December-5 January) on 7 MHz. Use of periods of anomalous propagated radio waves also permits contacts on 3.5 MHz. Simultaneously, on the same path, were conducted signals from South Africa and South America. It is interesting that radio stations located along the path of anomalous propagation (W6MUR, K6DC) were heard excellently in Alma-Ata, but were not carried on to UJ8, UH8 and UM8.

**Differences**

They are sharply distinguished from other modes of contacts, as with the Hawaiian Islands. Here they are not evidently representative of maximum anomalous propagation. During favorable conditions, Hawaiian stations make an appearance (even on 3.5 MHz) after sunset in the Hawaiian Islands and are audible continuously until the following morning. It is characteristic that local times in the Hawaiian Islands and in New Zealand are nearly the same, and populations of radio amateurs are similar, yet the number of contacts with KH6 predominates over contacts with ZL, especially on the lower-frequency bands.

At the time of observation on all bands, I noted the occurrence of single and multiple globe-circling radio echoes during maximum anomalous propagation, but twice (14 December 1974 at 1605 UTC and 1 March 1976 at 0022 UTC) at a frequency of 3.505 MHz, there were pleasantly lingering radio echoes delayed 10-15 seconds. Seemingly, long-delayed radio echoes belie a peculiar occurrence of propagation of radio signals in a ring-shaped channel in which they are able to fall into anomalous propagation.

**Spectrum Involved**

The frequency range encompassing anomalous propagation is perhaps very wide. During one recurrence, I carried on contacts while shifting from band to band. One incident bears consideration, namely, the example of 11 September 1974, during a contact with VK4YP in Brisbane, Australia. We began at 1250 UTC on 14 MHz and continued without interruption until 1308 UTC on 3.5 MHz. Yet, most impressive were occasions of reception of atmospheric static from tropical thunderstorms in the regions of Central America. Regularly, in times of maximum anomalous propagation, noise of lightning discharges was traced on all bands from 3.5 to 21 MHz, but lost after conclusion of the opening.

Realization of ionospherically ducted DX contacts via anomalous propagation obviously will be different with radio amateurs near the edges of tectonic plates (near faults in the earth's crust), e.g., Central Asia, Lake Baikal, the Far East and the Caucasus. The results thus will depend upon individual circumstances in the regions in which correspondents are located. Even at distances of 10,000 to 15,000 km, the width of the path ducted during favorable conditions may exceed thousands of kilometers. The probability of contacts especially at 3.5 and 7 MHz will be reduced with distance from the center of the path.

The path for contacts at 3.5 and 7 MHz at distances greater than 30,000 km and reception of globe-circling echoes for inhabitants of tectonic plates (i.e., distant from their edges) is improbable.

## ADDENDA

The above article was excerpted from *Radio*, 1979, no. 3, a monthly Soviet journal of electronic science. Alma-Ata in Kazakhstan is 2000 miles from Moscow, near the Chinese Sinkiang border.

Tectonic plates are colossal continent-sized areas which move slowly in relation to each other. Where they meet, we find mountains pushed up by gigantic pressures, volcanoes, and continental faults, such as the San Andreas which promises to make California an overseas territory one day.

Aurora Borealis is strong evidence of the effect of our planet's magnetic field on the ionosphere. Earth's magnetic field varies widely in strength and direction from place to place, undoubtedly because of varying reluctance of its surface regionally. This should cause stationary aberrations in the ionosphere above them.

Entrance of a radio signal into an ionospheric duct is more likely at dawn or dusk, with the high F layers existing and the end of the D and E layers nearby. Low-frequency DXers notice that signals tend to peak when one or both ends of a path are at a terminator. My contacts with Kanevsky at 3.5 MHz were of only a few minutes' duration, his signals abruptly appearing and disappearing, just as he describes.

The most striking example of anomalous propagation in New England occurs on 7 MHz in early January at about 1245 UTC, when UA9s are easily workable with modest equipment for about 15 minutes. Their signals are seldom audible the rest of the year. For more on long-delayed echoes, see February 1978 *QST*, pages 17-19. — *Ned Raub, W1RAN*

# The Great Ionospheric-Hole Experiment

## A rocket launch planned for September may deplete the ionosphere over the West Indies. Radio amateurs can help determine if such launches will have a disturbing effect on ionospheric propagation.

By P. A. Bernhardt;* J. A. Klobuchar,** W1BZT; O. G. Villard, Jr.,* W6QYT; R. Simpson,* W6JTH; J. G. Troster,*** W6ISQ/N6IQ; M. Mendillo**** and J. H. Reisert,***** W1JR

In late September, radio amateurs will have a unique opportunity to help assess what could become a serious future world problem — temporary destruction of the ionosphere by exhaust gas laid down by large rockets. Hams, because of their widespread distribution and the diversity of their technology, can provide an overall assessment of the communications consequences caused by rockets firing in the ionosphere. Such an assessment cannot be obtained from any other group.

It has been known for some time that rocket engines operating within the ionosphere create "holes" — regions of sharply depleted electron density. Fortunately, most large rockets burn out at E-layer heights — roughly 100 km — where the hole effect is not great. However, if a large engine burns up through the 300-km-high F layer, the affected region can be spectacular in size. The F-region electrons, which are responsible for the bending of radio waves, are greatly reduced in number for as long as several hours, thereby causing a weakening or even a failure of radio circuits for that period of time.

Ionospheric holes are formed by chemical action of rocket exhaust vapors on the plasma in the F layer. This exhaust, which consists of unburned hydrogen gas and water vapor, neutralizes the plasma by promoting ion-electron recombination.[1,2] The largest such hole yet recorded was produced by the burning Saturn V rocket which put Skylab into orbit.[3]

As many people are aware, one proposed solution to America's energy problem is to place huge solar-power-collecting satellites in geosynchronous orbit. This is the solar-power-station (SPS) system, wherein solar energy is converted to microwaves and beamed to collectors on the ground. Establishing the necessary orbiting structures could require so many launches of large rockets that the ionosphere may be almost continuously disturbed for a period of years. The resulting effect on radio communications is one of the major environmental impacts that must be assessed before SPS is given the go-ahead.

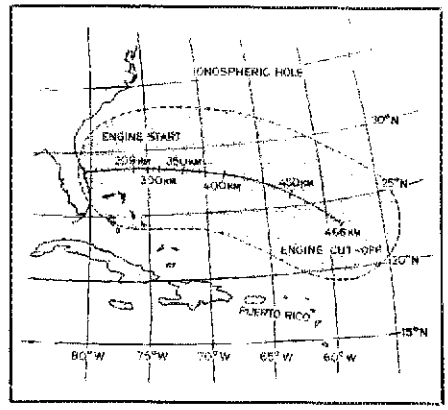



Fig. 1 — Geographic region expected to be affected by the Atlas-Centaur launch. Rocket height versus location is shown along its planned path.

By good fortune, amateurs will have a remarkable opportunity to participate in a realistic test when one of the last of the Atlas-Centaur rockets will be launched from the Kennedy Space Flight Center in Florida. The Atlas-Centaur rocket is scheduled to be launched at 0030 EST (0530 UTC) on September 14, 1979. The primary purpose of this launch is to place the third high-energy astrophysical observatory satellite (HEAO-C) into orbit. If the launch date is delayed, announcements of the updated launch time will be broadcast by W1AW. The Centaur stage of the rocket will burn from 209 km (130 miles) to 466 km (290 miles) altitude. Hydrogen will be ejected at a rate of 2 kg (4.4 pounds) per second and water will be ejected at a rate of 29 kg (64 pounds) per second for a period of 440 seconds. Thus, a total of 15 tons of material will be ejected into the ionosphere.

### Observing Propagation Disturbances

The ground track of the rocket is shown in Fig. 1. The shaded area indicates the region where a significant reduction in the F-layer ion concentration is expected. The

*c/o Radioscience Lab., Stanford University, Stanford, CA 94305
**c/o Air Force Geophysics Laboratory, Hanscom AFB, Bedford, MA 01730
***Contributing Editor, *QST*
****c/o Department of Astronomy, Boston University, Boston, MA 02215
*****17 Mansfield Dr., Chelmsford, MA 01824

[1]Notes appear on page 23.

ionospheric hole should persist for a period of four hours or longer. One should see fluctuations in hf signals propagating across the disturbed region.

The hole may influence propagation in several ways. A reduction in the plasma concentration along the path may reduce the maximum usable frequency (muf) of the path. The muf, however, can be increased because of refraction by plasma gradients at the edge of the hole. Signal fading may result from multipath propagation. Also, irregularities may form which can enhance the propagation of vhf signals via scattering.

To look for these effects, radio amateurs are encouraged to make signal-strength measurements along paths which cross the ionospheric hole. This may be done either by using individual two-station pairs or by listening to one of several beacon transmitters which will be set up near Arecibo, PR. The propagation between Puerto Rico and the eastern half of the United States should be greatly affected.

At the time of this writing, all of the details (i.e., power, frequency, exact location, etc.) of the beacon transmitters are not known. We hope to have six transmitters on the 80-, 40-, 20-, 15-, 10- and 6-meter bands.

We plan to have one beacon-type transmitter operating at 14.1 MHz, having power-stepping capabilities. According to the current design, it will transmit five 9-second pulses successively at 100, 10, 1, 0.1 and 0.01 watts. The sequence of power steps should last one minute and be repeated every two minutes. By keeping track of the 10-dB power steps, a listener can readily determine the weakest signal that can be heard within his equipment. (Wide variations in detectable signals can be expected depending on location and time-of-day because of static and QRM, as well as propagation anomalies.) The stepping-power technique should be more accurate than just reliance on S-meter readings. It should permit fairly precise intercomparison of stations.

Those participants who wish to monitor the beacons located at Puerto Rico are requested to write Joe Reisert, W1JR, indicating the frequency bands they are capable of receiving. Standardized log sheets for the recording of propagation conditions will be provided.

All participants in the experiment should record the times and signal strengths (S-meter readings) of the received signals. They should also note any unusual fluctuations, such as fading, which could be caused by the ionospheric hole. After the experiment, the log sheets should be mailed to W1JR, along with details of the location, type of receiver and antennas used for the measurements. A special certificate will be issued to all amateurs who participate with quantitative observations of the ionospheric event.

The measurements taken during the experiment will be analyzed and the results reported in a future issue of *QST*. These results can provide a great service to the scientific community. As we enter the space age, frequent firing of rockets in the ionosphere can be expected. For example, one current scenario[4] for putting the network of solar power stations in orbit requires the daily launch of rockets that are four times as large as the Saturn V. It is no wonder that government agencies (such as the National Aeronautics and Space Administration and the Department of Energy) are interested in the resulting effects.

**Notes**

[1]Bernhardt, Park and Banks, "Depletion of the F2 Region of the Ionosphere and the Protonosphere by the Release of Molecular Hydrogen," *Geophys. Rev. Let., 2*, 341, 1975.
[2]Mendillo and Forbes, "Artificially Created Holes in the Ionosphere," *J. Geophys. Res., 83*, 151, 1978.
[3]Mendillo, Hawkins and Klobuchar, "A Large Scale Hole in the Ionosphere Caused by the Launch of Skylab," *Science, 187*, 343, 1975.
[4]NASA, MSFC/JSC, *Solar Power Satellite Baseline Review*, NASA Headquarters, Washington, DC, July 1979.

# Feedback

☐ In Doug DeMaw's article, "Build a Simple 'Super' for SSB" (August 1979 *QST*, page 11), mention should have been made that an etching-pattern template and a parts-placement guide for the main board are available from ARRL hq. Their physical size did not permit publication with the article. To obtain your template and placement guide for this project send your request with a stamped business-size return envelope and $1 to cover handling to ARRL, Dept. TD-Super, 225 Main St., Newington, CT 06111. IRCs are acceptable from outside the U.S.

☐ These changes for the August 1979 *QST* article, "CMO — A Capacitance-Measuring Oscillator," were received too late for publication. In Fig. 1, the tap on L1 is placed three turns from the bottom of the coil and moved down to increase feedback. The text in paragraph 4, page 38, should state that capacitance $C_0$ at any subharmonic n of 7000 kHz will have a harmonic n that *behaves* as though the oscillator were on 7 MHz. At the beginning of equation 8, page 39, it should show $C_x = \Delta f$. The ordinate of Fig. 2 should be indicated as

$$\frac{C_x}{\Delta f}, \frac{pF}{kHz}$$

☐ These corrections are for the article, "Improving the SB-104/SB-644A" (August 1979 *QST*, pages 28-31). In Fig. 1, the relay armature is connected to pin 1. In Fig. 2, the RIT voltage to the VFO is carried through the mating section of the VFO connector. Reference to the Heath manual at the end of the section on changing the SB-644 is to page 2-9 and not pages 2 through 9. Under "Operation and Adjustment," the proper procedure is to depress REMOTE ON, XTAL 1 and REMOTE T/R, set the RIT control to the index mark (center of rotation) and tune in a signal for maximum clarity. Note the frequency. Next depress the XTAL 2 button and adjust the transmit center frequency potentiometer for the same frequency reading and for the same voice sound noted with the XTAL 1 button depressed.

☐ In Jay Rusgrove's article, "Spectrum Analysis — One Picture's Worth a . . ." (August *QST*, page 15), the spectrum-analyzer photographs of Fig. 8 were inadvertently interchanged.

☐ In the article "Slippers for a QRP Transceiver" (July 1979 *QST*, pages 30-32), the designations for positions 1 and 2 of S1 in Fig. 3 should be reversed. Position 1 is for cw and position 2 is for operation without the linear amplifier. The Argonaut is in normal use without the linear amplifier when the switch is in the center position.

☐ Ed Oxner, author of "Build A Broadband Ultralinear VMOS Amplifier" (May 1979 *QST*, page 23), advises that an important radical sign in Eq. 1 was omitted in publishing the article. The correct formula should be shown as follows.

$$\ldots + \sqrt{G} \bullet \frac{R_S + R_L}{2\sqrt{R_S R_L}}$$

The expression "G" found in this formula is not to be inserted as "dB" but must be expressed as a *power ratio*. Hence, to use, for example, a gain of 12 dB, the number would be 15.85. This is computed from

$$G = 10^{\frac{dB}{10}}$$

Fig. 6 should show R4 as 27 kΩ, a value that is correctly shown in the text.

☐ K4KYU points out a couple of typos in "Circular Orbits with Simple Computing Systems" (February 1979 *QST*, page 38). In Table 1, the denominator of the bearing equation should contain the cosine of the QTH latitude, not the cosine of the subsatellite latitude. Change cos $\phi_s$ to cos $\phi_Q$. A less-critical error appears in Table 2: Angular separation should be the Greek letter delta ($\delta$) instead of gamma ($\gamma$).

# A Radio-Compass Antenna-Elevation Indicator

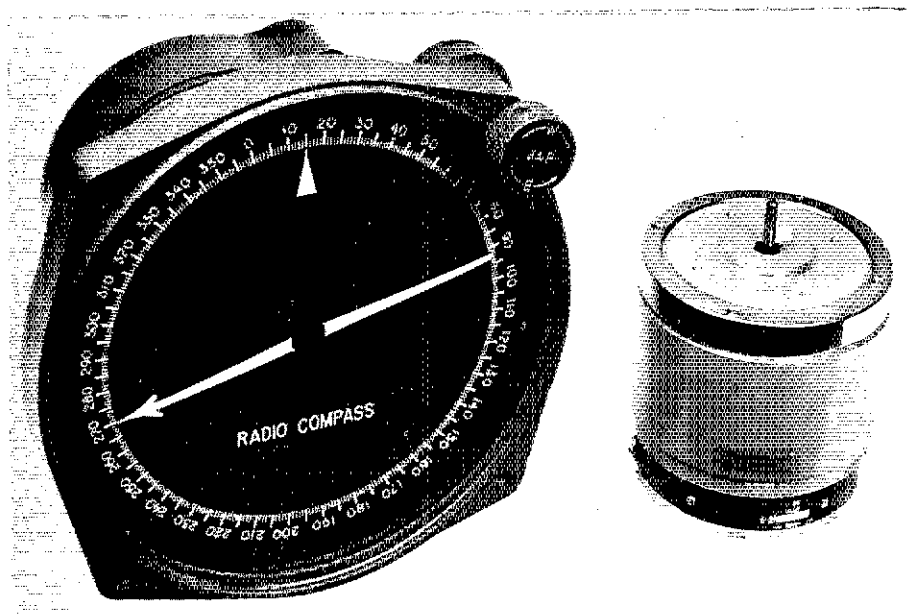
## With a surplus synchro transformer and radio-compass indicator, a very accurate elevation system can be made. Here's how.

By Jim Bartlett,* K1TX

In an earlier issue, we promised this short follow-up piece on using a Canadian radio-compass dial as an indicator for an antenna-elevation system.[1] The parts needed to complete the system are an MN-98 radio compass and an R5663642 synchro transmitter.[2] The compass indicator is quite large — 5 inches in diameter! It's really a beauty, with a large dial face already marked in degrees, making it perfect for this use. The two units should cost less than $20 when purchased on the surplus market.

After you have obtained the two units, carefully unpack them and examine them closely to be sure that they were not damaged in shipping. These units are usually packed in typical military fashion, with layer after layer of insulation, so they *should* look like new.

Place the MN-98 indicator face down on a soft cloth draped over your workbench, and remove the rear cover of the indicator unit. Disconnect the four wires that go to the glass-metal feedthrough located on the back panel. This should free the rear cover, which should be put aside for now. Next, drill a small hole in the rear of the case, next to the edge of the feedthrough. (See Fig. 1A.) Do this *carefully*, making sure that the drill bit doesn't push through into the inside of the indicator shell and get tangled in the wiring. When the bit breaks through the metal casing, the pressurized seal will be broken. Now, using a small screwdriver and a hammer, tap each of the individual glass feedthrough inserts, cracking them. Try to keep the screwdriver from pushing the broken pieces of glass down into the enclosure where they could get lodged in the dial mechanism. Instead, attempt to shake all the pieces of glass out onto the workbench where they can be swept up. The remaining part of the feedthrough can be removed now by heating with a soldering iron and prying with a screwdriver or needle-nosed pliers.




The MN-98 Canadian radio compass and Sperry R5663642 synchro transmitter. Note the small knob at the upper right-hand corner of the indicator face. This can be used to calibrate the indicator/transmitter system without making any changes at the antenna end. By turning this knob, you can rotate the degree markings around the outside of the dial face so that any desired heading can be placed in line with the pointer. As you can see in the photograph, the knob has been turned so that 15 degrees, not zero, is "due north."

After the feedthrough has been removed, you should gently pull the ends of the wires out through the hole left by the feedthrough. Clip off the feedthrough terminal pins. There should be five wires — a group of three and two others. The group of three will most likely be blue, yellow and black. The other two wires twisted together should be red and black. Fig. 1B shows how these should be connected to

[1]Notes appear on page 25.

*2109 Branch, Champaign, IL 61820

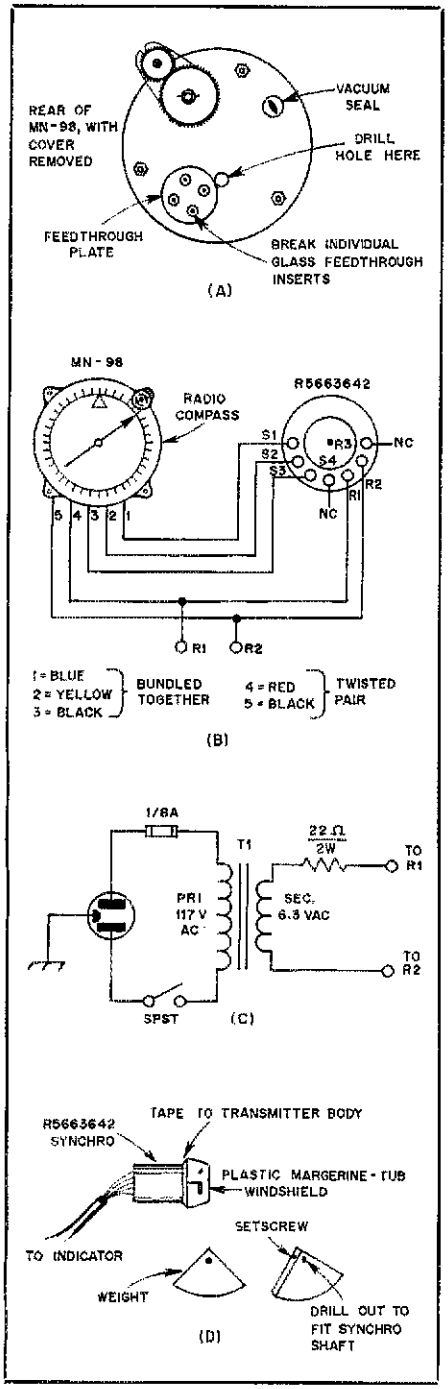



Fig. 1 — The rear of the MN-98 Canadian radio compass is shown at A. The drawing at B shows the interconnecting method used between the MN-98 and the Sperry synchro transmitter. The schematic diagram at C shows the power supply used with this indicator system. T1 can be Radio Shack 273-1384 or any junk-box 6.3-V filament transformer. At D, the drawing shows a method that can be used to prevent wind or ice from disturbing elevation readings.

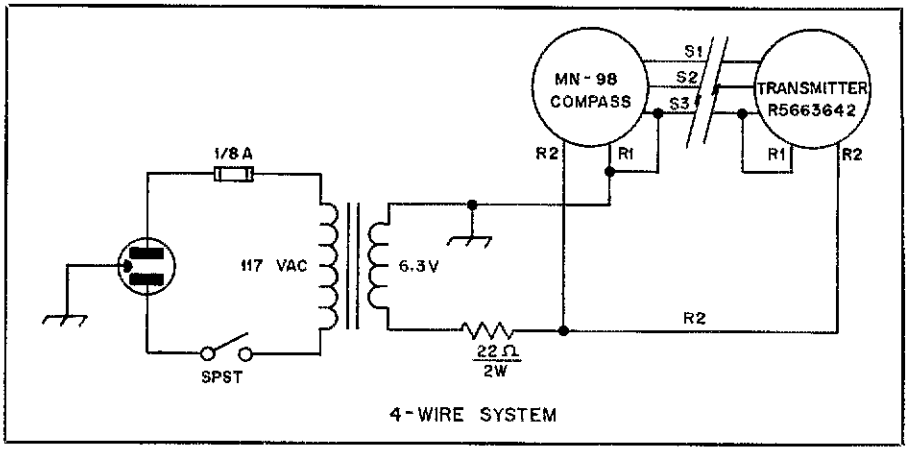



Fig. 2 — This diagram shows the optional four-wire connecting system that can be used with most five-wire synchros.

the terminals on the synchro transmitter in a five-wire system.

### Construction of the System

After performing the above surgery on my MN-98, I replaced the Cannon connector on the rear cover with one for which I had a matching male plug. Fig. 1C shows the schematic diagram of a simple 6.3-V ac power supply for the indicator system. Since the synchro and indicator were originally designed to operate at 26 V and 400 Hz, a 6.3-V transformer that could be easily scrounged was selected as acceptable for use at 60 Hz. A 22-Ω resistor was placed in series with the synchros to limit current and thus eliminate a slightly irritating buzzing sound in the indicator unit at certain pointer positions.

The indicator, along with the power supply, can be mounted in a small metal enclosure. Be sure to include a fuse, on/off switch, and three-wire line cord. At the synchro transmitter end (at the antenna), you may want to provide some kind of shield to keep wind, rain, ice and snow from affecting your indicator system. Fig. 1D shows a possible solution. A small weight, cut in the shape of a large pie section and drilled to fit the synchro transmitter shaft, could be mounted on the shaft and shielded with a small margarine tub which is taped or glued to the outside of the synchro casing. This arrangement should allow free movement of the weight, yet keep high winds or heavy icing from affecting the indicator. The synchro transmitter should be mounted to the mast in such a way that it will rotate with the antennas, causing the weight to turn the shaft.

### Four-Wire System

If you have a bunch of four-wire cable lying around and have thought about trying to use it to connect the synchro transmitter to the compass indicator, Fig. 2 gives the diagram for setting up five-wire synchros with only four wires. The system is the same as that shown in Fig. 1B, except that the R1 and S3 lines are combined at each end. This leaves only four wires that must be run between the two units. If such a wiring method is used, it is recommended that the R1/S3 line be *grounded* at the indicator end, as shown. If this system is used with the MN-98 unit, it may not be necessary to "dig into" the indicator at all. You should be able to solder directly to the four wires originally attached to the military connector on the rear cover. You may have to experiment to find out which is which. Try blue for S1, yellow for S2, red for R2 and black for both R1 and S3 — tied together inside.

### Operation

This synchro system is really slick! It should be ideal for those moonbouncers looking for a more accurate elevation readout, or for anyone who has a rotator with missing end stops or a bad position-indicating potentiometer. In fact, a fairly inexpensive azimuth indicating system could be installed in a station with more than one tower. This could be done by using separate synchro transmitters at each rotator and a single indicator/power supply unit switched between the transmitter units as needed. QST

**Notes**

[1]Bartlett, "An Accurate Antenna Elevation System," *QST*, June 1979.

[2]Five-inch radio compass, MN-98, is $15; possible alternative (smaller unit) is 1-81-N compass indicator, $8.95; Sperry synchro generator for use with MN-98 (Sperry no. R5663642), $2.95. *Do not use AY-201 transmitter with MN-98.* All prices from Fair Radio Sales Co., P. O. Box 1105, Lima, OH 45802.

## Strays

### *QST* congratulates . . .

☐ C. L. Doty, W8CXM, who received the Golden Anniversary Award from the Quarter Century Wireless Association for 50 years of service as a licensed radio amateur.

### ATTENTION ALL YLs

☐ YLRL's Howdy Days take place in September. See "Contest Corral," this issue, for details.

# The Little Jimmy Keyer

## Here's a simple, but very capable, manual keyer with self-completing dits and dahs. Point-to-point wiring, anyone?

By Richard W. Rose,* W7GMC

Are you really proud of your "fist"? Clean, accurate character formation and keying have long been the hallmarks of really fine cw operators. The first (and sometimes the last) impression you make on the air comes from your fist, and you're missing a great deal of fun if you can't express your thoughts and ideas clearly.

Here is a simple device for making it easier to "speak cw" fluently. It enables you to send accurately formed characters with little effort, and you can put it together in a very short time. Using only a few inexpensive and readily available standard components, this keyer will send cw accurately at any speed you can handle. It won't toss you any curves caused by stray rf energy, and is compatible with both single- and dual-lever paddles. Unlike other keyers, it provides for operation with a straight key or "bug" and gives you contact conditioning or "debouncing" at the external operating contacts.

What does it take to do all this? A couple of standard TTL ICs, a timer IC, a transistor, a few capacitors, a relay and five resistors — one of which is the variable speed control — make up the entire keyer circuit. Add an IC regulator for the supply voltage and a small perfboard and that's it. The whole thing goes together with a few simple, direct-wiring connections to make a small unit that will fit almost anywhere. I mounted mine on the terminals of the speed-control pot, making the entire assembly a single-hole-mount affair. Connections to a dc voltage source, key or paddle, and key jack of your transmitter are all you need to be in business. A schematic diagram is shown in Fig. 1.

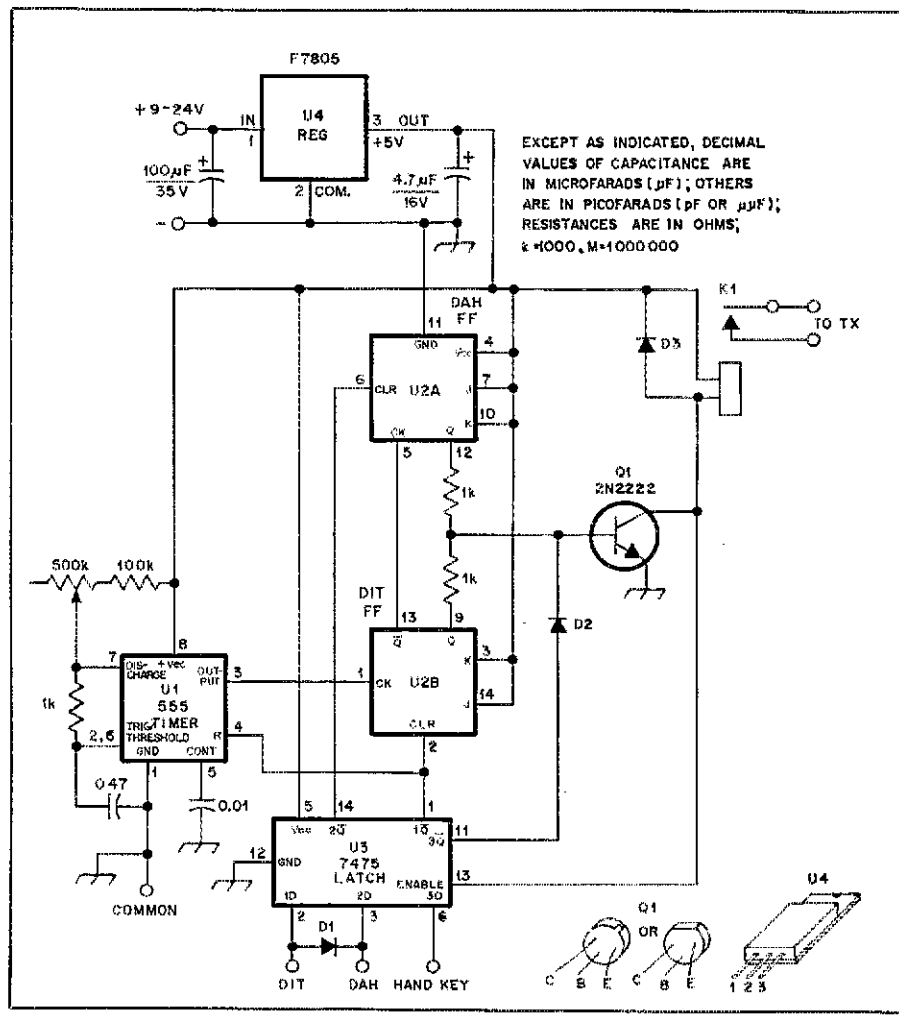



Fig. 1 — Schematic diagram of the Little Jimmy keyer. Unused pins of the ICs are not shown. Part numbers in parentheses are Radio Shack unless otherwise indicated.
D1, D2, D3 — 1N34 or gen. purpose germanium diodes (276-1123).
K1 — Reed relay (Allied 703 series).
Q1 — 2N2222 or gen. purpose npn transistor (276-2009).
U1 — 555 timer IC (276-1723).
U2 — 7473 IC (276-1803).
U3 — 7475 IC (276-1806).
U4 — Type 7805 5-V voltage regulator (276-1770).

How does it all work? A pair of flip-flops forms the heart of the system — a 7473 dual J-K package. The first flip-flop (FF) produces dits and spaces and drives the second flip-flop when dahs are being produced. The dit FF is driven or "clocked" by pulses generated in a circuit using a 555 IC timer chip. These are narrow, negative-going pulses suited to the drive requirements of the 7473. The spacing of these pulses are determined by the setting of the speed control. See Fig. 2 for a timing diagram showing the clock pulses along with other outputs. Instructions to start the clock and to set the FFs to produce dits or dahs are provided by the action of a "control center" consisting of a 7475 four-bit-latch IC — an interesting package containing four individual flip-flops arranged in pairs. Each flip-flop has one input or data terminal, and two complementary outputs. Each FF *pair* has a "latch" or enable control that may be used to "freeze" information at all terminals until the latch is released. The first pair of flip-flops and associated latch are used to

*8301 Tieton Drive, no. 112, Yakima, WA 98908

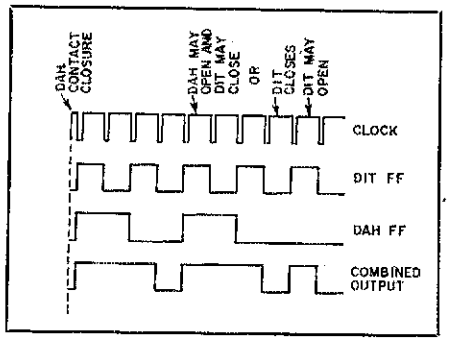



Fig. 2 — Timing diagram for the letter G.

control the clock and set the conditions for dit or dah production. The first FF of the second pair provides direct control of the transistor switch by a straight key or bug, and the fourth FF is unused.

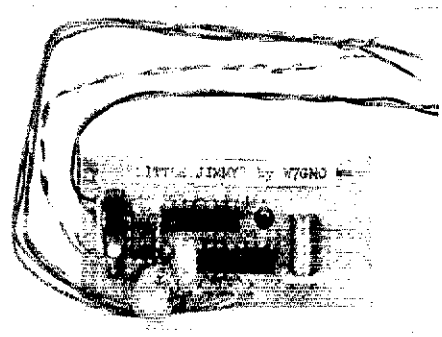
The final element in the system is a transistor switch used to transfer the signals from the dit and dah FFs to the outside world. Any of a number of npn transistors might be used for the switch — I used the popular 2N2222. If you wish, a small reed relay can be added, as shown in the photograph and Fig. 1.

There are four elements in the system: a pair of FFs, a clock, a control device and a switch. Closing a pair of external contacts tells the control what signals to send to the FFs and the clock; the FFs respond with the corresponding orders to the switch, which turns the transmitter on and off. It's that simple.

Why can it be so simple? First of all, there are just two basic orders to be obeyed: make dits, or make dahs. Second, these orders are delivered to the FFs and clock by sending enable or inhibit signals consisting of simple voltage-level changes — a high or positive level for enable and a low or near-zero level for inhibit. These level changes are produced at the outputs of the control device in response to contact closures which impose low conditions at the inputs. Finally, the dit FF operating alone produces dits, but *both* FFs operation together are required to produce dahs. Therefore, the key to selection of dits or dahs lies with control of the second flip-flop — if it is quiescent, the resulting output is dits and if it is active, the result is dahs. Fig. 2 is a timing diagram for sending the letter G, to help explain operation.

The clock sees an enable when the reset line (pin 4) of the 555 is high, and an inhibit when the reset line is low. The FFs are enabled when their clear lines are high and inhibited when these are low. Level changes at these three points — reset for the clock and a clear for each flip-flop — will then provide complete system control and the outputs from the first two sections of the 7475 are used for these level changes. Note that for either dits or dahs both the clock and the dit FF operate, and that for dahs all three — clock and *both* FFs — are active. Changing from dit to dah production is done by adding the action of the dah FF.

A low at the input of the first section of the 7475 (pin 2) forces the output of that section (pin 1) high. This goes directly to both the clock reset (pin 4 of the 555) and the dit FF clear (pin 2 of the 7473). When this happens, the clock and the dit FF operate and dits are produced. The dah FF starts when a low at the output of the second section of the 7475 (pin 14) goes to the dah FF clear (pin 6 of the 7473). Note that an enable at this point alone would not place the clock and the dit FF in operation. However, the dit-input terminal is "fooled" by D1 into thinking that it has been closed at the same time as the dah-input contact (pin 3 of the 7475). Thus all elements — clock, dit FF and dah FF — see enable signals, and dahs are generated at the output of the transistor switch. Since the first two sections of the 7475 are used to control dit or dah production, the latch or enable line will operate for either dits or dahs. The latch in effect holds a contact-closed condition until the action has been completed, making both dits and dahs self-completing. The third section of the 7475 is used (without its enable line) for direct control of the switch. This is done by closing a contact at the input (pin 6), causing the output (pin 11) to go high and key the transistor switch through D2



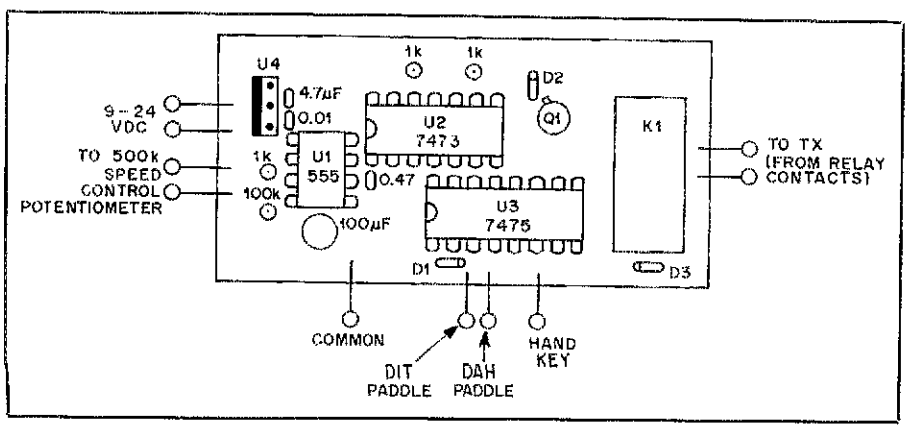
A completed prototype of the Little Jimmy keyer is shown here. Relay K1 was made from a spst reed switch and a homemade coil. The reed switch was removed from the coil before this picture was taken.

### Layout and Construction

When it comes to putting these bits and pieces together, some suggestions are in order. When the 7473 is used as shown, it is necessary for a number of the pins to be connected to the positive voltage source. Both positive and negative voltage distribution will be simplified by installation of some wiring on the component side of the board before any of the parts are put in place. This wiring consists of a negative (common) supply bus and short jumper wires for positive supply interconnections. I used no. 22 tinned copper bus wire, which was also used for the other connections on the wiring side of the board. Temporarily insert the ICs in their proper places and trace the outline of each with a pencil. This will help identify the proper holes through which leads will pass from top to bottom of the board. Preform each lead, making clean, right-angle bends, and install them according to the schematic diagram in Fig. 1. Check all your wiring when you are finished to see that it agrees with the schematic diagram. Note that if the suggested parts-placement diagram in Fig. 3 is followed, the output of the 555 (pin 3) and the clock input to the 7473 (pin 1) are adjacent, as are the output of section two of the 7475 (pin 14) and the clear line of the dah FF (pin 6 of the 7473). Just bend these pins toward each other and solder them together. At other points, such as the common connection between the 1-kΩ resistor and pins 2 and 6 of the 555 timer, use the resistor lead to make the connection across the pins and you won't need another wire.

When you have finished and inspected the wiring and are ready for a "smoke test," buy yourself some insurance — put a 560- or 620-ohm resistor in series with the positive supply lead. It won't upset normal operation, but might prevent *big* smoke!

Fig. 3 — Suggested parts placement for use in point-to-point wiring of the Little Jimmy keyer circuit. Parts are mounted on a small piece of perforated circuit board, and connected with small pieces of bare hook-up wire. See text for a more detailed explanation.



# An Audio Tone-Shift Power/SWR Meter

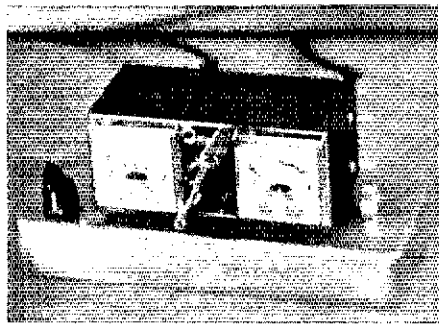
## Adjusting a pi network or an antenna-matching system requires visually handicapped amateurs to have a "third hand." This modified SWR indicator is an answer to that need.

By Raymond W. Brandt,* N9KV

A local visually handicapped amateur, who recently upgraded his license, had a dire need for a dependable tuning aid to assist him in adjusting the pi-network output of his transmitter and the antenna matching system. Much of his operating on the lower frequency bands now involved numerous changes in wavelength. How to help became a matter of concern to me. As we discussed his specific needs, I recalled hearing about devices that produce various audio tones to guide visually handicapped amateurs in making technical adjustments to equipment. Rather than research literature on such accessories, I chose to design a tuning aid from scratch, partly as a means of saving time.

Acquisition of a Swan SWR-1-A power and SWR meter became the first step of the project. This instrument serves to provide the necessary sampling voltages for the power and SWR indications. Because the SWR-1-A is so constructed that there is virtually no unoccupied internal space, any modifications of this Swan unit must be installed outside the device. To house additional components and provide a suitable base for the audio tone-shift meter, a small drawn-aluminum chassis was secured to the bottom of the Swan indicator.

In calling this audio-tone indicator a modified meter, the term "meter" is applied with tongue in cheek. Several factors militate against calibrating the unit well enough to have it deserve the term. For instance, because the sensitivity of the transmission-line coupler is inherently proportional to frequency, it varies drastically from band to band. The forward-power measurement is inaccurate whenever there is substantial reflected power. Furthermore, no method of measuring the output tone frequency is provided and neither the diode characteristics nor the voltage/tone frequency relationships of the 566 VCO are precisely linear.



This Swan rf bridge is equipped with an audio tone-shift system to aid a visually handicapped radio amateur tune a transmitter pi network and an antenna matching system.

Even though I've provided this set of disclaimers, and you've paused with raised eyebrows, let me hasten to say that indeed this is a most practical device for the visually handicapped amateur. It does permit such an operator to dip and load a transmitter with confidence, knowing that the pi-network output and the antenna matching system can be properly adjusted for optimum performance.

### About the Circuit

Simplicity of the design is evident in Fig. 1 showing the VCO and audio stage. Fig. 2 illustrates the minor modifications for adapting the Swan indicator for this purpose.

Because of previously gathered notes on the use of the 566 voltage-controlled oscillator chip, I determined that this IC was well suited to my plan. Although the specifications for the 566 call for a 12-V supply, by playing with a half dozen of them I found that each one provided reliable operation with as little as 7 volts. The 9-V battery indicated in the parts list is a satisfactory compromise.

The audio driver transistor, Q1, was not part of the original arrangement. It was added after attempts to operate the loudspeaker from the square-wave output terminal of the 566 resulted in overloading the IC. The 2N2222 resolved the overloading problem while supplying adequate audio output for the loudspeaker.

You will note in the diagram that R4 the emitter resistor, has a value of 470 ohms. This resistor limits the battery drain to about 18 mA. Where the audio output is more than adequate, R4 can be increased to 1000 ohms, a change that will also serve to reduce the drain to perhaps 12 mA.

Any displacement of the control terminal voltage at pin 5 of the 566 will cause the output frequency to vary as shown in the Table. A 2-V change will cause approximately a three-octave deviation in the output frequency.

For the values chosen and with no input signal, the output frequency of the tone indicating meter should be close to 150 Hz. Application of a 2-V signal causes the tone to increase to 1200 Hz as pin 5 is driven negatively away from the positive supply voltage. The 566 will not oscillate with pin 5 tied to the positive supply directly, but with the insertion of D1 and the resulting voltage drop, it will produce the 150-Hz tone. Inasmuch as the SWR bridge output will be between zero and perhaps +4 volts at high power on an HF band, a portion of this voltage is applied

*824 N. Marion Ave., Janesville, WI 53545

**Table**
**566 VCO Control Characteristic**

| *Voltage A to B* | *Output Frequency (Hz)* |
|---|---|
| 0 | 157 |
| 0.5 | 433 |
| 1.0 | 717 |
| 1.5 | 971 |
| 2.0 | 1157 |

to the IC by setting the sensitivity control for the desired amount.

### Operating Instructions

In use, the sensitivity control is advanced to show a substantial shift in the presence of rf. Without a signal, the audio-output frequency is approximately 150 Hz, and increases to about 1200 Hz with 2 volts of rectified rf applied to the control terminal of the 566 VCO. The plate tuning and loading controls are then adjusted to raise the pitch as much as possible. An intermediate amount of shift should be used initially so that an increase can be noted. With more than two volts of rectified rf, the audio output will stall out somewhat above 1200 Hz.

If the antenna is a reasonably well designed dipole or beam with a respectable match to the transmission line, this is all there is to operating the indicator, for there is nothing available to reduce the SWR anyway. A check of the reflected power will confirm that the SWR is reasonably low, evident by a much smaller frequency shift at the same sensitivity setting.

If the antenna requires a tuner, however, the audio-tone SWR/power indicator will really come into its own. In this case, the reflected power reading is adjusted for minimum pitch change in the presence of rf. Alternating two or three times between forward and reverse measurements may be necessary to get maximum contrast between the two. Once a low reflected power indication is obtained, the final adjustment would be to return to the rig and dip and load it for maximum forward power. This is with the presumption that the tuner was adjusted with less than full output while the tuner is being optimized, which is always a good idea.

The above procedure does not involve the visual meters at all. In fact the panel control of the Swan power/SWR meter is turned all the way down so that no indication is available. Accordingly, there is no danger of burning out the panel meters.

### Construction Notes

The aluminum chassis I found for the base of the device measures 3 × 7 × 1-1/4 inches (76 × 178 × 32 mm). It is secured to the base of the Swan indicator by means of two sheet-metal screws. Most of the chassis area under the Swan bridge is cut out to provide an aperture for the loudspeaker. A quarter-inch space between the bridge and the chassis, made possible by the feet on the bridge, allows the sound to be projected unhindered. Because the loudspeaker has no mounting ears, I mounted it permanently with a generous application of two-part epoxy cement.

The snap-slide on/off switch is so mounted that one end serves as a mounting barrier for the 9-V transistor battery which fits snugly in place. At the opposite end is a linear 10-kΩ potentiometer, a couple of square inches of Vectorbord accommodating the 566 and a few discrete components. No point of the circuit should be allowed to touch the chassis, for the input leads from the miniature plug are at potentials differing from the 9-V battery.

Several variations suggest themselves. If matched antennas are available, only relative power need be indicated. A simple diode coupled by a capacitance divider would serve in place of the SWR bridge. Or, if used extensively with an antenna tuner, the unit could incorporate two 566 VCOs with outputs connected to a pair of split stereo headphones. Use with headphones would permit having a VCO unit small enough to be built in the case of an unused microammeter, thus packaging the entire unit in the SWR bridge housing. A 600-ohm dynamic microphone unit could be substituted for the speaker in a similar physical configuration. I have seen several inexpensive bridges at flea markets. These were bargain priced because the meter movements were broken. Having one would be an excellent starting point for such a project.

Know a visually handicapped amateur? He might just like to own one of these tone-indicating meters.

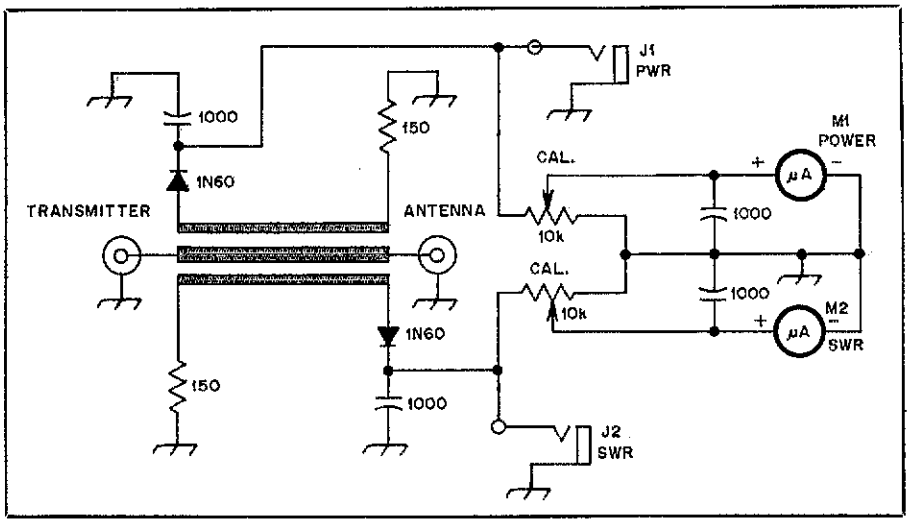



Fig. 1 — The Swan SWR-1-A circuit. The addition of J1 and J2 is the only internal change required to make the N9KV audio tone-shift modification. Capacitances are in pF. Resistances are in ohms.

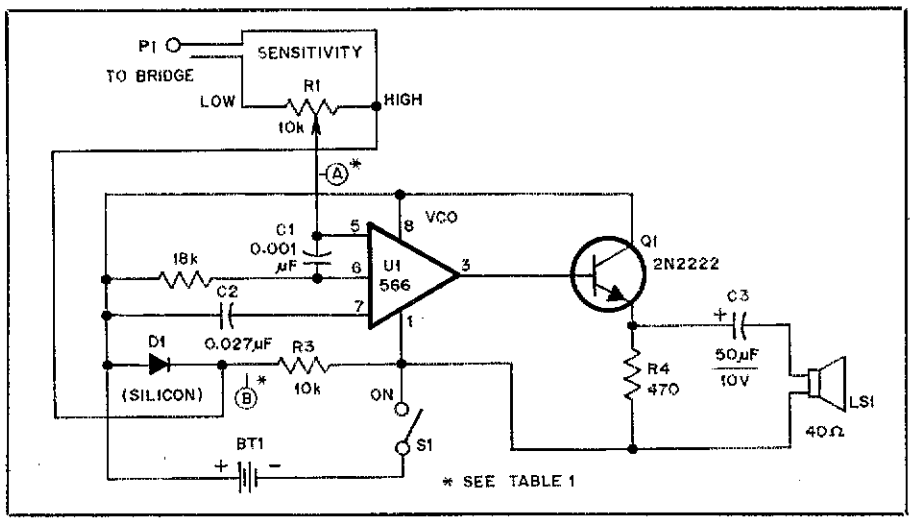



Fig. 2 — The audio tone-shift circuit designed by N9KV for use with the Swan SWR-1-A bridge. A type 566 voltage-controlled oscillator IC serves as the tone generator. The miniature loudspeaker is driven by Q1. Fixed resistors are 1/4 watt with values shown in ohms. R1 is a linear-taper potentiometer. BT1 is a 9-V transistor-radio battery.

● *Basic Amateur Radio*

# Quick-and-Easy Circuit Boards for the Beginner

## Why endure layout agony and the mess of chemicals? Make your own breadboard-style modules quickly. Here's how!

By Doug DeMaw,* W1FB

If you dread those brown ferric-chloride stains on your clothes, the tedium of etching a circuit board and the puzzlement of laying out a pc-board pattern, this article is for you! There's no rule that suggests a firm need for commercial-quality circuit boards. Sure, the professional stuff looks great with those lines and circles of copper so neatly etched on epoxy or phenolic board material. But, consider the person hours involved in planning a layout, applying the etch-resist tape or lacquer, then etching away the unwanted copper. All of this can become rather futile if the amateur is interested only in testing a circuit on a one-shot basis. A simple breadboard type of assembly will often suffice; time and money will be saved in the process.

But what of the finished product? Sure, nobody really wants an "ugly duckling" to show off at the next club meeting or when hams drop in to visit the shack. However, good looking circuit-board assemblies can be had even when using the non-etch techniques outlined here. An experimental circuit board which has the components neatly in place, "dress-right-dress" fashion, can be a thing of beauty to the beholder's eyes, provided he or she is not an inspector for a government-contract job! Let's examine some ways to make our own non-etched boards.

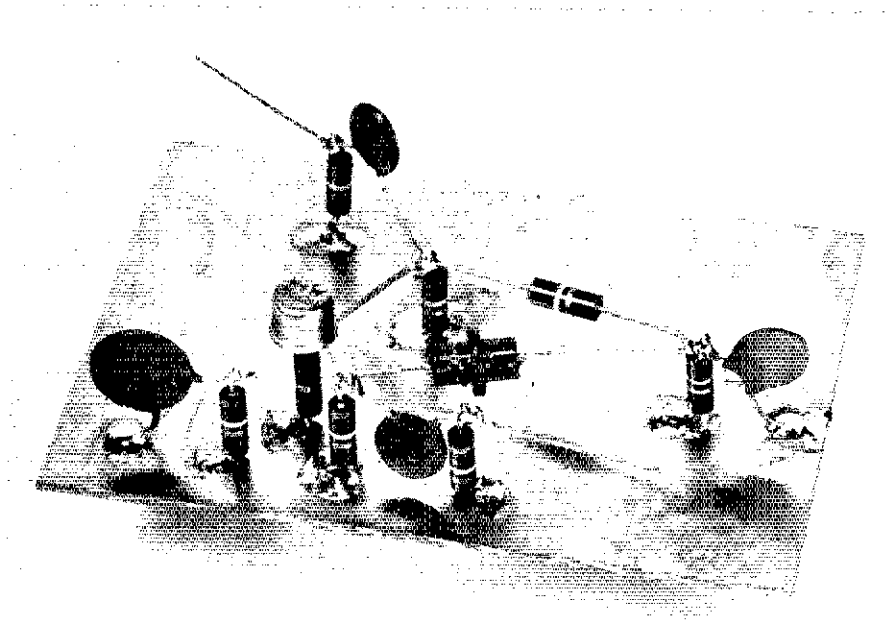


Fig. 1 — Photograph of the simple breadboard depicted in Fig. 2A. High-ohmage resistors serve as standoff terminals.

### The Standoff Technique

The basic foundation for any of the "quickie" boards we shall discuss here is a sheet of copper-clad circuit-board material — the kind we find in proliferation at hamfest flea markets, Radio Shack stores and similar outlets. It need not be clad on both sides, but "double-sided board," as the near misnomer indicates, is suitable also. Our objective in making any circuit board ready for use is to provide a suitable number of electrically isolated conductive islands upon which the various components can be connected by means of solder. At least that is the fundamental principle of *etched* boards. But, alternative methods exist for developing isolated pads or tie points. Regardless of the approach taken to achieve this effect, the name of the game remains the same: Assemble the components close to and above a copper "ground plane." In this type of situation the copper on the board becomes the circuit ground, just as a chassis does when circuit boards aren't employed. The copper plane enables us to make direct ground connections, thereby minimizing the pigtail lengths of the various resistors, capacitors and transistors. Short lead lengths and a quality ground conductor help prevent circuit instability (self-oscillations or parasitics). It is for this reason that many amateur projects call for double-sided pc board: One side is etched and the opposite side is solid copper, except where the various

*Senior Technical Editor, ARRL

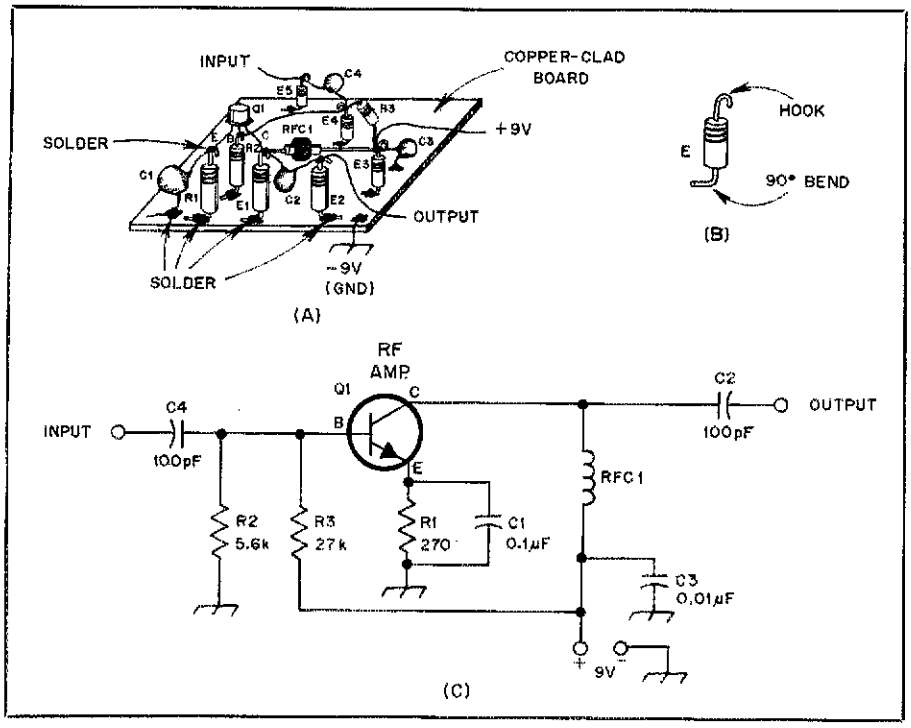
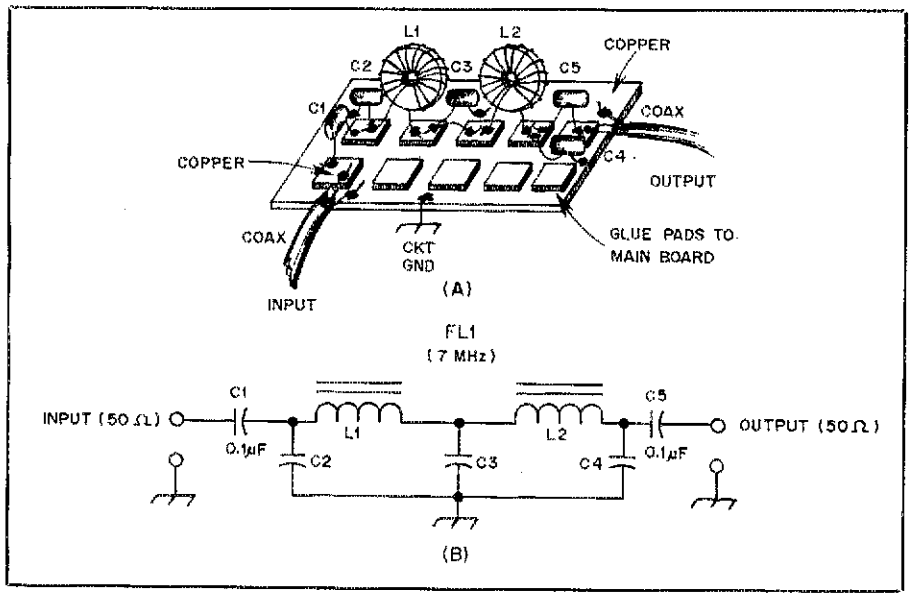



Fig. 2 — Pictorial view of a circuit board that uses the standoff technique as shown at A. A closeup view of one of the standoff resistors is shown at B. Note how the pigtails are bent. The schematic diagram at C shows the assembled circuit displayed at A.

Fig. 3 — Illustration A shows how isolated pads can be glued to a piece of copper-clad pc board to form a simple breadboard. The equivalent circuit is shown at B. A short wire jumper can be used to join individual pads, as shown just below C3 at A.




components are installed. A small amount of copper is removed around each pc-board hole to prevent short-circuiting the component leads to the ground plane.

The "standoff technique" calls for some more haggling at flea markets. Along with the pc-board material we garner in the swap-and-shop area, we must look for high-ohmage 1/4- or 1/2-watt composition resistors. Values from 220 kΩ to several megohms are suitable. Generally, bags of bargain resistors are abundant. Don't worry if the pigtails are short; this type will be just fine, provided the wire leads are each 1/4 inch (6 mm) long or greater.

The purpose of utilizing high-ohmage resistors is to ensure that they act more like *insulators* than as true resistors. Hence, the higher the resistance the better for our application. As a rule of thumb, the resistor being used as a standoff insulator should have a value that is at least 10 times the circuit impedance or value of resistance used at that circuit point. For example, if a resistor is used as a tie point at the 50-Ω output of a circuit, the resistor should be a 500-Ω type, or greater. In the circuit at Fig. 2C we find that R2 is 5.6 kΩ and R3 is 27 kΩ. We will make the standoff resistor, E4, 10 times greater than the smallest resistor, R2, or 56 kΩ. Any value higher than 56 kΩ will work nicely, too. Our only concern for the value of E3, the +9-volt standoff resistor, is that it is high enough in value to minimize the current drain from our power supply. A value of 220 kΩ would draw only 0.04 mA at 9 volts. This is an insignificant amount, even if a transistor-radio battery served as the power source.

Fig. 2A illustrates pictorially how one might apply the standoff technique to wire the circuit shown at C of Fig. 2. Illustration B demonstrates how the resistor pigtails are bent before the component is soldered to the pc-board material. The base circuitry at Q1 of Fig. 2A is strung out excessively. This was done to reduce clutter in the drawing. In a practical circuit all of the signal leads should be kept as short as possible. E4 would, therefore, be placed much closer to Q1 than the drawing indicates.

R1 and R2 of Fig. 2 actually serve two purposes: They are not only the normal circuit resistances, but function as standoff posts as well. This practice should be followed wherever a capacitor or resistor can be employed in the dual role.

### Glue-and-Pad Method

A simple but more time-consuming technique for making circuit boards is illustrated in Fig. 3A. Once again we have chosen a piece of copper-clad pc board as our foundation. The isolated pads consist of small squares of pc-board material, single or double sided. The size of the pads is arbitrary, but the author prefers them to be 1/4 inch (6.3 mm) square. The smaller the pads the more of them can be placed in a given area of the main board. There is no reason the pads can't be rectangular or round. The format will depend on personal choice and the cutting technique available to the amateur.

A power or "armstrong" type of hack saw is perhaps the best tool for cutting the board material into squares. If you have a friend who has access to a model-shop shear, perhaps he will be willing to cut a supply of squares for you during his lunch hour. Phenolic-based pc board will shatter in a shear, but glass-epoxy board with a cloth base will cut evenly when sheared.

Once the squares are prepared they can be affixed to the main board by means of epoxy cement. It can take as long as 24 hours for the glue to set firmly, depending on the brand and grade of cement used.

Noted *QST* author W7ZOI once suggested an alternative method for gluing pads to a pc board. He mentioned hot-melt glue as a faster agent for attaching

the pads to the main board. This type of adhesive is available from hardware stores in small packets. It comes in tubular stick form. A thin slice of the hard glue is shaved from the stick by means of a knife. The glue slice is placed between the bottom of the pad and the top surface of the main board. A soldering-iron tip is pressed against the pad, held there until the glue melts and spreads, then removed.

The shortcoming of this approach is that the glue softens each time a component is soldered to a pad. It requires more than casual care when assembling the circuit components. Epoxy glue will not melt during the soldering process. Also, the completed module will remain intact much longer if epoxy cement is used.

A comparison between the practical and schematic circuits for a simple half-wave hamonic filter is provided in Fig. 3. The pictorial version shows how we might mount the parts when using the glue-and-pad technique. There are some unused pads in the foreground.

### Saw-Slot Boards

For those who subscribe to the armstrong method discussed earlier, a hack saw can be used to cut through the copper on a section of pc board to form isolated pads. This concept was popularized by the author and W1ICP in a *QST* beginner's series which ran from April through September 1974. An example of this technique is given in Fig. 4. The copper must be cut *completely* away where each dark line is shown. This will prevent short circuits between adjacent pads. A hobby Moto Tool can be employed to cut the grid seen in Fig. 4. If this is done, a straight-edge guide will be necessary if a neat job is desired.

### If Etching Is Your "Thing"

A universal pc breadboard can be etched and used many times if one does not mind dabbling with etchant chemicals. A few brown stains here and there on one's garments could fit nicely into our contemporary world of fashion, so maybe the etching technique isn't all that bad!

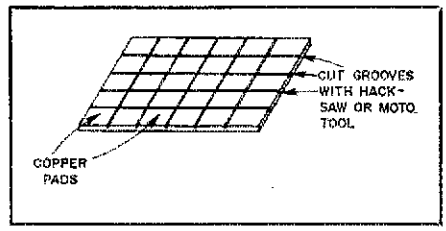
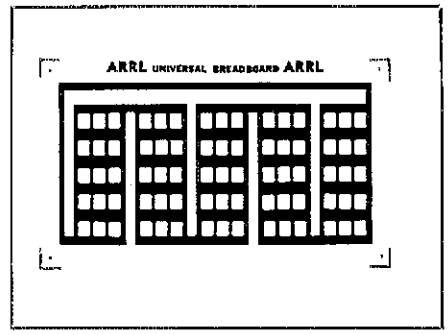



Fig. 4 — Saw-blade scoring of copper-clad pc board material provides isolated pads in this drawing.

Fig. 5 — Suggested pattern for a universal breadboard that can be etched as shown, not to scale. A +V and a ground bus are provided for easy access along the length of the board. See the "Hints and Kinks" section of this issue for a full-size pattern template.




The pattern shown in Fig. 5 is arbitrary. It suits the author's needs handily for circuit experimentation. The smaller pads are suitable for mounting transistors, diodes and other discrete components. The long conductors along the edges and one side of the breadboard are laid out to function as plus-voltage and ground buses. The +V foil has branches that extend through four groups of pads. The ground conductor has similar branches that pass through alternate groups of pads. This helps to keep lead lengths on the various parts to a minimum.[1]

We can use ordinary masking tape as the etch-resist material. Cover all of the copper surface with a layer of tape. Press the tape firmly against the copper by running a smooth object, such as the side of a lead pencil, back and forth across the tape. Next, draw the pattern on the tape. An X-acto knife can be utilized to remove tape sections where the copper must be etched away. All that remains for board preparation is 15 to 30 minutes of etching in ferric-chloride solution. *Do not allow the etching solution to contact your eyes or skin. If it does, wash it off immediately with clear, cool water.*

To ensure reasonable longevity of this type of breadboard, material with heavy-gauge copper laminate should be used. Glass-epoxy insulation is also recommended. If the copper is too thin, repeated soldering will loosen the copper, and stress on the pads will separate them from the main board.

### Some Closing Comments

Needless to say, earlier comments about brown stains on our clothing were offered in a purely jocular vein. Avoid allowing the etching chemicals to splash on your clothing: The stain will be permanent!

There are probably a number of additional methods for fabricating circuit boards quickly and simply. No credit is claimed for originality concerning the procedures described in this article. The purpose of this presentation is to illustrate some of the more common approaches to breadboard fabrication without chemicals. But of greater importance, we've tried to stimulate confidence among those who were heretofore unwilling to engage in home-project work through fear of circuit-board layout and etching. Let's compare brown stains later if we should use ferric chloride. If not, perhaps we can swap high-value resistors or sharpen saw blades together!

[1]Negatives and circuit boards for the breadboard are available from Circuit Board Specialists, P. O. Box 969, Pueblo, CO 81002. Tel. 303-542-5083.

# Strays

### PEDAL POWER

☐ Armed with 100 pounds of camping equipment, radio gear and other supplies, David Howerton, WA7ABI, pedaled into ARRL hq. during a 7400-mile, cross-country bicycle trip which began in Tijuana, Mexico, and ended in Rhode Island. The 35-year-old electrical engineer from Kent, WA, said Amateur Radio played an important part in the 113-day bike journey.

"Ham radio is a natural for traveling because of the distances over which you can talk," WA7ABI said. The cyclist said his W800 Wilson 2-meter transceiver kept him from getting lonely on the solo trip. Howerton also used the airwaves during emergencies and to get directions.

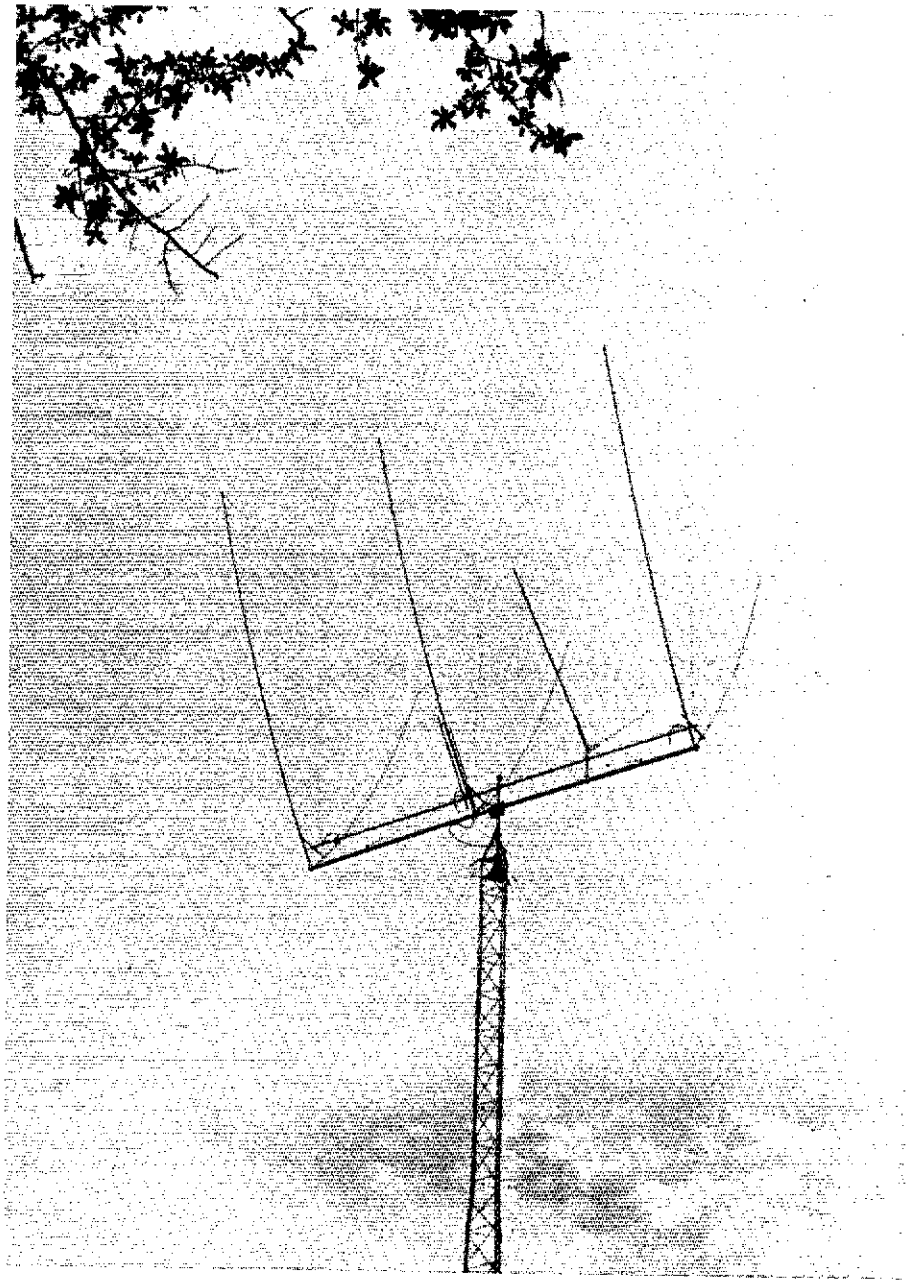
The journey was not without dangers. Howerton barely escaped injury on two occasions. He just missed getting caught in a rock slide during a heavy downpour at Big Sur in California. And while traveling through Yellowstone National Park, WA7ABI was forced to outdistance an elk which charged the bicycle.

WA7ABI plans to bike through Alaska and Europe in the future. "Europeans are used to bicycling," Howerton said. "There are even special paths along main highways (in Europe) for cyclists. In the U.S., one will often have to drive a much longer route because certain bridges prohibit bikes." As lines grow longer at gasoline stations across the country, perhaps more Americans will rediscover two-wheel transportation and join Howerton's pedal-power movement. — *Kevin Wollschlager and Bobbie Chamalian, WB1ADL*

# The Mono-Loop Delta Antenna

## Tired of lossy traps? Want broadband, triband operation? Mechanical ruggedness? The K5NE signal sender is for you! It's designed to put the signal where you want it . . . continually!

By Paul Glover,* K5NE



The three-element mono-loop delta beam perched atop its tower is an impressive array. The smaller fourth element is a parasitic director for 10 meters only. Tuning stubs are used on each of the three triband elements.

Being essentially a 10-meter operator with operational excursions to 15 and 20 meters, I have desired a good monoband beam antenna for each of the three bands. Not being able to realize this ambition, I set about to list the desirable characteristics of an alternative system. In order of priority, these are three-band operation, gain and front-to-back ratio (comparable to a three-element monobander for each band), use of a single feed line, adequate bandwidth, and low vertical radiation angles. Further consideration was given to mechanical reliability, maximum weight of about 50 lb (23 kg) and 12 $ft^2$ (1 $m^2$) of windloading, good general appearance and convenient and practical tuning. It must also be economical and easy to construct with readily available materials.

The popular triband quads and Yagis were considered, but ruled out on one or more points. A form of loop antenna was decided upon because of the gain, front-to-back ratio and bandwidth. It was also decided that an all-metal delta loop could be employed and beefed up mechanically to be reliable. However, three sets of such elements on each of the three bands conflicted with several desired characteristics. These conflicts are resolved through the use of only three elements on the three bands of interest.

### Theory of Operation

Years of spare-time research and work have produced the present mono-loop delta beam antenna. Again, the basic principle of this antenna is the multiband operation of a single loop. Articles have been published relative to such operation, which generally has been accomplished by the insertion of multiple parallel-resonant circuits in series with the loop.[1,2] This method involves critically tuned circuits and tends to introduce excessive losses and mechanical construction problems as well. The operational theory is illustrated in Fig. 1. The three-sided delta loop lends itself well to triband operation. With a

*2805 Janet Dr., Benton, AR 72015

[1]Notes appear on page 36.

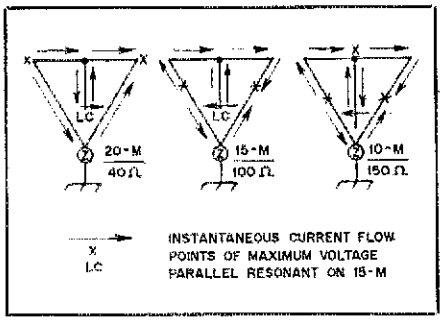



Fig. 1 — Current flow, points of maximum voltage, and impedance vs. frequency are shown above.

48-ft (14.6-m) loop (a full wave on 15 meters), the arrangement shown maintains zero rf potential at the same apex (the feed point) on all three bands. This particular triangular loop results in current distribution about the perimeter, producing maximum possible radiation efficiency relative to the loop area on all three bands. There is an active three-quarter wavelength section on 20 meters, a full wavelength on 15 meters and three half-wavelengths on 10 meters. This all adds up to significant gain — especially on 10 meters. The only lumped-circuit component is a capacitor made up of short lengths of coaxial cable. High-voltage, high-efficiency ceramic capacitors may be used instead. Note that "LC" of Fig. 1 acts as a phase-shift network of 180 degrees on 15 meters and introduces the proper reactance on 10 and 20 meters as well. Several loop configurations have been tried, but other lengths and shapes reduced gain and altered impedance values on one or more bands because they did not exhibit proper current relationships.

## Construction Details

Construction can be varied according to the availability of tools and materials. Generally, small U-bolt assemblies may be obtained from TV-parts stores, large U bolts from auto-parts houses, tubing and small clamps, dowels, eyebolts, etc, from hardware stores. The boom material used is irrigation tubing. Aluminum angle stock is used to construct the yoke for the 10-meter director presented in Fig. 2A. For rigidity, the yoke is clamped by means of U bolts. Commercial boom-to-element clamps are available, making it unnecessary to drill the boom to attach the elements.[3]

In order to obtain mechanical reliability, a secondary boom *must* be used. Use a good, strong center mast with an additional steel-wire support for booms over 12 ft (3.7 m) in length. If the plans are closely followed, the result should be a practically indestructible antenna. When constructing the model shown in Fig. 2B,

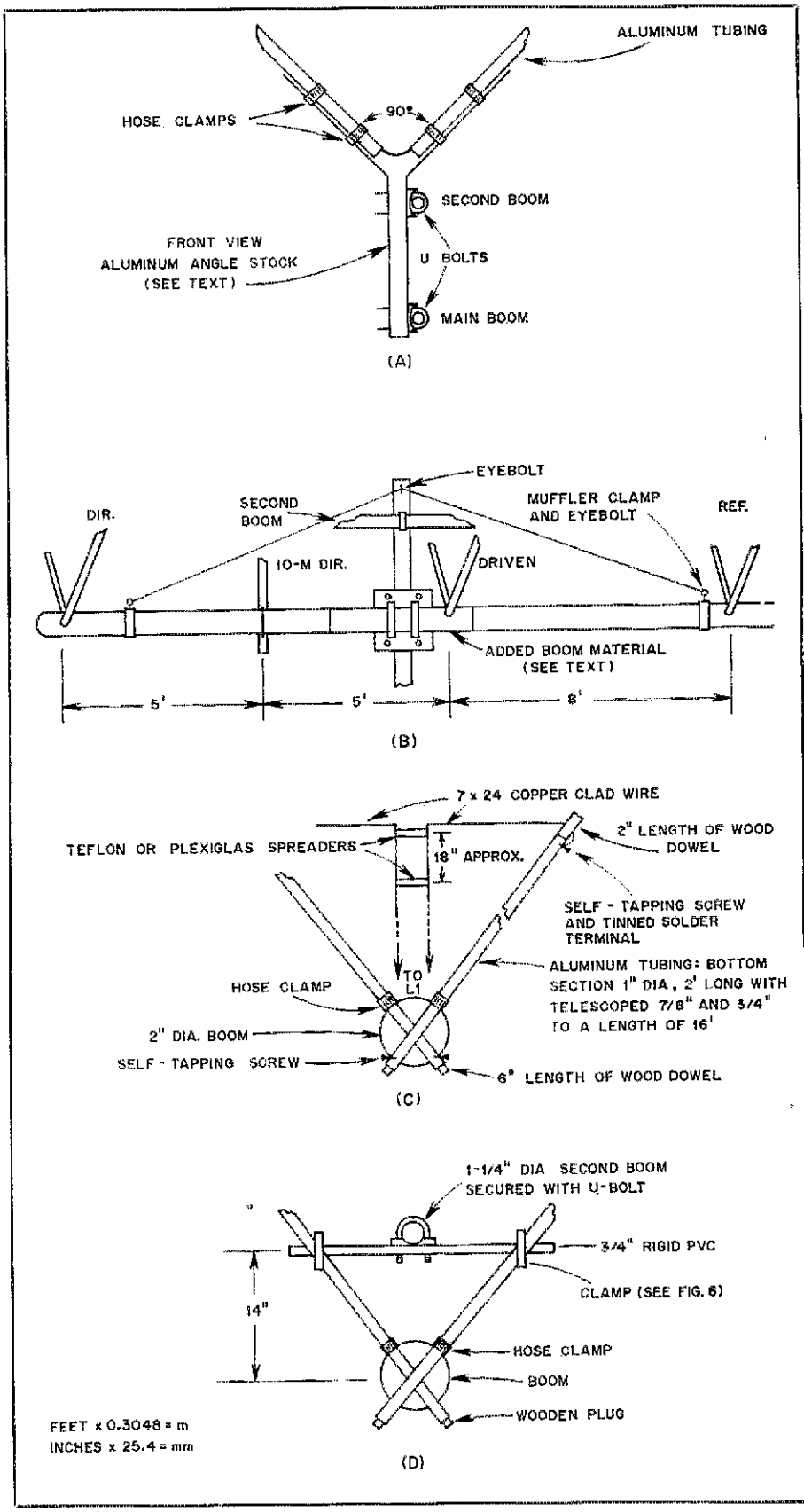



Fig. 2 — At A, aluminum angle stock is used to fashion a 10-meter director support, to which aluminum tubing is clamped. Placed between the driven element and 20/15-meter director, this produces a four-element beam on 10 meters. As shown at B, the three-element (four on 10 meters) array should have additional bracing. The array weighs approximately 40 lb (18 kg) and requires a boom length of over 18 ft (5.5 m). An end view of the boom/element assembly is shown at C. The wood dowel at the element end is drilled to pass the element wire, which is then secured with a self-tapping screw through the tubing and into the dowel. The drawing at D shows how the individual elements are strengthened with crosspieces of PVC tubing secured to the second boom. The hose clamps prevent the tubing from slipping through the boom.

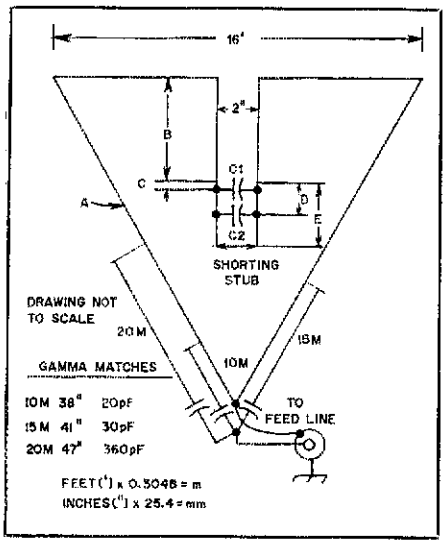



Fig. 3 — Gamma-match and tuning-stub data for the mono-loop delta beam are given here. The drawing shows the layout of the driven element.

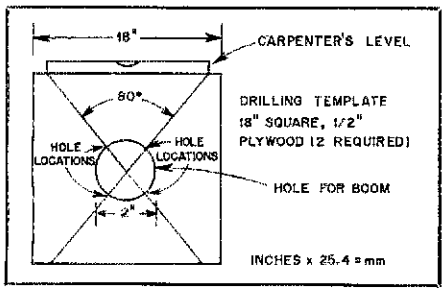



Fig. 4 — The drilling templates are used to locate the element mounting hole locations on the boom. A flat surface should be used to assure accuracy.

**Table 1**

**Dimensions for a Typical Installation**

| | A | B | C | D | E | C1 | C2 |
|---|---|---|---|---|---|---|---|
| Director | 16'0" | 11'3" | 4" | 6" | 2' | 1'4" | 7" |
| Driven | 16'2" | 11'7" | 4" | 6" | 2' | 1'6" | 10" |
| Reflector | 16'4" | 11'10" | 2-1/2" | 4" | 2' | 1'8" | 7" |

The 10-meter director is 7'8" per side. C1 and C2 are the lengths of the trimmed coaxial cable (connecting leads are about 3 in. long).

Variation in any dimension will cause changes in other dimensions for a given frequency, but proper tuning can still be achieved by following the suggested tuning procedure.

The resonant frequencies for the examples given above are 14.3 MHz, 21.3 MHz and 28.6 MHz.

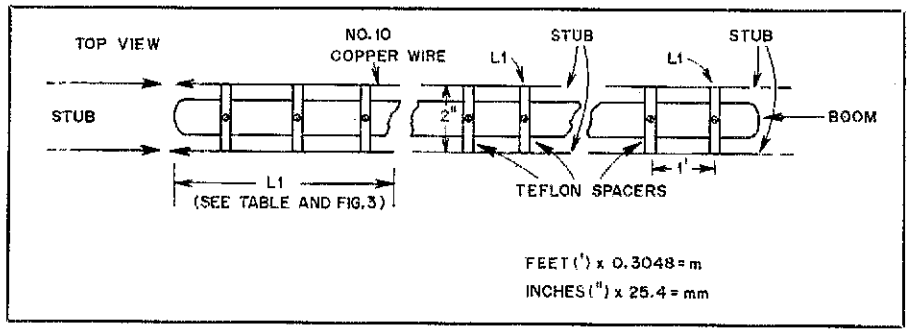



Fig. 5 — L1 for the director, driven and reflector elements is adjusted to lengths given in Table 1 (see Fig. 3).

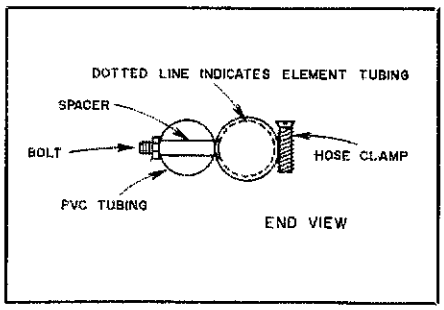



Fig. 6 — An enlarged drawing showing the method of attaching the PVC cross-brace ends to the element arms. The spacer prevents crushing the PVC tubing.

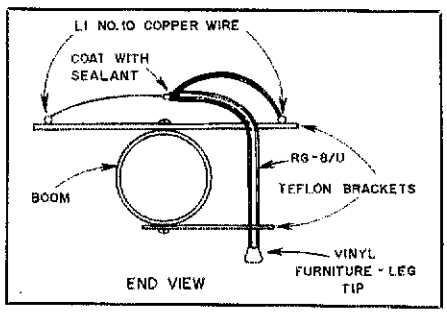



Fig. 7 — The two capacitors made of coaxial line (one shown) are attached to L1 as shown, weatherproofed and secured to the boom with Teflon brackets mounted beneath the boom.

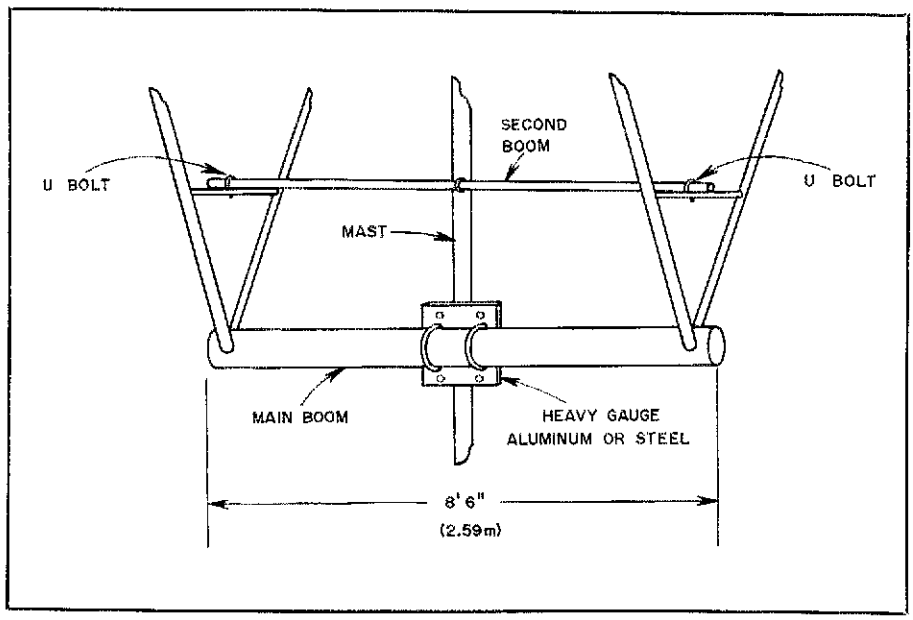



Fig. 8 — A two-element version of the mono-loop delta beam weighs about 25 lb (11 kg). (Gamma match and tuning stubs not shown.)

we used a reinforcing section of 1-3/4 in. (44 mm) steel tubing, 3 ft (900 mm) long, inserted into the main boom at the center and fastened in place with two large, self-tapping screws. The secondary and main booms are bonded together at the extreme ends using the shortest possible lengths of no. 10 wire. Be sure to turn the trimmed side of the dowel toward the bottom as this will allow for water drainage. The self-tapping screws are run through the edge of the boom hole, into the element, and through to the wooden dowel.

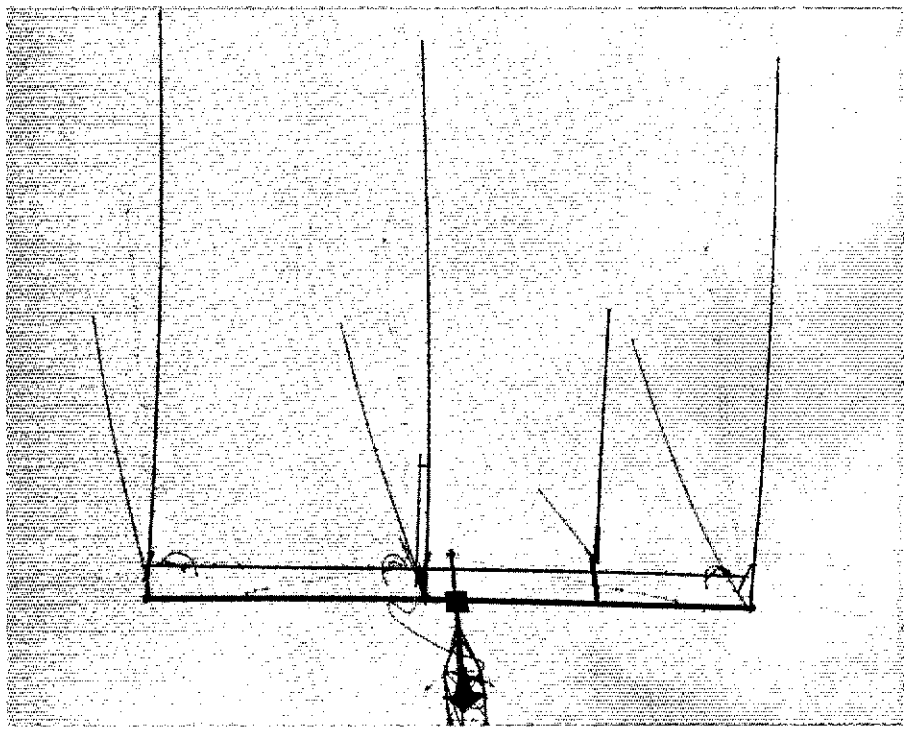
Element construction follows that of other delta-loop antennas. Aluminum tubing is used for the upright arms of each element, while the horizontal portions are made of wire; I chose to use stranded 7 × 24 copper-clad conductor.

Gamma match construction is standard and data are given in Fig. 3. The 20- and 10-meter matches are assembled on one arm of the driven element, while the 15-meter rod is arranged on the opposite arm. It is suggested that the gamma match rods be secured to either the front, back or inside of the driven element, rather than the outside.

When you're drilling the element holes through the boom, your accuracy will be ensured by using a pair of drilling templates. Prepared as shown in Fig. 4, the templates are slipped over the boom.

1) 20 meters: Adjust the element lengths. Maintain stub length at attachment to L1 for proper tension.
2) 10 meters: Position C2
3) Touch-up:
   a) Adjust shorting bar of L1 on 20 meters.
   b) Position C1 on 15 meters.
   c) Position C2 on 10 meters.
   d) Repeat the above procedure until correct.

Fig. 9 — Tuning procedure. The procedure should be followed as outlined above because of interaction of the adjustments. See Table 1.



This photograph gives a close-up look at the construction of the antenna.

The assembly is then placed on a flat plane and checked for evenness with a carpenter's level, the boom marked, and the holes drilled.

Spreaders for the tuning stub, L1, and the 12-ft stub can be constructed of sheet Teflon. [Or Plexiglas — Ed.] The spreaders for L1 are secured to the top of the secondary boom with short self-tapping screws. Refer to Fig. 5. Leave about 12 in. (300 mm) of extra wire on the 12-ft (3.7-m) stub ends so that they can be adjusted to apply proper tension to L1 as element length is varied during initial tuning. The excess is then removed and the stub soldered to L1.

The PVC-to-element clamps are shown in expanded form in Fig. 6. In lieu of the method shown, two hose clamps may be used, one looping through the other; drilling would not be required.

Fig. 7 exhibits the arrangement of the coaxial cables used as capacitors. The ends of the cable must be weatherproofed using a sealer and/or 1/2-in. (13-mm) vinyl furniture-leg tips. Polyurethane shellac is used as an overall coat. The free ends of the coaxial capacitors are supported by short strips of Teflon secured to the bottom of the secondary boom.

A smaller, two-element version of the mono-loop beam is shown in Fig. 8. Gamma matching and tuning stubs are employed in the same manner as the larger model, but the smaller antenna is less than half the physical size and weight of the former.

### Tuning Procedure

A position as high and in the clear as possible should be selected during tune-up. Review the tuning chart of Fig. 9 carefully before beginning. Adjusting for maximum front-to-back ratio is easiest. If adjustment heights of about 12 ft (3.7 m) are used, tune to a frequency 100 kHz below the desired center frequency on 20 meters, 200 kHz on 15 meters, and 300 kHz on 10 meters. When the antenna is raised, the adjustments should be at the correct center frequencies.

An 8-ft (2.44-m) piece of 75-ohm coaxial cable may be inserted between the common input point of the gamma matches and the antenna feed-line connector to effect a somewhat broader frequency response. Coil the cable and secure it to the boom in the most convenient manner. Use an SWR indicator *at the antenna* connection when adjusting the gamma matches on the driven element. Tighten securely when finished. Since a number of adjustments are required during tuning, some assistance will be both necessary and helpful.

Once the adjustments have been completed, you've got an antenna you can be proud of — one made by your own hands and designed to do just what you want it to. Now, go and work that DX station you've been hunting all this time!

**Notes**

[1]Ruckert, "A Triband One-Loop Cubical Quad Element," *QST*, March 1969.
[2]Ruckert, "More on the Triband One-Loop Quad Element," *QST*, "Technical Correspondence," May 1969.
[3]Kirk Electronics, 73 Ferry Rd., Chester, CT 06412.

## Strays

### HAMFEST CALENDAR GUIDELINES

☐ *QST* will list your hamfest in its monthly Hamfest Calendar, free of charge. There are certain guidelines, however.

Hamfests will be listed only once. If the event will occur before the 10th of the month, it will be listed in the previous month's *QST*. If it will occur on or after the 10th, up to the end of the month, it will be listed in that month's *QST*. The deadline for receipt at ARRL hq. of hamfest information is the 18th of the second month preceding publication.

In other words, if your hamfest will occur between November 10 and December 9, the information must be in our hands by September 18 (preferably sooner) to make the deadline for the November issue. If your event will occur between December 10 and January 9, the information should get to Hq. by October 18 for the December issue.

We will acknowledge all information received at Hq. for the Hamfest Calendar with a postcard stating the date of publication. If you do not receive an acknowledgment within two weeks, your letter may never have arrived at Hq., so send us a duplicate copy.

Oh, yes. The Hamfest Calendar is separate from the hamfest section of the Ham Ads. See the first page of the Ham Ads section in this issue for more information. — *Marge Tenney, WB1FSN*

### CONTEST WINNERS ANNOUNCED

☐ The results of the 1979 Radio Society of Bermuda Contest have been tabulated. The winners and their scores are Bermuda — VP9IX, 2,141,300; Canada — VE3BVD, 119,250; United Kingdom — GU5CIA, 329,120; United States — N1GL, 268,025; West Germany — DK5WL, 301,595. Congratulations to all the winners of the 20th annual contest! — *John A. Paradine, VP9CP*

# A Simple Technique for Tower-Section Separation

## Planning to move to a new QTH? Dismantling your tower could be a major operation. This safe and easy technique takes the onus off that project.

By Malcolm P. Keown,* W5XX and Laimon L. Lamb,** K5ZRO

Tower sections that have been in place for long periods of time often seem impossible to separate without the tower being on the ground. It is very difficult to separate sections without some sort of assistance. Various techniques have been tried to develop the necessary mechanical advantage — bumper jacks, pry bars, sledge hammers and others, all of which leave something to be desired. Bent tower-section members and skinned knuckles accented by verbal air pollution are results familiar to many amateurs who have tried these approaches. A simple method that requires a minimum of physical effort without damaging the tower sections is described below.

This procedure requires procurement of a small hydraulic jack and the fabrication of two bearing plates. The plates (Fig. 1) are constructed with 1/4-inch (6-mm) steel plate and 1-1/2 × 1-1/2 × 1/4-inch (38 × 38 × 6-mm) angle-iron stock. The dimensions of the bearing plates must be such that they will fit inside the two sections to be separated at the point where they are joined, with the angle-iron stock fitting across the horizontal members of the sections (Fig. 2). The dimensions of the triangular plate are 9 inches (230 mm) on each side when used with the Rohn 25G tower section. An electrical arc welder is recommended for assembling the triangular plate and angle-iron stock into a single unit. For safety purposes, a chain with a swivel snap is attached to the lower plate with an S-hook being connected to the upper plate. When the plates are in place, they should be fastened together to prevent the upper bearing plate from falling as the upper tower section breaks free during the separation process. A hydraulic jack suitable for this application can probably be obtained locally in most cases. A 1-1/2 ton (1360 kg) jack is adequate for separating the tower sections. The only critical physical dimensions are the base of the jack, which must fit inside the lower bearing plate, and the vertical recessed height of the jack, which must be less than the interior distance between the upper and lower bearing plates when in position. A chain with a swivel snap should be used to attach the jack to the lower tower section during the separation process to prevent the jack from falling accidentally.

*213 Moonmist, Vicksburg, MS 39180
**511 Spring Ridge Dr., Vicksburg, MS 39180

### Gin Pole Needed

Since the jacking plates are somewhat

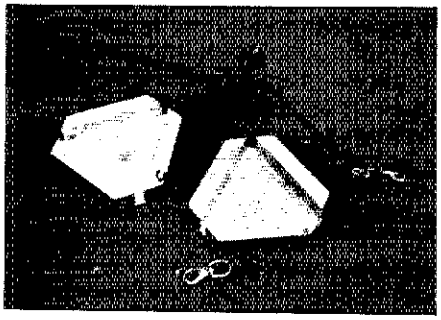


Fig. 1 — Components of tower section separation assembly. Upper bearing plate is in the left portion of the photograph; the lower bearing plate is in the center. The plates are identical except for the chain and swivel snap on the lower plate and S-hook on the upper plate. Note the safety chain and snap on the hydraulic jack.

Fig. 2 — The upper and lower bearing plates must be fabricated such that they fit inside the horizontal members of the tower section.

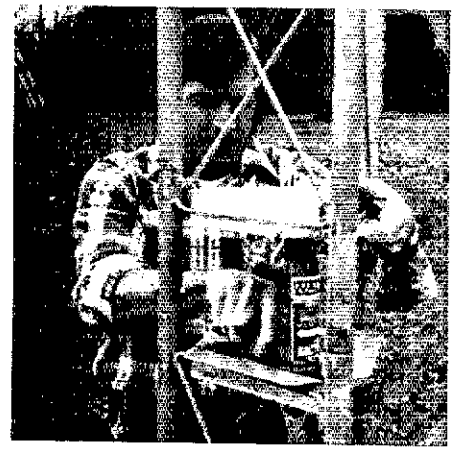


Fig. 3 — Hydraulic jack being placed between upper and lower bearing plates.

Fig. 4 — Safety chain is attached to the upper bearing plate.

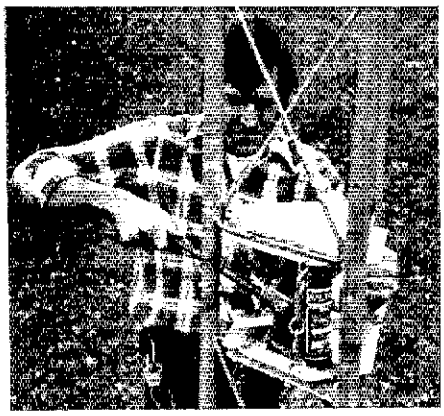


Fig. 5 — With the jack handle inserted, all components of the tower-section separation assembly are now in place. The remaining step prior to separating the sections is to remove the tower leg bolts.

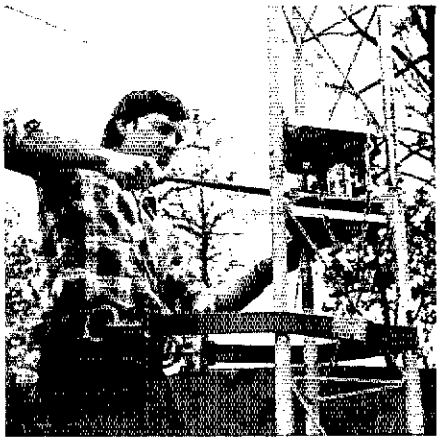


Fig. 6 — Upper tower section being jacked free. Note that the leg bolts must be removed. This photograph was taken for demonstrative purposes.

unwieldly to carry up a tower, a bucket is recommended for transporting the two plates and jack. Prior to putting the tower section separation assembly into place, a gin pole should be attached to the lower tower section and extended until the pulley is above the center of the upper tower section by some 12 inches (300 mm) such that when the section is free it will hang down, but still can be handled by the person on the tower.

Prior to removing the tower-leg bolts, the lower bearing plate should be put into place, followed by the upper plate (Fig. 2). The jack is then positioned between the plates (Fig. 3) and the lower bearing plate swivel snap attached to the upper bearing plate S-hook (Fig. 4). Next, the jack chain is attached to the lower tower section. Last, the handle is inserted into the jack (Fig. 5).

All components are now secured and prevented from falling during the separation of the tower sections. The leg bolts are then removed, followed by the jacking of the upper section (Fig. 6). Moderate tension should be maintained on the gin-pole rope during this operation. There should not be so much tension, however, that the upper section will jerk free with the possibility that the person on the tower might lose control of the section.

After the upper tower section becomes free, lower it to the ground. If a third person is available, a rope can be tied to the lower end of the free section so it may be pulled away from the tower as the section is lowered. This will prevent tower sections from colliding and removing corrosion-retarding materials.

Although the above discussion has been directed toward Rohn 25G stock, the general principle is applicable to any type of tower section where horizontal members at the upper and lower ends of the tower sections permit pressure to be applied with bearing plates. If removing a tower is on your agenda, consider trying this method. Your need to call upon the deity will be forsaken and required effort will be at a minimum.

# Strays

## 9N1MM IS ON TOP OF THE WORLD

In Nepal, a small country located northeast of India in the Himalayan Mountains, is, for most people, a land shrouded in a cloak of mystery thicker than the clouds that blanket Mount Everest. But DX chasers know of Nepal because it is the home of Marshall D. Moran, S.J., 9N1MM, one of the most active — and most sought-after — hams in Asia.

DXers around the world eagerly listen for the signal from 9N1MM. (Nepal has two licensed amateurs — the other is Pradyumna S. Rana, 9N1NFO, the first and only Nepalese ham and a former student of Father Moran.) When Father Moran is on the air, he doesn't have to call CQ. All he says is "Mickey Mouse," and, like an avalanche thundering down the Himalayas, hungry DXers answer.

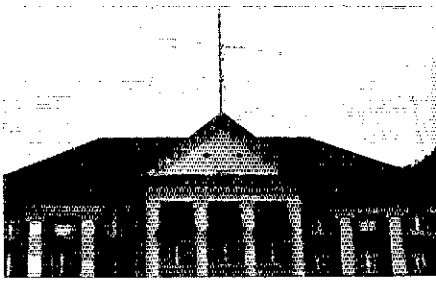
During the lull in activity, Father Moran gave me a tour of his station, located at the Xavier School for Boys in Gadawari. The gear includes Drake twins, a Drake linear and a triband trap vertical antenna. A Hammarlund SP600 JX Super Pro for general listening and a variety of recorders also are set up in the shack.

Autographed photos, diplomas, special awards and thousands of QSL cards wallpaper the shack. The signatures on the photographs read like a White House guest list. Astronauts, ambassadors and film stars have met Father Moran. The King and Queen of Nepal are frequent visitors. Father Moran is the communications consultant for the many famous mountain climbers who journey to Nepal to challenge Mount Everest.

Father Moran has been granted lifetime operating privileges in Nepal by royal decree of King Birendra Bir Bikram Shah Dev. He can operate legally on all bands except 160, but usually can be found on 20 meters between 14.320 and 14.325 kHz.

DXers wait for 9N1MM's signal from his home at the top of the world. Have a little patience and you can work Nepal and QSO with a man who signs off with "God bless" instead of "73." — *Mac Maurer, W1QMS*

Father Marshall Moran, 9N1MM (*left*), journeyed from the peaks of the Himalayas to attend the SEANET convention held in Bangkok, Thailand, in 1977. Pictured with 9N1MM are YB7AAA (center) and BV2A/B.



9N1MM's antenna sits atop the Xavier School for Boys in Gadawari, Nepal. (*WB4NFO photo*)

# Product Review

Conducted By Doug DeMaw,* W1FB

## McKay Dymek DR33C All-Wave Receiver

The McKay Dymek model DR33C is a fully synthesized, solid-state, general-coverage receiver intended for operation in the 50-kHz to 29.7-MHz frequency range. Using up-to-date technology, McKay Dymek has introduced a truly accurate, digital-readout, good-performing "all-wave" receiver at an affordable price. Previously, these features were available with only the most expensive receivers that were produced mainly for the military market. The DR33C receiver is available in either a rack-mount format or a handsome solid-oak cabinet. We reviewed the oak-cabinet version. It is interesting to note that the receiver looked somewhat more at home in the writer's den beside the stereo equipment than in the ham shack! Well, not all communications equipment needs to be ugly.

### The Circuit

It appears as though the McKay Dymek engineers have produced a fairly well designed receiver. A block diagram of the receiver is shown in Fig. 1. The incoming signals are routed through the rear-panel antenna connector (or binding post — user's choice) to a protective 1/16-ampere fuse to the 30-MHz, image-stripping low-pass filter. From there, the front-panel switch labeled "BAND" is used to select the signal path. Position 1 (0.05-29.7 MHz/preamplifier) passes the output of the low-pass filter directly into the rf amplifier; the output of the rf amplifier goes directly to the first mixer. Position 2 (0.05-29.7 MHz) routes the low-pass filter output directly into the first mixer. Position 3 (local) delivers the output of the low-pass filter through a 30-dB, 50-ohm attenuator into the first mixer. Position 4 (2.5-29.7 MHz) channels the output from the low-pass filter through a 2.5-MHz high-pass filter into the mixer. Position 5 (2.5-29.7 MHz/preamplifier) sends the low-pass filter output through the 2.5-MHz high-pass filter into the rf amplifier; the output of the rf amplifier is fed to the mixer. This arrangement allows flexibility when faced with possible overload problems caused by local broadcast stations or strong signals close to the receive frequency.

The first mixer is of the doubly balanced, diode-ring variety and is capable of handling strong signals without producing undue IMD problems. Injection to this mixer is from the phased-locked loop synthesizer. Output from the mixer, at an i-f of 30 MHz, encounters a two-pole monolithic crystal filter that has a bandwidth of 30 kHz. A dual-gate MOSFET amplifier follows this filter. From here the signal is applied to the second mixer, which uses a pair of junction FETs in a balanced configuration. The injection for this mixer is supplied by a VXO centered at 40.7 MHz, producing the second i-f of 10.7 MHz. At this i-f the signal passes through a four-pole monolithic crystal filter that narrows the signal path to 8 kHz at −6 dB and 28 kHz at −60 dB. Another dual-gate MOSFET amplifier follows this filter.

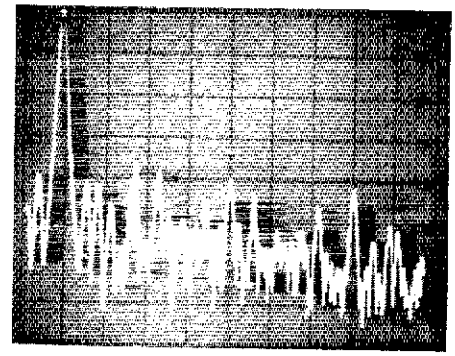
The third mixer position is occupied by a dual-gate MOSFET with a fixed injection frequency of 11.155 MHz. This produces the third i-f of 455 kHz where the main selectivity filters are located. The receiver comes equipped with 8-, 4- and 2.2-kHz wide Collins/Rockwell mechanical filters. Optional filters are 0.4 kHz for cw and 1.2 kHz for RTTY work.

From here, the signal is routed to the i-f amplifier stages, the a-m envelope and age detectors, and to the product detector. The detected audio is amplified, passed through a 5-kHz notch filter (to reduce heterodyne interference) and further amplified before reaching the internal speaker or the headphone or external-speaker connections.

Three VCOs covering the 30- to 60-MHz frequency range (in 30-40 MHz, 40-50 MHz and 50-60 MHz sections) are well buffered and used to supply injection to the first mixer. Front-panel switches program a divider chain that divides the VCO frequency. This signal is compared to a 5-kHz reference (8 MHz ÷ 1600) in a phase detector — the output of which is applied to an active low-pass filter and is used to lock the VCO to the predetermined frequency.

### Using the Receiver

The method used to tune this receiver is a bit different from that used on most ham-band-only receivers. Five knobs are used to select the desired receive frequency. The far-left knob is used to select the MHz digit, the second knob (next one to the right) selects the 100-kHz digit and the third knob is used to select the 10-kHz digit. The fourth knob operates a bit differently than the other three. It is a 20-position switch that selects the 1-kHz digit in 5-kHz steps. The fifth knob is also different from the others. This knob controls a multiturn potentiometer and is referred to as the fine-tune control. The range of this control is 5 kHz with approximately 1 kHz of over-travel on each end. For someone who is accustomed to tuning a conventional amateur hf receiver this may take some getting used to. For example, in order to tune an entire ham band, at least three of the tuning knobs will have to be used.

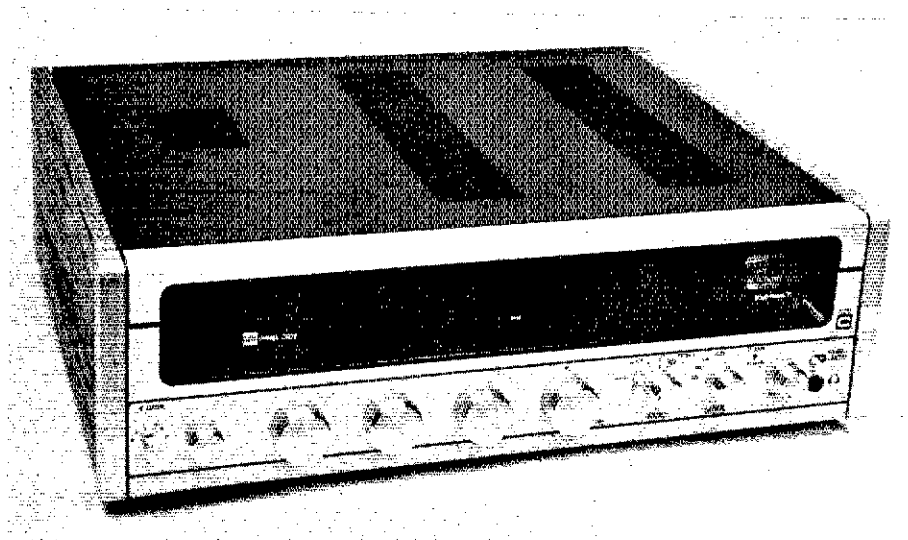


Spectrum-analyzer display of the DR33C VCO signal at roughly 45 MHz. The tall pip to the left is the main signal. Each horizontal division is 100 Hz and each vertical division represents 10 dB. An analyzer filter bandwidth of 10 Hz was used for this measurement.

The large digital-frequency display is quite enjoyable to use. The frequency readout is easily visible from across an average-sized room. This contrasts many of the systems used on commercial amateur equipment. Readout is to the nearest 100 Hz and the last two digits of the display will blink on and off should you approach the end of the fine-tuning potentiometer range. This warns the user that he should switch to the next higher or lower 5-kHz segment.

Receiver performance tests were performed

The McKay Dymek DR33C receiver.



*Senior Technical Editor, ARRL.

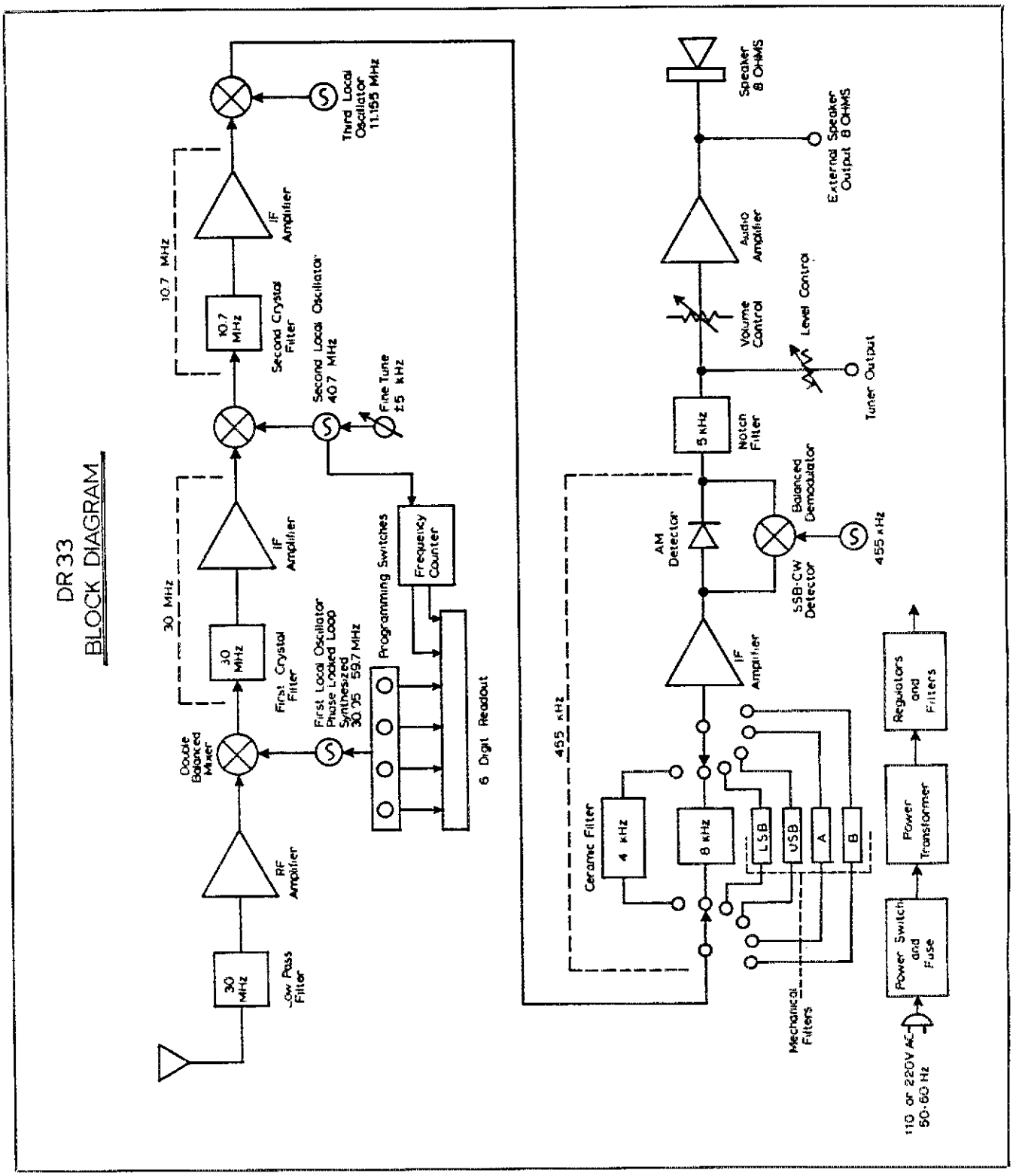



Fig. 1 — Block diagram of the McKay Dymek DR33C receiver as shown in the owners manual.

as outlined by Hayward.[1] A set of data was taken on both 80 and 20 meters using the 400-Hz bandwidth filter. The numbers were as follows: 80 meters: noise floor of −137 dBm, blocking dynamic range of 100 dB and IMD dynamic range of 85 dB. For 20 meters: noise floor of −138 dBm, blocking dynamic range of 101 dB and IMD dynamic range of 90 dB.

[1]Hayward, "Defining and Measuring Receiver Dynamic Range," July 1975 *QST*.

Throughout the use and laboratory testing phase of this review it was felt that the receiver suffered from excess VCO noise. As a result, the output of the VCO was checked with the spectrum analyzer. A spectral photograph of the synthesizer output is shown with this review. A relatively high level of noise can be seen off to the side of the main signal. This noise can cause reciprocal mixing problems and is likely responsible for the relatively poor blocking dynamic range performance. The problem appears to stem from the fact that the PLL system is used as the only means for controlling the oscillator frequency. Had "coarse steering" of the VCO been used, the level of noise could probably have been significantly reduced.

All in all, the receiver performed quite well, especially when its intended purpose is considered. While it may not be suitable for serious ham-band-only work, it would be a welcome addition to the shack of anyone who

**McKay Dymek DR33C All-Wave Receiver**

*Claimed Specifications*

Frequency coverage: 50 kHz to 29.7 MHz.
Reception modes: A-m, usb, lsb, cw and RTTY (with external converter).
Sensitivity (400 Hz BW): 100 kHz — 1 μV.
200 kHz — 0.5 μV.
400 kHz-20 MHz — 0.25 μV.
20 MHz-29.7 MHz — 0.35 μV.
Frequency stability: ±40 Hz at a constant ambient of 25°C in any 8-h period after 0.5-h warmup.
Image rejection: 70 dB.
Bandwidths: A-m 8 kHz — 8 kHz at −6 dB and 28 kHz at −60 dB.
A-m 4 kHz — 4 kHz at −6 dB and 10 kHz at −60 dB.
Usb or lsb 2.2 kHz — 2.2 kHz at −3 dB and 3.1 kHz at −60 dB.
Cw 0.375 kHz (optional) — 0.375 kHz at −3 dB and 3.5 kHz at −60 dB.
RTTY 1.2 kHz (optional) — 1.2 kHz at −3 dB and 8.0 kHz at −60 dB.
Audio notch filter: 5 kHz at greater than 25 dB.
Audio output: 2 watts at 4 ohms.
Power required: 110-120/220-240 V ac, 50-60 Hz, 30 W.
Dimensions: 17-1/2 × 5 × 15 inches (445 × 127 × 381 mm).
Weight: 16 lb (7.3 kg).
Price class: $1500.


The Yaesu CPU-2500RK 2-meter fm transceiver shown with keyboard mic, YM-2500.

is interested in short-wave listening. Several variations of this receiver are available from the manufacturer. One model, without the digital readout (DR55), is considerably less expensive than this model. For additional information contact McKay Dymek Company, 111 So. College Ave., P. O. Box 5000, Claremont, CA 91711. — *Jay Rusgrove, W1VD*

## YAESU CPU-2500RK 2-METER FM TRANSCEIVER

Billed as the fm transceiver that does practically everything, the CPU-2500RK *should* do just about anything a 2-meter op could want! The heart of the '2500 versatility is a *central processing unit*, thus the name "CPU." This processing unit, actually a small, dedicated microprocessor, helps provide some of the more esoteric functions featured in the '2500.

What functions are we talking about? Well, besides PLL synthesis of 800 5-kHz frequency steps covering the entire 2-meter band, there are four programmable memories, an automatic scanner, automatic or manual tone burst, two power levels (3 or 25 watts), and an optional subaudible tone-guarded squelch (TGS). The frequency display is a medium-sized LED type, one that also displays the number in a memory, if one is in use.

**Yaesu CPU-2500 2-Meter FM Transceiver**

| *Claimed Specifications* | *Measured in ARRL Lab* |
|---|---|
| Frequency coverage: 144-148 MHz. | |
| Power output: 25 watts (high), 3 watts (low). | 30 watts (high) @ 13.6 V. |
| Spurious emissions: Better than 60 dB down. | (See photo.) |
| Receiver sensitivity: 0.3 μV for 20 dB quieting. | 0.3 μV for 20 dB quieting. |
| Receiver selectivity: ±6 kHz at 6 dB down, ±12 kHz at 60 dB down. | |

Antenna impedance: 50 Ω.
Audio output impedance: 8 Ω.
Microphone impedance: 600 Ω.
Tone-burst frequency: 1800 Hz (U.S. model).
Power requirements: 13.6 V dc at 0.5 A (receive), 6 A (transmit).
Dimensions (HWD): 3 × 7-1/2 × 11-1/2 inches (76 × 191 × 292 mm).
Weight: 3.2 lb (1.5 kg).
Price class: $600 (CPU-2500RK — including YM-2500 mic), $16 (YE-17 mic).

### Features

Operating flexibility is the name of the game with the CPU-2500RK. As with a few other new amateur transceivers, the '2500 contains an optically coupled frequency selection system that uses a photo-interrupter to QSY up or down. This is done with two opto-isolators and a disk attached to the click-stopped frequency "dial" knob. The clear plastic disc is opaqued at uniform intervals that coincide with the click stops on the dial mechanism. As the dial knob is rotated, the opto-isolators are alternately enabled and inhibited as the opaque areas on the disc pass through the light path. This assembly is designed so that, depending on the direction the dial knob is turned, one opto-isolator is interrupted slightly before the other. This is sensed by the PLL control unit, and the CPU-2500 QSYs up or down accordingly.

A built-in CPU gives the '2500 some "smarts" that can help prevent you from inadvertently transmitting outside the amateur band. The CPU automatically inhibits the transmitter when the dial is tuned above 147.4 MHz while the +600-kHz transmit offset is selected. Likewise, dial frequencies below 144.6 MHz with the offset switch on the −600-kHz position will also keep you from transmitting. Of course, the CPU-2500 can't be expected to keep track of subbands, so the neophyte should memorize the OSCAR, cw, and small-signal frequency segments so as not to incur the wrath of other 2-meter spectrum users. (No amount of highfalutin circuitry can substitute for common courtesy.)

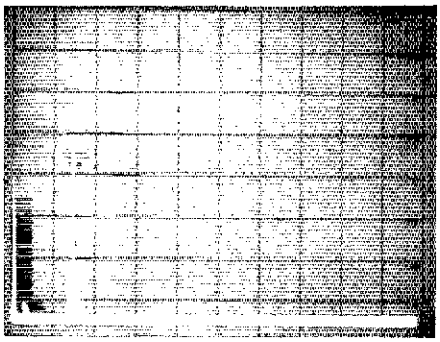
If you desire to work through a repeater that has a split other than the standard ±600 kHz, two "SFT" positions on the offset switch allow selection of any desired offset frequency so that unusual splits can be accommodated.

The scanner feature of the '2500 can be used to scan up or down the band or to scan only the four memory channels. "Auto" scan can be selected, causing the receiver scanner to stop on the first busy or clear channel, depending on your wishes. Selection of the "manual" scan mode causes the scanner to scan continuously until interrupted by a press of the PTT switch or the "call" button on the front panel.

In addition to the S meter, which also displays relative power output during transmit periods, the '2500 also sports an "on the air" light, and a "busy" light. The latter indicates that a particular frequency is being used. This kind of indicator would be redundant in most rigs since the operator should be able to *hear* the activity on the receiver. However, this feature is useful in providing an indication of channel usage when the CPU-2500 is equipped with the optional tone-guarded squelch (TGS) circuit.

### Circuitry

The receiver section of the CPU-2500 isn't too much different from that in the FT-227 or even that of the FT-127RA (reviewed in *QST*



Transmitter output of the CPU-2500RK as displayed on a spectrum analyzer. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. The large pip near the left side of the photo is the fundamental, attenuated approximately 33 dB by a two-cavity notch filter to prevent overload distortion in the analyzer. The most significant spurious emissions appear to be i-f related, being ± 10.7 MHz from the fundamental, and down about 63 dB with respect to the unnotched fundamental. The only harmonic emission of great enough amplitude to be seen above the "grass" is the second (approximately 290 MHz) just barely visible at more than 72 dB below the unnotched fundamental. The CPU-2500RK complies with current FCC regulations regarding spectral purity. All tests were made in the ARRL lab.

for August 1979). The first rf amp (3SK51) is followed by a four-pole band-pass filter contained in a single shielded enclosure. Following this is another 3SK51 dual-gate MOSFET used as the first mixer stage. Local oscillator energy is supplied to this mixer from the PLL unit. The signal (now at 10.7 MHz) then passes through a two-pole monolithic crystal filter, a 3SK40 i-f amp and a ceramic filter before going to the second mixer. A bipolar (2SC1815) second mixer is used to convert the signal to the 455-kHz second i-f. From here, the signal passes through two ceramic filters and four stages of i-f amplification before reaching the discriminator and audio-amplifier stages.

There are nine basic assemblies inside the CPU-2500. Each pc board contains multi-pin connectors, and interconnecting cables are fitted with matching plugs. This arrangement should make servicing the CPU-2500 much simpler than many of the older 2-meter rigs.

### Your Mic Does What?

Perhaps one of the most unique features of the CPU-2500RK is the keyboard microphone, YM-2500. This microphone is plugged into a 20-pin rectangular socket located on the right side of the chassis. (An optional "standard" mic (YE-17) is also available. This plugs into a six-pin microphone jack on the front panel.) Operation of the CPU-2500RK with the keyboard mic takes some practice. The YM-2500 push-button array is quite small and compact, making it fairly easy to press the wrong button — or even two at the same time — especially during mobile use. In addition to the 19 buttons on the front of the YM-2500, two more are situated on top of the mic. These control the up and down scanning of the receiver, as do identical buttons located in the same spot on the stock mic.

Operating features available with the keyboard mic are quite impressive: frequency storage in memories, memory recall, memory scan control, and operating-frequency entry — not to mention the ubiquitous tone-encoder pad, also included. In fact, the YM-2500 lets you operate the CPU-2500 almost entirely without touching the front panel of the rig. Unfortunately, it is still necessary to manually switch from +600 kHz to −600 kHz transmit offset when going from a 147-MHz repeater to one in the 146-MHz segment of the band. The transmit offset cannot be programmed into memory or into the "dial" with the YM-2500, so scanning of several repeaters not all located in the same band segment is impossible.

Another disadvantage in the design of the CPU-2500/YM-2500 is the lack of some type of keyboard "lock" to prevent inadvertent entry of something from the mic keyboard. This kind of accident occurred several times when I was using the '2500 mobile. I'd be carrying on a conversation with someone on a given repeater and all of a sudden realize that the transceiver had "jumped" into scan mode and locked in on another repeater, leaving my QSO kHz or even MHz away! (It should be pointed out that the CPU-2500RK *will not transmit while scanning*.) Apparently others have commented to Yaesu on this, as I am told that future models with the keyboard frequency-entry feature *will* in fact contain a locking circuit to prevent such mishaps. (For example, the new FT-207R has this feature.)

### Operation

On the bright side, the '2500 seems to be extremely clean, spectrally speaking. In fact, it is one of the cleanest 2-meter, 25-watt transmitters we have checked to date. (See the spectral photo for details.)

Other than the difficulties experienced with the keyboard mic, operation was quite smooth and predictable. The front-panel controls have a positive "feel," especially the audio gain and squelch controls, which are mounted concentrically at the bottom left corner of the panel. The only thing I wished for here was a little more "finger room" so that the squelch could be adjusted a bit more easily without disturbing the volume control or getting caught on the side of the offset switch. (This should cause problems only for those operators with large hands.)

The exact procedure used to program the memories, recall them, scan them, and so forth with the keyboard mic would take a considerable amount of space, so I won't include that explanation in the review. The instructions in the manual provide sufficient information to get you on the way to proficient operation of the CPU-2500RK.

In addition to the controls visible on the front panel and on the keyboard mic, there are several small slide switches located on the bottom of the enclosure, and a single one on the rear apron. The three switches on the bottom side are recessed, making them less-natural targets for knees or other misplaced objects. One switch selects power-output level (either 3 or 25 watts), one places the tone-burst feature in the "call" or "burst" mode, and the third turns on the TGS, if that option is installed. The tone-burst "call" mode is essentially a manual mode, where a front-panel "call" button is used to activate both transmitter and tone-burst encoder. With the switch in the "burst" position, a short tone burst is generated at the beginning of each transmission, starting when the PTT switch is pressed. Although located on the bottom side of the chassis, these controls are still quite accessible, as long as you don't install the CPU-2500 *in the dash* — flush mounted — as some security conscious fmers do.

The rear panel contains the single slide switch mentioned earlier (used to turn on and off the memory backup-power feature), an external-speaker jack, rf-output connector and dc-power jack. Concerning the latter, Yaesu should get a gold star for using a two-pin connector with threaded sleeve. This should keep the attached power cord from popping out or wiggling loose, as some tend to do.

### Details

Packaging of the CPU-2500RK is excellent. The entire enclosure is metal, with fancy slip-out mounting brackets located on the side panels. If you haven't seen these brackets yet, it's almost worth a trip to the local ham dealer's shop just to check them out. (Not to mention the fact that you'll likely get to play with the rig, too!) A half turn of the knurled knobs on the sides of the rig are enough to loosen the mounting bracket, and the rig simply slides out of the tracks! Disconnection of power and antenna cables from the rear panel complete the removal of the CPU-2500RK from a mobile installation.

In general, other than the problems already mentioned, the CPU-2500RK was a dream to use. All amateurs I talked to gave excellent audio reports; receiver selectivity and sensitivity seemed to be more than adequate. Lab tests performed on the transceiver confirmed the claimed sensitivity of 0.3 μV for 20 dB quieting (lab measurement made at 146.52 MHz). No intermod problems were experienced during the review period, although the rig was used in a number of well-known "intermod alleys."

### The Manual

One last area that deserves specific mention is the owner's manual supplied with the CPU-2500RK. Some of the Japanese manuals I have seen in the past have left a lot to be desired, and comments in past *QST* Product Reviews have indicated a general lack of information in many amateur equipment manuals. Apparently Yaesu has been listening, for the CPU-2500RK manual is one of the better ones supplied with a rig in this class. For a change, the schematic diagram is fairly large and more easily readable. The maintenance and alignment section contains procedures for transmitter and receiver alignment. Here, photographs of individual pc boards are labeled with part-number designations and pointers, making it easier to trace a circuit and replace a defective part. Although the photographs in this section aren't nearly as large and detailed as those found in factory service manuals, they are certainly a step in the right direction. The manual warns that "under no circumstances should (the PLL control) circuitry be touched for alignment purposes." Perhaps to help reduce temptation, Yaesu does not show this circuitry in the schematic diagram, either. All in all, the CPU-2500 might be described as "the 2-meter fm rig with all the bells and whistles included" . . . and if that's what you desire, then this Yaesu should be on your shopping list. — *Jim Bartlett, K1TX*

## TEMPO K6FZ 20-METER LOOP ANTENNA

The K6FZ loop antenna nearly fulfills the impossible dream of the apartment-dwelling ham a 20-meter beam. This aerial is a full-size half

wavelength loop, yet it is only eight feet square and small enough to be mounted in the minimal space available in the confines of an apartment or condominium. The loop is intended for mounting in a horizontal plane. It has some forward "beam-like" gain and a front-to-back ratio.

Assembly of the antenna can be completed in less than 15 minutes; however, there is one pitfall to avoid. The sections of the loop are held together at its four corners by snap-on connectors that are enclosed by rubber covers. Since each corner connector is concealed, the manufacturer has designed a way to be able to tell visually whether or not there is a good connection. To ensure that each section is actually making contact with the connector, each rubber cover must have a large bulge. A small bulge is not sufficient; I mistakenly thought that the small bulge was sufficient and found that the antenna would not load properly. I had to tap each corner with a hammer to obtain a larger bulge, which indicated a good connection.

**Loop Performance**

New England was in the throes of winter when the antenna was mounted on the roof, so it was put up as quickly and easily as possible. The loop was mounted approximately five feet above the roof amongst four other antennas of various sizes and heights, certainly not an ideal location. A matching network for the loop is housed in a fiberglass enclosure, as an integral part of the antenna. A built-in tuning knob permits selection of the center frequency, while a sliding stub adjustment can be set for minimum VSWR. I adjusted both at their midpoints, got off of the icy roof and loaded up. The SWR was 1:1 at 14.175 MHz. At the band edges (14.0 and 14.35 MHz), the SWR was 2.4:1 and 2.9:1, respectively. That was a pleasant surprise! If the antenna had been mounted higher and away from the other antennas and if more precise adjustments were attempted, the SWR bandwith might have been even better.

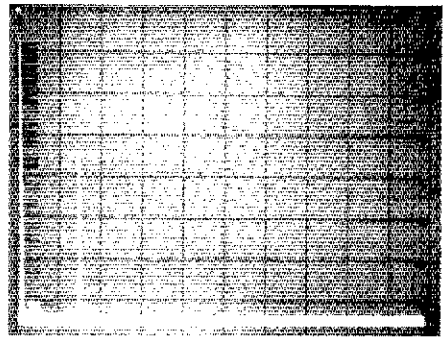
I tuned up and down 20 meters comparing the loop with a dipole mounted approximately 30 feet above the ground. On the average, the signals heard off the front end of the loop were one to two S units better than the same signals heard with the dipole. My transmitted signal elicited similar reports. The antenna is designed to have front-to-back ratio on the order of 1-1/2 S units, and this was also apparent when the antenna was rotated.

A unique feature of the antenna construction is the use of fiberglass in the loop element sections. This makes the antenna lightweight (less than 10 pounds), and permits it to be turned easily with an inexpensive TV rotator.

The Tempo F6FZ loop antenna feed-point impedance is 50 ohms at resonance, and the antenna has a power rating of 2000 watts PEP. It is a relatively expensive unit, in the $160 price class. The K6FZ 20-meter loop is distributed by Henry Radio, 11240 West Olympic Blvd., Los Angeles, CA 90064. (A 10- and 15-meter snap-on adaptor will be available soon, permitting the antenna to be used on all three low bands.) — *Stan Horzepa, WA1LOU*

## KLM PA 15-80BL 2-METER LINEAR AMPLIFIER

Making the conversion from tube-type amplifiers to solid state is difficult for the amateur who has grown accustomed to vacuum tubes. You know . . . the light from the filament, the glow of the plate, meters indicating current, the flashing of mercury-vapor rectifiers, and all those things we once learned to like in tube-type amplifiers. My first impression of a solid-state amplifier was, "How can a little box like that put out 80 watts?" The first indication of power is the Teflon-covered wire (no. 12 AWG) used for hook-up to the 13.5-V dc power source. The next was an indication on the rf wattmeter. Even after testing and operating, it's still quite amazing to see such a small box delivering 80 watts of rf output.

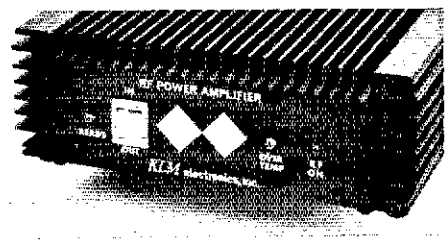


Spectrum-analyzer photo of the output of the KLM PA 15-80BL. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. The fundamental was attenuated approximately 34 dB by two notch cavities to prevent overload distortion in the analyzer. The only spurious emission visible above the "grass" is the second harmonic, which is about −72 dB with respect to the unnotched fundamental. This measurement was made in the ARRL lab with the device operating at maximum rated output on 144 MHz. The PA 15-80BL complies with current FCC regulations pertaining to spectral purity when driven with an rf source also meeting these regulations.

**KLM PA 15-80BL 2-Meter Linear Amplifier**

*Claimed Specifications*

Frequency coverage: 143 to 149 MHz.
Class of service: "AB" linear.
Rf input (usable): 5-15 watts (15 maximum).
Rf output (minimum): 80 watts with 10 watts of rf drive.
Power requirements: 13.5 V dc (usable from 11 to 14.5 V dc), at 10 A.
Input impedance: 50 Ω.
Input VSWR: 1.4 from 144 to 148 MHz.
Duty cycle: ICAS (Intermittent Commercial Amateur Service).
Rf connectors: SO-239 (UHF female).
Circuit protection: 15-A fuse.
Dimensions (WHD): 7 × 2.38 × 7.50 inches (178 × 60 × 191 mm).
Price class: $190.
Weight: 5 lb (2.3 kg).
Manufacturer: KLM Electronics, Inc., 17025 Laurel Rd., Morgan Hill, CA 95037.



The KLM PA 15-80BL amplifier rests on four rubber feet. Power-supply connections are located on the rear panel, and only one control is required to switch the device in and out of the line.

A front-panel switch turns the amplifier on, and this state is indicated by a green READY LED. When rf is applied, a red RF ON LED will indicate that the rf supplied to the input is being amplified. If the amplifier is not needed, turn the front panel switch off and the amplifier is automatically bypassed, providing straight-through operation to the antenna. The only remaining indicator is a yellow OVER TEMP LED controlled by a thermostat which also automatically switches the amplifier off if the transistor-flange temperature exceeds 160°F (71°C). This may happen if the amplifier is pushed beyond its ICAS rating and/or if air circulation around the heat sink is inadequate. The amplifier can be reset by toggling the IN-OUT switch. The only audible sound during operation is the click of the internal rf-sensing relay, which is similar in operation to the VOX relay used in many transceivers. This relay has a time delay that is adjustable through an access hole in the rear panel. If remote keying is desired (such as for low-level ssb) 9- to 15-V dc can be applied during transmit to the REMOTE phono jack on the rear panel. This provides normal delay, but locks up the relay so that low average ssb input levels do not cause premature dropout.

Using a 2-meter, all-mode transceiver with VOX for ssb and cw allows the operator more freedom from switch throwing. This is helpful for OSCAR (satellite) operating that requires several hand manipulations during a pass. All modes (cw, ssb, a-m, and fm) were used during testing and found to be quite acceptable, with favorable reports received. Spectrum analyzer photographs of the transmitted signal are shown elsewhere in this review.

This new style amplifier (type 2 heat sink) has a one-year parts and labor warranty. Service is an important consideration when investing in Amateur Radio gear, and this warranty certainly looks attractive compared to the 90-day warranty offered by many equipment manufacturers.

Converting from tubes to solid state was not as difficult as expected. The ease and convenience of operating the PA 15-80BL makes it one of those "How come I waited so long to go solid-state?" rigs. After operating the amplifier almost daily for the past month, I only have one question. What do I do with my 5894 tube amplifier that is sitting in the corner collecting dust? — *Bernie Glassmeyer, W9KDR*

# Hints and Kinks

Conducted By Stuart Leland,* W1JEC

## THE NO-MATH METER — A VOM

There is no need to fuss with math to determine the values of shunts and multipliers when building a VOM. When I recently built this volt-ohm-milliammeter for a friend, I tried an easier approach that resulted in almost instant accuracy.

Everything except for a few pin jacks came from my junkbox or the well-stocked collection of W7NDC. The meter, as shown in the photograph, is built in a wooden box 5 × 8 × 2-1/2 inches (127 × 203 × 64 mm). The panel is 5/32-inch (4-mm) Plexiglas. A piece of 1/8-inch (3 mm) Masonite serves as the bottom panel.

The 30-division scale of the 0-3 milliampere meter face lent itself to establishing ranges of 30 and 300 V ac; 30, 300 and 900 V dc; one range of 150 milliamperes and an ohms range. A four-position rotary switch serves as the function switch. The ohms-adjust control is a potentiometer salvaged from an old TV set.

Having another VOM is necessary when constructing this project in order to determine the values of the multiplier resistors R1 through R3, R4 (the shunt) and R7 and R8. The lowest voltage range is checked first. At the point where the multiplier resistor is to be connected, insert a potentiometer by means of alligator clip leads. With a known voltage applied to the test prods, the potentiometer is adjusted until the meter needle rests at the proper spot on the scale. There is no need to apply full-scale voltage to set the multipliers.

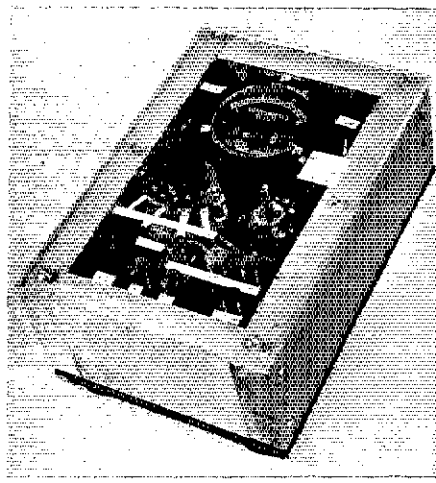
When the meter needle correctly indicates the applied voltage, the clip leads are removed and the resistance of the potentiometer at that setting is measured. A resistance equal to that of the potentiometer is soldered in place. Each successively higher range is completed in exactly the same manner. In the higher ranges, it may be impossible to measure the value of the variable resistance accurately. A solution is to place two potentiometers in series. The resistances added together determine the total resistance of that multiplier.

The shunt, R4, for the milliammeter function is wound with no. 28 enameled wire on a 1-megohm, 1-watt resistor. Obtaining the proper value for the shunt is a matter of cut and try. For a starter, a good length of wire for the shunt is 5 to 6 feet (1.5 to 1.8 m). Resistance of the shunt will be 1 to 3 ohms, or even less.

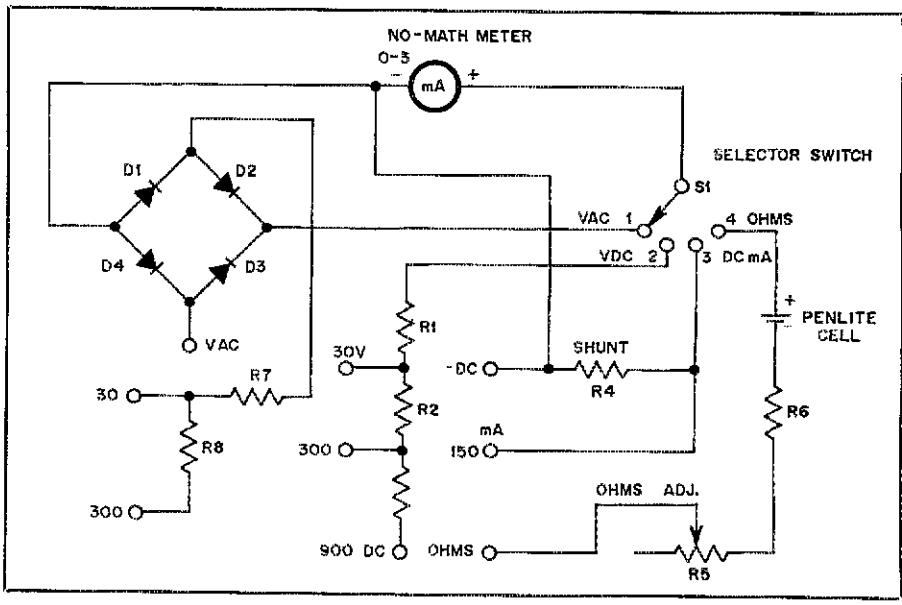
In order to determine the correct shunt resistance, a series circuit is arranged with one dry cell, the milliammeter in the auxiliary VOM, and a potentiometer having sufficient resistance to limit the current flow to a safe value for the meters. Because even short extender wires will affect the shunt resistance, the shunt is lightly soldered in place without additional wire. The series test circuit is next opened and the two meters are connected in series. By means of the variable resistance, the current flow can be set to a value that comes closest to a calibration point on the meter under construction. (Several properly calibrated milliammeters in a series circuit will all show the same current.) A proper reading is obtained by lengthening or shortening the shunt winding. If the meter reads too high for the current flowing, the shunt resistance must be lowered by shortening the winding, and vice versa.

A single penlite AA cell holder is screwed to one side of the box beneath the panel. The cell is used for the ohms function. The ohms-adjust control is of the order of 500 to 1000 ohms. This, in series with a 200- to 400-ohm resistor, R6, makes for a smooth zero adjustment. The meter indicates 750 ohms at center scale. This function works well for continuity testing, checking for shorts or opens and determining whether a resistance is high or low.

Typed labels for the switch and pin jacks may be Scotch taped to the underside of the Plexiglas panel. This meter is sufficiently accurate for most uses around the shack. For the price, you can't beat it. — *Al Lafky, K7YY, Spokane, WA*



The No-Math Meter, a useful VOM constructed from spare parts. Components are visible through the Plexiglas panel. This is the work of K7YY.



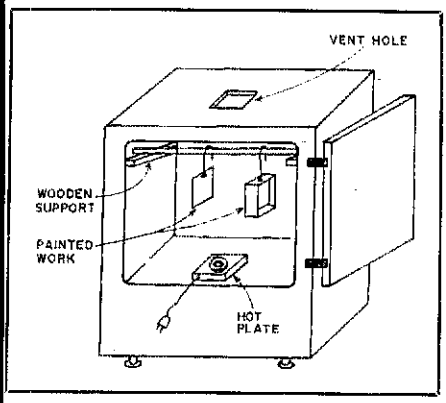

Schematic diagram of the No-Math Meter. D1-D4 are silicon diodes, type 1N4007 or equivalent. Substitution may be made for the 0-3 mA meter. Information about the resistances is contained in the text. A four-position rotary switch is used for S1.

## BAKED-ON ENAMEL DRYING OVEN

This item should appeal to the amateur workshop enthusiast who likes to do his or her own custom styling of cabinets and panels. Many spray-can paints just don't adhere strongly to the surfaces of homemade cabinets and panels. There are a couple of tricks that aid this cause, so if you're interested — read on!

Trick no. 1 is to ensure that the surface being painted is not so smooth that the paint will chip or scratch off easily. A practical method (one used in the ARRL lab) to make the paint cling under adverse conditions is to abrade the surface of the aluminum or plastic with a medium grade of sandpaper or equivalent finishing cloth. Make certain that the grooves from the sanding operation run in a straight line up and down, or left to right. A random or circular sanding motion will sometimes cause the tiny grooves in the metal or plastic to be visible after the paint has been applied. After the abrading is completed, wash the work in hot water and soap, rinse well and dry without touching the surfaces with your hands. Human skin contains oil which, when allowed to come

*Assistant Technical Editor, *QST*




A "Baked-On Enamel Drying Oven" fashioned from a discarded refrigerator. See W1FB's explanation for converting the ice box and also his tips on custom styling of cabinets and panels.

in contact with the surface to be painted, will prevent the paint from sticking. The result will be convex circular areas in the paint.

Procedure no. 2 is to bake the enamel onto the painted surface. This will help the paint to adhere nicely, and the drying process will be hastened considerably. How to bake the painted surfaces? Well, the family kitchen oven is not always the most practical means by which to accomplish this task. The smell of paint may linger far too long in the house — an annoyance to some of the nonham residents! It's better to do the baking in the workshop or garage. A baking/drying oven may be built inexpensively for this purpose.

The oven can be fashioned from a junked refrigerator (see drawing). It's a perfect airtight enclosure. Most appliance stores take refrigerators in trade. Some are sold, while others are not worthy of being offered as used equipment. An old trade-in unit can be purchased inexpensively. Sometimes the appliance store owner will urge you to take one away at no cost! Another source of discarded refrigerators is the city dump.

The motor, cooling unit, and electrical gadgets and controls can be stripped and thrown away. All plastic items and trim should be removed from the interior of the main compartment. Heat will melt them, and toxic fumes could be formed as they melt. *Safety first!* Aluminum or galvanized iron sheeting can be used to patch the areas where the plastic was used. Sheet-metal screws are suitable for affixing the patch plates.

Two wooden or metal hanger strips are mounted on each inner side wall of the main compartment, about 6 inches (150 mm) below the top of the inner cubical. A V-shaped groove is cut dead center in each of the hanger strips. A piece of metal pipe is laid in the grooves to traverse the span between the side walls of the compartment. The painted work can be hung from this metal bar during baking.

Heat for the oven is supplied by means of a small single-burner hot plate (750-watt class). The burner should be one with a variable heat control, as the full-on mode will heat the refrigerator compartment to at least 200°F (95°C). A temperature range between 120 and 175°F (50 and 80°C) is best for baking the paint.

The hot plate is placed on the lower surface of the refrigerator compartment. The line cord can be brought out the door. The door will close satisfactorily on the cord, provided the cord is of normal (small) diameter.

Elaboration consists of placing a vent in the top of the refrigerator. It should be roughly 4 inches (100 mm) square or 6 inches (150 mm) in diameter. This will allow gases to escape while also providing a means to control the internal heat of the oven (when the burner has no heat control). Temperature control is effected by placing a sheet of metal over the vent hole and using it as a damper. An oven thermometer will be suitable for monitoring the inner-area temperature. Ideally, the vent system would contain a pipe system which would permit the fumes to be dispersed outside the house or garage. Fruit-juice cans can be soldered end to end and used as the vent-pipe system for the oven. Typical baking time is from one to three hours depending upon the thickness of the paint layer and the oven temperature.

This type of oven also is excellent for drying epoxy cement. What did the author first use such an oven for? It was a smoke house for his homemade sausages, bacon and ham! — *W1FB*

[Editor's Note: If you use an old refrigerator for your oven enclosure, you should do the following things in addition to cutting a vent hole in the cabinet. Be sure to keep the oven locked at all times. A hasp and padlock can be attached easily to the outside of the refrigerator. Also, if possible, install a door-latch opening lever on the inside of the refrig door. These precautions will lessen the likelihood that a small child will attempt to use your oven as a playhouse and get trapped inside.]

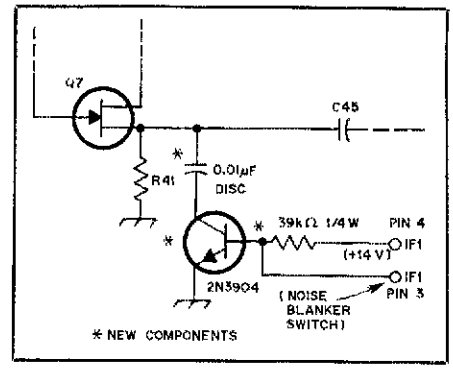
## ADJUSTING THE YAESU MONITOR SCOPE

Recently I purchased a Yaesu monitor scope but discovered that proper adjustment of the instrument could not be made by following the instruction manual. The problem is that the tone-balance control has no effect on the 1900-Hz tone. Rather, it controls the level of the 1500-Hz tone. Thus, balancing becomes a matter of setting the level of the 1500-Hz tone so that it equals that of the 1900-Hz signal. C. H. Margelli of Yaesu Musen has confirmed that the 1500-Hz tone is the tone which is adjusted by this control. He also states that the following procedure, which I use, is satisfactory for adjusting the device.

Remove the cover of the scope and set the 1900-Hz tone amplitude at the two calibration marks on the scope face by using the internal two-tone level. Set the 1500-Hz tone by means of the balance control at the rear of the unit. The proper setting is also at the two calibration marks in amplitude. Keep the vertical gain set at the 12 o'clock position for both adjustments. Voltage levels should then agree with the values shown on the schematic diagram of the monitor scope. — *George Kelleyan, WB6NUL, Malibu, CA*

## ELIMINATING LEAKAGE SIGNALS IN THE TS-820

My complaint about the Kenwood TS-820 was the leakage of signals around the filters, especially the 500-Hz cw filter. The problem is not filter leakage per se; but rather noise-blanker leakage. The noise blanker i-f amplifier is located directly below the filters on the i-f board. The signal from this amplifier couples back into the regular i-f chain, resulting in the leakage.




K8MR's modification of the TS-820 for eliminating unwanted signals that can leak around the filter circuitry. To be effective, the noise blanker must be turned off.

The cure is to remove the unwanted signal from the blanker chain when the noise blanker is not in use. This is done by bypassing the signal at R41, the source resistor of Q7, through a 0.01-μF capacitor and a transistor switch. The noise-blanker switch on the front panel provides an open circuit with the blanker on and a ground with it off. Therefore, the transistor is biased into saturation with the blanker switch off, bypassing the signal to ground. With the blanker switch on, the transistor base is grounded and the transistor is turned off. This allows the blanker to function normally. The leakage will be present with the blanker on, but since I seldom use the blanker, this is not a problem.

The new components are attached directly to the leads of the existing components. The terminals of jack IF1 can be reached more easily by removing the three screws holding the bracket which holds the i-f board and carefully lifting the assembly an inch or so.

I've successfully tried this modification with both the Kenwood and Sherwood filters. Cw operation is much more pleasant without the extra weak signals from outside the filter passband. — *James Stahl, K8MR, Cleveland Heights, OH*

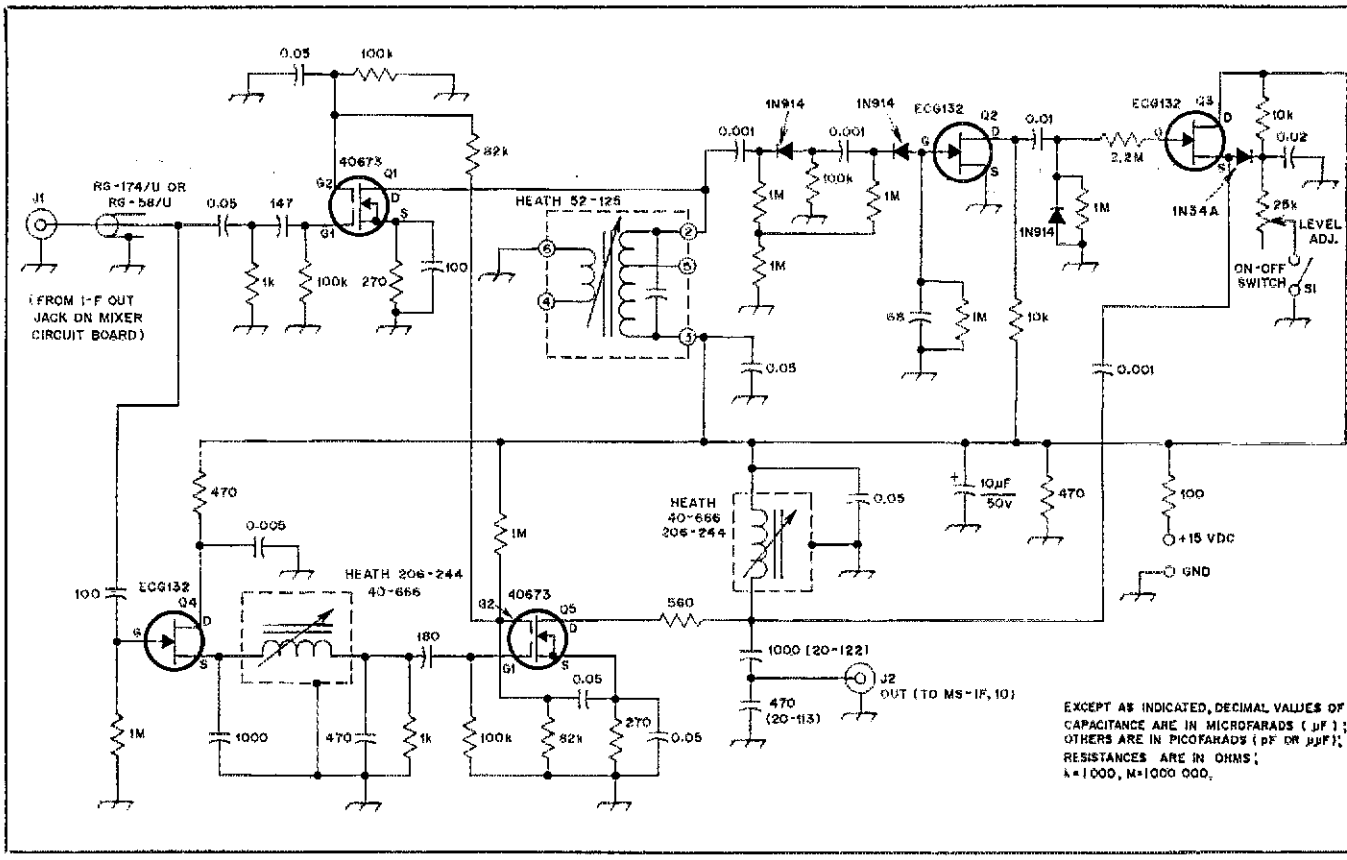
## INCREASED SENSITIVITY FOR THE DRAKE 2-B

The 6BZ6 rf amplifier tube (V1) in the Drake 2-B can be directly replaced by a 6CB6, a sharp-cutoff i-f amplifier tube used in many TV receivers. The change will result in greater sensitivity on the 10- and 15-meter bands.

The avc voltage, S-meter zero and S-meter sensitivity controls must be readjusted in accordance with the Drake instruction manual. This modification also can be used on an R4. A theoretical objection is that the change also should increase cross-modulation distortion, for the 6CB6 is a sharp-cutoff rather than a remote-cutoff pentode. However, I have not found this to be the case, even amidst 40-meter cw contest QRM. Credit for this modification goes to the Pittsburgh 13-73 repeater gang. — *Dr. John W. Thompson, K3MD, Pittsburgh, PA*

## A NOISE BLANKER FOR THE HEATH SB-303 RECEIVER

In my modification for the Heath SB-303/SB-401 that appeared in the May 1979 "Hints and Kinks" column, reference was

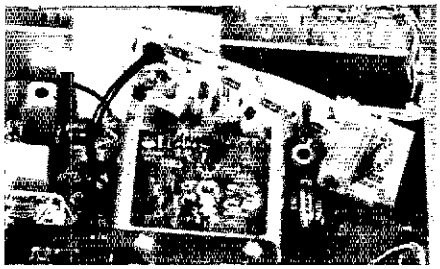



A noise-blanker circuit for the Heathkit SB-303 receiver. This is one of several modifications provided by W7THY for use with the SB-303/SB-401 combination. Heath component numbers are shown in parentheses or are otherwise indicated. S1 is mounted externally to the receiver with connection provided by means of a spare phono jack.

made to the noise blanker I constructed for this equipment. The blanker circuit, shown here, is similar to that described by Frank Van Zant, W2EGH, in his article, "A Solid State Noise Blanker" (July 1971 *QST*), except that it was discovered that better sensitivity for noise detection can be obtained by using a fixed gain greater than unity. An added benefit is that intermodulation products may be somewhat reduced as a result of lowered gain in the rf amplifier stage caused by tighter avc action. Two stages of i-f amplification are used in the signal channel to allow some delay of the noise so that the blanking pulse would become effective prior to the passing of noise into the selective filter.

The circuit is constructed on a 2 × 5-inch (51 × 127-mm) perforated board as shown in the accompanying photograph, taken before the emitter-follower stage was added. Input signals are fed through a 6-inch (152-mm) section of RG-58/U. Power is wired from the connectors on the plug-in i-f/audio board. The switch S1 is wired to a spare jack at the rear of the receiver, an arrangement for outboard use. This assembly sits atop the selective filters and in back of the LMO.

For the benefit of those who may wish to perform the SB-303/SB-401 modifications described in May 1979 "Hints and Kinks," I wish to correct a drafting error that occurred in publication. The 0.005-µF capacitor from the HEP-802 to ground should be connected to the drain and not the source. — *John W. Hartung, W7THY, Portland, OR*

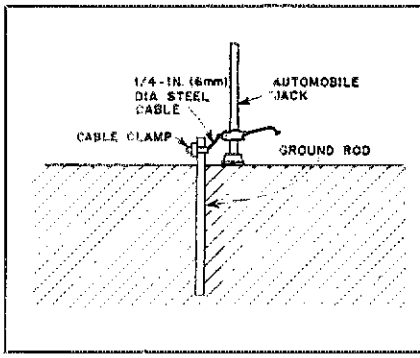


The W7THY noise blanker for use with the SB-303 receiver is shown in this photograph. It rests on edge atop the selective filters and behind the LMO. A small sponge prevents electrical contact between the blanker and the receiver chassis.

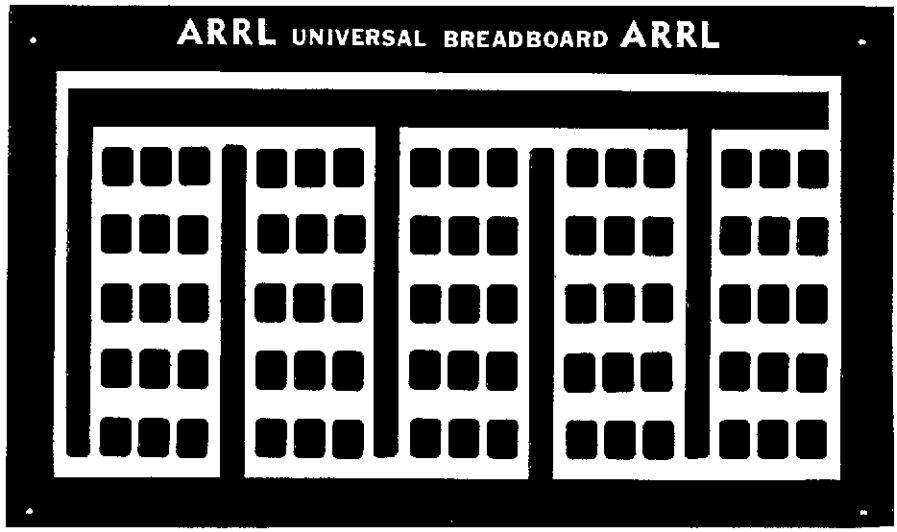
## GROUND-ROD REMOVAL

The "Hint" in February 1979 *QST* from K2GNC about putting in ground wires with a metal rod prompts me to describe a method of easily withdrawing a ground rod, a pipe driven into the ground or any similar driven object. A metal link chain is attached to the rod just above ground level. Usually there is nothing to which the chain can be attached but a Vise Grip wrench will hold the chain to the rod. Alternatively, the chain may be wrapped around the rod after closing the wrench on the rod. The other end of the chain is attached in any way to the lifting lever of an ordinary automobile bumper jack. Operating the jack will pull up almost any ground rod or pipe. I've easi removed an 8-foot rod this way. The chain a tachment, I should add, has to be moved dov the rod as it is jacked up. — *Robert E. Tro Jr., W4AHP, Montgomery, AL*

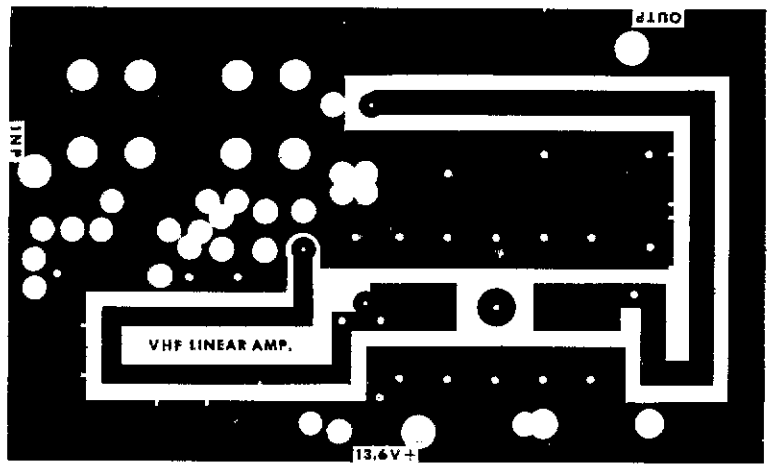
[Editor's Note: Robert Troy's ground-rod remov method using a bumper jack seems worth presenti in "Hints and Kinks" for the benefit of tho amateurs who have not given this approach consider tion. The idea has appeared in *QST* in days gone b Harry Engwicht, W6HC, offered this suggestion f "Hints and Kinks" in June 1958, followed by a var tion described by John Dines, K8QOJ, in Novemb 1967. The latter method is reillustrated here.]




A simple method of extracting hard-to-remove ground rods.




(A)

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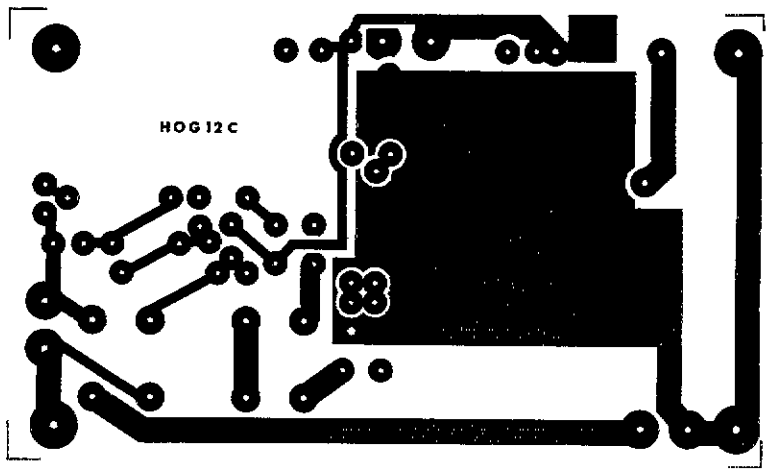



(C)

Etching patterns for projects in this issue of *QST*. Black represents copper; the patterns are shown at actual size. The board at A is single sided (copper on one side only), shown from the foil side, and is a universal breadboard pattern suggested by DeMaw (see Fig. 5, page 32 of this issue). The patterns at B and C are for the two sides of the board for the 144-MHz amplifier and rf-sensing circuit (see Fig. 6, page 16). The bottom of pattern C as shown here aligns with the top of the pattern at B.

# How to Get Special Zoning Approval for Your Antenna

## If your town zoning board and your neighbors aren't as enthusiastic about your planned tower as you are, try these commonsense approaches to gain their approval.

By Steve Phillabaum,* K7NR

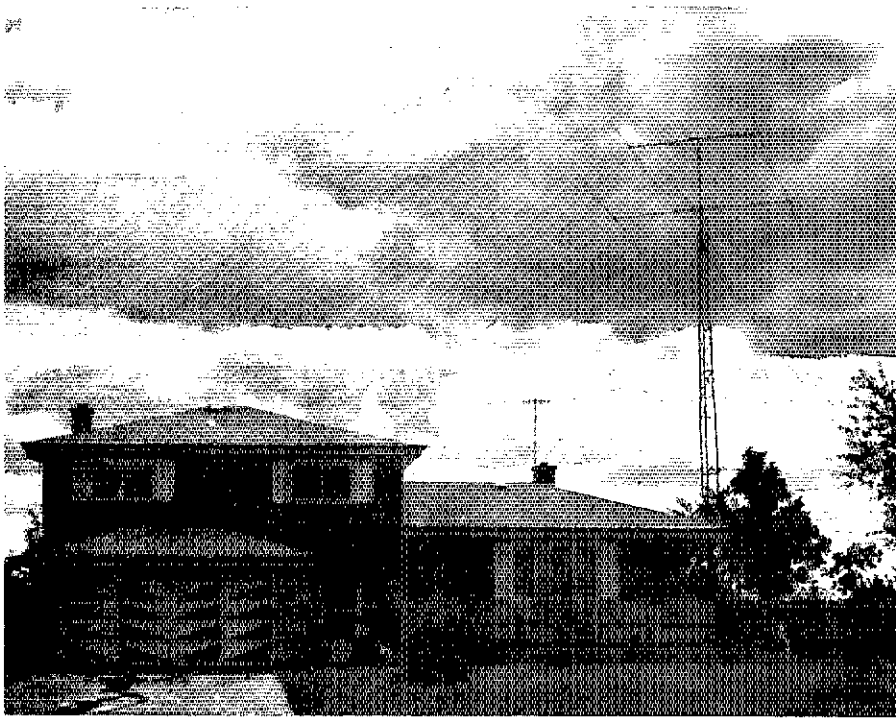
Because hams are more and more often required to obtain special permits when building a tower, it is important to understand the steps that should be taken to help ensure approval of a tower installation. If a few general rules are followed, the necessary special approvals will very often be obtained without any real problems. But if an application is handled in the wrong way, denial is almost certain. A little knowledge of how the system works can go a long way toward ensuring success.

### Building Permits and Zoning Regulations

Two types of permits are generally required for a tower: building permits and zoning approval. Under the Uniform Building Code (UBC) a tower is a structure, so a building permit must be obtained for it prior to construction. The UBC regulates structural standards only, and if the tower installation is well planned, there should be no problem demonstrating the structural soundness to the building official. Generally, a sketch of the proposed installation, together with the data supplied by the tower manufacturer regarding wind load, base and guying, will be sufficient. Only occasionally will a building official require more-detailed plans. If the building code is the only local regulation that must be complied with, there will rarely be any problem with erecting as large a tower as the builder can afford. The rub is almost always with zoning. Often, the building permit will not be issued until any required zoning approval is obtained.

As population has increased in metropolitan areas, more and more cities, towns and counties have adopted zoning regulations in an attempt to control growth. Unfortunately, Amateur Radio towers and antennas often conflict with these zoning regulations. In years past, this was not much of a problem; often, no permits were required for towers, or hams just put up their towers and didn't bother to get building or zoning permits. Most hams didn't know permits were necessary. Since the cities didn't have staff members searching for zoning violations, the towers were up for years and years with no problem.

Now, however, private citizens have become more conscious of zoning



When defending your request to erect a tower, it may help to bring slides or photographs that demonstrate that towers need not by eyesores. (*W9ON photo*)

*c/o Parr, Peeples and Carrier, 711 South Capitol Way, Olympia, WA 98501

regulations and are more apt to request that the local building or planning department investigate tower installations to be sure they comply with regulations. Perhaps the increase in TVI from CB radios has caused more people to be concerned about all radio antennas as possible sources of interference. Because people are afraid a new antenna means increased interference, they may try to use zoning to stop tower construction. As a result of this recent public concern and watchfulness, hams are well advised to obtain the necessary permits *before* they start construction. Building without a permit means running the risk that the tower may have to be removed.

Some purposes often stated for zoning are to prevent overcrowding, view blockage and location of incompatible uses near one another. Further, zoning should help ensure adequate light and air within developed areas. In order to accomplish these purposes, many zoning ordinances attempt to restrict homes in single-family residential districts to two stories by prohibiting structures over 35 feet tall unless special approval is obtained.

Most zoning ordinances have special provision for some uses or structures, otherwise prohibited, to be allowed in residential zones with a conditional- or special-use permit. Churches or schools are common examples: Before they are allowed in a residential district, a public hearing must usually be held and a special-use permit issued. Often, the ordinance will list towers along with schools and churches as potential special uses. Another type of special approval that may be granted after a public hearing is a variance. A variance from the terms of the ordinance may be granted when the terms, strictly applied, would work a special hardship on an individual.

Both special-use permits and variances are discretionary (they do not have to be issued), and both involve public hearings. Because the city or town will generally have the same concerns in mind when deciding if either permit should be issued, the discussion here is equally applicable to either type.

While there is no simple formula for guaranteeing approval of a special-use permit or variance applicable to every case, there are a number of steps the applicant can take to vastly improve the chances for success. The real key is to start working toward an approval even before submitting an application.

### Step 1 — Be a Good Neighbor

The primary concern of the city or town will be to ensure that the proposed new use, the tower, is compatible with existing uses. In other words, the local government doesn't want to let someone put up a tower that would antagonize his neighbors. At the public hearing, city officials will use neighbors' comments to gauge the compatibility of the new tower with the neighborhood.

This is where a good relationship with one's neighbors prior to the time of application really helps. If the ham seeking approval is known as a reasonable person who gets along well with people, the neighbors will probably support his or her application. But if they don't know the applicant, or suspect he or she may defiantly create TVI, chances for approval are pretty slim. Support from neighbors is probably the single most important factor in obtaining approval.

For example, a ham once received a variance to build an 80-foot tower (in an area with a 35-foot limit), largely because he had occasionally helped one little old lady take out her garbage and another with her yard work. When the fellow applied for a variance the ladies had no idea what it was for, but they knew he was nice, so they wrote letters to the city asking that the variance be issued. With support rather than opposition from the neighbors, the City Council voted unanimously to approve the variance.

### Step 2 — Explain Your Plans to the Neighbors

Unfortunately, many people stop listening to a proposal once they have made up their minds to oppose it. So, don't be caught in the sad position of trying to explain your project to the neighbors after they have learned of it through rumor or speculation — they will already have assumed the worst. When a neighbor receives a notice of a public hearing from the city regarding a proposed radio tower larger than normally allowed by the zoning ordinance, he is likely to conjure up a 700-foot orange-and-white monster with flashing red lights. After a little more thought he may conclude the antenna will emit radiation similar to that which, he has read, the Soviets beam at our embassy in Moscow.

There are two negative aspects of such a false impression held by a neighbor. First, it may well rouse him to actively oppose your application. Part of his opposition will probably include spreading rumors based on misinformation among other neighbors. Such rumors get farther and farther from the facts of the application and create organized opposition to approval of the antenna. This opposition can be based on an irrational fear of TVI, reduced property value, increased lightning strikes, radiation sickness, airplane crashes, and so on. The second bad aspect about such false impressions is that once formed, they are very hard, and often impossible, to dispel. The ham trying to explain his project to a hostile crowd at a public hearing may not even understand the concerns of the neighbors until after they have given very damaging testimony or presented petitions. By then it's too late to try to refute the testimony; the damage has been done.

The lesson to be learned is: The applicant for a special approval must go out and fully explain his project to the neighbors *before* they hear about it from another source. Fortunately, most people are reasonable and will be gratified that the applicant has taken the time to visit them, find out their concerns and explain his or her proposed antenna installation. Once they understand the facts of a proposal, most people have no objections and may even turn out to be supporters. Either before or immediately after applying, the ham should get out and talk to the neighbors. If he or she waits until after the city or town has sent out or posted notices, or placed legal ads in the newspaper, it will be too late.

### Step 3 — Contact the Planning Staff

Nearly all cities and towns have a planning department that handles applications for special use permits or variances. In some cities this department may have another name, such as the community development department. Whatever the name, the function is generally the same. If you inquire about the permits necessary for a tower and are told a special-use permit or variance must be obtained, ask to talk to the planner who will present your application to the board, council or commission that ultimately makes the decision on the application. That planner can help you a great deal by telling you how similar applications have fared in the past, what the concerns of the decision maker have been and, perhaps, his opinion of your chances for success. If there has been a proposal similar to yours recently, you may want to read the minutes of that hearing to determine what concerns were expressed by the public and the decision makers at the hearing.

Remember, when dealing with an administrative agency, whether it is a local planning department or the FCC, if you are friendly and cooperative with them, they will try to be helpful. If you resent their regulations and let them know it, they are apt to be less than helpful. Staff people in administrative agencies hear an endless barrage of complaints day in and day out, and they soon grow tired of the complainers. So, when applying for a special approval, don't complain about the regulations, red tape or delay — you will be risking the loss of the help of the agency's staff, and you need all the help you can get.

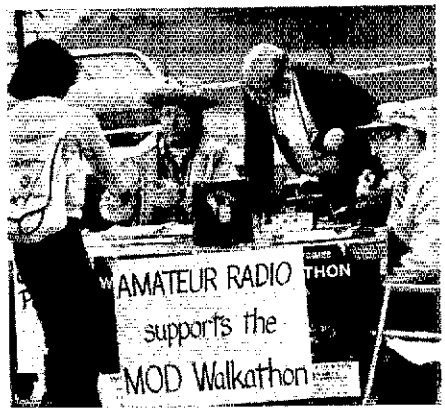
### Step 4 — Public Hearing Tactics

The public hearing is what you have been waiting for. All the information you have gathered about past hearings, your neighbors' concerns and those of the planning staff will help you make a favorable presentation to the body that will make a decision on your application. Using this

information, you can anticipate why people may be opposed to your antenna. If you get in the first word, you should be able to put the objections you have anticipated to rest before they are spoken.

Generally, you will be asked to describe your project before others speak. If not, request an opportunity to make your presentation before the hearing is opened to everyone. When describing the project, discuss all potential problems and show how you have carefully considered and minimized them. You should probably get TVI over with first. Explain that the FCC regulates and monitors your emissions to be sure that you do not interfere with other services. You can mention that the U.S. Supreme Court has recently let stand the *Schroeder* decision, which says that the federal government has exclusive power to regulate interference. (See July 1978 *QST*, page 45.) But don't be pushy about local government's non-right to police TVI. If the decision maker suspects you will cause TVI and try to hide behind federal regulations, you will appear to be a bad neighbor; your application could be denied for a reason other than TVI. Be sure to describe the TVI-prevention measures you have taken, such as the use of grounded equipment, coaxial cable, a low-pass filter, a tuned antenna, and any applicable special precautions. Mention that your TV isn't affected and have letters on hand from nearby neighbors indicating there is no interference from your existing setup. Then describe how the multielement beam antenna you plan to put higher than your existing antenna would actually reduce TVI, if you had it.

Also, be sure to talk about the visual effect of your tower. Be reasonable and admit you know some people might not like it, but explain what you plan to do to make your tower presentable. Perhaps it will be free standing, in which case note the absence of ugly guy wires. Perhaps you can explain that you chose 80 feet as the height so only two rather than three sets of guys would be required. If it is crank up, offer to leave it down when not in use. If possible, show some slides of your neighborhood and any trees which would block the view of your antenna.




Stress the public service activities local clubs have participated in — many of your neighbors may know little about Amateur Radio's contributions to your community. *(photo by Kirk McClelland)*

Try to have the neighbors with the best view of the antenna send letters requesting approval of the application. Explain that if the application is granted you will be replacing all five dipoles you now have hanging every which way with a single tower and antenna.

Be sure to discuss the structural adequacy of the installation. Point out you are following the manufacturer's recommendations and that the city's building department will inspect the tower installation to be sure it is sound. Finally, you can explain that in the highly unlikely event that the tower fell, your homeowner's insurance would cover any damage (check first to be sure it will).

Before concluding, discuss any other aspect of the project that may be of concern and briefly go over some of the services Amateur Radio offers to the community. A list of civic projects for which your club has provided communication services, a description of continuous training for emergency service, and a review of past emergency services performed should more than outweigh any unavoidable negative aspects of your project.

Generally, the applicant should make his own presentation, even if he isn't a polished public speaker (in fact, *because* he isn't a polished public speaker). Part of the final decision will be based on balancing the hardship to the applicant against the hardship of the neighbors. If a reasonable, courteous applicant has made a presentation, the decision makers can identify with him. If a polished attorney makes the presentation, it lacks the personal touch that could swing the decision makers to your side. It's not that an attorney can't help you with you application; he probably can. Rather, it is the applicant himself who is probably more effective making the actual presentation.

An attorney who has experience with local zoning problems could provide valuable advice about applying for a special approval, as well as alternatives if the approval is denied. A rezone might be possible or the zoning ordinance itself may be invalid; only an attorney would be equipped to evaluate all the alternatives. But, for the first step of applying for approval and making a presentation at the public hearing, the personal appearance of the applicant is more valuable than an appearance by an attorney.

In addition to your own presentation, it may help to have others there with you to show you have support of the community and to help answer questions. For example, a member of the local TVI committee may be able to offer a better explanation of the methods used to prevent interference than the permit applicant himself. However, be careful that comments from supporters don't get too long or emotional. Sometimes it is better to take a few less people to the hearing by avoiding those supporters whose comments are apt to antagonize the decision makers.

There is no way to guarantee approval of a special-use permit or variance, but by demonstrating your good faith and willingness to avoid conflicts with your neighbors, your chances for success will be vastly improved. Communication and cooperation with your neighbors before the application is actually filed will often tip the scales in your favor. QST

## Strays

### HAMMERING HAM

☐ Congratulations to Joe Rudi, WA6PVA, of the California Angels, who on July 23 hit his third career grand-slam home run in Fenway Park against the Boston Red Sox. The many NY Yankee fans at ARRL hq. wish him continued success in Boston, while the many Red Sox fans at Hq. wish he'd stay home and operate a DX or vhf contest during the Angels' next East Coast road trip. — *WB1EYI (a suffering Red Sox — and a Joe Rudi — fan)*

### ARNS PUBLICATION CONTEST

☐ The Amateur Radio News Service is again sponsoring their annual publications contest to recognize and reward writers who demonstrate excellence in Amateur Radio journalism. If you wish to nominate your favorite Amateur Radio publication for an award, please write to Arny Gamson, K6PXA, Contest Chairman, 8034 Gentry Ave., N. Hollywood, CA 91605, for an application blank, or contact any ARNS member.

The papers will be judged in the following areas as applicable: (1) General format, (2) Member contributions, (3) Editorials, (4) Club activity, (5) Recruiting activity and training and (6) Technical articles. Nominations must be of publications dated July 1978 to July 1979. The contest deadline is November 1, 1979.

# Amateur Radio in the Computer Age

## Low-cost microprocessors are revolutionizing ham radio. Here are some ways you can use one in your shack.

By Paul L. Rinaldo,* W4RI

"Why do I need a computer?" This question comes up, sooner or later, every time radio amateurs discuss computers. We all have been taught that "necessity is the mother of invention" — you must have the right kind of problem before you will know that a computer can provide the solution. There is no real necessity for having a computer in the ham shack. Therefore, it would be more accurate to describe the microcomputer as a "solution looking for a problem." Look at it this way — all the necessity we amateurs could muster would not put one microcomputer in anybody's ham shack if it were not for the availability of low-cost, large-scale-integration (LSI) microprocessors and other solid-state devices needed to make a microcomputer work.

It is fair to say the real push behind microcomputers was the design and mass marketing of microprocessors starting in 1970. Many radio amateurs found the microprocessor fascinating and irresistible. Here was high technology within the reach of the average ham.

The growth in interest in microcomputers among consumers can best be seen in the tremendous popularity of TV video games, which have become a big business. Many of the games played on the family TV set were developed by amateur programmers using their home computers. While the commercial devices are limited as to the games they can play, the home computer is virtually limitless in this respect. Most of the games traditionally played at home already are programmed for the popular microcomputers. Programs are printed in personal computing magazines and are available on paper tape, magnetic tape cassettes and discs.

Computer games serve several useful purposes. While the fun lasts, preprogrammed games can teach the owner quite a bit about the capabilities and idiosyncracies of the computer. Dissatisfaction with some features of a game programmed by someone else can lead to writing modified versions of the program. A typical next step is trying to write new programs for games that may not have been attempted by others. An enticement to learning programming, computer games are both fun and educational. They are an especially good way of introducing children to computers.

### Station Control

Probably one of the first things a radio amateur thinks about as an application of a computer is complete control of his station. Automatic control of certain station functions is helpful in contests because some of these chores, such as logging, are time consuming, tiresome and prone to human error.

An early attempt at automating a station for contest operation was made in 1973 by Michael M. Dodd, WA4HQW, who built a hard-wired "computer."[1] As soon as he heard a call sign, Mike would type it on his keyboard and receive immediate feedback from the machine in the form of a red/green light-emitting diode (LED) — red meaning the station had been worked before. In the case of a green light, the computer would then send, in Morse code, the call sign of the other station, DE WA4HQW, followed by 579 VA or whatever exchange was called for in the contest. Afterwards, the contact information was printed on a Baudot (five-level) teleprinter used as a log.

A more sophisticated system, utilizing software or programmed instructions, was designed in 1976 by Don E. Alexander, WA8VNP.[2] Don's microcomputer-controlled radioteleprinter (RTTY) station display won Grand Prize at the First World Altair Computer Convention in 1976. His system consisted of an Altair 8800 microcomputer, an ST-6 RTTY modulator/demodulator (modem), an American Standard Code for Information Exchange (ASCII) eight-level keyboard, a video terminal and a Teletype M-19 teletypewriter. Before a contact, the operator typed in the call sign of the distant station. The computer would indicate whether the station had been worked before and display log data from the previous contact. The operator would then decide what to do and command the computer by means of two-letter codes.

Whether a computer is called upon to control the station or generate the messages that are transmitted during a contest, a central theme in contest automation is computerized logging and QSLing. Jim Huffman, WA7SCB, has written a computerized log-keeping program for the Southwest Technical Products (SWTP) 6800.[3] A BASIC program for computer printout of a log on a teleprinter was devised by James C. Berets, WA1UOU.[4] F. Barry McWilliams, W2HBY, wrote a computer program in 8080 assembly language to calculate the contestant's score from the contest summary sheet.[5] Also, Dr. George L. Haller, W4BQ, has a BASIC program to keep track of QSLs and provide data on nearby repeaters.[6]

Not too many microcomputer manufacturers offer the necessary hardware or software to control or work with Amateur Radio stations. An exception is The Digital Group, which offers the Ham-1 Ham Interface Board to be used with an existing Digital Group computer. Designed by Robert Suding, WØLMD, and Theodore Holdahl, WØPMY, it is capable of sending and receiving RTTY at 60, 66 and 100 wpm. It can send Morse code and receive while automatically adjusting for any speed sent. The "cw send" feature has a 256-character, first-in-first-out

*1524 Springvale Ave., McLean, VA 22101

[1]References appear on page 56.

(FIFO) buffer as well as eight 100-character memories that can be called up when desired.

Another commercial entry into this field is the Curtis Electro Devices System 4000, which is designed around the SOL-20 computer (or other 8080 computers using an S-100 bus). It sends Morse code from an ASCII keyboard and receives cw at up to 250 wpm. It also sends and receives Baudot RTTY. Curtis plans to sell software for contest station management, antenna directions and other capabilities.

In addition to using your own computer for logging, filling out contest report sheets and QSLs, another option is to use a computer at work or school on a batch basis. Some amateurs may be able to borrow or rent a time-share terminal to process logs. Your computer or training department at work may have portable, acoustically coupled terminals and some prepaid training time available from their time-share service at off-peak hours. Still another possibility is renting a microcomputer from a local computer store to handle a one-time mound of logs, such as after a contest or DXpedition.

### Control Philosophies

Most of the thinking thus far has been along the lines of using "a computer" in the ham shack to control the radio equipment, which may be a narrow view of the situation. The term "computer" generally conjures up the image of a metal cabinet about the size of a bread box with a keyboard and a readout device (printer or TV screen) nearby. There are numerous types of these computers on the market in both kit and assembled form. Fairly complete "computers" with central processing units (CPU), some memory and peripheral communications chips are available on printed circuit boards without the fancy cabinet. One of these may perform the station control and bookkeeping functions you desire.

One consideration in large data-processing systems is whether to centralize or decentralize the processors. That is, would it be best to have a large central computer with a number of remote input/output (I/O) terminals or a number of smaller, job-oriented computers linked together? With popular microprocessors now costing less than $20, it might be reasonable to have more than one. Possibly this could be carried to the extreme of supplying each piece of equipment with a microprocessor and the necessary supporting chips to control that particular building block. Already we are seeing smart (microprocessor-controlled) scanning receivers, smart cw keyers and smart ASCII terminals with keyboard and video display. At the moment, they fall far short of units that simply can be plugged together to make up a distributed computer-controlled radio station, but the seeds of progress have been planted.

Rather than having a microprocessor-controller inside each piece of equipment, another possibility is that the equipment will have just the necessary digital communications chips for interfacing to a computer bus. There would be a standard receptacle wired according to an agreed convention that would be present on all new equipment. The equipment could be plugged into the central computer or into a limited-purpose microprocessor-controller.

As with many previous advancements in ham radio, it is likely that individual amateurs will build controllers of this sort that will work directly with equipment designed for remote digital control. They also can be expected to design special-purpose interface boards to slip inside older equipment to make it externally controllable. As with other designs, it is probable that schematics for these controller and interface boards will be available in the back pages of the Amateur Radio magazines.

An example of a special external controller/interface unit is a device built by Eugene R. Zobel, K6AP, as an accessory to an existing frequency synthesizer such as the GLB unit.[1] It is shaped like a pocket calculator, has a keyboard for serial entry of frequencies, and seven-segment LEDs for display of six-digit frequencies. It stores eight frequencies for scanning.

There are numerous considerations in selecting a suitable digital control method for your radio equipment. Will it work on emergency power as well as regular commercial power? Can it tolerate a temporary power outage without requiring reprogramming? Once the system is built, can it be moved to the radio club meeting for show and tell? Will it operate mobile? It is worthwhile to consider these and other questions before plunging into computer control.

### Computers and Repeaters

In addition to controlling individual stations, computers can be used to control radio repeaters. There are a number of repeaters across the country (WR3AFM, WR4AWJ, WR6ABM and WR9ACZ, to name a few) now using microprocessor-based control circuits. A microprocessor-controller can perform many functions for a repeater: It can generate Morse or voice identification and make sure that it is sent as often as regulations require; it can control the autopatch timer routines; it can be used to determine if received frequencies are either high or low and send a Morse HI or LO as soon as the station stops


K6AP's Synthascanner, a special external controller/interface unit, is used as an accessory to an existing frequency synthesizer. The unit stores eight display frequencies for scanning.

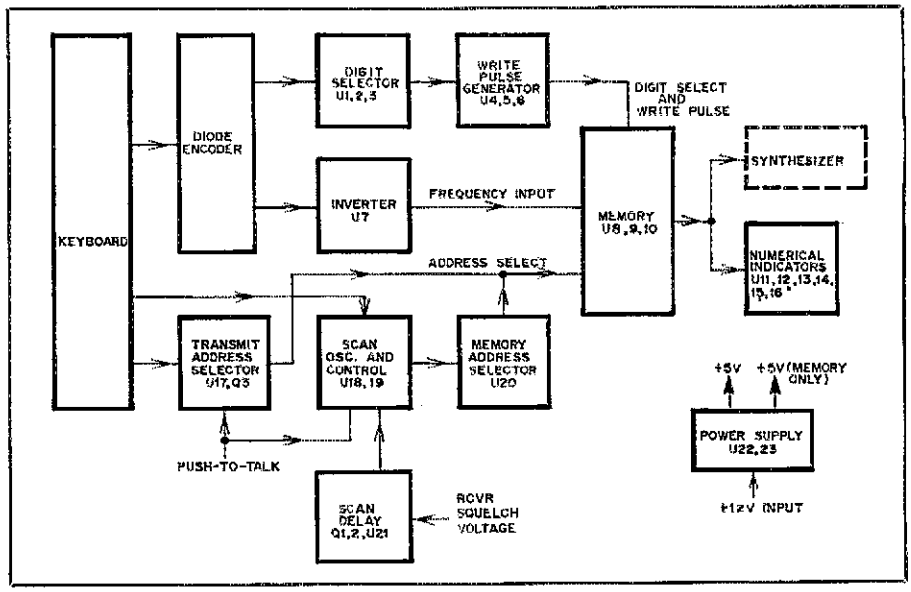



Fig. 1 — Block diagram of the Synthascanner.

transmitting; and it can be used to program a number of telemetry and telecommand functions needed by control operators. The main advantage of the microprocessor compared with hard-wired controllers is that it can be reprogrammed to meet the changing needs of the repeater group's membership. Reprogramming can be accomplished via telephone line or radio link by sending a particular Touch-Tone sequence.

Thus far, we have taken only a very conservative look at microprocessor control of repeaters — essentially the same things done every day with hard-wired controllers. All of this is fairly tame sport for the microprocessor, hardly taxing its true capabilities. Let's list a few things that a microprocessor can do (or control) for a repeater. It could function as an "electronic mailbox" for storage and retrieval of voice messages taped on a recorder or RTTY messages in solid-state memory. Messages could be commanded by tones or by recognition of key words in speech, in which case certain replies could be produced in a speech synthesizer. A new station checking into a repeater on RTTY might trigger a program in memory which would present the newcomer with greetings and general information about the repeater and its sponsoring organization. ARRL and club bulletins could be stored and called up in the same manner. When in receipt of a prescribed command, the repeater could automatically connect with another repeater some distance away to link mobiles in different cities. The linkup could involve conversion from RTTY to cw and transmission via an OSCAR satellite at the next programmed pass. RTTY repeaters could have programs which recognize certain tones and teletypewriter speed combinations, and select optimal filters to improve the signal-to-noise ratio. Signals received in 170-Hz tones at 60-wpm Baudot could be retransmitted in some different shift at 110-baud ASCII — possibly multiplexing for members using old and new machines. There is hardly any question that these and many more "far out" applications will be found for computers controlling Amateur Radio repeaters.

Quite a different marriage of repeaters and computers is to provide a microcomputer which can be accessed by a repeater. This has been going on since 1975 at the Metrovision ATV Club's WR4AAG repeater, located in Alexandria, VA. It can be accessed by means of a 439.25-MHz fm afsk RTTY signal. At the repeater, the signal is decoded, goes through an 8008 computer and is presented on a television character generator at the video output of the repeater at 426.25 MHz. Provided by Bruce Brown, WB4YTU, the computer is installed at the WR4AAG site.[8]

In November 1977, the Amateur Radio Research and Development Corporation (AMRAD) — a technically oriented Amateur Radio and computer club in the Washington, DC, area — began experimental operation of an AMI 6800 computer via its WR4APC 147.81/21-MHz repeater at Tyson's Corner, McLean, VA. Rather than being located at the repeater site, which has restricted access, the computer is at the QTH of Bob Bruninga, WB4APR, who is responsible for the project.

The computer was set up so that it could be remotely programmed by any RTTY station capable of accessing the repeater. At first, this "telecomputing" capability attracted keen interest. But, the initial enthusiasm wore off within a few months, partly because of the slowness of transmission — 60-wpm Baudot. Another reason for the drop in interest was that many of the RTTYers were obtaining or building their own computers. The computer was reprogrammed to function as an "electronic mailbox" for RTTY stations.[9]

Because all the potential users were not radio amateurs, telephone access also was installed. The telephone access conformed to computer conventions and was set up to operate at 110 and 300 baud ASCII with the Bell System type 103 modem tones of 1270 Hz mark and 1070 Hz space. On the telephone line, the user must first type several "return" characters to allow the computer to adjust automatically to the user's speed of either 110 or 300 baud. The software was redesigned in late 1978 to be more compatible with Personal Computing Network protocols developed by the PCNET Committee. The communications format and commands available to users were changed for closer conformity to other Computerized Bulletin Board Systems (CBBS) across the country.[10] Some CBBSs in operation and their telephone numbers are: Atlanta 404-458-4886; Chicago 312-528-7141; New England 617-897-0346; San Diego 714-565-0961; Santa Clara 408-246-2805 and Washington, DC (AMRAD) 703-281-2125.

**Computers in Satellites**

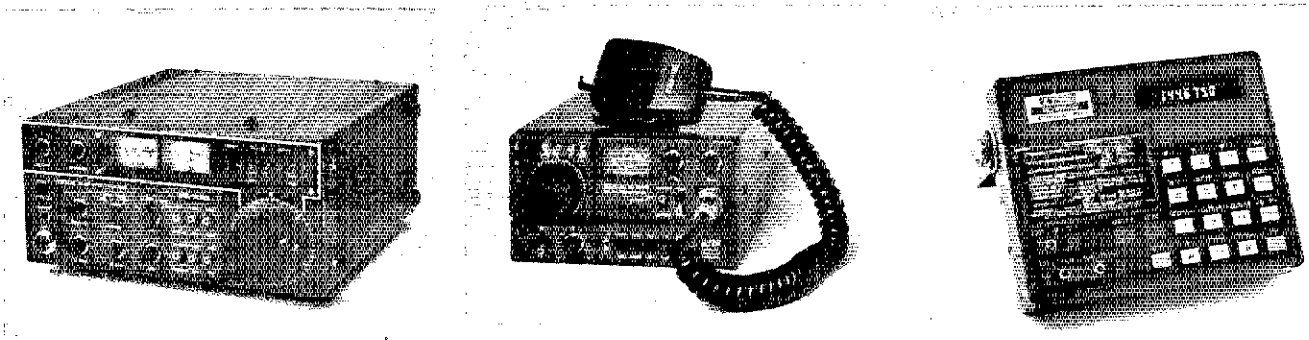
Current OSCAR satellites actually are computer-controlled *repeaters*, although you will find that AMSAT (Radio Amateur Satellite Corporation) prefers to call them *transponders*. Call them what you may, without some type of intelligent digital control, amateur satellites would be of very limited capability and probably have short lives. There are a number of articles on the design of the OSCAR 6 and 7 satellites and their digital control subsystems.[11] The AMSAT PHASE III satellite, which is being prepared for launch next year, employs a sophisticated Integrated Housekeeping Unit (IHU) built by AMSAT-Deutschland. The final IHU will consist of one or two CDP 1802 (COSMAC) microprocessors, a command decoder, up to 32 kilobytes of random-access memory (RAM), an analog-to-digital (A/D) converter and control circuits. The satellite technical committee cannot (yet) visit the transponder to check on its well being, repair it when something fails, or just tweak it up. All of these things must be done either internally or by telecommand; otherwise they are left undone. Designers working on new concepts for terrestrial repeaters could probably learn a few things by taking a look at OSCAR satellite control schemes.

It is true that very few amateurs are going to be involved in designing satellites and their control subsystems. The same can be said for the ground-control stations (GCS) that command and telemeter the satellites. Nevertheless, study of GCS digital control systems would be worthwhile for amateurs contemplating advanced designs.

Many more amateurs will be interested in computer control possibilities for their own stations for working amateur satellites. These low orbiters present some problems that are not experienced in other means of radio communications. For example, they are in view at a particular location for several short periods of time each day. The mutual visibility window for two ground stations is even shorter. When the satellite is in view, its azimuth and elevation with respect to any point on the earth are changing constantly. A related problem is that there is a Doppler shift in the frequency received from the satellite. All of these unique problems can be worked into a computer control program for an Amateur Radio station. Joe Kasser, G3ZCZ, has written an article which describes a computer program to give individual orbit predictions for OSCAR 6 and 7 satellites using 8-K BASIC.[12] This is still a very young area of Amateur Radio exploration. It is safe to predict that amateurs who have computers in their shacks will try many different approaches to automating their satellite communications.

BASIC and assembly-language programs exist and can easily be written from scratch for determining antenna azimuths, given the two coordinates involved. This is hardly very taxing for a programmable pocket calculator, let alone a computer. It is not much more complicated to have a look-up table which allows the user to enter the amateur call sign prefix and have the computer automatically substitute the geographic center of that call sign area. The problem takes on another dimension when working earth-moon-earth (EME) or satellites because both azimuth and elevation are involved. Work needs to be done to make good antenna-positioning software available to all amateurs.

There is a real problem in interfacing antenna rotators for digital control. One of the best approaches to appear thus far



The first two Amateur Radio transceivers on the market capable of computer control were ICOM's IC-211 (left) and IC-245 (center). They can be remotely controlled through a 24-pin receptacle located on their back panels. ICOM produces the RM2 remote microprocessor controller (right) for use with these transceivers and the IC-701 high-frequency transceiver.

was devised by Randall Smith, VE3SAT, to control an inexpensive rotator using a 26-position stepping relay.[13] Another attempt has been made by David Brown, W9CGI, who built a hard-wired controller for azimuth and elevation positioners.[14]

There seem to be two basic methods of digitizing a rotator control. One is to leave the potentiometer already present in the rotator alone, simulate it with switchable discrete resistors, and sense the difference between the two. This may be the easiest approach for most amateurs. The other method is to encode the rotator position digitally. Perhaps the most elegant way of doing this is to use a digital shaft encoder, which can be purchased new for as little as $50 or homemade by amateurs.

### Transmitters, Receivers and Transceivers

The first two Amateur Radio transceivers on the market capable of computer control were the ICOM 2-meter IC-211 and IC-245. They were soon followed by a high-frequency transceiver, the IC-701. Any of these transceivers can be controlled remotely through a 24-pin receptacle located on their back panels. ICOM offers an RM2 remote microprocessor controller for use with these transceivers.

Kenwood's TR-7600/TR-7625 2-meter transceivers also are capable of external digital control through a multipin remote connector which mates with their RM-76 microprocessor control unit. Kenwood's new TS-180S transceiver also is microprocessor-controlled. Yaesu's CPU-2500R 2-meter fm transceiver is capable of remote digital control from its optional keyboard microphone. Yaesu also has a hand-held transceiver, the FT-207R which is microprocessor controlled. Other transceivers to make use of microprocessor control are the Palomar PTR-130k and the Swan Astro 150. Surely others are on the drawing boards. At this time, it does not look as though much thought has been given to standardization of the digital interface for Amateur Radio equipment.

With the introduction of radio equipment capable of computer control, microprocessors have opened up a whole new field of signal processing for the amateur. Signal processing is used here to indicate anything that can be done to modify a signal so that it is either enhanced or converted from one form to another. This wide open field is crying for experimentation by radio amateurs. Nevertheless, some interesting work has already been accomplished.

Many amateurs operating RTTY use a universal asynchronous receiver/transmitter (UART) in their RTTY demodulators. The UART can perform parallel/serial conversion, clean up the signal by removing distortion, detect errors by means of parity checking, and convert from one speed to another. The MPC-1000R Regenerative RTTY Terminal Unit is an interesting modem built by Dovetron. Its UART regenerator can be programmed for 5-, 6-, 7- or 8-level codes. It has a wide range of RTTY tones and an 80-character buffer memory.

Microprocessors also can play a significant role in code conversion and generation. Hams are confronted with the problem that there are three codes in popular use: Morse, Baudot and ASCII. Baudot teletypewriters are used almost universally for amateur RTTY because they are readily available at very low prices and present FCC rules prescribe the Baudot code. Microcomputers, on the other hand, are normally designed for ASCII, and affordable model 33 Teletype machines and cathode ray terminals are readily available. People with microcomputers quickly discovered the cheap Baudot teletypewriters and started designing format converters to enable the Baudot machines to be used to produce hard copy. Those with ASCII teletypewriters or video terminals saw that they could be converted to Baudot. A great amount of literature on ASCII-to-Baudot (and vice versa) converters is readily available.

Another preoccupation of amateur literature is Morse code. Several manufacturers have Morse encoders and decoders. Info-Tech, Inc. has a line which includes Morse keyboards and Morse-to-video converters. Microlog Corp. manufactures the AVR-2 digital receiving and digital display system for Morse and RTTY (Baudot and ASCII), as well as a programmable memory AKB-1 keyboard. Hal Communications Corp. is offering a DS3100 ASR microprocessor-controlled video terminal that handles Morse, Baudot and ASCII.

Many are familiar with the terms "image processing" or "image enhancement" in the context of computer manipulation of pictures from deep space. An article by Dr. George R. Steber, WB9LVI, goes into considerable detail on restoration, enhancement, pseudo-random dither to reduce level contouring, video companding, frame averaging and scan conversion.[15] In amateur usage, scan or standards converters typically are designed to permit use of fast-scan television (FSTV) cameras and monitors with slow-scan television (SSTV) transmissions which occupy only voice-frequency bandwidths. With SSTV and FSTV, we have what might be described as two extremes. FSTV transmissions are capable of high quality, require a wide bandwidth, and are restricted to 420 MHz and above; the range is thus limited. SSTV can be transmitted at long ranges on any amateur band except 160 meters, but has low resolution and is not fast enough to reproduce normal motion. Medium-scan television (MSTV) is an experimental technique aimed at producing moving pictures at bandwidths compatible with international transmission. The Federal Communications Commission has granted a special temporary authorization (STA) for MSTV experiments in the 10-meter band.[16] The microcomputer will undoubtedly play a key role in format conversion between SSTV, MSTV and FSTV equipment.

### Automatic Testing

The term built-in test equipment (BITE) describes special circuits inside a piece of equipment which check its well being. A

BITE indicator is usually a latching, dual-state display device that holds the message until reset. Placing these indicators at a few strategic points in the equipment can speed up troubleshooting. More sophisticated approaches to this problem are made possible by using a microprocessor designed into the circuit for BITE purposes. If the equipment has an integral video display or outputs to a video display or teletypewriter, the microprocessor could be programmed to spell out the fault on the display. BITE has received little attention from amateurs, and would be an interesting research field to pursue.

Automatic test equipment (ATE) is computer-controlled measurement gear. This idea has been pioneered by the laboratory-quality test equipment manufacturers. Not only does the microprocessor control the test equipment, but it sometimes controls the device under test. As an example, ATE can be used to test completely a computer-controlled receiver (all frequencies, all detection modes, all bandwidths, plot response curves, check gain and dynamic range, noise figures, and so on) with no human manipulation of dials and no one taking data. Quality assurance testing, which once took many mind-dulling days to perform manually, can now be done in minutes or hours by ATE. Of course, this type of ATE equipment presently is out of reach of most amateurs, except for those who have access to an ATE facility in a laboratory to run some tests.

Two main routes of applying automatic testing techniques to Amateur Radio are apparent: making smart and/or multipurpose test equipment, and using microcomputers interfaced to other equipment to perform automatic testing routines. Anyone planning to use a microprocessor in Amateur Radio equipment should think seriously about incorporating some (ATE/BITE) diagnostic capability. Adding automatic test features to equipment using a microprocessor can be obtained at minor expense.

When microcomputers hit the market, little attention was paid to standards — whatever was done first tended to set the rule. Much in this way, the MITS Altair bus was adopted as an industry standard S-100 by virtue of the use of 100 contacts on the board edge connectors. SS-50 was coined to mean the 50-contact bus structure used in the SWTP 6800 microcomputer. Both of these bus standards permit design of new, printed-circuit boards to communicate with existing boards via the bus inside the computer box. Neither the S-100 nor the SS-50 are meant to make connections outside the box, although this is done in some modified forms. It has been normal practice to convert to something else when data lines leave the box. In most cases, so far, this has tended to be nonstandard. However, the Electronic Industries Association's (EIA) recommended standard interface connection, RS-232, is often used. RS-232 seems to be good for peripheral or remote devices that operate on serial bits. On the other hand, the Institute of Electrical and Electronics Engineers (IEEE) Standard 488-1975 is promising as a box-to-box standard bus for amateur applications.

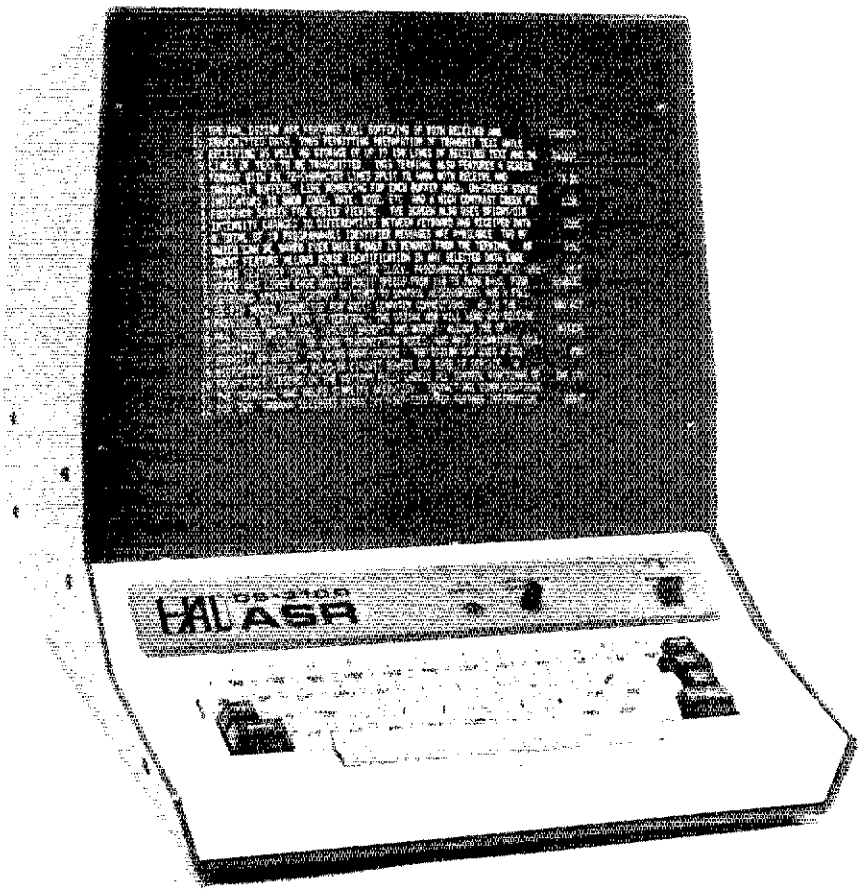
IEEE-488 had its genesis in Hewlett-Packard as a standard bus for interconnecting test equipment and equipment under test. It goes by other names, such as "HP Interface Bus" (HP-IB), "General Purpose Interface Bus" (GPIB), the "ASCII Bus" and American National Standards Institute (ANSI) Standard MC 1.1. The bus consists of eight data lines (for parallel bits, serial bytes), three "handshake" lines, and five lines for the control of bus activity. IEEE-488 is enjoying wide application in professional computer-controlled radio systems. It is of interest in personal computing because it is used in the Commodore PET microcomputer system for connection of peripheral equipment. Amateurs designing computer-controlled stations and test equipment should consider carefully the merits of an IEEE-488 bus for the entire station before taking the plunge.

**Dawn of New Era**

Microprocessors and microcomputers are available at prices that many people can afford. A new personal computing hobby has sprung to life in the past several years, and radio amateurs have played a major role from the beginning. Computers also are having their impact on Amateur Radio, particularly in station control and signal processing. Contests, logging, QSLing, RTTY, SSTV, FSTV, OSCAR satellite communications, vhf/uhf repeaters and generation and decoding of Morse code have all been affected since the advent of the microprocessor. Despite the numerous technical articles in the amateur press, much more experimentation is going on in individual ham shacks with little or no fanfare or record available to others. Clubs could help by asking experimenters to give demonstrations at club meetings and by helping exprimenters write technical articles for club newsletters or national magazines.

Much of the Amateur Radio applications of microprocessors has been spon-

Hal Communications Corporation's DS3100 ASR microprocessor-controlled video terminal handles Morse code for transmission and reception of communications using either Morse, Baudot or ASCII codes.



**A Microcomputer Glossary**

*Analog* — Numerical quantities which have a wide range of variation, such as voltages representing human speech. (See Digital).

*ASCII* — American Standard Code for Information Interchange, an 8-bit code used in many computers and data communications. Also known as (ISO — International Standards Organization) International Standard 646 and (CCITT — International Consultative Committee for Telephone and Telegraph) International Telegraph Alphabet (ITA) No. 5.

*Assembly Language* — A computer code using letter abbreviations which are easily converted by the computer to machine language, but are easier for the human programmer to remember than machine language.

*ATE* — Automatic test equipment; a computer programmed to perform tests automatically.

*BASIC* — Beginner's all-purpose symbolic instruction code. A computer language commonly used in microcomputers.

*Baud* — A unit of speed of a pulse-type signal. One pulse (or bit) per second is considered one baud.

*Baudot* — A 5-bit code widely used in teletypewriters. Also known as (CCITT — International Consultative Committee for Telephone and Telegraph) International Telegraph Alphabet (ITA) No. 2, in England it is known as the Murray code. It is the code used for amateur radioteletype (RTTY) and for teletypewriters (TTY) for the deaf which operate over phone lines.

*Bit* — An abbreviation of binary digit; a single unit in a digital code.

*BITE* — Built-in test equipment. A device designed into equipment to record a faulty condition until read and reset by human operator.

*Bus* — A multiple conductor typically ranging from 8 to 100 wires that connects the microprocessor to memory, communications chips and peripheral devices.

*CBBS* — Computerized bulletin board system. A type of electronic mailbox which is capable of operating independently or as a node or exchange in a personal computing net. (See Electronic mailbox.)

*Computer* — A device capable of accepting digital information, processing it and outputting the results. A computer consists of a processor, memory and communications ports for input and output of information.

*Digital* — Use of discrete quantities or steps in a numbering system. Digital numbering systems used in computers are binary (2 states, represented by 0 and 1), octal (8 states, 0 through 7), decimal (10 states, 0 through 9), and hexadecimal (16 states, 0 through 9 and A through F). (See analog.)

*Disc, disk* — An information storage medium consisting of a magnetically coated film. Floppy discs of this material in 5-1/4- and 8-inch diameters are commonly used with microcomputers.

*Electronic mailbox* — A Computer programmed to serve subscribers by receiving, storing and retransmitting messages to and from distant teletypewriters or computers via telephone lines or radio. (See CBBS.)

*Firmware* — A ROM, or read-only memory. In a sense hardware ( a memory chip) containing permanent or semi-permanent software (program or routine).

*Hardware* — Equipment or component parts physically making up a computer system.

*Input* — Information from an external device such as a keyboard, cassette tape recorder or paper-tape reader into internal storage of the computer.

*I/O* — Abbreviation for Input/Output.

*Interface* — A common boundary between two pieces of hardware, typically between a computer and a peripheral device.

*Language* (Computer) — An agreed vocabulary and rules of syntax. Examples: BASIC, assembly language and machine language.

*Machine Language* — A numerical code for use by a computer without translation.

*Microcomputer* — A small computer containing a microprocessor.

*Microprocessor* — An integrated circuit or chip capable of arithmetic or logical manipulation of digital information.

*Modem* — Contraction of modulator-demodulator. The modulator is typically an audio frequency-shift keyer (afsk); the demodulator is a device which changes the afsk tones to on/off pulses. A modem is normally connected between a computer or teletypewriter terminal and a communications path such as a telephone line or radio equipment.

*Operating System* — A collection of programs or routines that automatically permits processing by a digital computer. Operating systems for many microcomputers are programmed in firmware or read-only memory (ROM). Also known as monitor, executive or supervisor.

*Output* — Information from the internal storage of the computer to an external device such as a printer, video display or cassette tape recorder.

*Peripheral* — That which is used closely with a computer, such as input/output devices.

*Program* — A sequence of computer instructions and routines needed to solve a particular problem.

*RAM* — Random-access memory. Used to denote solid-state memory which may be written into, read out or erased with ease. RAM is normally "volatile" in that stored data is lost when power is removed; a back-up battery can prevent such losses of information.

*ROM* — Read-only memory. A solid-state device preprogrammed with a fixed set of instructions. Some types have permanent memories. Other variations permit erasing and reprogramming by the user.

*Software* — All programs, operating systems, assemblers and logical routines used to manipulate a computer system.

*Telecomputing* — Remote access to a computer by means of a terminal (teletypewriter or computer) via a telephone line or radio link.

*Time-share* — A computer system which can process information from numerous subscribers so rapidly that they appear to have simultaneous computer access.

taneous and, not surprisingly, uneven and disjointed. The radio amateur's love affair with (or aversion to) the Morse code, two teletypewriter standards (Baudot and ASCII), and the advent of the microprocessor have spawned many Morse/Baudot/ASCII converters. In contrast, other ham applications have hardly been touched, namely ATE, BITE and digital interfaces for existing radio gear. Manufacturers of Amateur Radio equipment (including transceivers, antenna rotators, I/O devices, test equipment and even power supplies) should take a hard look at designing in a digital remote-control capability before freezing new designs. Obviously, some hard work is ahead in the interface standards arena.

Personal computing and Amateur Radio applications of microcomputers have been around only since 1975, yet tremendous strides have been made. Those who are interested but sit on the sidelines will soon be unable to catch up with those who have learned from the bottom up. As things develop, it is less likely that individual amateurs will want to repeat steps already pioneered by others; it will be more and more a matter of adopting hardware and software designed by others. If, for reasons of limited time, it is necessary for an amateur to choose between the more familiar building of hardware and learning software design, software should win out. Interested amateurs should start writing their own programs. Otherwise, they will be stuck with buying commercial programs or copying amateur programs which may not satisfy their needs. An important step is to learn a programming language such as BASIC or the appropriate machine or assembler language for a particular microprocessor, even though these languages have their drawbacks for Amateur Radio applications. It is expected that some ham-oriented languages will be appearing in the near future.

During the past year or so, many radio amateurs have purchased one of the three currently most popular microcomputers — the Radio Shack TRS-80, Apple Computer Company's Apple II and the Commodore PET. Now we need someone to design some really good Amateur Radio applications software for these computers.

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# MARS — Alive and Well

## Many thousands of ham volunteers are providing a much-needed service through the Military Affiliate Radio System. You can join them.

By George Hart,* W1NJM and Kevin Wollschlager**

Amateur Radio and the U.S. military have traveled side-by-side through the evolution of the art of communications. Nowhere is this more evident than in the Military Affiliate Radio System. MARS has been active since shortly after World War II. Divided into three separate systems — Air Force, Army and Navy-Marine Corps — the system is a combined effort of military stations and civilian volunteers. From a simple beginning, it has progressed until MARS now boasts about 15,000 volunteer affiliates.

The primary role of MARS is to provide auxiliary communications for military, civil and disaster officials during emergencies. An almost endless list of MARS activities during emergencies could be cited. MARS stations have operated during hurricanes, tornadoes, floods and other natural and manmade disasters. When tornadoes devastated parts of Oklahoma and Texas in early April, Army MARS operators went into action. They provided communications on an active and standby basis for the relief effort until normal communications were restored. Army MARS station ABM5USA at Fort Sill, OK, handled coordinating traffic for a convoy carrying medical and food supplies to the stricken area. Loring Windblad, K7UIX, communications clerk with Army MARS, praised the work of affiliates during the emergency. "Texas and Oklahoma MARS affiliate members really helped out during the emergency. I can't say enough for the work they did," Windblad said.

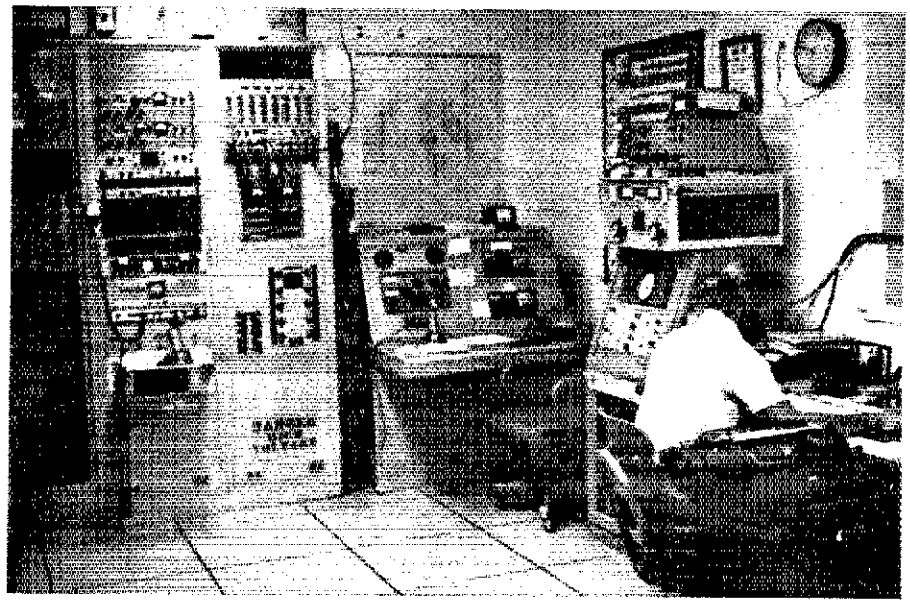
A second function of the MARS program is to assist in transmitting routine traffic under emergency conditions. On June 4, 1979, Fort Leavenworth, KS, lost all long distance communications capabilities because of damage to a telephone toll cable. Within a matter of minutes, radio communications and a telephone patch were arranged from the fort's MARS facility through Fort Sam Houston in Texas. For the next 10 hours, until the cable was repaired, all long-distance communications from the isolated fort were through the MARS station.

MARS also handles morale and quasi-official communications for military and U.S. government personnel throughout the world. No better example of this aspect of MARS could be given than its activity during the Vietnam War. Regular amateur frequencies could not be used because Vietnam was a restricted country. Military and civilian affiliates from the three MARS branches transmitted thousands of messages to our servicemen in Southeast Asia via phone patches on military frequencies. In 1971 alone, Army MARS handled more than 409,000 phone patches to Vietnam. A single station, the Senator Barry Goldwater MARS club station, K7UGA/AFAUGA, handled more than 50,000 phone patches on Air Force MARS circuits.[1]

### Solid Foundation

The ARRL supplied the backbone for military communications during World Wars I and II. The armed forces continued to rely on the League's technical expertise and radio equipment after the war to establish MARS in 1947. With this solid foundation, MARS developed and

[1]Griffis, "MARS Milestone," *QST*, October 1978, p. 50.



An unidentified operator operates K4NAA, the Navy-Marine Command Station in Arlington, VA. Since this photo was taken, the station has been moved to Cheltonham, MD. *(W1NJM photo)*

*ARRL Communications Manager, retired
**Editorial Assistant, *QST*

**Backgrounds**

Amateur Radio's affiliation with the military goes back almost to the beginnings of the Amateur Service. In 1917, our government badly needed trained communications personnel, and we amateurs supplied them. Said W1CBD in *Two Hundred Meters and Down*: "When the United States went into the war, the military forces were faced with an absolute lack of the great corps of radio officers, instructors, and operators that was needed. That need was great, and it was urgent. There was no time to train men. Probably no more fortuitous circumstance has ever occurred in history than the fact that at the time these thousands of trained radio men were so badly needed, there were over 6,000 amateurs in this country who had been training themselves for periods as long as 15 years in just the sort of activity for which they were required." The first call was for 500 operators. The League supplied them, along with a great deal of amateur equipment which was quickly converted to military use. The second call was for 2000 more volunteers, and these also were supplied. As a result, in World War I, the U.S. forces were head and shoulders above all other belligerents in communications technology.

Many things happened in our relations with the armed forces after the war, not all of them rosy. But in 1927, officials of the ARRL and the U.S. Army Signal Corps got together to form a basic agreement which resulted in the establishment of the Army Amateur Radio System (AARS). So close did this relationship become that traffic totals of AARS stations were listed in *QST* for many years, and Signal Corps procedures were heard in Amateur Radio nets conducted inside the amateur bands. (Space outside the bands for AARS was limited to two spot frequencies, both shared with regular military communications.)

But what of the Navy? This service too had a stake in amateurs, with its Volunteer Communications Reserve, a part of the U.S. Navy Reserve. This program was a great deal tighter than the AARS, with its operations being part of regular Navy operations outside of the amateur bands. Not until after World War II did the Navy enter the basic program of the others.

Again, during World War II, amateurs supplied the backbone of military communications, as hams by the thousands enrolled in the Signal Corps and Naval Communications. Amateur equipment was again used in the early stages until the wheels of industry could catch up. By the time hostilities came to an end, amateurs not only constituted the bulk of communicators but had founded and operated the Army Air Corps' communications network, then known as the Army Airways Communications System.

In 1947, the new Military Amateur Radio System was formed, after consultation with ARRL officials. With the prospect of increased amateur-band congestion following the war, the League was none too ecstatic at the prospect of military communications within the amateur bands. Therefore, MARS was set up to operate entirely outside the amateur bands, on government frequencies assigned for the purpose, shared in most cases with regular military communications.

Its mission is to provide Department of Defense-sponsored emergency communications on a local, national and international basis as an adjunct to normal communications. It has three priority functions: (1) to provide auxiliary communications for military, civil and disaster-relief officials during time of emergency, (2) to assist in effecting normal communications under emergency conditions, and (3) to handle morale and quasi-official record and voice communications traffic for military and authorized U.S. Government civilian personnel stationed throughout the world.

MARS is composed of military personnel operating military stations as well as civilian volunteer (affiliate) operators who are licensed hams, have reached their 14th birthday, and possess a radio station capable of operating on frequencies assigned to MARS. In all there are about 13,000 volunteers in the program today.

Why was the word "Amateur" in the title changed to "Affiliate"? A matter of connotation. Military minds rebelled at the word "amateur" as not giving the kind of impression desired. Besides, not all (just most) of the participants were Amateur Radio operators.

matured on its own. Recently, however, MARS has shown signs of instability. Some consideration has been given either to consolidating or eliminating them totally. Recent budget cuts by the Department of Defense have forced station closings and personnel reductions in the three MARS programs. Continuing the League's long-standing policy of maintaining cordial relations with the MARS program, then-League Communications Manager George Hart, W1NJM, visited the three MARS headquarters to evaluate the status of the systems.

The first stop on the MARS tour was Scott Air Force Base, located 30 miles east of St. Louis, MO. Scott is headquarters of the Air Force Communications Service (AFCS), of which MARS is a part. The program is under the direction of Colonel Bradley W. Hetrick, chief of MARS, USAF.

There are 207 authorized Air Force MARS stations, 144 in the continental U.S. and 63 overseas. Of these, 23 are manned on a full-time basis. There are 10 "key" stations, four of which are gateways for movement of overseas traffic — Andrews AFB, MD; Kelly AFB, TX; Travis AFB, CA and McChord AFB, WA.

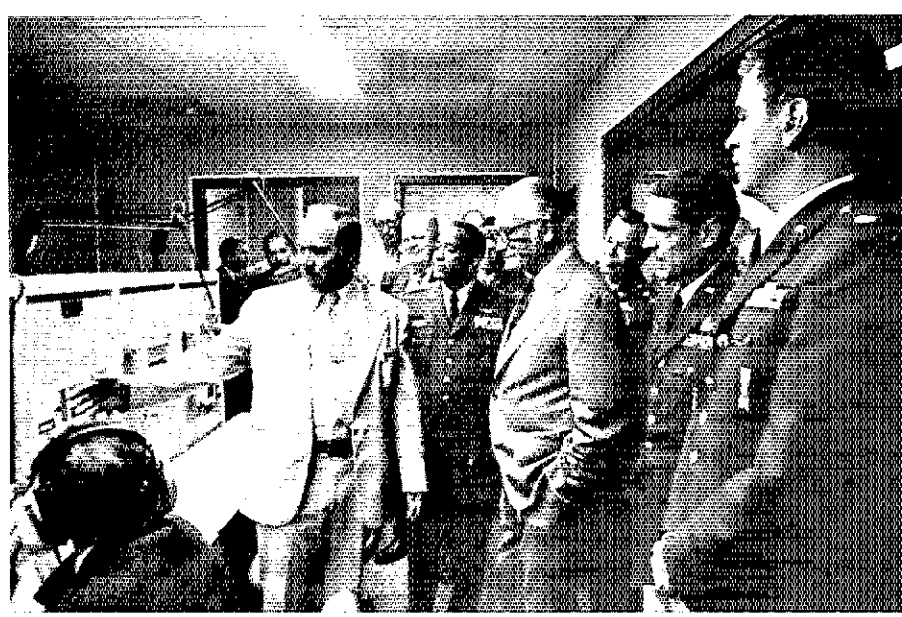
More than 85 MARS stations at Air Force bases are unmanned, but are activated during emergencies and for tests. Every installation has a base MARS director, who serves that post as an auxiliary duty. Some MARS stations have "support teams" composed of local affiliates who operate during emergencies.

Although the number of affiliated hams recently has dropped from 11,000 to 4800, volunteers still are vital to the Air Force program. Affiliates participate in transcontinental and regional hf nets and overseas phone patches. Most operations are on ssb voice, but cw and RTTY capabilities are being integrated into the program.

AFSC Commander Major General Robert Sadler, who has spoken at a number of ARRL conventions, said he is concerned with the decline of the Air Force program in recent years. However, Sadler said he is strongly committed to MARS and its objectives.

### Army and Navy MARS

The desert, 75 miles southeast of Tucson, AZ, is the home of Fort Huachuca, headquarters of the U.S. Army Communications Command and Army MARS. The Army program has 82 military installations, 35 in the U.S., 22 in Europe and 25 in the Pacific and Far East.



ARRL President Harry Dannals, W2HD, Vice President Vic Clark, W4KFC, and Senator Barry Goldwater, K7UGA, were among the dignitaries at the dedication of AFA, the new Air Force Command MARS station at Andrews AFB, MD. *(photo by Bill Thompson)*

Its five major gateway stations are located in Pirmasens, Federal Republic of Germany; Seoul, Republic of Korea; Fort Meade, MD; Fort Sam Houston, TX and Presidio, CA. The Army also owns and operates a major relay station in Hawaii. Windblad said that, according to a recent Department of Defense directive, the number of Army stations is expected to double in the next three years.

Jerry King, W7EZV, has been chief of Army MARS since June 1978. Like the other chiefs, he recognizes the drawdown in support for MARS within the Department of Defense. King said this drop means more responsibility for Army MARS will be assigned to its 6000 affiliates. He added that the program will continue to be a viable worldwide system because of the ham volunteers, whom King calls "the backbone of the program."

From the dry heat of the desert, W1NJM journeyed next to our nation's capital. The Navy-Marine MARS headquarters is located at the Naval Communications Unit in Washington. Commander Frank J. Clement is chief of Navy-Marine MARS. The program boasts approximately 290 military stations (215 are aboard ships) and about 4000 affiliates. The system is divided into seven regions, each managed by Naval chief petty officers.

A major factor of Navy MARS operation is administration of Armed Forces Day, especially preliminary publicity. During Armed Forces Day 1979, in addition to the standard ssb, cw and RTTY transmissions, Navy MARS transmitted via SSTV on hf from both coasts, thus updating the service tests.

### Panels Study MARS

In 1976, the General Service Administration, watchdog agency of the federal government, questioned the management tactics of the system. As a result of the GSA report, a tri-service MARS panel was set up under the direction of Walter Coari, assistant secretary of Defense, Communications, Command, Control and Intelligence (ASDC$^3$I). This panel concluded that MARS still was important and that training under military auspices is paramount. The original MARS directive, then, was reaffirmed by the ASDC$^3$I panel.

Yet pressure for consolidation of MARS continued to grow. As a compromise solution, in December 1978, a new panel was established to study objectives, explore problems and conduct coordination plans for MARS. The group includes members from the three armed forces. It meets quarterly, working to standardize MARS operations; pool resources, when appropriate; unify approaches to emergency conditions; consolidate stations, when possible, for cost effectiveness; and increase military and affiliate input in the program. Panel chairmanship rotates yearly; the MARS Air Force chief was the first chairman.

One facet of MARS the panel focuses on is how to gain more affiliate stations. To be eligible for participation in MARS, volunteers must be licensed hams, at least 14 years old, and capable of operating on MARS frequencies. All MARS programs use frequencies allocated from the military block, which is outside the amateur bands. In some cases, notably the Air Force, the MARS frequencies are far removed from the ham bands.

Army MARS Communications Clerk K7UIX said the tight organization of MARS nets attracts many hams to the program. "There is a high stress on net discipline," Windblad said, which helps eliminate the breakins and interruptions that plague some nets.

Another advantage of MARS is that, after being an affiliate for six months, a member can request surplus equipment. "The probability of getting gear that doesn't need work is very low," Windblad said. "So the equipment isn't exactly free; it takes time and money to put it in working order."

For more information on the MARS programs, write to: Chief, Army MARS; U.S. Army Communications Command; Attn: CP-OPS-OM; Fort Huachuca, AZ 85613; Chief, Air Force MARS; Hq., AFCS/DOYR, Scott Air Force Base, IL 62225; or Chief, Navy-Marine Corps MARS; Building 13, U.S. Naval Communications Unit, Washington, DC 20390.

We are not going to philosophize again on the question, "Is MARS Amateur Radio?" Whether it is or not, many "Martians" spend all their time on MARS and are never heard on the amateur bands. Of course, thousands of hams are not connected with any MARS program. How about a tradeoff? Some of you Martians come back into the amateur bands; take some part in an ARRL operating program such as NTS, ARES or even DXing. We need your support in our activities to keep them going and expanding. On the other hand, a cordial and cooperative relationship with the armed services is essential to our well-being, both now and in the future; MARS is a military adjunct to Amateur Radio. How about some mutual back-scratching? Relations are cordial and cooperative at the Headquarters level. You must back us up by participating in the MARS program while continuing to be interested in ARRL's activities.

Current indications are that the number of affiliates to all three MARS programs is increasing and that the decline is over. Keep this trend going — sign up with MARS now!

## Strays

### A LINK TO THE WORLD

☐ For nearly 20 years, the Braille Institute's Amateur Radio class has been receiving messages from hams around the world at their home in California. But now, thanks to John Ruckert, WB6ZPN, the institute's students also are able to transmit. Ruckert is the originator and teacher of a ham radio code and theory class at the institute. Thirteen students, whose visual acuity ranges from legal blindness (10 percent of normal vision) to total blindness, are enrolled in the class. The institute's ham radio station provides the students with the practical, hands-on experience necessary for them to obtain their Novice licenses or to upgrade their current tickets. "Now that our students are able to send as well as receive messages, they have an important new link with the world outside their often-confined environments," Ruckert says.

The Braille Institute uses Ruckert's call sign on the air. Listen for WB6ZPN on 14.305 Monday through Friday at 10:05 PDT. The call goes out for approximately five minutes via a 2-meter fm repeater in Hollywood, CA. The Braille Institute is a nonprofit organization offering services and training without charge to the legally blind in southern California. For more information on the institute's Amateur Radio class, contact Ken Stone, Braille Institute of America, Inc., 741 N. Vermont Ave., Los Angeles, CA 90029, tel. 213-663-1111, ext. 253. — *Vicki Smith, Communications Assistant, Braille Institute*

Members of the Braille Institute's Amateur Radio class practice code theory under the direction of instructor John Ruckert, WB6ZPN (center). *(photo by Gayle Zimmerman)*

# Rehab Radio

## If you should hear "CQ this is WD6BPT," give them a call. You'll be helping someone recover from a debilitating accident or illness.

By Michele Bartlett,* N1AGD

Sitting quietly in her wheelchair, her hands folded in her lap, Alice almost seemed asleep. She hadn't said a word for weeks, ever since a stroke had left her virtually speechless. The therapists were frantic — would she ever talk again? Suddenly a voice with a familiar accent filled the room and her head jerked up in interest.

"CQ CQ, this is WD5XYZ in Oklahoma City, calling CQ 10 meters."

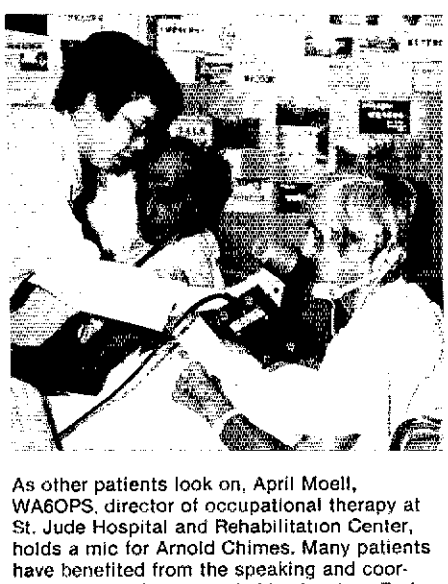
"Let me talk," Alice whispered, and she took the first step toward recovering her speech.

At St. Jude Hospital and Rehabilitation Center in Fullerton, CA (not the St. Jude's Children's Hospital of Danny Thomas fame), such events as this dramatized account are fairly common. The hospital has a 38-bed wing for victims of stroke, head injury, spinal cord injury and other disorders that require victims to learn again to talk, walk and feed themselves.

One of the more enjoyable tools used in rehabilitation is Amateur Radio. April Moell, WA6OPS, is the director of occupational therapy at St. Jude and the licensee of WD6BPT, the club station at the hospital.

"Usually the first question I hear from a visiting ham is 'How many people have you helped to get a license?' " April says. "That isn't the purpose of having a station here, although we do recommend the several excellent clubs in the area for someone who wants to continue in Amateur Radio after his release. But the main reason for the formation of the St. Jude Hospital and Rehabilitation Center Amateur Radio Association is to provide motivation, stimulation and orientation for our patients."

The seed of SJH-RC-ARA was planted by Myra Young, the widow of Carl, WB6ECW. As a new employee at St. Jude, Myra asked April whether she thought the hospital could use a pair of Kenwood twins and a Hustler vertical antenna. She wanted to put Carl's equipment to good use. "Myra didn't even know I was an amateur. What a coincidence!" April says.



As other patients look on, April Moell, WA6OPS, director of occupational therapy at St. Jude Hospital and Rehabilitation Center, holds a mic for Arnold Chimes. Many patients have benefited from the speaking and coordination exercises provided by Amateur Radio at WD6BPT.

After reassuring the hospital's powers-that-be that the hf station would not cause harmful interference to any existing medical equipment, April applied for a club call sign, and on October 4, 1977, the station was fired up from a corner of the rehab wing.

Patients who are involved with WD6-*B*ed *P*an *T*rainers benefit from more than speech therapy. Locating contacts on a map improves visual scanning ability. Stamping and filling out QSL cards is a good hand-eye coordination task which makes the patient feel productive. For some of the less-severely disabled patients, sending and receiving code is a good physical and mental exercise. Merely being at the station encourages patients to interact and helps improve their attention span.

April says she's become spoiled by the excellent response the station has had from the amateur community. Since it is usually more meaningful for a patient to ragchew with an amateur about the weather or sports or everyday activities, April will seldom wade through a DX pileup. Occasionally, however, DX stations have kept the DX hounds at bay while enjoying a lengthy chat with WD6BPT. (A list of third-party countries is posted prominently in the shack.) "Handicapped amateurs will often go out of their way to boost morale and encourage our patients, telling them how they've learned to cope with their disability," April explains.

The station enjoys a high percentage of QSL returns. Bob, N4AOJ, listens for WD6BPT every week, inquires about the patients by name, and sends cards and letters to each new patient he talks to. Some amateurs send letters or QSL cards to each individual in the "shack," which is especially rewarding as the patient can show the card to his or her family as proof of activity. April was especially gratified to receive a confirmation that came with a self-addressed envelope, asking her to "please QSL."

Out of the SJH-RC-ARA experience has evolved a list of guidelines for amateurs who are interested in starting similar programs in local rehabilitation or convalescent facilities. The club will be happy to send a copy of the guidelines upon receipt of an s.a.s.e. Supporting members who donate $5 or more receive special name badges and copies of the club bulletin, *The Call Letter*.

Ham radio breaks down many barriers and promotes equality in spite of disability. As April says, "A happy patient heals faster, and there's nothing like the smile on the face of a patient who hears his or her name on the radio!"

*2109 Branch, Champaign, IL 61820

# The Past and Future at Baton Rouge

## Hiram Percy Maxim, long-range planning, WARC and computers: all topics for discussion by the ARRL Board at its second 1979 meeting.

By Harold M. Steinman,* K1FHN

What do Hiram Percy Maxim, long-range planning, WARC and computers have in common? The answer is that they were all topics for discussion when the ARRL Board of Directors met in Baton Rouge, LA, July 18-19 for its second 1979 meeting. The topics discussed spanned 65 years of League history and dozens of subjects; if there exists a common theme uniting them all it lies in their very diversity, for the many subjects covered by the Board of Directors parallel the many interests of amateurs throughout the world.

At minute 66 the Board reached back through the decades to honor the great Hiram Percy Maxim, W1AW, cofounder of the ARRL and its first President from 1914 until his death in 1936. It was with visible emotion that Atlantic Division Director Harry McConaghy, W3SW, made the motion to elect Mr. Maxim as the Charter Member of the ARRL Hall of Fame, in accordance with the nomination submitted by the Foundation for Amateur Radio. The motion was unanimously approved.

Hiram Percy Maxim was a man of vision, a man who recognized the need for unifying amateurs into their own organization; an organization that, 65 years later, is still going strong and representing radio amateurs day in and day out. This author firmly believes that Amateur Radio as we know it would not exist today without the ARRL, and the ARRL would not exist had it not been for the vision of Hiram Percy Maxim.

Therefore, it seems appropriate that the same Board which honored Mr. Maxim would also discuss such topics as WARC, long-range planning, and an in-house data processing facility for ARRL hq. These subjects look toward the *future* of Amateur Radio and the *future* capability of ARRL hq. to meet unknown challenges. It was a meeting Mr. Maxim would have enjoyed.

*Washington Area Coordinator, ARRL

### WARC

WARC, the World Administrative Radio Conference, which meets in Geneva, Switzerland, September through December of this year, has been high on the agenda of the past several Board meetings. This meeting was no exception, except for one *very* important difference. This was the final Board meeting before WARC — by the end of this year WARC will be history. Listening to the final status reports concerning Amateur Radio's preparation for this most important conference was very much like listening to the final moments of an Apollo countdown. Everything humanly possible has been done to prepare for the conference, and the reports concluded that radio amateurs go to this conference better prepared than ever before. Yet the suspense is still there, and the results won't be in for months. The future of Amateur Radio hangs in the balance. At minute 54, the Board took time to recognize and applaud the efforts of many individuals and organizations, too numerous to mention individually, who have actively engaged in preparations for the 1979 World Administrative Radio Conference.

### Organizational

Full support for the League's Long-Range Planning Committee (LRPC) was shown at minute 25, where the Board unanimously approved the plan of action and the 1979 budget presented by the Committee. At minute 41 it was voted that the LRPC include in its studies the feasibility of reorganizing the ARRL into a local chapter structure similar to the way professional, political, service and fraternal membership organizations operate.

A highlight of the meeting was the granting of autonomy to the Canadian side of the American Radio Relay League, more commonly known as the Canadian Radio Relay League (CRRL). Minute 22 gives authority to the President and Secretary of the ARRL to sign agreements required by the Minister of Consumer and Corporate Affairs of Canada in order to incorporate the ARRL as a not-for-profit corporation under the laws of Canada. Furthermore, in order to facilitate liaison between the ARRL and the CRRL, minute 23 invites the President of the CRRL to sit as an observer, with the right to make comments as appropriate, at meetings of the ARRL Board, so long as the President of the ARRL is similarly authorized to attend meetings of the CRRL.

In other organizational matters, the Board voted at minute 32 to hold the second annual 1980 Board meeting on July 23 and 24 in Seattle, WA, prior to the National Convention scheduled in that city July 25 to 27. Minutes 39 and 47 establish a Public Relations Advisory Committee to advise the Board on the most effective way of projecting the Amateur Radio image. The board in minute 65 adopted the design of Ralph G. Holberg III, N4RX, of Mobile, AL, as the official flag of the American Radio Relay League.

### Regulatory

Two recently released FCC Notices of

Inquiry received the attention of the Board. The first is an Inquiry concerning the biological effects of radio-frequency radiation. Recognizing that rising public concern over the potential effects of rf radiation could pose a threat to the operations of radio amateurs, the Board established a Committee on Biological Radiation Hazards at minute 27. This committee will include experts in the field chosen from academia, industry and the general membership of the ARRL, and will submit recommendations to the Board on how to respond to the Commission's Inquiry in this area. The committee's work will continue after the FCC Inquiry is completed in order to monitor the political, social and technical environment for trends in the area of the biological effects of rf radiation, to submit to the Board recommendations concerning ARRL policy in this area, and to represent Amateur Radio and the ARRL at hearings and other forums at the local, state and national level where actions in this area may potentially impact upon the Amateur Radio Service.

The second Inquiry concerns the creation of an additional Personal Radio Service in the 900-MHz band; the Board at minute 63 directed that the ARRL hq. staff prepare comments to this Inquiry supporting the allocation of a band of frequencies in the vicinity of 900 MHz for the Personal Radio Service, and urging the allocation of a separate band of frequencies in the vicinity of 900 MHz for the Amateur Radio Service, with uses appropriate to each service.

Also on the regulatory front, minute 34 directs the General Manager to reaffirm to the appropriate government agencies the deep concern of American and Canadian amateurs over the persistent and disruptive interference created by the so-called "Woodpecker" transmissions on our high-frequency bands. The ARRL General Counsel is directed at minute 36 to discuss with appropriate members of the FCC and its staff the malicious interference, obscene language, and other unlawful activities on the amateur bands, and to submit a plan of action to the ARRL Executive Committee at the earliest possible date. At minute 48 the Board directed that the FCC be petitioned to provide a license-expiration notification to each licensee 60 days in advance of his or her license expiration. Finally, at minute 60 the Board reaffirmed its desire to obtain enactment of the amendments to the Communications Act of 1934 which were presented by League spokesmen to the Communications Subcommittees of the Senate and House of Representatives in the most recent hearings on bills S.611, S.622 and H.R.3333.

### *QST*

Because it is the official journal of the ARRL and the primary means of disseminating information to the members, *QST* always receives considerable attention at meetings of the Board. At the July meeting the editor, at minute 40, was directed to increase the emphasis on technical articles that introduce the reader to microprocessors. At minute 43 a new *QST* column was established: a column designed to provide recognition to radio amateurs who have distinguished themselves either in Amateur Radio activities or in their professional or volunteer activities. Also, minute 42 instructs the Management and Finance Committee to review current policies relating to *QST* advertising and to make recommendations to the Board at its next meeting.

### Headquarters

It is important not to think of the League as a building in Newington that houses approximately 120 people who are paid to get the work done. The League is far more complex, consisting of officers, directors, and members, thousands of which are hard-working volunteers without which there would be no ARRL. ARRL hq., nevertheless, provides a focal point for the activities of these people and serves as a clearinghouse for the exchange of information. It also performs the more obvious and necessary functions such as the processing of memberships, handling of correspondence, and so on. An efficient Hq. makes an efficient League.

The Board made Hq. more efficient at minute 57 by establishing an in-house Hq. data processing facility. Currently, all data processing activities, such as the preparation of *QST* mailing labels, are contracted out to a firm in Massachusetts. A study ordered by the Board in January 1979 indicated that moving the data processing functions completely to Hq. would prove cost effective and would provide much-needed future flexibility. Hence the Board's decision.

At minute 15 the Board examined the results of a study on the feasibility of hiring an attorney for the Hq. staff, and concluded that the League's requirements for legal services are adequately fulfilled by present arrangements.

### Studies

Where there is insufficient information on which to base a knowledgeable decision, the Board often directs that studies be performed, and that the results be reported to the Board, usually at the next meeting. This time the Board tasked the Plans and Programs Committee (Directors Holladay, Grauer, McConaghy and Vice President Clark) with studying the content of *QST* (minute 28), the creation of a new *QST* column (minute 38), and the possibility of FCC approval of digital data transmission via Amateur Radio (minute 44). The Membership Affairs Committee (Directors Gant, Anderson, Wicker and V. P. Clark) will study the establishment of a new operating award to encourage international friendship and understanding (minute 49 — this study is to be done in cooperation with the DX Advisory Committee) and the feasibility of issuing a one-time membership certificate with each renewal, indicated by a distinctive sticker (minute 55). Finally, the Legal and Regulatory Committee (Directors Egbert, Carpenter, Thurston and V. P. Smith) will study the benefits and problems arising from the use of reciprocal operating privileges in the United States (minute 51).

### The Details

The fine print on the next few pages contains the details of the above actions, and many more. To see how the ARRL Board of Directors represented *you* in Baton Rouge, grab your magnifying glass and peruse the minutes, beginning on page 63. QST

## Strays

### OSCAR BOOK AVAILABLE

☐ *Using Satellites in the Classroom*, the excellent OSCAR Education textbook by Dr. Martin Davidoff, K2UBC, is available again. Funded by the National Science Foundation and published with the assistance of the Smithsonian Air and Space Museum, the original supply of 1200 copies was very quickly exhausted. Now, all 234 pages can be purchased on microfiche for 83 cents. Many libraries have microfiche readers and facilities for producing printed copies of specific pages. Send your prepaid order (don't forget your name and address) to ERIC Document Reproduction Service, Box 190, Arlington, VA 22210. Ask for Document no. ED 162 635, microfiche. Enclose 83 cents, plus 15 cents postage, and 4 cents tax (VA residents only), for the microfiche copy. — *Steve Place, WB1EYI*

### *QST* congratulates . . .

☐ Dr. Roemer Jack Best, W5RPH, who was recently elected to a two-year term on the City Council of Corpus Christi, TX. He is the first amateur on the Council for more than 50 years. Dr. Best is a dentist and a life member of ARRL, as well as a past president of QCWA in Corpus Christi.

# Moved and Seconded...

MINUTES OF THE 1979 SECOND MEETING OF THE BOARD OF DIRECTORS
THE AMERICAN RADIO RELAY LEAGUE, INC.
July 18-19, 1979

1) Pursuant to due notice, the Board of Directors of The American Radio Relay League, Inc., met in second session at the Prince Murat Inn, Baton Rouge, LA, on July 18, 1979. The meeting was called to order at 9:30 A.M., with President Harry J. Dannals, W2HD, in the Chair, and the following directors present: Garfield A. Anderson, KØGA, Dakota Division; Max Arnold, W4WHN, Delta Division; Maurice O. Carpenter, KØHRZ, Rocky Mountain Division; Richard A. Egbert, W8ETU, Great Lakes Division; Jack D. Gant, W5GM, West Gulf Division; Paul Grauer, WØFIR, Midwest Division; Ron J. Hesler, VE1SH, Canadian Division; Jay A. Holladay, W6EJJ, Southwestern Division; Harry A. McConaghy, W3SW, Atlantic Division; Don C. Miller W9NTP, Central Division; Larry E. Price, W4RA, Southeastern Division; William J. Stevens, W6ZM, Pacific Division; John C. Sullivan, W1HHR, New England Division; Robert B. Thurston, W7PGY, Northwestern Division; L. Phil Wicker, W4ACY, Roanoke Division; Stan Zak, K2SJO, Hudson Division. Also in attendance, as members of the Board without vote, were Victor C. Clark, W4KFC, First Vice President; Noel B. Eaton, VE3CJ, Vice President; Carl L. Smith, WØBWJ, Vice President; and Richard L. Baldwin, W1RU, General Manager. Also in attendance, at the invitation of the Board as nonparticipating observers, were the following Vice Directors: Jesse Bieberman, W3KT, Atlantic Division; C. Richard Dyas, WØJCP, Midwest Division; George A. Diehl, W2IHA, Hudson Division; Kenneth A. Ebneter, K9EN, Central Division; Fred Evans, W1JFF, New England Division; William Loucks, VE3AR, Canadian Division; Peter F. Matthews, WB6UIA, Southwestern Division; Ron D. Mayer, K7BT, Northwestern Division; Gay L. Milius, W4UG, Roanoke Division; John Sanders, WB4ANX, Delta Division; and Raymond B. Wangler, W5EDZ, West Gulf Division. There were also present Honorary Vice Presidents R. O. Best, W5QKF, Robert York Chapman, W1QV, and Wayland M. Groves, W5NW; Treasurer John Huntoon, W1RW; General Counsel Robert M. Booth, Jr., W3PS; Associate General Counsel B. Robert Benson, QC, VE2VW; Assistant General Manager David Sumner, K1ZZ; Membership Services Manager Perry F. Williams, W1UED; and Washington Area Coordinator Harold M. Steinman, K1FHN.

2) The assembly observed a moment of silence in recollection for those amateurs who have joined the ranks of the Silent Keys, especially for L.A. "Pete" Morrow, W1VG, former Advertising Manager of *QST*, and also for the wife of Vice Director Dyas, both of whom passed away this year.

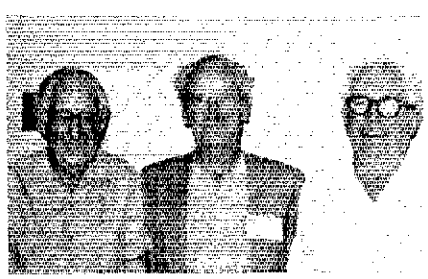
3) On motion of Mr. McConaghy, seconded by Mr. Arnold, VOTED to adopt the agenda, with the addition of items 5) g), Report of the Ad Hoc Committee on Canadian Reorganization, Mr. Smith, Chairman; 5) h), Report of the Long-Range Planning Committee, Mr. Clark, Chairman; 7), Nominations to ARRL Hall of Fame.

4) On motion of Mr. Thurston, seconded by Mr. Sullivan, unanimously VOTED that the Minutes of the 1979 Annual Meeting of the Board of Directors are approved in the form in which they were issued by the Secretary.

5) Reports of the officers were presented here. In his written report, and in supplementary oral comments, the President remarked that our efforts in preparation for WARC-79 continue to be noteworthy. Judging from reports received today, there is every indication that our local as well as global homework has been done well. Noel Eaton, Vic Clark and most recently Carl Smith, plus members of the Headquarters IARU Team, deserve our cheers for their work in this most-important arena. On the fraternal side, the League presence at conventions and hamfests is important; there should be an attractive ARRL booth at a prominent location at sponsored events, staffed adequately to answer member comments. The report also emphasized the necessity for continued efforts in public relations assuring proper recognition of Amateur Radio. The President also touched on present and planned contacts with the Federal Communications Commission on a continuing basis.

6) First Vice President Clark reported on meetings with the Region 2 IARU Executive Committee, Mexico City, in April. Discussions have been held by Region 2 Executive Committee members with administration officials from every one of the Region 2 ITU member nations. An IARU reception, organized by Region 2 Secretary OA4AV, was held in April for delegates to an ITU WARC preparatory meeting in Panama. Another is planned for delegates to the CITEL CPT3 WARC preparatory meeting in Bogota, Colombia, later this month, organized by the IARU society in that country. Mr. Clark has continued to assist with the preparation of *Region 2 News* and maintains regular contact with Region 2 Executive Committee members. The report also mentioned meetings of the Long-Range Planning Committee and responses from radio amateurs at large to its call for comments. Vice President Eaton, who also serves as President of the International Amateur Radio Union, reported on the global preparations for the World Administrative Radio Conference. The Special Preparatory Meeting of the CCIR last fall to consider technical background for WARC-79 was quite favorable to the Amateur Service. This spring, meetings were held in each ITU region to assure that the smaller countries of the world fully understood the findings and recommendations of the Special Preparatory Meeting. IARU has been represented at each of these meetings: in Nairobi by Bruce Johnson of Headquarters; in Panama by Gustavo Reusens, OA4AV; and in Sydney by Region 3 Director Michael Owen, VK3KI. The Johnson trip to Nairobi provided an opportunity for visits in Kenya, Botswana, South Africa, Cameroon, Ivory Coast, Liberia, Sierra Leone, The Gambia, Senegal, and Egypt. A meeting of the IARU Region 1 Executive Committee attended by Vice Presidents Eaton and Smith also provided opportunities for a visit to Geneva confirming office and lodging arrangements for WARC-79, and a special trip to Jordan for consultations with King Hussein, JY1, and members of his government. The report concluded that radio amateurs go to this conference better prepared than ever before, with a unified and common approach by our member societies to their own administrations. Vice President Smith reported on his meetings with radio clubs, meetings of the Ad Hoc Committee on Canadian Reorganization, the International Affairs Committee, the Management and Finance Committee, and the IARU WARC Team. The report also mentioned the trip to England and Geneva with Vice President Eaton.

7) General Manager Baldwin began his extensive oral report with a discussion of logistics for the IARU Team at Geneva, including provision for frequent contacts by telephone and telex. Mr. Baldwin also reported that Merle Glunt, W3OKN, retired assistant chief engineer of FCC and an ARRL consultant, had been named to the U.S. Delegation as the "Industry" representative for the Amateur Radio Service. Turning to domestic matters, the report covered improved morale at Headquarters but a shortage of personnel in the Technical Department, and similar staff matters. Fund raising efforts and an improved financial situation for ARRL were also covered, the latter being based on increased advertising income, dues income and economies in the printing of *QST*. Matters before the Federal Communications Commission, especially the proposal for a new Citizens Band near 900 MHz, and the study of non-ionizing radiation were mentioned briefly. During the course of the above, the Board was in recess from 10:30 to 10:53 A.M.



Three honorary vice presidents attended the Board Meeting: (l to r) R. O. "Doc" Best, W5QKF; Wayland M. "Soupy" Groves, W5NW; and Robert York Chapman, W1QV. *(photos courtesy of John Sanders, WB4ANX)*

8) Treasurer Huntoon reported on changes in the ARRL portfolio of securities, both for operating funds and for the Life Membership accounts. The Board was again in recess from 12:35 to 1:30 P.M. for luncheon, reconvening with the same persons in attendance as at the morning session.

9) General Counsel Booth presented a report mentioning local legal matters in which he has been active; the various bills for rewriting or amending the Communications Act; the ARRL suit in Federal Court to overturn FCC's decision in Docket 21116 concerning linear amplifiers; and related matters. Associate General Counsel Benson reported similarly on his activities in Canada, dealing with the proposed reorganization of the Canadian Radio Relay League, and local legal matters. Honorary Vice President Chapman, in his capacity as President of the ARRL Foundation, reported on fund raising activities of the Foundation among Life Members, scholarships which have been awarded, grants to the AMSAT/OSCAR program, and donations to the WARC Fund.

10) Reports of the Standing Committees came next. Mr. Zak, as Chairman, presented the report of the International Affairs Committee. In response to Minute 99 of the January Board Meeting, the Committee reviewed preparations for the 1979 World Administrative Radio Conference, and the level of support needed for the remainder of the year. The Committee will receive further reports, and monitor the WARC effort on a continuing basis.

11) Mr. Holladay, as Chairman, reported briefly for the Plans and Programs Committee, with its continuing study of ARRL publications.

12) Mr. Gant, as Chairman, presented a progress report of on-going studies by the Membership Affairs Committee concerning a uhf awards program; material in *QST* on distinguished amateurs; an award for outstanding staff performance; and efforts to encourage a feeling of belonging by the membership.

13) Mr. Price, as Chairman, presented the report of the Management and Finance Committee. In response to Minute 29 of the January Board Meeting, the Committee sought proposals from the "big eight" accounting firms and, after study, recommended that Price Waterhouse & Company be appointed auditors for ARRL. This recommendation was accepted at the Executive Committee Meeting on April 21. A study of the League's expense reporting procedures, responding to Minute 49 of the January Meeting, resulted in some changes in accounting method and in frequency of reports to directors concerning their own expenses. A difficult task was presented by Minute 50 of the January Meeting, a study of the duties and responsibilities of the Vice Presidents with the objective of improving their ability to better serve the organization. The study confirmed that provisions in the Articles of Association and By-Laws for Vice Presidents meet the requirements of Connecticut Law; additionally, the utilization of Vice Presidents as chairmen or ordinary members of standing committees of the Board should be seriously considered. Investment of League funds by the Treasurer is subject to advice from the Committee; its report included recent purchases of securities for the portfolio. The Committee presented a draft agreement between ARRL and Bonn Gilbert, who administers insurance programs for the League. The Committee recommended against adoption of a plan for group life insurance since our efforts in the insurance field should deal with concerns of radio amateurs as such. Similarly, the Committee found a proposed pre-paid legal plan too broad in its present version, although it believed a policy could be constructed around amateur radio legal problems. Finally, the Committee recommended that ARRL obtain liability protection for Officers and Directors of the League. During the course of the above, the Board was in recess from 3:27 to 3:46 P.M.

14) On motion of Mr. Price, seconded by Mr. Sullivan, at 4:06 P.M., unanimously VOTED that the Board now resolve itself into a Committee of the Whole for the purpose of management appraisal. Whereupon, the staff members present other than the General Manager departed from the meeting. At 5:31 P.M. the Committee arose and reported to the Board. On motion of Mr. Price, seconded by Mr. Sullivan, it

Southeastern Division Director Larry Price, W4RA; Hudson Division Director Stan Zak, K2JSO; and New England Division Director John Sullivan, W1HHR, discuss strategy during a break.

was unanimously VOTED to adopt the report of the Committee. Staff members rejoined the meeting at this point.

15) Mr. Egbert, as Chairman, presented the report of the Legal and Regulatory Committee. After study, in response to Minute 37 of the January Board Meeting, the Committee concluded that the League's requirements for legal services are adequately fulfilled by the current organization and purchased service arrangements. The addition of an attorney to the Headquarters staff would, in the opinion of the Committee, increase our operating cost without materially improving the effectiveness of our legal activities.

16) Mr. Smith, as Liaison, presented the report of the VHF Repeater Advisory Committee, concerning activities on 10 meters, the lack of FCC action on 16F3 emission for 52-52.5 MHz, unification of the VRAC and VHF/UHF Advisory Committee, tone access standards, and autopatch issues.

17) Mr. Zak, as Liaison, presented the report of the Contest Advisory Committee, covering the success of the one-weekend-per-mode format for the DX Contest. A slight change will be made for 1980, with phone on the first full weekend in March, CW on the third full weekend in February. The Committee currently is studying the number of operating classes in the Novice Roundup, possibly changing the information exchanged in contests, allowing DXpedition scores for club totals in the DX contest, and changing the minimum time-out rule for Sweepstakes. During the course of the above, the Board recessed at 6:00 P.M., reconvening at 8:00 P.M., with all members herein before mentioned present.

18) Mr. Milius, as Liaison, presented the report of the DX Advisory Committee. The report covered discussions of countries list criteria for several places and reports of several subcommittees. Whereupon, moved by Mr. Wicker, seconded by Mr. Sullivan, that the DX Advisory Committee Subcommittee report on International Friendship and Understanding be referred to the Membership Affairs Committee for a study of the suggestions presented therein, the feasibility of executing these suggestions, and additional suggestions on the same subject and report thereon to the Board in January, 1980.

19) Mr. Arnold, as Liaison, presented the report of the Emergency Communications Advisory Committee, covering its recommendation for yearly in-person meetings; Headquarters solicitation of constructive comments following each Simulated Emergency Test; preparation of a unified, nationwide plan for emergency operations around the clock when necessary; changes in the traffic to be recommended for the Simulated Emergency Test; inclusion of information on RACES in the *QCD* bulletin; cessation of publication of SET scores in *QST* to avoid contest connotations; and simplification of scoring for SET.

20) Mr. Holladay, as Liaison, presented a brief report from the VHF/UHF Advisory Committee concerning on-going studies of a UHF award and the possibility of the Committee combining with the VHF Repeater Advisory Committee. Mr. Holladay noted that WØYZS completed the first 432 MHz Worked All States on July 15.

21) Mr. Smith, as Chairman, read the report of the Ad Hoc Committee on Canadian Reorganization.

22) On motion of Mr. Hesler, seconded by Mr. Price, VOTED the following resolution:

BE IT AND IT IS HEREBY RESOLVED that the President and Secretary of this League be and they are hereby authorized to sign such consents as may be required by the Minister of Consumer and Corporate Affairs of Canada in respect of the application for incorporation of the Canadian Radio Relay League, Inc. as a Not-For-Profit Corporation under the laws of Canada.

23) On motion of Mr. Smith, seconded by Mr. Arnold, the following resolution was unanimously ADOPTED:

WHEREAS, it is deemed desirable that the Canadian Radio Relay League be incorporated under the laws of Canada, and carry on many of the activities and duties presently carried on by the Canadian Radio Relay League as a Division of the American Radio Relay League; and,

WHEREAS, amateur radio and the members of the proposed Canadian Corporate entity who would also be members of this League would best be served by continued close and effective liaison between our two organizations; now, therefore,

BE IT AND IT IS HEREBY RESOLVED that, with a view to facilitating and enhancing liaison between the proposed Canadian Radio Relay League, Incorporated ("CRRL") and the American Radio Relay League, Incorporated, the incumbent President of the CRRL be invited regularly to attend all meetings of this Board, and at those meetings to sit as an observer, with the right to make such comments as he deems necessary and appropriate respecting matters of joint interest to Canadian and American amateurs, but without any right to vote at the said meetings. Further, that this arrangement remain in force so long as the President of the ARRL is similarly authorized to attend meetings of the CRRL.

24) The Board recessed at 10:15 P.M., reconvening at 8:30 A.M., July 19, with all persons herein before mentioned present.

25) Mr. Clark yielded to Mr. Holladay for the report of the Long-Range Planning Committee. Whereupon, on motion of Mr. Holladay, seconded by Mr. Gant, it was unanimously VOTED that the plan of action and the 1979 portion of the budget presented by the Long-Range Planning Committee is accepted and the chairman and members are encouraged to proceed with the work of the Committee, reporting progress to the Board at the prescribed intervals.

26) Moved by Mr. Arnold, seconded by Mr. McConaghy, the following resolution:

WHEREAS, the Federal Communications Commission has issued a Notice of Inquiry in the matter of the creation of an additional Personal Radio Service in the 900 MHz band (FCC Personal Radio Docket 79-140), MOVED that the ARRL endorses the concept of establishing this service in the 900 MHz band, and that the ARRL staff is directed to file comments in PR Docket 79-140 for the purpose of assisting the Commission in the systematic and orderly creation of the new service, based on the extensive history and self-policing tradition of the Amateur Radio Service and the individual experience and expertise of radio amateurs throughout the world. After discussion, on motion of Mr. Holladay, seconded by Mr. Anderson, VOTED that the matter is laid on the table.

27) On motion of Mr. Egbert, seconded by Mr. Holladay, the following resolution was ADOPTED:

WHEREAS, the present public concern over the biological effects of radio frequency radiation could have potential adverse impact on the day-to-day as well as emergency operations of radio amateurs; and,

WHEREAS, certain states and municipalities have already attempted to establish their own standards for permissible levels of radio frequency radiation, standards that are so restrictive that they would adversely affect the operation of many types of radio stations, including Amateur; and,

WHEREAS, the Federal Communications Commission has released a Notice of Inquiry (General Docket 79-144) concerning the biological effects of radio frequency radiation;

MOVED, that there be established by the Board an Ad Hoc Committee on Biological Radiation Hazards, the members of which are to be appointed by the President, said members to be selected based on their individual knowledge of and expertise in the area of the biological effects of radio frequency radiation and chosen from academia, industry, and the general membership of the ARRL, including liaisons for the ARRL Board and staff. This Committee shall be immediately charged with submitting to the Board recommendations for response to General Docket 79-144. The on-going charge of the Committee shall be to monitor the political, social, and technical environment for trends in the area of the biological effects of radio frequency radiation, to submit to the Board recommendations concerning ARRL policy in this area, and to represent Amateur Radio and the ARRL at hearings and other forums at the local, state, and national level where actions in this area may potentially impact upon the Amateur Radio Service.

28) On motion of Mr. Zak, seconded by Mr. Grauer, VOTED that the Plans and Programs Committee, in conjunction with the General Manager, perform a study to determine if any changes should be made in the content of *QST*. Such a study shall include, among others, the technical content of *QST*, possible payment for *QST* articles and a consideration of the various specialty columns that now appear or might appear in the Journal, with a report to be rendered to the July 1980 meeting of the Board.

29) Moved by Mr. Grauer, seconded by Mr. Sullivan, that the FCC be petitioned to amend Part 97.82 to permit the usage of a photocopy of the original operator license in the fixed or non-fixed location. After discussion, on motion of Mr. Price, seconded by Mr. McConaghy, VOTED that the matter is laid on the table.

30) The Board was in recess from 10:28 to 10:4 A.M.

31) Moved by Mr. Sullivan, seconded by Mr. Thurston, to amend By-Law 29 by striking out "Finance Committee" wherever those words appear, substituting therefore "Management and Finance Committee." A roll call vote being required, all 16 of the directors voted in the affirmative.

32) On motion of Mr. Thurston, seconded by Mr. Zak, unanimously VOTED that the July 1980 Board Meeting be changed and held in Seattle, Washington during the fourth week of July, and that the Board convene on Wednesday and Thursday the 23rd and 24th, prior to the National Convention scheduled for Seattle on the 25th, 26th and 27th of July, 1980.

33) On motion of Mr. Stevens, seconded by Mr. Wicker, VOTED the adoption of the revised draft of the Insurance Administration Agreement between ARRL and G&H Insurance Administrators, Incorporated. Mr. Grauer requested to be recorded as voting opposed.

34) On motion of Mr. Wicker, seconded by Mr. McConaghy, unanimously VOTED that the General Manager is instructed to reaffirm to the appropriate government agencies the deep concern of American and Canadian amateurs over the persistent destructive interference created by the so-called "Woodpecker" transmissions on our high frequency bands.

35) On motion of Mr. Price, seconded by Mr. Sullivan, unanimously VOTED that the General Manager is directed to negotiate with appropriate insurance underwriters a professional liability coverage for officers and directors of the League. The proposed policy shall be submitted to the Executive Committee for approval not later than the planned September 1979 meeting.

36) On motion of Mr. Holladay, seconded by Mr. Gant, after discussion, unanimously VOTED that the ARRL General Counsel confer with appropriate members of the Federal Communications Commission and its staff concerning the malicious interference, obscene language, and other unlawful activities which are of increasing concern to the Amateur Radio community, with the objective of developing more effective programs for enforcement of the laws of the United States and the rules and regulations of the FCC. The General Counsel shall submit a plan of action to the Executive Committee at the earliest possible date.

37) On motion of Mr. Gant, seconded by Mr. Wicker, unanimously VOTED that the Technical Excellence Award for 1978 be awarded to Dr. Richard W. Harris and Mr. J.F. Cleveland, WB6CZX, for their two-part article appearing in November and December 1978 *QST*, "A Baseband Communications System."

38) Moved by Mr. Miller, seconded by Mr. Stevens, that a column be established monthly in *QST* where the duties and functions of the staff, directors, vice presidents, etc., are discussed in lay terms for new amateurs and League members. After discussion, on motion of Mr. Anderson, seconded by Mr. Zak, unanimously VOTED that the matter is referred to the Plans and Programs Committee for study.

39) Moved by Mr. Zak, seconded by Mr. Stevens, that a Public Relations Advisory Committee is created. The purpose of this Committee shall be to advise, provide information to the Board of Directors and to provide guidelines for the functioning of the Public Relations Assistant appointments and to provide a common meeting ground for ideas and discussions relating to the most appropriate way of projecting the image of Amateur Radio to the general public and pertinent organizations. The Advisory Committee shall concern itself but not necessarily limit itself to study and advise the Board on the most effective way of projecting the Amateur Radio image. This Committee shall undertake such tasks as directed from time to time by the Board of Directors that are within its general scope. All communications between and among the Committee members and liaison personnel shall be by mail. After extended discussion, on motion of Mr. Holladay, seconded by Mr. Price, VOTED that

the matter is laid on the table.

40) On motion of Mr. Grauer, seconded by Mr. Price, unanimously VOTED that the Editor of *QST* is urged to increase the emphasis in *QST* on technical articles that introduce radio amateurs to the use of microprocessors.

41) On motion of Mr. Stevens, seconded by Mr. Holladay, VOTED that the Long-Range Planning Committee include in its studies the feasibility of reorganizing the ARRL to provide for a local chapter structure similar to the way professional, political, service and fraternal membership organizations operate.

42) On motion of Mr. Wicker, seconded by Mr. McConaghy, unanimously VOTED that the Management and Finance Committee in cooperation with the General Manager is instructed to review the current policies for and instructions to *QST* advertisers and to make recommendations to the Board of Directors at its January 1980 meeting as to any changes and modifications considered necessary to bring them up to date.

43) Moved by Mr. Gant, seconded by Mr. Wicker, that the Editor of *QST* establish a feature column designed to provide recognition to radio amateurs who have distinguished themselves either in Amateur Radio activities or in their professional or volunteer activities, and that this column shall appear as often as *QST* space and biographic material are available. After discussion, on motion of Mr. Sullivan, seconded by Mr. Zak, moved that the matter be referred to the Plans and Programs Committee; but the motion to refer was lost. The vote then being on the original motion, the same was unanimously ADOPTED.

44) Moved by Mr. Miller, seconded by Mr. Anderson, that the General Counsel be asked to investigate the possibility of FCC approval of digital data transmission via Amateur Radio and report to the January Board Meeting. After discussion, on motion of Mr. Price, seconded by Mr. Egbert, unanimously VOTED that the matter is referred to the Plans and Programs Committee for study. During the course of the above, the Board was in recess for luncheon from 12:17 to 1:17 P.M., reconvening with all persons herein before mentioned present.

45) On motion of Mr. Arnold, seconded by Mr. Zak, unanimously VOTED that the General Manager is instructed to investigate the possible advantages of arriving at formal cooperative agreements with national CB organizations for operation during emergencies, and report at the next Board meeting.

46) On motion of Mr. Egbert, seconded by Mr. Sullivan, at 1:25 P.M., unanimously VOTED that the Board resolve itself into a Committee of the Whole to discuss standing committee procedures. The Committee rose at 1:43 P.M. and reported to the Board. On motion of Mr. Egbert, seconded by Mr. Stevens, unanimously VOTED that the report of the Committee of the Whole is adopted.

47) On motion of Mr. Zak, seconded by Mr. Sullivan, VOTED that the matter of the Public Relations Advisory Committee be removed from the table. Whereupon, on motion of Mr. Sullivan, seconded by Mr. Zak, it was VOTED to move the previous question. A roll call vote being requested, the original motion was ADOPTED, with 14 directors in favor and 2 opposed. All directors voted in favor except Messrs. Anderson and Price.

48) On motion of Mr. Grauer, seconded by Mr. Sullivan, VOTED that the FCC be petitioned to provide a license expiration notification to each licensee 60 days in advance of his license expiration.

49) On motion of Mr. Sullivan, seconded by Mr. Zak, unanimously VOTED that the Membership Affairs Committee and the DX Advisory Committee study the establishment of a new operating award having the following suggested requirements:

1) Two-way single-mode contacts.

2) Only contacts between citizens of countries that have a national society holding membership in the IARU shall be considered valid.

3) A minimum of 100 confirmed contacts with 100 different IARU countries to be required.

4) The award to be issued on a one-time only basis with endorsement stickers available for additional modes.

5) A suitable fee shall be established by the General Manager.

6) A minimum of 15 minutes solid copy and conversation to be required.

7) ARRL membership shall be required for U.S. and Canadian amateurs.

8) Only contacts made after announced starting date to be valid.

The committee shall report back to the Board at the first meeting in 1980.

50) On motion of Mr. Stevens, seconded by Mr. Price, unanimously VOTED that because of the announcement that the West Coast DX Bulletin is about to cease publication and because that bulletin provides a desired service to many DX operators, the General Manager is authorized to determine on what terms ARRL might obtain publication rights to the West Coast DX Bulletin and the services of Hugh Cassidy as editor, and the General Manager is further directed to report his findings promptly to the Executive Committee for their consideration.

51) On motion of Mr. Holladay, seconded by Mr. Sullivan, unanimously VOTED that the Legal and Regulatory Committee is directed to study the benefits and problems arising from the use of reciprocal operating privileges in the United States and to recommend any appropriate improvements in the exercise of these privileges, and make an initial report at the next Board Meeting.

52) On motion of Mr. Gant, seconded by Mr. McConaghy, unanimously VOTED that the Board expresses its appreciation to the Mt. Airy VHF Radio Club in Philadelphia (the "Pack Rats") for its initiative in creating a memorial award to honor VHF/UHF pioneer Sam Harris, W1FZJ, as announced in August *QST*, thereby fulfilling the intent of Minute 91 of the 1979 Annual Meeting.

53) Moved by Mr. McConaghy, seconded by Mr. Wicker, that due to the current energy crisis, which has been felt by the directors, officers and personnel of the League, the 17-cents mileage allowance is increased to 20 cents per mile. After discussion, on motion of Mr. Thurston, seconded by Mr. Sullivan, it was VOTED to amend the motion by adding an effective date of August 1, 1979. The question then being on the motion as amended, the same was unanimously ADOPTED.

54) On motion of Mr. Zak, seconded by Mr. Grauer, unanimously VOTED that the Board of Directors warmly applauds the efforts of the many individuals and organizations who have been actively engaged in preparations for the 1979 World Administrative Radio Conference, including particularly officers and members of IARU member radio societies around the world who have so effectively pressed the case for Amateur Radio with the national administrations, and also the members of the Regional Executive Committees who have coordinated their efforts.

55) On motion of Mr. Grauer, seconded by Mr. Sullivan, unanimously VOTED that the Membership Affairs Committee be directed to study the feasibility of issuing a one-time membership certificate and then each year of renewal would be indicated by a distinctive shape and color sticker which would be added to the border of the certificate.

56) The Board was in recess from 3:11 to 3:38 P.M.

57) On motion of Mr. Grauer, seconded by Mr. Miller, unanimously VOTED that the General Manager is directed to establish an in-house data processing facility at League Headquarters along the lines of the report to the Board in response to Minute 31 of the January 1979 Board Meeting.

58) Moved by Mr. Grauer, seconded by Mr. McConaghy, to lift from the table the motion concerning Part 97.82 of the FCC Rules. But the motion was LOST.

59) On motion of Mr. Price, seconded by Mr. Thurston, unanimously VOTED that the General Manager is directed to continue his fund raising efforts and to ensure that these efforts are integrated with the activities of the ARRL Foundation.

60) On motion of Mr. Holladay, seconded by Mr. Smith, unanimously VOTED that the President, General Counsel, and appropriate Headquarters staff members renew their efforts to obtain enactment of the amendments to the Communications Act of 1934 which were presented by League spokesmen to the Communications Subcommittees of the Senate and House of Representatives in the most recent hearings on bills S.611, S.622 and HR.3333.

61) Moved by Mr. Gant, seconded by Mr. McConaghy, that the DXCC Honor Roll be listed in *QST* once a year, the month for submission to be the month of June, with expected publication in September *QST*. There will be no deletions of the three basic DXCC awards. The monthly publication of DXCC new members and endorsements will continue. The number of cards required to be submitted for DXCC endorsement shall be in increments of 25 up to the 250 level; 10 cards up to 300; and 5 cards from there up to the next endorsement level. A once-a-year submission will continue to be allowed regardless of the number of cards sent in. Endorsement stickers awarded for DXCC will be at the following levels: 125, 150, 175, 200, 225, 250, 260, 270, 280, 290, 300, 305, and increasing increments of five. Old stickers in increments of ten will continue to be issued until the present supply is exhausted. Full implementation to be effected with notice in the January issue of *QST*. After discussion, on motion of Mr. Price, seconded by Mr. Thurston, unanimously VOTED to amend the motion by deleting the first sentence. The question then being on the motion as amended, the same was unanimously ADOPTED.

62) On motion of Mr. Miller, seconded by Mr. Grauer, unanimously VOTED that the Board authorize the awarding of a special plaque to the Milwaukee Radio Amateurs Club for 60 years of ARRL affiliation. This would be awarded on December 6, 1979 by proper League officials or directors.

Retiring Atlantic Division Director Harry McConaghy, W3SW, moves that Hiram Percy Maxim, W1AW, first President of ARRL, be elected the Charter Member of the ARRL Hall of Fame. The nomination was submitted by the Foundation for Amateur Radio.

63) On motion of Mr. Arnold, seconded by Mr. Clark, unanimously VOTED to lift from the table the matter concerning 900 MHz. On motion of Mr. Arnold, seconded by Mr. McConaghy, unanimously VOTED to amend the motion by striking the text and substituting therefor the following: Moved, that the staff prepare comments in response to the Notice of Inquiry issued June 25, 1979, FCC Docket No. PR 79-140, urging the allocation of a band of frequencies in the vicinity of 900 MHz for the Amateur Radio Service, and the allocation of another band of frequencies in the vicinity of 900 MHz for the Personal Radio Service, with uses appropriate to each service. Further moved, that a draft of the comments be reviewed by the Executive Committee at its next meeting, a revised draft then to be mailed to all directors for comment, and a further revised draft then to be reviewed by the Executive Committee at its last meeting before the due date of comments. The question then being on the motion as amended, the same was unanimously ADOPTED.

64) The Board was in recess from 5:44 to 8:50 P.M., reconvening with all persons herein before mentioned present.

65) On motion of Mr. Gant, seconded by Mr. Price, unanimously VOTED the adoption of a design submitted by Ralph G. Holberg, III, N4RX, of Mobile, AL, of the Southeastern Division, as the official flag of the American Radio Relay League, with official recognition and presentation made to the artist by President Harry Dannals at the ARRL Forum at the 1979 National Convention in Baton Rouge, LA, on July 22, 1979.

66) On motion of Mr. McConaghy, seconded by Mr. Thurston, unanimously VOTED that Hiram Percy Maxim, W1AW, first President of the American Radio Relay League, is elected as the Charter Member of the ARRL Hall of Fame in accordance with the nomination submitted by the Foundation for Amateur Radio.

67) On motion of Mr. Clark, seconded by Mr. Eaton, unanimously VOTED that the ARRL Board of Directors expresses to the officers and members of the Louisiana Council of Amateur Radio Clubs its sincere appreciation for the warm hospitality and the many courtesies extended to the officers, directors and staff members of the ARRL and their wives on the occasion of its July 1979 meeting in Baton Rouge.

68) At this point, the Chair announced the appointment of an Official Availability Committee to identify qualified candidates for the office of ARRL Treasurer: Mr. Egbert, Chairman; Messrs. Sullivan and Arnold.

69) The meeting concluded with informal remarks by all present. There being no further business, on motion of Mr. Thurston, seconded by Mr. Zak, the Board adjourned *sine die*, at 10:57 P.M. Total time in session as a Board, 16 hours, 59 minutes; as a Committee of the Whole, 1 hour, 43 minutes.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

# WARC Countdown

Conducted By David Sumner,* K1ZZ

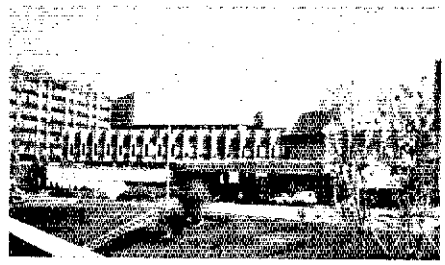
## IARU Team Members Have Diverse Experience, Talents

Of the 1600 or so delegates who will be in Geneva for the World Administrative Radio Conference when it convenes late this month, at least 100 will be licensed radio amateurs. Not that WARC-79 will in any way resemble a hamfest: Most of these amateurs will be attending in professional capacities as official representatives of their national administrations and will be delegates first, hams second.

While most of these WARC delegates will have to deal with issues affecting a multitude of radio services, some have been named to their national delegations specifically to represent the interests of the Amateur and Amateur-Satellite Services. This is especially true of the larger delegations, from countries where Amateur Radio is well developed. For example, from the U.S., ARRL WARC consultant Merle Glunt, W3OKN, will be serving in this way; from Canada, it will be J. C. R. "Bud" Punchard, VE3UD. As members of national delegations, these amateurs can attend closed delegation meetings and speak up for our interests. Also, as long as what they say is in agreement with their national positions, they can speak in conference meetings on behalf of their administrations (subject to any rules of conduct which their delegations may have). Theirs is the best position from which to influence the WARC proceedings. Recognizing this, from the very start of conference preparations the International Amateur Radio Union has urged its member-societies to work for the placement of an amateur on their national delegations. Of course, any member of a national delegation is committed to support the positions of his administration rather than the desires of any service which he may represent, so the efforts to make these positions as favorable as possible to Amateur Radio have been very important.

Apart from the members of the national delegations, there will be a group of radio amateurs in Geneva this fall specifically to represent the Amateur and Amateur-Satellite Services under the banner of the IARU. These are the members of the IARU Observer Team. The International Telecommunication Union permits the IARU (and similar international organizations representing other services) to participate in its work as a nonvoting observer. It will be the job of the IARU Observer Team to monitor all conference proceedings which might affect the Amateur Services and to ensure that the requirements of the world's radio amateurs are given adequate consideration as the delegates wrestle with the thousands of complex issues facing them. Most of the members of the IARU Observer Team have been involved for several years in the preparations for this conference. Most are volunteers, and some will be taking unpaid leaves of absence from their regular employment to represent *you* in Geneva this fall.

At this writing, the following amateurs are expected to spend a minimum of several weeks in Geneva as members of the IARU Observer Team (most will be there fulltime): Noel B. Eaton, VE3CJ, President, IARU; Victor C. Clark, W4KFC, Vice President; Richard L. Baldwin, W1RU, Secretary; Thomas R. Clarkson, ZL2AZ; C. E. Godsmark, G5CO; Bruce Alan Johnson, WA6IDN; Shigetake Morimoto, JA1NET; Wojciech Nietyksza, SP5FM; David H. Rankin, 9V1RH; Pedro Seidemann, YV5BPG; Alberto Shaio, HK3DEU; Carl E. Smith, WØBWJ; R. F. Stevens, G2BVN; and David Sumner, K1ZZ. This month, we will let you meet some of them; we will introduce the rest next month.



Later this month, WARC-79 will convene in this modern conference center in Geneva.

Noel Eaton, VE3CJ, has been active in IARU affairs for almost two decades. He became Director of the ARRL Canadian Division in 1960 and helped establish the IARU Region 2 organization two years later, serving as the Treasurer of Region 2 until his election as President of the Union in 1974. Noel has been licensed since 1937 and put his experience to work during WW II as an officer in Signals and Radar, Royal Canadian Air Force. He was a member of the IARU team at the 1971 WARC for Space Telecommunications (WARC/ST) and has attended two other specialized WARCs since then. Of course, he has attended innumerable IARU regional conferences. Noel was involved in the Canadian preparations for WARC-79 in addition to his international duties. Also licensed as 6Y5BP, ZF1BP and G3SDA, Noel is active daily on 14-MHz ssb whenever he is near a rig. As President of the IARU, Noel will serve as Chairman of the team.

Vic Clark, W4KFC, has been active since he was first licensed in Arizona as W6KFC in 1933 (yes, W6 included Arizona in those days!). Vic served as Section Communications Manager of both Arizona and Virginia before being elected Director of the ARRL Roanoke Division. He served as Director from 1967 to 1975, when he became First Vice President of the League (and Vice President of the IARU). Vic's international involvement became especially intensive in 1976, when he was elected President of IARU — Region 2. His IARU duties have included visits with officers of member-societies in more than 40 countries, including virtually all of North and South America. Retired from civilian employment with the U.S. Coast Guard, Vic's professional experience included a stint as Assistant Chief of the Latin American Branch, International Assistance Division, Federal Aviation Administration. He was an active member of the FCC Advisory Committee for Amateur Radio, which played an important role in domestic WARC preparatory work, and is a Life Member of AMSAT.

Dick Baldwin, W1RU, ARRL General Manager, has been preparing for WARC-79 since 1963, when he was named Assistant General Manager of the ARRL and was given responsibility for stepping up the League's international programs in anticipation of the conference. Almost immediately, Dick found himself in Africa and the Middle East, investigating what could be done to promote Amateur Radio in those parts of the world. His League employment began in 1948 and, except for four years with Motorola in the early 1950s, he has been here ever since. Dick has been attending ITU seminars and conferences steadily since 1964, including the WARC/ST in 1971. His involvement in domestic WARC preparations began when the U.S. first began to get organized in 1973, and he was an early proponent of making new bands at 10, 18 and 24 MHz part of our objectives. Most recently, he served as an alternate to Merle Glunt on the Department of State WARC Advisory Committee. First licensed in 1934 as W1IKE, he served as a Naval communications officer in WW II and was an active DX chaser for many years.

C. Eric Godsmark, G5CO, became available to serve on the IARU team when he retired recently from the U.K. Radio Regulatory Department. During the last 10 years of his 24-year career with the Department, Eric was responsible for the licensing of Amateur, Aeronautical, Maritime and Model Control stations. He was a member of the United Kingdom delegation to the 1971 WARC/ST. His professional duties involved close liaison with the Radio Society of Great Britain, and his willingness to be a part of the IARU team speaks well for the rapport which the RSGB enjoys with its administration. Since his retirement from government service, Eric has spent considerable time preparing charts summarizing the proposals affecting the Amateur Services for the benefit of the other members of the team.

Shigetake "Take" Morimoto, JA1NET, also brings a unique combination of professional and amateur experience to the team. His activity in the affairs of the ITU and its permanent organ, the International Radio Consultative Committee (CCIR), dates back to 1950. He was on the Japanese delegation to the 1959 WARC and the 1971 WARC/ST and received the "Diploma of Honour" at the 1978 CCIR Assembly in Kyoto. On the Amateur Radio side, Take has been a member of the Japan Amateur Radio League (JARL) since its establishment in 1926 and was previously licensed as J1FT and J2IJ. Today he is a Director of the JARL, President of the Japan AMSAT Association, and a Life Member of AMSAT. He attended the IARU Regional Conferences in Tokyo, 1971, and Bangkok, 1978.

Next month we'll let you meet the rest of the team.

*Assistant General Manager, ARRL

# International News

Conducted By Bruce Alan Johnson,* WA6IDN

## Kagisano: Amateur Radio in Botswana

"If Project Goodwill had not come along, The Botswana Amateur Radio Society simply wouldn't exist!" Dave Harris, A2CBX, told me after I reached Botswana. That should be good news indeed for the many clubs and individuals who have contributed to the project since June 1978.

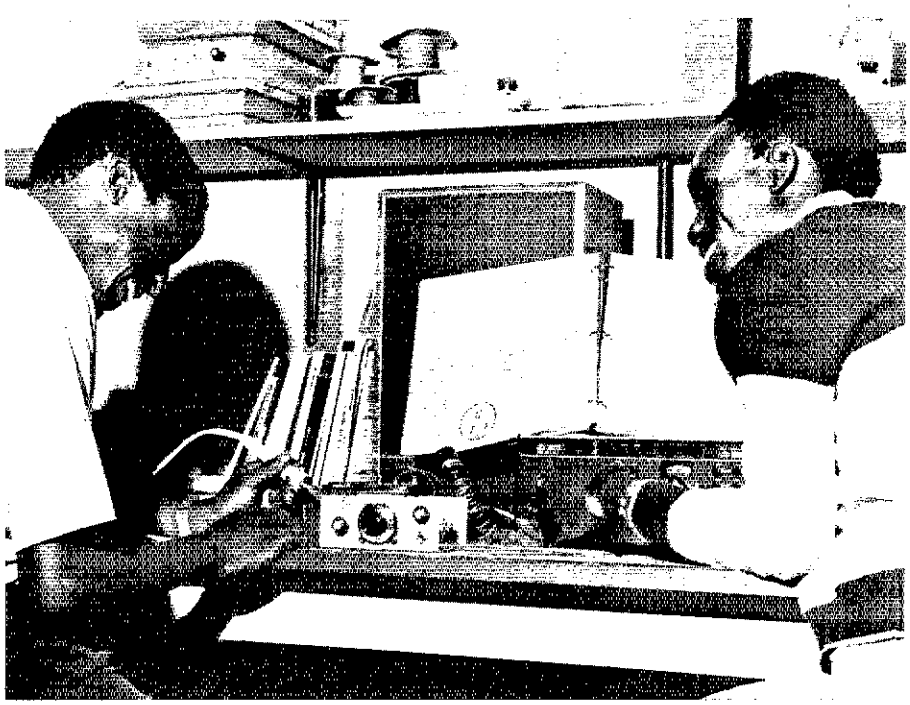
A landlocked republic in southern Africa, Botswana is a land of deserts, some swamps and vast scrublands. The dryness of the climate allows little agriculture, so the Batswana turn to stockraising (producing some of the world's best beef) and mining. As far as Amateur Radio is concerned, the country faces the same problems as most other developing nations: a *per capita* income of only a few hundred dollars a year, and a population of 610,000 scattered among eight tribal groups throughout the country. It is this widely dispersed population which in fact accounted so long for the absence of an Amateur Radio movement in Botswana. BARS officers explained to me that it was only in 1976 that they were able to gather enough interested enthusiasts in the capital town of Gaborone (kha-bar-OWN-nee) to form a society. They lost little time joining the International Amateur Radio Union (IARU), but even then the lack of programs on which to focus radio amateurs' interest led to apathy and inactivity.

But today the Botswana Amateur Radio Society (BARS) is by far one of the African continent's most active, forward-looking societies. Dave Harris, A2CBX, is quite obviously one of the guiding forces behind BARS (and, by the way, an excellent host!). As Chief Engineer for Radio Botswana, his attention is daily focused on the importance of telecommunications. Shortly before my visit he led the society to approach the Botswana government in an attempt to get hold of some used surplus radio equipment about to be dumped by the Botswana Police Force. We haven't heard yet of the outcome, but even if they didn't succeed on this first attempt, they doubtlessly have done a great deal of good for themselves by pointing out in their formal letter that there is in Botswana "a severe shortage of trained telecommunications technicians in the country." The need, they continued, is "to improve the situation at the 'grass-roots' level, by introducing young Batswana to electronics and radio through the medium of Amateur Radio. It is an uphill task. A major problem is that traditionally the equipment for the hobby — although cheap by Western standards — is out of reach of youngsters and newly trained technical assistants."

This sort of direct, honest and professional approach is evident also in BARS' submission to the Ministry of Posts & Telecommunications concerning the needs of the Amateur Radio Service at WARC-79 this September. At this writing, BARS is working with the university in Gaborone on the possibility of arranging a club headquarters building on the campus, in return for helping to bring interested university students into Amateur Radio. They have also instituted a thorough training program covering code, theory and regulations.

*International Services Officer, ARRL

Here are some of the newest members of BARS, waiting now to take their amateur exams. (l-r) Kingsley Reetsang; France Rakola; Ted Makgenene (who was also a Botswana delegate to the ITU Seminar for African WARC Preparation in Nairobi, 1979); Dave Harris, A2CBX; Peter Masisi (on tower); Don Bushe, A2CAB, the administrator of the Botswana Police Amateur Radio Club, affiliated to BARS.



BARS member Peter Masisi completes one of the Project Goodwill receiver kits after work at Radio Botswana, while another amateur enthusiast, Kingsley Reetsang, looks on. *(photos by Botswana Amateur Radio Society)*

In a recent letter to IARU hq., BARS members reiterated their enthusiasm over Project Goodwill, the program that was designed expressly to meet the need for low-cost, simple hf equipment in the developing nations. (See January 1979 *QST*, page 58, for background on the program.) This report is typical of those from other small African societies, for unless the local citizens can get on the air with their own stations, how can they be expected to remain interested in Amateur Radio? Even club stations have been relatively scarce until recently. (Project Grab Bag — see June 1979 *QST*, page 57 — is helping here, by providing used gear and useful parts for club projects.)

By the time you read this, the Gaborone Trade Fair will have been held. We have no doubts at all that the special Amateur Radio booth being set up by BARS will impress Her Majesty Queen Elizabeth and many others who attended not only with the accomplishments to date of the Botswana Amateur Radio Society, but of the tremendous potential that the Amateur Service holds for the Republic of Botswana.

It's a beautiful country, a true showplace of democracy by even the most rigorous standards — and a nation which has shown sincere, active interest in Amateur Radio's future. A country, in other words, which considers its radio amateurs important elements in its national policy of KAGISANO: *peace, harmony and* unity.

# Happenings

Conducted By W. Dale Clift,* WA3NLO

# FCC Inquiry: Bioeffects of RF Radiation

Last month *QST* announced that FCC had issued a Notice of Inquiry concerning the biological effects of rf radiation on individuals. It is General Docket 79-144, and its outcome is bound to have an effect on all users of the radio spectrum who are licensed by the Commission. This includes Amateur Radio operators. Because this Inquiry is likely to receive a great deal of public attention via the broadcast and print media, members of the Amateur Radio community should begin familiarizing themselves now with the issues and concerns of the possible harmful biological effects of radio frequency radiation. Public awareness of these issues has already been aroused by the publicity of the irradiation of the U.S. Embassy in Moscow, hearings before the U.S. Senate's Committee on Commerce, Science and Transportation, the recent Canadian proposal to lower the limits of exposure of the general public to rf radiation, and numerous reports, articles and books on the subject. (For example, see *QST*'s report on the book entitled *The Zapping of America — Microwaves, Their Deadly Risk, and the Cover-Up* in May 1978 *QST*, page 34.)

This article will summarize the major points and issues of General Docket 79-144. ARRL urges all amateurs to submit responsible comments to FCC before its December 15, 1979 deadline. Copies of the complete NOI are available from ARRL hq.; please send an s.a.s.e. with your request for General Docket 79-144. Also, nearly all public libraries receive copies of the *Federal Register*, and this NOI may be photocopied from Volume 44, Number 123, which appeared Monday, June 25, 1979.

### A Simplified Explanation

The first important distinction to be made is that this NOI deals with *nonionizing*, as opposed to ionizing, radiation. Ionizing radiation displaces electrons from atoms, whereas nonionizing radiation does not have enough energy to do this. Examples of ionizing radiation would be radiation with short wavelengths and high energy such as X-rays and gamma rays. Radiation with longer wavelengths and less energy, such as the lower end of the ultraviolet spectrum, infrared and radio frequencies, does not possess enough energy to produce ionization. FCC presently regulates the frequencies of 10 kHz to 300 GHz, frequencies that do not have sufficient energy to cause ionization in living matter.

### Parameters

Power density is the parameter most commonly used to measure the relative capacity of radio frequency (rf) radiation to produce an observable effect on biological material. The rf power density is given in watts (W) per square meter ($m^2$) or milliwatts (mW) per square centimeter ($cm^2$). In this Notice, the Commission uses both milliwatts (mW) and microwatts ($\mu$W). The conversion between these two units is: 1 mW = 1000 $\mu$W (e.g., 10 mW = 10,000 $\mu$W and 100 mW = 100,000 $\mu$W).

There are other important factors. For example, the amount of rf energy absorbed depends upon the electrical properties of the exposed tissues. In general, tissues with high water content will absorb relatively greater amounts of rf energy. Additionally, frequency plays an important role in tissue absorption of rf energy. Theoretically, the higher the frequency, the less deeply it penetrates. The controversy is in determining the thresholds for radio-frequency damage to humans. The question is exceedingly difficult not only because of the low energy involved, but also because of the large number of experimental variables.

The American National Standards Institute (ANSI) currently has a safety standard of 10 mW/$cm^2$. This standard is derived from studies demonstrating that 100 mW/$cm^2$ was the lowest power density resulting in thermal damage and using a safety factor of 10. ANSI concluded that its safety factor of 10 would be sufficient, and the substantive basis on which the 10-mW/$cm^2$ level was selected has not been legally questioned or criticized. However, there are considerable differences of opinion about the biological effects of low-level (i.e., *nonthermal*) and long-term rf radiation.

The USSR and other Soviet Bloc countries have set a lower general-population exposure standard based on nonthermal effects of rf radiation they believe have been shown by experiments. The USSR has a civilian exposure standard of 1 $\mu$W/$cm^2$ for the general population, and 10 $\mu$W/$cm^2$ for occupational groups. The exposure limit for occupational groups is raised to 100 $\mu$W/$cm^2$ for exposure periods of up to two hours in a 24-hour period. It also allows up to 1 mW/$cm^2$ for occupational groups for exposure periods of up to 20 minutes in a 24-hour period. (M. H. Repachale, et al., *Emission and Exposure Standards for Microwave Radiation*, Paper No. 77114, IEEC & E, '77 Session No. 11.)

The experiments leading to the Soviet standards have not been verified by scientists in the United States. A number of American researchers, such as Sol M. Michaelson, think that the ANSI 10-mW/$cm^2$ standard affords adequate protection. Others have a contrary view.

The ANSI standard of 10 mW/$cm^2$ was adopted by the Occupational Safety and Health Administration (OSHA) in 1971. It was also incorporated in FCC's procedures for implementing the National Environmental Policy Act (NEPA). However, the OSHA standard was later ruled unenforceable by an OSHA administrative law judge and the decision was never appealed.[1]

### The Commission's Responsibility

FCC's concern arises from its basic responsibility to promote the safety of life and property through the use of wire and radio communications. It has two areas of statutory responsibility: to regulate millions of nongovernment rf transmitters for communications purposes, and to authorize, under Parts 15 and 18 of its rules, microwave ovens, industrial heaters and many other types of unintentional rf-radiation devices.

If another agency of the U.S. Government, such as the Environmental Protection Agency (EPA), or the Occupational Safety and Health Administration, sets stricter standards for rf exposure, FCC must consider these new standards.

The Commission also has a responsibility to ". . . make available, so far as possible . . . a rapid efficient . . . communications service . . . at reasonable charges . . . and to prevent interference between stations . . ." Accordingly, the Commission must consider the effect of any particular proposed standard on the radio services that it licenses and the equipment it approves, while making certain that these services are not *unnecessarily* impaired by overly restrictive standards. A balance must be achieved between serving the public interest by fulfilling its needs for communications services and adequately protecting the populace against potentially adverse biological effects that may be attributable to excessive rf radiation.

### Current Data on RF Radiation Levels

EPA data from rf-radiation measurements made at 373 sites in 12 U.S. cities showed that fm radio and vhf television transmitters are the most significant environmental sources of rf radiation. However, general population exposure levels are relatively low compared to the ANSI and OSHA exposure guide of 10 mW/$cm^2$. Typically, values of power densities measured from 0.0001 to 10 $\mu$W/$cm^2$.

But near the base of some fm broadcast towers, levels of nearly 1 mW/$cm^2$ were present. While even this level is far below the 10 mW/$cm^2$ ANSI standard, several countries, including Canada and Sweden, are considering a general-population long-term exposure standard of 1 mW/$cm^2$. This suggests that multistation broadcast installations may be special problem areas if a general-population exposure standard of less than 10 mW/$cm^2$ were adopted.

In contrast to the general-population data, EPA issued a technical note that deals with *occupational* standards. This note, *A Measurement of R.F. Field Intensities in the Immediate Vicinity of FM Broadcast Station Antenna*, states the following: "In a recent study of broadcast radiation levels, measured values of the radiation intensity of an FM Broadcast tower were obtained. The measured values could lead to exposures in excess of established standards and suggest the need for corrective action to protect *operating and maintenance personnel* who must climb these towers (emphasis added)." The values EPA measured *on*

*Deputy Manager, Membership Services, ARRL

[1] *In re: Swinline Corp.* OSHRC Docket No. 12715 Dec. 31, 1975; CCH Employment Safety and Health Guide Para. 20, 379, at 24, 308-24, 311 (February 17, 1976).

the tower were in excess of 180 mW/cm$^2$.

**Matters to Be Addressed in This Inquiry**

The subjects listed in the Inquiry are not exhaustive. They merely typify the Commission's areas of concern. Information not directly responsive yet relevant to the general subject matter of the Inquiry is welcome and invited. To facilitate staff review, each response should clearly state the precise topic or question being addressed.

A) Factual Information Needed

Please provide information on the following:

1) Information concerning the typical near-field and, in the case of very powerful radio stations, the far-field power densities at specified distances from the following kinds of stations or devices: (a) Hand-held transmitters operating from 25 to 900 MHz with minimum to maximum powers. (b) Land-mobile transmitting antennas with gains from 0 to 10 dB operating from 25 to 900 MHz with powers of 200 mW to 400 watts antenna input and mounted on vehicles or towers. (c) Point-to-point relay transmitting antennas with gains from 20 to 50 dB, operating below 300 GHz with typical and maximum radiated powers. (d-h) A-m, fm and TV broadcast antennas; industrial, medical and scientific units; and radar transmitters. (i) Any other sources of non-ionizing electromagnetic radiation on which experimental or empirical data are available.

2) In discussing the topics above, consideration should be given to how the human body close to a transmitting antenna or ISM equipment may distort the near-field radiation pattern causing changes in the voltage standing wave ratio and, if so, the effects of such changes on the absorption of the electromagnetic radiation by that human body.

3) Statistical studies relating to morbidity of electronic equipment users, particularly long-term users of hand-held portables, marine radio and industrial heating units, and the incidence of cataracts would be of particular interest.

B) Questions

Describe the applicability (or lack thereof) of the standard adopted for microwave ovens (1 mW/cm$^2$ at 5 centimeters) to other radio equipment with appropriate adjustment for frequency and manner of use. What studies support your conclusion?

Describe the pros or cons of adopting the 10 mW/cm$^2$ ANSI guideline if it were adopted as an interim standard pending completion of definitive studies establishing safe radiation levels.

Should measurements of field intensities within the area of FCC authorized facilities be made? By whom?

Should the Commission do a study to determine what services use fm and TV towers for mounting their equipment (e.g., point-to-point transmitters, CATV receivers and Land Mobile transceiver antennas)?

Should the Commission establish procedures for protecting personnel when working on antenna towers?

If measurement of power densities is necessary, what problem does this pose for licensees? Describe how any standard adopted should differ for the various frequency ranges and state why.

If there are any places frequented by people where the radiation exceeds 10 mW/cm$^2$, what action should be taken to reduce this level?

Reduction in output power could have a deleterious effect on several of the radio services. It could also cause a reduction in service to the public. Does a health risk, no matter how small, outweigh economic loss or service cutbacks, no matter how large? By how much?

The radiation level in the main beam of a microwave antenna will probably be above the level considered safe (10 mW/cm$^2$). Should this level be permitted if the chance of a human climbing the antenna structure is small? Should the Commission require fences around such structures?

Should licensees be required to warn maintenance people of the radiation hazards involved at each radio site or to post warnings if levels are shown to be above 10 mW/cm$^2$? Some other specific value?

Discuss in detail the impact on Commission licensees in the various radio services (e.g., broadcasting, mobile, fixed, other) that the various standards mentioned would have (50 $\mu$W/cm$^2$, 1 mW/cm$^2$, and 10 mW/cm$^2$), continuous or short-term, occupational or general public.

**How to File Comments**

Your comments must clearly show the docket number, "General Docket No. 79-144," on the first page. Please label each part of your responses to identify clearly the subject you are addressing. If you have general comments which are not on a specific matter listed above, simply label these commments with the docket number. Section 1.419 of the Rules requires that you file the original and five copies of your comments. If you want each Commissioner to receive a personal copy of your comments, you should include six additional copies. The FCC will fully consider all comments, even if only the original is filed. Send your comments to: Secretary, Federal Communications Commission, Washington, DC 20554. Comments are due December 15, 1979; replies to comments are due March 15, 1980. For further information, contact Will McGibbon, Office of Science and Technology, 202-632-7060.

## THE REWRITE IS DEAD

Representative Van Deerlin's (D-CA) two-year effort to rewrite the Communications Act of 1934 ended when the congressman sent a letter to the members of the House Communications Subcommittee stating that it had become apparent that most members of the Subcommittee felt more comfortable with instituting amendments to the 1934 Act rather than proposing top-to-bottom revisions. Instead of proceeding with the overall revision, Van Deerlin now plans to draft a new bill incorporating the common carrier provisions of the old bill in the form of amendments to the 1934 Act. In addition, the new bill may potentially propose amendments on any subject which Subcommittee members raise, but it is likely that the controversial matters which caused dissent over previous versions of the rewrite (H. R. 13015 and H. R. 3333) will not be included.

ARRL has presented testimony to the House Communications Subcommittee three times in the past two years, assisting the Subcommittee in its effort to revise the communications law of our land. The most recent appearance was June of this year. For details, see last month's "Happenings."

## NEW TERM FOR COMMISSIONER BROWN

The U.S. Senate has confirmed the reappointment of FCC Commissioner Tyrone Brown for a seven-year term ending June 30, 1986. He was first appointed to the Commission by President Carter on November 4, 1977.

Formerly of the law firm of Covington and Burling, Mr. Brown became a special investigator for the President's Commission on Campus Unrest at Jackson, MS, in 1970. He later joined the staff of Senator Edmund S. Muskie, and then became the staff director of the Intergovernmental Relations Subcommittee. In 1971, Mr. Brown became director and vice president for Legal Affairs for Post-Newsweek broadcast stations, a position he held until 1974, when he joined the Washington law firm of Caplin and Drysdale. Mr. Brown conducted his undergraduate studies at Hamilton College, Clinton, NY, and received his law degree from Cornell University.

## NEW JERSEY DOUBLEBACK

New Jersey's so-called "mobile scanner law" is back. Last month, *QST* reported that the law, 2A: 127-4, would be repealed (August 1979 *QST*, page 68). Governor Byrne had vetoed an Amateur Radio exemption from the law, but the veto made no difference because the law itself was scheduled to be repealed on September 1, 1979.

Now it appears that a NJ Senate bill, S. 3203, will reinstate this law, which makes it a misdemeanor to have installed in any automobile a "shortwave radio receiver operative on frequencies assigned by the federal communications commission (*sic*) for fire, police, municipal or other governmental uses . . ." unless one is exempted from the law or has a permit from the police.

S. 3203 lists all the amendments to the new state criminal code and is supposed to take care of typographical and other errors which may have crept into the legislative process. On page 105 of the 110-page bill, the number-letter grouping "2A: 127-4" is enclosed in brackets. The purpose of the brackets is to delete the scanner law from a list. The mobile scanner was originally listed to be repealed, but the brackets now mean that it will continue in force.

S. 3203 has already been passed by the NJ Senate, and the NJ Assembly will be voting on the measure soon. If the Assembly passes the bill, New Jersey's mobile scanner law will remain in effect and Amateur Radio operators will *not* be exempted. — *information courtesy of Bob Ewing, WA4GWG/2*

## FCC "CENSURE-Y" CLUB

Beginning this month, "Happenings" will report various FCC disciplinary actions taken against licensed amateurs who have violated the Part 97 Amateur Rules and Regulations under the heading "FCC Censure-y Club." The column title is a bit macabre, admittedly. It represents awards *no* amateur would be proud of!

### *W8MZ, WB8AKU/WB8CPL Revoked; Operator Licenses Suspended*

In March 1979, the station licenses of John

R. Sheller, W8MZ, of Groveport, OH, and John C. Gallucci, WB8AKU/WB8CPL, of Columbus, OH, were revoked by the Commission and their operator licenses were suspended for the remainder of their term. The amateurs had bribed a Commission employee in order to obtain call signs for which they were not eligible.

### *WD9GBM Revoked; Operator License Suspended*

On July 3, 1979, FCC Administrative Law Judge James K. Cullen, Jr. revoked the amateur station license of Warren K. Brown, WD9GBM, of Mishawaka, IN. His operator license was suspended and citizens band radio station license, KJV-4869, was revoked as well. Evidence gathered by a Commission monitoring van in Brown's vicinity led to the charges and Commission action. He had been found operating on a frequency of 27.415 MHz in the Industrial Radio Service. Brown was not licensed in this service, and during transmissions was not using a Commission-assigned call sign for identification.

### *Show-Cause Order Issued in Revocation Proceeding on WD8NLS*

On June 15, 1979, the FCC ordered a suspension of the operator license of Alexander G. Sullivan, WD8NLS, of Traverse City, MI, for the remainder of the license term, pending the receipt of a request for hearing from Sullivan to show cause why his station license should not be revoked and operator license suspended. On several separate occasions in September and October, 1978, Sullivan was found to be transmitting communications containing obscene, indecent or profane language, as well as messages to the public and transmissions of music. The transmissions took place within the 40-meter phone band.

### *Request for Review of Revocation and Suspension of WAØFQF Denied by the Commission*

On May 10, 1979, the FCC upheld the revocation of the station license WAØFQF and the operator license issued to Robert P. Milbert, of St. Paul, MN. According to the order, Milbert had applied for a special two-letter call sign and falsely claimed eligibility for the modification. He stated that he had been an Amateur Extra Class licensee since 1971. Attached to his application were a list of 80 two-letter call signs in order of preference and a page from the *Callbook* magazine which had been altered to show that he was an Amateur Extra Class licensee in 1971. The Commission, in denying review, said that Milbert had raised no new facts or argument. Upholding the Bureau's decision, the Commission said that Milbert's contentions had been thoroughly considered and refuted previously. — *Alexander N. Gerli, AC1Y*

## LEAGUE ADVISORY COMMITTEE MEMBERS

Each December, the ARRL President chooses new members for the various ARRL Advisory Committees from nominations submitted by fellow amateurs. Positions are opened during the previous year because of expirations of terms or resignations. Terms normally run for two years. These committees, whose rules are included in the League's bylaws, prepare recommendations within their specialty areas to the ARRL Board of Directors and/or staff. These recommendations are based on consultation with segments of the membership and studies conducted by the committees. Each committee is composed of 11 volunteers representing Canada and each of the U.S. call areas. Members wishing to serve on a committee are nominated by three League members; forms for this purpose are available from Hq.

**Table 1**

**League Advisory Committees and Their Members for 1979**

**Contest Advisory Committee**

Kenneth M. Bolin, W1NG, chairman, 21 Pleasant Rise Cir., Brookfield, CT 06804.
Dennis G. McAlpine, K2SX, 901 Lexington Ave., New York, NY 10021.
William Olson, W3HQT, R.D. 1, Box 163, Ottsville, PA 18942.
Howard Hoyt, K4PQL, 9458 4th Pl., Lorton, VA 22079.
Mike Badolato, W5MYA, 2 Country Pl., Bedford, TX 76021.
Wayne Overbeck, N6NB, 5818 Woodland Ave., Woodland Hills, CA 91367.
Frederick D. Niswander, K7GM, 6802 S. 47th St., Phoenix, AZ 85040.
James R. Stahl, K8MR, 3592 Atherstone Rd., Cleveland Heights, OH 44121.
Victor A. Shields, K9UIY, 1258-1/2 S. Galena Ave., Freeport, IL 61032.
Fred A. Minnis, KØMM, RFD 3, Box 273, Clinton, IA 52732.
Richard W. Guy, VE7TT, 6812 Dunnedin St., Burnaby, BC, Canada V5B 1Z2.
Board Liaison — Stan Zak, K2SJO, 13 Jennifer La., Port Chester, NY 10573.
Hq. Liaison — Tom Frenaye, K1KI.

**Emergency Communications Advisory Committee**

Frank Jasinski, W1XA, 42 Saddleback Hill Rd., Bellingham, MA 02019.
Paul Vydareny, WB2VUK, 259 N. Washington St., North Tarrytown, NY 10591.
Bob Josuweit, WA3PZO, 9 Derwen Dr., Havertown, PA 19083.
William Farone, N4NK, chairman, 210 Midfield Rd., Bon Air, VA 23235.
H. O. Townsend, WA5MLT, 2324 Morgan Dr., Norman, OK 73069.
Edward A. Gribi, Jr., WB6IZF, Box 984, King City, CA 93930.
Everett R. Snyder, W7DO, 300 Abbot, Richland, WA 99352.
Robert F. Miller, WB8GGR, 330 Sherwood Dr., Lexington, OH 44904.
Bruce B. Woodward, W9UMH, 6208 Bramshaw Rd., Indianapolis, IN 46220.
W. D. Bemmels, WØKL, 40 Rockwood Dr., Ottawa, KS 66067.
W. H. Parker, VE5CU, 214 McMaster Crescent, Saskatoon, SK, Canada S7H 4E3.
Board Liaison — Max Arnold, W4WHN, 129 Page Rd., Nashville, TN 37205.
Hq. Liaison — Robert J. Halprin, K1XA.

**DX Advisory Committee**

Anthony C. Berg, W1OT, chairman, 11 Vanderbelt Rd., Acton, MA 01720.
Robert C. Scully, W2XN, 179 Kendall Blvd., Oaklyn, NJ 08107.
James A. Douglas, W3ZN, 22432 Goshen School Rd., Gaithersburg, MD 20760.
John C. Kanode, N4MM, RFD 1, Box 73-A, Boyce, VA 22620.
Sanford Hutson, K5YY, P. O. Box 5299, Little Rock, AR 72215.
James T. Rafferty, N6RJ, 178 Paseo Robles, Anaheim, CA 92807.
Robert W. Hudson, K7LAY, 29826 24th Pl. So., Federal Way, WA 98003.
Daryl H. Kiebler, WB8EUN, 517 Farmstead La., Lansing, MI 48917.
Robert C. Locher, Jr., K9AM, 1145 Osterman, Deerfield, IL 60015.
James Spencer, WØSR, 3712 Tanager Dr. N.E., Cedar Rapids, IA 52402.
Harold E. Parsons, VE3QA, RR 3, Metcalfe, ON, Canada KØA 2PØ.
Board Liaison — Gay E. Milius, W4UG, 1416 Rutland Dr., Virginia Beach, VA 23454.
Hq. Liaison — Don Search, W3AZD.

**VHF Repeater Advisory Committee**

Lewis D. Collins, W1GXT, 10 Marshall Ter., Wayland, MA 01778.
Charles Harrison, K2MZ, chairman, MR 179, Oyster Bay, NY 11771.
Thomas B. Carpenter, W3YVV, Post Office, Harmans, MD 21077.
Charles Durst, WA4WTX, 4407 Sunny Ct., Durham, NC 27705.
Eilene Spiegel, WA5WDW, 2812 Pritchett, Irving, TX 75061.
Gordon Schlesinger, WA6LBV, 5364 Saxon St., San Diego, CA 92115.
Clay Freinwald, K7CR, 8515 Idelwood Dr. S.W., Tacoma, WA 98498.
Richmond B. Shreve, W8GRG, 2842 Winthrop Rd., Shaker Heights, OH 44120.
Jack D. Forbing, K9LSB, 1416 Lakewood Dr., Ft. Wayne, IN 46819.
Whitman E. Brown, WBØCJX, 14418 West Ellsworth Pl., Golden, CO 80401.
Ronald MacKay, VE1AIC, Box 188, Cornwall, PEI, Canada CØA 1HØ.
Board Liaison — Carl L. Smith, WØBWJ, 1070 Locust St., Denver, CO 80220.
Hq. Liaison — Stan Horzepa, WA1LOU.

**VHF/UHF Advisory Committee**

Joe Reisert, W1JR, 17 Mansfield Dr., Chelmsford, MA 01824.
Richard T. Knadle, Jr., K2RIW, 316 Vanderbilt Pkwy., Dix Hills, NY 11746.
Anthony F. Souza, W3HMU, P. O. Box 169, Ottsville, PA 18942.
Russell G. Wicker, W4WD, chairman, Box 463, Perrine, FL 33157.
Roy L. Albright, N5RA, 107 Rosemary, San Antonio, TX 78227.
Louis N. Anciaux, WB6NMT, P. O. Box 82183, San Diego, CA 92138.
Randall Stegemeyer, W7HR, 2340 E. 18th St., Bremerton, WA 98310.
Ted Hartson, WA8ULG, 2444 W. Halbert Rd., Battle Creek, MI 49017.
Malcom M. Bibby, GW3NJY/W9, 990 N. Lake Shore Dr. no. 21C, Chicago, IL 60611.
John C. Fox, WØLER, 321-109th La., N.W., Minneapolis, MN 55433.
J. Leslie Weir, VE3AIB, 42 Cobham Cres., Toronto, ON Canada M4A 1V6.
Board Liaison — Jay Holladay, W6EJJ, 5128 Jessen Dr., La Canada, CA 91011.
Hq. Liaison — Bernie Glassmeyer, W9KDR.

League Advisory Committees and their members for 1979 are listed in Table 1. Not shown is a brand-new group, the Public Relations Advisory Committee, established by the ARRL Board at its July 1979 meeting. There is thus a special need for nominees for this Committee, from Canada and all 10 U.S. call areas.

# The New Frontier

*The World Above 1 Gig*

Conducted By Bob Cooper Jr.,* W5KHT

## Good Microwave Experience is Hard to Find

Experience, the practical kind, in microwaves usually comes from either doing it yourself the hard way or alternately reading or learning about work done by others. In the latter case, this column serves as a useful forum by providing a painless vehicle through which you can learn what others have already done, and hopefully, how they have done it.

I4SN located in Bologna, Italy, reports in some detail on the experimental work done to date in his country with the amateur 10-GHz assignment. Following the tradition established by G amateurs, who have found 10-GHz band beacons to be very essential "machines" for indications of improved long-range conditions, as well as handy tools for antenna and receiver alignment, there is a pair of 10-GHz beacons in operation in northern Italy. One, a 50-mW unit loading into an 8-dB gain omni antenna some 1250 meters above sea level, provides useful signal for measurement purposes out to 150 km on a regular basis on overland paths. Another, located at the seaside port of Port Tollie, uses two separate horn antennas on a short tower near the water; one horn points towards Trieste while the second is directed at Bologna.

Now for the results. The Port Tollie-to-Trieste path is virtually all over water and it is in the 140 km region. A high-pressure area over the region produces super refraction along the oversea path. The Port Tollie-to-Bologna path is around 100 km and all over land. This path is productive during the nighttime hours and, frequently, when there is a high-pressure system dominating the regional weather. The Port Tollie beacon sits almost directly on the path from Bologna to Trieste and I4 amateurs have found that when the beacon is being heard at *both ends* (i.e. Bologna on the west and Trieste on the east) that indeed a direct 240-250 km path between the two is then open at 10 GHz.

The importance of establishing one or more beacons for 10-GHz work should be obvious. Not only do the beacons provide an excellent signal source for the "local area" against which new amateurs to the band can adjust receiving equipment and antennas, but by carefully selecting their location they can also serve as "early warning indicators" as to improved tropospheric refraction conditions. The 1250-meter-high beacon west of Bologna serves to provide wide-area coverage from an elevated location; it reaches a large number of amateurs interested in getting operational on 10 GHz. The Port Tollie beacon, on the other hand, was located and activated "at seaside" primarily because this location serves as a dual-direction propagation condition warning indicator between two major centers of amateur 10 GHz activity.

A parallel for USA operation might be locating a beacon near Atlantic City, NJ to drive signal northward toward Long Island and Boston, and southward toward Norfolk. A similar beacon located near Apalachicola, FL, could direct 10-GHz energy toward the Tampa region on one leg and the New Orleans region on a second leg. In both cases, the presence of the beacon at either end would signal the possibility that the full path might be open or open shortly. A beacon at 10 GHz need not be complicated or expensive. A Gunnplexer device (or homebrew Gunn diode oscillator) provides the signal source and horn antennas with 10 to 20 dB of gain are so small as to fit into the palm of your hand. Like most amateur uhf experimentation, the 2-meter band repeaters provide the I4 amateur with a communication system to alert people on the opposite end when the beacon "pops through."

### Tricks Of The Trade

Steve Noll, WA6EJO of Ventura, CA, passes along a number of bits of wisdom that can only be gained by having done it yourself. We share them with you here this month in the hope that Steve's experience may save you some wasted time in your own "getting started on shf" activities.

Looking for some inexpensive way to know when an shf signal source is "cooking"? Steve suggests a police radar detector, noting "Many are not very frequency selective and for a $30 investment you've got a way to know when you are generating rf from 1.2 GHz way up past 10 GHz." Another possibility for detecting microwave-region rf is some of the 10.525 GHz burglar alarm equipment on the market now. As Steve notes, this can sometimes be a bit of a problem; he had a ham friend who experienced "RFI" at 10.2 GHz when the ham friend set off a neighbor's 10.525-GHz burglar alarm system receiver! As you might suspect, such receivers are typically as broad as a barn door in the selectivity department.

If you are looking for component parts to construct your own 10-GHz equipment, Steve suggests Racon, Inc. (8490 Perimeter Road S., Seattle, WA 98108, tel. 1-800-426-5966) which has been building commercial 10.5- to 11-GHz equipment for many years. Racon is now offering a number of devices to amateurs in small quantities at reasonable prices. For example, a 10-mW Gunn source covering 9.47 to 10.67 GHz outfitted with WR-90 waveguide flange is $35 in the under-nine-lot range, down to $22.50 each for 10 or more ordered together. A 50-mW Impatt source covering 10.375 to 10.5 GHz is $37. An 18-dB gain horn antenna for the 10-GHz assignment is $11.75 (they drop to $5.75 each in lots of 10 or more). There's the makings for a 50-mW output and 2.5-watt-EIRP beacon for under $50!

The same Steve Noll also raises the question of where Amateur "Radio" communication ceases and amateur lightbeam communication begins. In theory, at least the amateurs have the legal right (under Part 97.61) to utilize any frequency above 300 GHz. During the recent June VHF QSO Party, W6OAL managed a 22-mile contact with K6MEP at 474.1 THz (that's a T friends, not a G!), or 632.8 nanometers. Using 3-mW Helium Neon lasers and A2 modulation on the transmitters, the receivers were 931A photomultipliers fed by a 10-inch Fresnel at W6OAL and a 3-inch double convex at K6MEP. The amateurs involved make the claim that this was the "first" legitimate "Amateur Radio contact" in the bands above 300 GHz. They point out that unlike other (much shorter range) contacts in the past, all equipment was amateur constructed — none was "borrowed from a laboratory."

Where and how do we draw the line? In fact, is there a need to draw a line at all? Steve Noll feels there is, noting that in an absurd extension of their highly prized and carefully controlled 474.1-THz contact during the VHF QSO Party in June, he sees amateur groups hungry for contest points hauling out flashlights and colored bits of plastic for lens material to create short-haul "cw" contacts by the bushelbasket full. Is there a practical upper limit to the "new frontier of Amateur Radio?" What do *you* think?

### Grading SHF Hardware

In the past two issues of *QST* we have discussed do-it-yourself hardware for the 4-GHz region and reported on some amateur efforts in this area. There is currently a rather large amount of surplus microwave gear around and about, but, frankly, some of it isn't even good for component parts. Unfortunately to the newcomer to this field, it is sometimes difficult to tell what is good stuff and what should be relegated to "boat anchor" service.

During the recent West Coast UHF Conference (held last May 5-6 in San Mateo, CA) the assembled group had the opportunity to check out "preamplifier noise figures" up through and including the amateur 3.3-GHz assignment. A pair of entrants in the 3.3 and 2.3 bands stood out because of their uselessness for even non-serious amateur work. They were some "surplus" TWT amplifiers (or preamplifiers as they are sometimes labeled) originally manufactured by Hewlett Packard. A number of these large, cylindrical shaped objects are now on the surplus market. They are carrying HP and Watkins-Jenkins nameplates and you can recognize them quite easily. They are from 12 to 18 inches long and about 6 inches in diameter, and are much heavier than you would expect when you bend over to pick one up. Because of the current interest in low-noise receiving systems in the gigahertz region, surplus dealers have hiked the price on these largely useless units into the $50-and-up-each range.

The West Coast UHF Conference results on the measurement bench should complete our story. Two units checked exhibited gains of 30 dB but noise figures of 28 dB each at 2.3 and 3.3 GHz respectively! There is a message here. Don't be dazzled by microwave bargains. If it costs more than a few dollars (or some amount you can afford to "write off"), be a very wary buyer. You may be investing $50 in a boat anchor. QST

*Rte. 5, Box 364, Guthrie, OK 73044

# YL News and Views

Conducted By Jean Peacor,* K1IJV

## Leading Ladies — Part 2

Last month, we got to know a little about three women who serve as presidents of their Amateur Radio clubs. This month, you'll meet four more. Others are out there, we realize; unfortunately space limitation prevents us from covering all the outstanding women who lead their local radio clubs. Perhaps we'll be able to continue this series in future columns.

Vivian Franco, WB6VTG, president, North Peninsula Electronics Club (CA)

### There Is a Santa Claus

Vivian Franco, WB6VTG, of Daly City, CA, is this year's North Peninsula Electronics Club's leader. Through hearing of an Amateur Radio class, she and her OM decided to get involved with Amateur Radio. Their interest grew, and she earned her Novice ticket in January 1977, followed by Technician in June, and General in March 1978. She is presently working toward her Advanced.

In addition to monthly meetings, their 50-member club enjoys Saturday breakfasts together. This provides better socializing and the opportunity to help each other with various projects.

Vivian is also president of a new club, Narrow Band Communication (NBC). Formed because of Docket 21033, this 2-meter ssb club has approximately 35 members and is growing. Sponsor of both a phone and cw net each week, the club's goal is to put into working what they believe to be the first linear translator.

NBC also sponsors Operation Santa Claus for the Peninsula Hospital Children's Ward each year. Excellent news coverage has been created by this activity.

What is it like being a president? Vivian says, "I love it!"

### Forerunner

The love of people — learning about their countries, hobbies and families — prompted Vera Brayan, AC8T, to become a radio amateur. Her seqence of licensing sounds like a record: Novice in 1977; General in September 1977; Advanced in January 1978; and Extra Class in July 1978 — or, about one year from Novice to Extra. There being no other radio enthusiasts in her family, she simply gathered together several license manuals and one code record and taught herself.

Vera is president of the Genesee County (MI) Radio Club, founded in 1933; present membership is 120. This club was a forerunner in that it elected its first YL president, Vera Russell, K8BPQ, in 1963.

Vera Brayan, AC8T, president, Genesee County Radio Club (MI)

In addition to their meetings, Field Day activities, etc., GCRC sponsors a 5-County swap and shop and their own club station located in the Red Cross Building. Twice-a-week code practice is sent from this station on vhf and it is open to all Tuesday evenings for operation.

Vera is assistant emergency coordinator for Genesee County and is most active in their ARES and RACES programs. ARES provided medical communications for the American Red Cross for five days last July during the Flint Festival which she coordinated. She willingly gave 80 hours to that event. Flint, MI certainly has a leading lady.

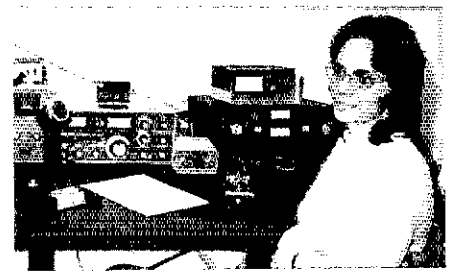
### A Slow-Scan Reward

The good old art of self defense produced this president for the Rockford Amateur Radio Club. Being married to Gene, WB9MMM, a very active ham in this Illinois club, Sharon Harlan, WB9SFT, realized that there had to be more to all this than what she could see (a lot of knobs on a black box). She enrolled in a course, discovered there indeed was much more to it and first became licensed as a Novice in 1975. No sooner was she a Novice than the club elected her secretary, which spurred her on to a General ticket in 1977. Since then, she has been vice president and is now their president. The tremendous support from the group of 180 members has turned an experience that at first appeared a little frightening into a most enjoyable one. Members of the Rockford club are hard at work in planning this month's ARRL Illinois State Convention again this year. Look for Shari on the DX bands, most contests, or, if you're into slow scan, you'll often see her on 10 meters.

Sharon Harlan, WB9SFT, president, Rockford ARC (IL)

### The Beat of Kettle Drums

The Kettle Moraine Amateur Club in Wisconsin also recognized talent when they saw it in electing Ellie Jorgenson, WB9WFC, to lead them this year. Ellie is extremely proud to be part of their 90-member fine group whose interests vary from uhf, vhf, fm and ATV to OSCAR. To quote her: "There is always something new to learn and that's what I think ham radio is all about."



Ellie Jorgenson, WB9WFC, president, Kettle Moraine Amateur Club (WI)

Ellie's OM, Howie, WB9WFB, drives a truck; their interest in Amateur Radio began as a result of many hours of helping other truckers using 11-meter operation. The purchasing of a book about radio theory and Morse code created an even greater interest in radio. Thanks to Bob Pierkaski, WB9LFW, who started a code class, they received their Novice tickets in 1976. Everyone in KMAC helped in answering their questions and in setting up their first station. They elected Ellie secretary in 1976 and 1977 when she also became editor of their excellent newsletter, *Kettle Drums*. Having upgraded to Technician in 1977, she hopes to earn her General license this year. All this, plus being mother of two children and a full-time bookkeeper, makes Ellie one of Wisconsin's leading ladies.

The fact that there are more women presidents of our clubs today reflects their becoming more directly involved in radio club activities. No longer the coffee makers, they've moved from the wings to center stage. There have always been capable women. It's exciting to see this increasing number using these talents in leadership roles.

In the theater they use an endearing phrase when they want to wish someone "good luck." In that same manner, to these and other leading ladies in Amateur Radio: "Break a leg." That's endearment!

*Country Club Dr., Monson, MA 01057

# FM/RPT

Conducted By Stan Horzepa,* WA1LOU

# The GIGO Recognition Test

Listen. That's all you have to do. Tune across the amateur skyways and eventually you'll hear garbage. Not the kind permeating from the Russian aviary, but the kind falling from the lips and paddles of our licensed brethren. Listen to repeaters and you'll discover that there the problem is compounded; the garbage transmitted on the repeater's input is retransmitted on the repeater's output. Garbage In, Garbage Out . . . GIGO.

The following episodes are real-life examples of garbage overheard on repeaters (the names have been changed to protect the guilty). See if you can recognize the GIGO in the following examples.

### Case Number One

Pat and Mike were chewing the fat on the ole 147.66/06 machine.

"Mike, why don't we go simplex and let somebody else use the machine?"

"Ok, Pat. Where do you want to go?"

"Let's make it easy. Just switch the megahertz control down three steps to 144. That should give us a clear frequency."

"Meet you there."

Pat and Mike moved down three megs and continued their conversation.

### Case Number Two

It's July. The smog hangs thick over the Northeast as the sun muddles on toward the Appalachian horizon. Two meters is wide open and the repeater on the 1500-foot hill in Eastern Pennsylvania is getting a lot of action.

"My name is Billy and the QTH is down in the Tidewater."

"Fine business, Billy. Two meters is sure hopping tonight. We're up here about 100 miles north of the New England border. Looking at the map, I'd say we're about 900 miles apart working through this repeater."

"Yeah, 900 miles sounds about right. It sure helps to have a 15-element beam and 100-watt amplifier, though."

"I know what you mean. I'm running an 80-watt'r myself into 11 elements. Works pretty good. There's a new show starting on the tube that I want to watch, so I'm going to QRT. 'Twas a pleasure talking to you and I will QSL."

"Okay on the QSL. I'm going to stay on this frequency and see how much more DX I can work tonight. 73."

Billy sat there half the night working stations from Halifax to Newport News. A wonderful time was had by all.

### Case Number Three

The traffic is heavy on the El Aye Freeway; it always is during the rush hour. The traffic is also heavy on the El Aye repeater. The gang is talking about the ideal height for low-band antennas, when a prominent one-by-two breaks in to add his two cents.

"I'll tell you about the ideal system. At *my* QTH . . . (a two-minute dissertation fits in here) . . . and that antenna really plays. Let me reset the timer."

The one-by-two drops it, listens for the squelch tail and picks it up again.

"On 40 meters, I have . . . (another two-minute dissertation) . . . and it cuts right through all the pileups. Before I time-out the repeater, let me drop it."

Again he drops it, listens for the tail and picks it up with his hairbreadth trigger finger. And his dissertation continues ad infinitum, ad nauseam.

### Low-End FM

Pat and Mike had good intentions. Anytime you can communicate on simplex, that's the way to go. Then, someone else who needs the repeater's facilities will be able to use them. The problem was that Pat and Mike moved from 147.06 to 144.06, which put them right in the middle of the cw portion of the band (only A1 emissions are permitted between 144.0 and 144.1).

Admittedly, twisting the megahertz control on a 2-meter box is the easiest way to move to a clear simplex frequency. But you have to be careful where you are twisting, especially if you are using one of the new rigs that covers the whole 2-meter band. There are repeaters below 146 MHz now and you may find yourself simplexing on a repeater input or output. Or you may unknowingly be transmitting through an amateur satellite. Weak-signal activity exists between 144.0 and 144.5 MHz and you could interfere with a station trying to work moon-bounce. So watch where you're going (consult the accompanying 2-meter band plan table). Although you may have to twist a few more knobs to move to a standard simplex frequency, exercising your wrists could prevent interference with your fellow ham.

**Two-Meter Band Plan**

| | |
|---|---|
| 144.0-144.1 | A1 emissions only |
| 144.1-144.5 | Weak-signal (non-fm) operation |
| 144.5-144.6 | Linear translator inputs |
| 144.61-144.89 | Repeater inputs |
| 144.9-145.1 | Non-channelized simplex operation |
| 145.1-145.2 | Linear translator outputs |
| 145.21-145.49 | Repeater outputs |
| 145.8-146.0 | OSCAR and RS sub-band |
| 146.01-146.37 | Repeater operation |
| 146.40-146.46 | Repeater and simplex operation |
| 146.49-146.58 | Simplex operation |
| 146.61-147.39 | Repeater operation |
| 147.42-147.57 | Simplex operation |
| 147.60-147.99 | Repeater operation |

### Repeater DXing

To some folks there is nothing more annoying than having to listen to a one-sided conversation coming through the local repeater, when that conversation is actually occurring on another repeater that is on the same frequency as the local machine. When band conditions are good, this is sometimes unavoidable. But there are some hams, like Billy, who warm up the amplifier, dust off the gain antenna and chase DX through the repeaters.

These DXers may intend to work through only one repeater, but, in fact, they may simultaneously be keying up one or more other machines on the same frequency pair. When this occurs, those other repeaters may be timed out by the DXer. The DXer's signal may even be strong enough to prevent weaker stations from using the local repeater. And what happens if an emergency occurs and the repeater is unusable because the DXer is coming through loud and clear?

DXing via repeaters is to be discouraged. It is a selfish activity and could be the difference between life and death. If you wish to DX in the fm mode, do it on a simplex frequency; you'll surely make fewer enemies.

### The Pause That Refreshes

At least, the one-by-two was considerate enough to stop talking and allow the repeater's timer to reset. After all, there are some operators who are completely oblivious to a timer and continue blue streaking until they run out of air. It doesn't matter that they have timed-out the repeater eons ago, as long as they get everything off their chests.

Those who have developed the tactic of dropping their carrier to reset the timer and then commence transmitting again are truly the elete among the repeater hogs. They have developed the art to the nth degree. Why should other hams be allowed to speak when they can hear the hog's pearls of wisdom?

During the rush hour, traffic emergencies are more likely to occur and a long dissertation could delay or prevent an emergency call from being made through the repeater. Even if there is no emergency, there are others who may wish to say a few words; long monologues cut into everyone's air time.

Long transmissions are to be eschewed. Keep it short and keep everybody happy.

*Hq. liaison, VRAC

# Washington Mailbox

Conducted By Michele Bartlett,* N1AGD

## The 610 — Again

You find some rather complicated forms printed in Washington these days. Take the IRS 1040 — *please!* Then there's the FCC Form 610, which is being revised but has not been released as of this writing. Until it is (and during a phase-in period) the FCC will continue to process applications submitted on the form dated September 1977. As a space-saving measure, we'll dispense with the question-and-answer format this month in order to bring you: **Instructions for Completing the Form 610**

*Part 1:* The first three questions are pretty routine. All licensed amateurs must give their primary station call sign, class of license, and the expiration date. If you are not licensed, skip to number 2. Fill in your last name, first name and middle initial, and fill in your date of birth numerically (i.e., 3-14-54) in number 3.

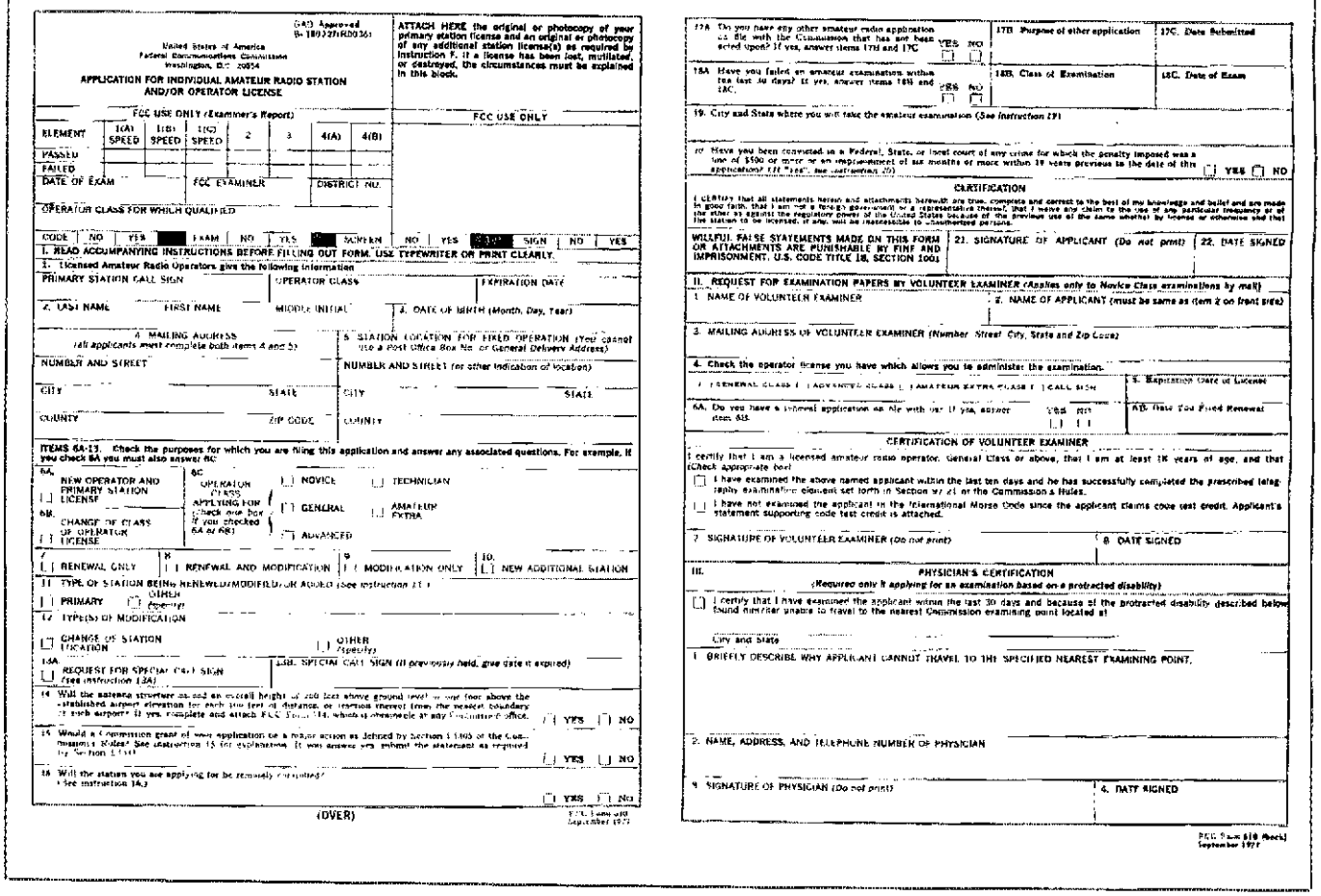
Many applicants are confused by items 4 and 5. You must provide a mailing address in the United States in question 4. It may be a street address, an RFD number, a P. O. Box or even an APO/FPO address. However, your station location (item 5) must be a fixed address: You may use a street address or you may give the distance and direction from a city or major road intersection. Be sure to include your county. You may use the Form 610 to change either your mailing address or your station location, or both. In this case, indicate your *new* address or station location. Whatever you do, don't leave either item blank!

If you are unlicensed and are applying to take an amateur exam, check 6A. You should also check 6A if your license has expired and you are applying *after the one-year grace period has also expired,* since you will then be issued a *new* station license. If, on the other hand, you are already licensed but wish to take an examination for a higher class of license, check 6B. Indicate in 6C the class of license you are applying for but check only one box! You cannot hold more than one class of license at the same time, so if, for example, you want to take the General class exam but you're a little shaky on the code, check the box marked "General." If you miss the code, you'll still get to take the written exam for a Technician license, even though you did not check that box.

You should check item 7 if you are merely renewing your license, or if your license has expired more than one but less than five years ago, as your operator license will still be renewed. (For a more detailed explanation of the grace-period structure, see "Happenings," May 1979 *QST.*)

Check number 8 if you are modifying your license. Modifications include change of station location, upgrading your license,

*Membership Services Assistant



GAO Approved B-180227(R0036)

United States of America
Federal Communications Commission
Washington, D.C. 20554

APPLICATION FOR INDIVIDUAL AMATEUR RADIO STATION AND/OR OPERATOR LICENSE

ATTACH HERE the original or photocopy of your primary station license and an original or photocopy of any additional station license(s) as required by instruction F. If a license has been lost, mutilated, or destroyed, the circumstances must be explained in this block.

FCC USE ONLY (Examiner's Report)

| ELEMENT | 1(A) SPEED | 1(B) SPEED | 1(C) SPEED | 2 | 3 | 4(A) | 4(B) |
|---|---|---|---|---|---|---|---|
| PASSED | | | | | | | |
| FAILED | | | | | | | |

DATE OF EXAM | FCC EXAMINER | DISTRICT NO.

OPERATOR CLASS FOR WHICH QUALIFIED

| CODE | NO | YES | EXAM | NO | YES | WAIVER | NO | YES | SIGN | NO | YES |
|---|---|---|---|---|---|---|---|---|---|---|---|

FCC USE ONLY

1. READ ACCOMPANYING INSTRUCTIONS BEFORE FILLING OUT FORM. USE TYPEWRITER OR PRINT CLEARLY.

2. Licensed Amateur Radio Operators give the following information

PRIMARY STATION CALL SIGN | OPERATOR CLASS | EXPIRATION DATE

2. LAST NAME | FIRST NAME | MIDDLE INITIAL | 3. DATE OF BIRTH (Month, Day, Year)

4. MAILING ADDRESS (All applicants must complete both items 4 and 5)
NUMBER AND STREET
CITY | STATE
COUNTY | ZIP CODE

5. STATION LOCATION FOR FIXED OPERATION (You cannot use a Post Office Box No. or General Delivery Address)
NUMBER AND STREET (or other indication of location)
CITY | STATE
COUNTY

ITEMS 6A-13. Check the purposes for which you are filing this application and answer any associated questions. For example, if you check 6A you must also answer 6C

6A. [ ] NEW OPERATOR AND PRIMARY STATION LICENSE
6B. [ ] CHANGE OF CLASS OF OPERATOR LICENSE
6C. OPERATOR CLASS APPLYING FOR (Check one box if you checked 6A or 6B): [ ] NOVICE [ ] TECHNICIAN [ ] GENERAL [ ] AMATEUR EXTRA [ ] ADVANCED

7. [ ] RENEWAL ONLY
8. [ ] RENEWAL AND MODIFICATION
9. [ ] MODIFICATION ONLY
10. [ ] NEW ADDITIONAL STATION

11. TYPE OF STATION BEING RENEWED, MODIFIED, OR ADDED (See instruction 11)
[ ] PRIMARY [ ] OTHER (Specify)

12. TYPE(S) OF MODIFICATION
[ ] CHANGE OF STATION LOCATION [ ] OTHER (Specify)

13A. [ ] REQUEST FOR SPECIAL CALL SIGN (See instruction 13A)
13B. SPECIAL CALL SIGN (If previously held, give date it expired)

14. Will the antenna structure be sited on a radio height of 200 feet above ground level or over 200 feet above the established airport elevation for each 100 feet of distance, or fraction thereof, from the nearest boundary of such airport? If yes, complete and attach FCC Form 714, which is obtainable at any Commission office. [ ] YES [ ] NO

15. Would a Commission grant of your application be a major action as defined by Section 1.1305 of the Commission's Rules? See instruction 15 for explanation. If you answer yes, submit the statement as required by Section 1.1311. [ ] YES [ ] NO

16. Will the station you are applying for be remotely controlled? (See instruction 16.) [ ] YES [ ] NO

(OVER)

FCC Form 610 September 1977

17A. Do you have any other amateur radio application on file with the Commission that has not been acted upon? If yes, answer items 17B and 17C. [ ] YES [ ] NO
17B. Purpose of other application
17C. Date Submitted

18A. Have you failed an amateur examination within the last 30 days? If yes, answer items 18B and 18C. [ ] YES [ ] NO
18B. Class of Examination
18C. Date of Exam

19. City and State where you will take the amateur examination (See instruction 19)

20. Have you been convicted in a Federal, State, or local court of any crime for which the penalty imposed was a fine of $500 or more or an imprisonment of six months or more within 10 years previous to the date of this application? (If "Yes", see instruction 20) [ ] YES [ ] NO

CERTIFICATION

I CERTIFY that all statements herein and attachments hereto are true, complete and correct to the best of my knowledge and belief and are made in good faith, that I am not a foreign government or a representative thereof, that I waive any claim to the use of any particular frequency or of the station to be licensed, if after, will be inaccessible to unauthorized persons.

WILLFUL FALSE STATEMENTS MADE ON THIS FORM OR ATTACHMENTS ARE PUNISHABLE BY FINE AND IMPRISONMENT. U.S. CODE TITLE 18, SECTION 1001

21. SIGNATURE OF APPLICANT (Do not print) | 22. DATE SIGNED

II. REQUEST FOR EXAMINATION PAPERS BY VOLUNTEER EXAMINER (Applies only to Novice Class examinations by mail)

1. NAME OF VOLUNTEER EXAMINER
2. NAME OF APPLICANT (must be same as item 2 on front page)
3. MAILING ADDRESS OF VOLUNTEER EXAMINER (Number, Street, City, State and Zip Code)
4. Check the operator license you have which allows you to administer the examination.
[ ] GENERAL CLASS [ ] ADVANCED CLASS [ ] AMATEUR EXTRA CLASS [ ] CALL SIGN
5. Expiration Date of License
6A. Do you have a renewal application on file with the FCC? If yes, answer item 6B. YES [ ] NO [ ]
6B. Have You Filed Renewal

CERTIFICATION OF VOLUNTEER EXAMINER

I certify that I am a licensed amateur radio operator, General Class or above, that I am at least 18 years of age, and that (Check appropriate box)
[ ] I have examined the above named applicant within the last ten days and he has successfully completed the prescribed telegraphy examination element set forth in Section 97.21 of the Commission's Rules.
[ ] I have not examined the applicant in the International Morse Code since the applicant claims code test credit. Applicant's statement supporting code test credit is attached.

7. SIGNATURE OF VOLUNTEER EXAMINER (Do not print)
8. DATE SIGNED

III. PHYSICIAN'S CERTIFICATION
(Required only if applying for an examination based on a protracted disability)

[ ] I certify that I have examined the applicant within the last 30 days and because of the protracted disability described below found him/her unable to travel to the nearest Commission examining point located at
City and State
1. BRIEFLY DESCRIBE WHY APPLICANT CANNOT TRAVEL TO THE SPECIFIED NEAREST EXAMINING POINT.
2. NAME, ADDRESS, AND TELEPHONE NUMBER OF PHYSICIAN
3. SIGNATURE OF PHYSICIAN (Do not print)
4. DATE SIGNED

FCC Form 610 (Back) September 1977

requesting a call-sign change if you are eligible, etc. Items 9 and 10 will probably be eliminated on the revised form, as all licenses that are modified by the FCC are *automatically* renewed, and new additional station licenses (for repeaters, clubs, secondary licenses and so forth) are not being granted at this time.

Indicate the type of modification you are applying for in number 12. Use this item to exchange your secondary station call sign for your primary if you would rather keep the secondary and if neither license has expired. Be sure to clearly indicate your intention, and don't forget to attach photocopies of both licenses. If you don't feel you can make yourself understood in that small space, you may choose to attach a note of explanation.

Item 13 is often misunderstood by amateurs who want new call signs. You are eligible for a new call: if you are upgrading your license, if you move to another call-sign district (although you may keep your call when you move, if you wish), if you presently hold an Amateur Extra Class license, or if you are an Advanced class licensee and your license will expire in 60 days or less. Requests for a new call sign under any other circumstances will only result in processing delays, so leave this line *blank* if you do not qualify for a new call sign.

You shouldn't have to worry about item 14 unless you live near an airport or your antennas are 200 feet above the landscape. In either case, obtain an FCC Form 714 from any Commission office, and complete it according to the directions included.

Most applicants will check "no" to the "major action" question — number 15. A major action is (a) erection of an antenna structure more than 300 feet tall; (b) an increase of an existing structure to more than 300 feet; (c) locating an antenna structure in an officially designated wilderness area, wildlife preserve or nationally recognized scenic and recreation area, or near sites significant in American history, or (d) construction that involves extensive changes in the landscape. Details may be found in Section 1.1305 of the Commission's Rules. If your modification is a major action, you must submit an Environmental Impact Narrative Statement (EINS) with your application. An explanation of this statement can be found in Section 1.1311 of the Rules, and a brief summary is included with the instructions that come with Form 610s. [Editor's Note: Hq. is happy to provide a reasonable number of 610s to any member who sends a self-addressed, stamped envelope. These are ARRL *reprints* of the FCC's form and might not include the FCC's three pages of instructions. If your modification will be a major action, please ask for a copy of the instructions with your request.]

Will your station be remotely controlled? Try this simple test: Are all the elements of the station located on the same premises, and is there an elementary form of interconnection of electrical conductors directly between the control devices and the transmitter? If so, your station is not remotely controlled, and the answer to item 16 is "no."

If you have *any other 610s* on file with the FCC, check "yes" on number 17, and indicate the purpose and date of the application. (You did keep a photocopy of your completed application, didn't you?) Did you fail an exam within the last 30 days? If so, indicate the class and date of exam on line 18.

Answer number 19 only if you are taking the exam at an FCC field examination point. If this is the case, or if you are disabled or blind and unable to travel, send the Form 610 to your nearest Field Office. *Send all other applications, including requests for the Novice examination, to the FCC, P. O. Box 1020, Gettysburg, PA 17325.* (If you are taking the test at a Field Office where walk-ins are allowed, you needn't mail your application in ahead of time.)

The FCC recently decided that applicants for an amateur license need not indicate whether they have ever been convicted of a crime within the last 10 years, so you may leave line 20 blank.

You must sign your name (don't print!) exactly as it appears in line 2, and don't forget to date your application. (Your volunteer examiner cannot complete or sign your application for you, unless you are blind or physically handicapped. In this case, you must at least mark an "X" for your signature, and your volunteer must include a note of explanation to the FCC.)

*Part II:* This section is completed only when the applicant will be taking the exam from a volunteer examiner, such as for the Novice exam. To be a volunteer you must be at least 18 years old, hold a General or higher class of license which is not due to expire during the exam period, and be unrelated to the applicant. Before you or the applicant complete the form, you must first administer the five-word-per-minute code test — and the applicant must pass it! The FCC does not care whether you administer a solid-copy or a multiple-choice test, as long as the applicant has successfully completed the test according to Section 97.21 of the Rules within the last 10 days. (If the applicant claims code credit because he or she has held a commercial radiotelegraph license within the last five years, or because he or she passed an FCC-administered code test at a Field Office or testing site, the applicant must attach a statement giving the license number, expiration date and class of commercial license, or attach a copy of the code-credit certificate.)

You, the volunteer examiner, must fill in your name and your mailing address, and the applicant's name. Indicate your class of license and call sign in number 4, and complete items 5 and 6 as directed. Don't forget to sign and date Part II.

*Part III:* Applicants who are blind or disabled and who cannot travel to an FCC Field Office may have their physician complete Part III. If such is the case, the physician must be provided with the address of the nearest Field Office so that he or she may determine whether or not the applicant can travel that far.

**Summary**

FCC figures indicate that one of seven applications has to be returned because they are incomplete, incorrect or improper. The most common mistakes are: failure to attach a copy of the license; improper address or station location; improper request for a special call sign; and failure to complete both sides of the form. When you have completed the Form 610, take a moment to double-check your application. Chances are, if you've followed these instructions, your application will sail through without a snag. QST

[Note: Material in this column is in response to questions frequently asked of the FCC and other agencies, and has been approved by the FCC staff.]

# Strays

## RADIATION "DANGERS"

According to the July issue of *Connecticut* magazine, Bristol (CT) police are operating with potentially "dangerous" cruiser and some walkie-talkie radio equipment. The magazine quotes an expert from the Preventable Diseases Unit of the State Health Department as being ". . . 'surprised' by test results that showed 800 megahertz of radiation [*sic*] being given off by the cruiser system . . . far above federal levels." Further, ". . . The health department also found that walkie-talkies with frequencies [*sic*] higher than 2 watts may be dangerous." By permitting the poor innocent hams to use considerably higher levels of radiation and higher frequencies, the FCC must be trying to thin our ranks!

## MOVING? UPGRADING?

When you change your address or call sign, be sure to notify the Circulation Department at ARRL hq. Enclose a recent address label from a *QST* wrapper if at all possible. Address your letter to Circulation Department, ARRL, 225 Main St., Newington, CT 06111. Please allow six weeks for the change to take effect. Once we have the information, we'll make sure your records are kept up-to-date so you'll be sure to receive *QST* without interruption. If you're writing to Hq. about something else, please use a separate piece of paper for each separate request.

## VOLUNTEERS NEEDED

Have some time to devote to a worthy cause? The Boy Scouts of America is looking for volunteers to advise and assist Lone Scout Plan members to obtain merit awards in radio communications. Write Joseph Pascot, Assistant Director, Field Service Division, B.S.A., North Brunswick, NJ 08902, or Ann W. Nalley, National Cub Scout Committee, 4008 Patricia St., Annandale, VA 22003.

## HAM/PHILATELISTS TAKE NOTE

To celebrate their 20-year jubilee, ARIM, the Amateur Radio in Morokulien, LG5LG/SJ9WL, is offering a special envelope with a Norwegian and Swedish stamp. It can be ordered until September 15 from ARIM, Konglevegen 5, N-2200 Kongsvinger, Norway. Cost is $2, or 7 IRCs.

## SCHOLARSHIPS AVAILABLE

High school graduates planning to enter college this fall who are licensed amateurs may be eligible for one of the $250 scholarships offered by the Atlanta (GA) Radio Club. For more information, write to the ARC Scholarship Fund, P. O. Box 77171, Atlanta, GA 30357.

# Correspondence

Conducted By Perry F. Williams,* W1UED

The publishers of QST assume no responsibility for statements made herein by correspondents.

## QUALITY VS. QUANTITY IN CONTESTS

I have just spent a frustrating afternoon on 20 ssb trying to work my way around another contest. Frankly, I'm fed up. However, instead of grousing and pointing my finger at contesters, I have an idea which would, I feel, satisfy the committed contester and the dyed-in-the-wool ragchewer — why not combine the two?

For some reason, up to now contests have been built on the concept of *quantity* only. Why not establish one based on *quality*? My idea is to run a competition based on real ragchews, scored like this:

One point for every five minutes of the QSO, with a multiplier for each contact lasting more than a half hour.

Score a point for each topic discussed, with a set number of specific subjects to break the ice; topics could include your rig, occupation, description of your town and could go on to other hobbies, etc.

Some of the reasons behind my suggestions: Many people like to be competitive. However, the bands during a contest are kind of chaotic, especially to the noncontester. But he or she could feel right at home in *this* one. And well-publicized contests are an ideal way to promote our hobby with public relations. But a contest sounds rather "rushed" and it is not an ideal way to introduce people to the hobby. I've heard comments such as, "Why do they want to contact so many people?"

A contest like this would have variety and competition at the same time. Anyone for it? — *Carl Raskin, VE3JRZ, Ottawa, ON*

## USING ANOTHER AMATEUR'S LICENSE

Page 9 of the new *Repeater Directory*, like "Repeater Tips," ARRL Form CD 209, is a very good guide to operation via repeaters. However, both omit a most relevant point about repeaters — that users of any repeater, with the exception of the actual licensee or trustee, operate another amateur's station with his, or her, tacit permission. This fact seems to escape the attention of many newcomers and old-timers alike and without relation to class of license.

Paragraphs 97.79 (a) and (b) of the FCC Rules and Regulations for the Amateur Radio Service are very specific as to who is responsible for the proper operation, in all respects, of an amateur station. Yet some repeater users will jeopardize a fellow ham's license, and repeater privileges in general, by using unsuitable or suggestive language; making unidentified transmissions; or discussing subjects which they would not allow someone else to use, make or discuss over their own stations.

I prefer to believe that most of this is unthinking, but the point needs to be made that the practice can result in more stringent regulatory and enforcement actions. This should be at least as important as the unfavorable impression it may make upon casual listeners. — *W. E. Smitherman, WB2GJZ, Elberon, NJ*

[Editor's Note: Form CD 209 is available free on request; please enclose a stamped self-addressed 5 × 7-1/2" envelope. The *Repeater Directory* is $1 from your local dealer or Hq.]

## PATIENCE

Inform the gang who are waiting for awards from Box 88 Moscow not to lose heart. I received my W-100-U Award this week; I applied one year ago for it. They don't rush things in the U.S.S.R. — *Joseph Holderness, W1BFK, New Bedford, MA*

[Editor's Note: Similarly, QSLs from U.S.S.R. stations may be quite a while coming, but they'll eventually arrive, via the bureaus.]

## MYSTERY LETTER

I was cleaning out the junk file and I ran across the attached letter. The readers may enjoy trying to figure out who the writer is, here describing his mobile rig to me. I've worked him while he was on the road to the golf course at 55 miles per hour — on cw, at 25 to 30 words per minute! — *Dave Hardacker, W7TO, Sheridan, WY*

"Dear Dave: The 1 kW amplifier is in the trunk. Nearby is a battery in parallel with the car battery in front with two no. 00 wires. The third battery is in the compartment normally holding a tank. The tank was moved to between the grill and the radiator. Fuses are 100 ampere in the lead running fore and aft, at each end; chafing wires have burned up cars, says Swan.

"The antenna has its big wire coil in the center. I carry coils for 80 to 10 meters, for emergency use, but enjoy 20 cw so usually stay there. Last time I was on ssb was in 1967, winning the top 7M score Field Day.

"The antenna is on the left fender on a heavy spring; the cord lets me pull it down going into my radio door garage. Extra shielding, car bonding, everything possible such as hood, trunk, muffler. Keyer on seat next to me. Swan 400 in cockpit, so when I go barefoot, it's 400 watts. I've worked five continents in the half-hour trip to the country club."

[Editor's Note: Any guesses about the identity of this prominent amateur? Replies received by September 10 may be considered for the November "Correspondence" column.]

## A PLEA FOR COOPERATION

As we continue to enjoy our beloved hobby, the need for voluntary cooperation among ourselves is more and more apparent, to recognize and respect certain frequencies used for specialized communications. Thousands of Amateur Radio operators have progressed into highly developed, state-of-the-art modes such as slow-scan television.

Amateurs participating in these special modes almost totally restrict their activities to a very small segment of the authorized frequencies. This voluntary practice not only provides a convenient gathering location for others enjoying the same mode, but also protects nonparticipants from interference. It doesn't take much imagination to realize the chaos and bedlam which would result if SSTV, RTTY and the like operated all over the place. Thus, it is in everybody's interest to have recognized frequencies for the more-exotic modes, and for other operators to avoid these spots. — *Mike Stone, WB0QCD, Lowden, IA*

[Editor's Note: Some frequencies that are generally recognized for certain modes or certain activities: 1800-1810 kHz — cw, DX calling; 1825-1830 kHz — "DX Window" (no W/VEs); 3610-3630 kHz — RTTY; 3845 kHz — SSTV; 7090-7100 kHz — RTTY; 14,080-14,100 kHz — RTTY; 14,230 kHz — SSTV; 21,090-21,100 kHz — RTTY; 28,090-28,100 kHz — RTTY; 28,680 kHz — SSTV; 29,300-29,500 kHz — Satellite downlinks; 29,520-29,580 kHz — Repeater inputs; 29,600 kHz — Fm simplex; 29,620-29,680 kHz — Repeater outputs. In addition, on 20 meters in particular, DX uses the low end of the U.S. phone segment, traffic the high end, and ragchewing in between, but the dividing lines are not definite.]

## STUPIDITY TO THE NTH DEGREE

Avoid heartbreak! Lock up your precious mobile rig, regardless of location. Take advantage of the low-cost ARRL insurance plan or similar coverage.

I didn't do either, and had my KDK 2016 (serial no. A1138) ripped off on a beautiful residential cul-de-sac street! I hope *you* don't let experience be your outrageously expensive teacher, as *I* did. — *Chuck Newton, W1TNS, Simsbury, CT*

## SIMPLEX — NOT SIMPLY DISMISSED

This letter is in response to Mario Filippi's (WB2JII) letter which appeared in "Correspondence," July 1979.

Do you, as an Amateur Radio operator, participate in (or believe in) public service? Maybe it doesn't appeal to you, but some of us hams show interest in it. Sure, no amateur or group of amateurs has a specific right to any frequency, but in most cases there is a sensible reason for using a particular channel. Let me cite an example.

Every year the Niagara Power Boat Association holds two boat regattas, the Icebreaker in the spring and the Frostbite in the fall. Members of the Buffalo Amateur Radio Repeater Association under the guidance of Richard Diehl, WB2JCB, and Carl Brittain, WA2OLW, are on hand to assist in radiocommunications, thereby greatly increasing safety throughout the races. Judge boats, patrol boats, and even the City of Tonawanda's amphibious "Duck" carrying members of the

*Manager, Membership Services Dept., ARRL.

police underwater rescue team operate at critical points all over the course. All except the Duck are provided with Amateur Radio operators and their equipment.

We use 146.52 MHz simplex. Most of the operators are using crystal-controlled handheld rigs, not fancy synthesized rigs. Ask your friends how many simplex channels *they* keep in a crystal rig! Need I say more? — *Howard G. Kraus, K2UD, Tonawanda, NY*

☐ A marathon is not only an excellent way to sharpen net skills but it also provides an excellent demonstration of the beneficial and lifesaving facilities that Amateur Radio and amateurs provide. The hams using 146.52 — and *other* simplex and repeater channels — were providing a communications link with the contest and medical officials. Because of the number of runners and the duration of the marathon, an effective and safe communications system probably could not have been formulated by anyone but hams. There were many fixed and mobile units participating and interfacing with the public. A great many people who knew nothing about ham radio were educated and our stance was improved.

There are numerous other circumstances where amateurs can really show what they are made of: parades, block watches, county and state fairs, mall demonstrations, Scout camporees and so on. If more hams would participate in nets like the one during that marathon weekend, or help organize another successful system, the public would be able to differentiate between amateur and CB with the added benefits of publicity, public support and the good feeling one gets when he has helped others. — *Howard Goldstein, N2WX, Brooklyn, NY*

☐ If Mr. Filippi has a hand-held transceiver, I wonder what simplex frequency came in on it? Probably 146.52 MHz!

The first principle within the Basis and Purpose section of the amateur rules is "Recognition and enhancement of the value of the Amateur Service to the public as a voluntary noncommercial service." Amateur Radio exists as a hobby because it qualifies as a service.

I am very proud of my Public Service Award, and a Public Service Commendation, also commendations from the Red Cross, the Irvine Police Department and San Clemente Fire Department, received for public service provided, God forbid, on 146.52 simplex. — *Robert Dale Piedfort, N6AIW, Laguna Hills, CA*

[Editor's Note: The office wit summed up the above letters, "52 is the one rock to have, if you're having only one."]

## THEY ALWAYS COME BACK

☐ In the 1920s I first became infected with the ham radio bug, as 8DOS. Hiram Percy Maxim was ARRL president. I could say a lot about the crystal detector, the coherer, honeycomb coils and $15 Baldwin "cans" — headphones, to you young squirts.

For 30 years the bug lay dormant, but it was still there; once one becomes infected one cannot escape. And I'm glad — now, at age 70, I'm once again enjoying ham radio and *QST*. Many of the articles seem geared to the design-engineering types and I find myself rather lost in the continuity, but that is what one has to expect if one does not keep up with the ever-changing state of the art.

Thanks to all you nice people who have been the life blood of Amateur Radio for all these precious years. — *Edward Darnall, WB3GYG, Bethesda, MD*

☐ I had a Novice and then General ticket (K1GSN) back in my high school days, circa 1958. Life intervened and the license never got renewed. Now, 20 years later, the call of early-morning Australian cw QSOs on 20 and long ragchews with Bayonne, NJ, amidst the evening din on 40 have reached to my soul again. I'm on the air, cw exclusively, with dipoles inside my apartment.

I feel the call to service. It will take me a little time to see where and how I can best contribute, but I must. The privileges we amateurs have are very numerous and special. It would be nothing short of tragedy if we jeopardized or lost any of them through apathy, irresponsibility or ignorance of the world communications situation. — *Maxon J. Buscher, N1AOE, Cambridge, MA*

## REPEATER-BASED RADIOLOGICAL MONITORING

☐ This is a general call for all amateurs involved in fm repeater design to give serious thought to a major new opportunity for Amateur Radio public service.

The recent near-catastrophe at Three Mile Island nuclear plant, and the consequent release of hazardous radiation into the surrounding environment, have rekindled a tremendous national concern with radiological monitoring.

Investigation here in the Amherst, MA, area pointed to an incredible situation: Each regulatory agency contacted (the NRC, the EPA, Mass. EPC, Mass. e.d.) assured us that one of the *other* agencies was responsible for radiological monitoring, and for public notification in the event of hazardous radiation release from one of our two neighboring nuclear plants (Vernon and Rowe). When the telephone chase through governmental agencies was completed, it seemed apparent that *no one* was providing radiological monitoring.

An urgent call is therefore being issued to all vhf amateurs with design backgrounds and capabilities to consider devising radiological monitoring facilities as a new control function for amateur repeaters. Some preliminary discussion has already suggested the following:

1) Repeaters operating within a 20-mile radius of functioning nuclear plants should be able to respond to significant ambient changes in levels of ionizing (or gamma) radiation, as well as to the transit of radioactive particulate matter through the atmosphere.

2) Repeaters operating some distance away from nuclear facilities should be able to detect the transit of concentrated radioactive particulate matter through the atmosphere. For example, particulates escaping from the near-meltdown were borne by wind currents at least as far north as New Jersey, and showed up in milk samples there.

3) A first approach to the design of repeater-based radiological monitoring might be to devise a "counting" circuit, accessible by control operator function only. A microprocessor, fed by a sensitive radiation counter, could tabulate the ambient millirems per hour of radiation received, and transmit a running count figure in cw upon command. This would have the advantage of delivering the information to qualified personnel, and avoiding a panic in the event of false alarms.

4) A complementary function might be to have the repeater transmit a voice alert signal, if ambient radiation exceeded a certain predetermined background level and remained in excess for a certain length of time.

Radiation hazards are serious and immediate, as nuclear proliferation continues. Surely there are many amateurs committed to research and development in various technologies who would be interested in devising a radiological monitoring function for their local repeater. I urge that working designs be submitted to national amateur publications for further development and adaptation by other repeater groups. This is an unprecedented new opportunity for amateur public service. Qualified amateurs should move on it without delay. — *Dave Beauvais, K1JPP,* The Valley Advocate, *Amherst, MA*

## WHEN YOU CARE ENOUGH . . .

☐ I am a 16-year-old ham of two years, and I have my Advanced ticket. I attend high school and spend much of my free time at school conversing with some fellow students who are also hams. Some of the nonham kids, especially the girls, just don't understand what value there is in Amateur Radio. They can't see what fun there would be in just talking on the radio all the time. I try to explain the different facets of our hobby to some of them, but it has no effect.

Ironically, my mother, who doesn't really understand Amateur Radio very well herself, came up with an answer I could give them. One day, in a batch of QSL cards from the bureau, I found two shortwave listener cards from the Soviet Union. I had never received any SWL cards before and I was quite tickled. I showed them to my mother, and I explained that they were from people who simply *heard* my QSOs with other stations and wanted confirmation. She also was quite delighted and said, "I think that proves that there is hope for this crazy world, in the fact that two people far away in another country with different government and customs would care enough to send you a card to say that they heard your signal halfway around the world." Quite touched by the thought, I replied, "Mom, I can say what you just said in two words . . . Amateur Radio." Needless to say, I sent each of the SWLs a card. — *Steve Phillips, WB3FSO, Camp Hill, PA*

☐ As Amateur Radio operators we are in a unique position to learn about other people in foreign lands. Many friendships have developed on the bands and continue through the years. Why limit it just to amateur operators?

I met such a friend on 15 meters cw, Jun Okamura, JA2BJW, from Shizuoka, Japan. With his QSL was a short note which I answered. During his correspondence he mentioned his nine-year-old daughter, Yohko, who is studying the code and also trying to learn English. Now my 10-year-old, Karen, has a pen pal!

The only hope for world peace is communication between people. Amateur Radio is one step toward this goal. Why not build on it through letters? — *Janice Shillington, N9YL, Glendale Heights, IL*

# ClubNotes

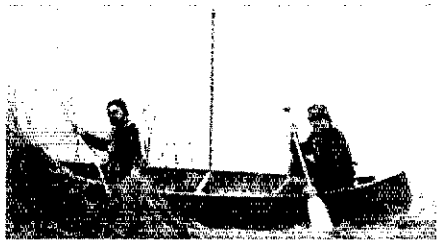
Does your club constitution have provision for an associate membership classification? We recently received a letter from a gentleman who was trying for the Novice license. He wanted to join the local club but their constitution required a person to be licensed before joining. Our letter writer felt that prospective Novices, SWLers and former hams would be discouraged by this. The club misses out on new members, too. It's something to think about.

Radio Central ARC (NY) members implemented a new way of nominating club members for officers: nominations by mail. Members would be given a nomination form and would be asked to list who they would like to nominate. A chairperson would call all of those listed to see if they would accept the nomination. This method allows members to think for a few days about the type and amount of work of each office and who would be suitable.

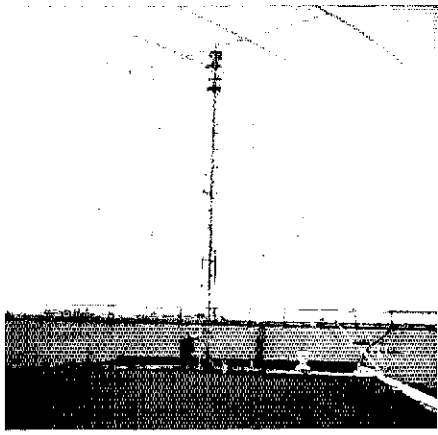
Birmingham (AL) ARC makes new members welcome. When people join, the club photographer takes their picture and prints the photos in the club's bulletin with information on these new members.

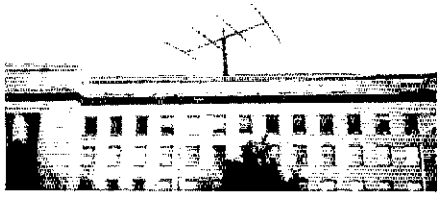
Each time Palomar (CA) RC members attend a club function, they sign their name on a ticket, which is collected by the secretary. At the annual picnic, all the tickets are dropped into a hopper and drawn for $500 worth of prizes. Attendance throughout the year is certainly encouraged by this incentive.

Amateur Radio Club of El Cajon (CA) features an "Amplifier of the Month" in their club bulletin. The amplifier goes to club members who have performed accomplishments. These accomplishments are reported and documented, thus amplifying the Amateur Radio Service. The club public relations person writes up the information for a story for the local paper when appropriate. The club bulletin reporters have fodder for articles for the newsletter. The members explain in writing, in 100 words or less, any and all deeds, with no limit to the number of reports per month. Judges determine if the act is amplifierworthy. One drawing is made each month and the hopper contains only current monthly reports. Winners are eligible once per year. Sample distinctions have been: "converted two ordinary citizens into Amateur Radio operators" and "unpressed the 'bejabers' out of a local fire chief with an Amateur Radio demonstration." The reports document the public service aspect of our hobby and are ready when needed for proof. Every day, little things now don't go unappreciated. — *Rosalie White, WA1STO*



Canoe-mobile? VE3KSX and VE3GSO (r) of London (ON) ARC handle communications for the Thames Valley Classic Canoe Race, a fundraiser for crippled children. The race was the brainchild of VE3CFR. *(photo by VE3GYQ)*





Ever wonder who has the big voice at the Pentagon? Pentagon ARC, K4AF, of course. This 40-meter beam is atop the Pentagon on a 50-foot tower.

# Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1AWO, Walter L. Glidden, Wenham, MA
W1CU, Fred B. Swett, Pelham, NH
WA1EGR, George F. McFarland, Norwich, CT
WB1HGM, Van B. Hopps, Greenfield, MA
W1HZG, Frank P. Canney, East Dedham, MA
W1IGH, Carl J. Marshall, Quincy, MA
W1ITI, Peter V. Elyosius, Hartford, CT
W1JJE, Ernest A. Pfeiffer, Lawrence, MA
WA1KPR, Dan Safran, Wilton, CT
K1LJV, Lawrence W. MacDonald, Wellesley, MA
WA1QIJ, George J. Brown, Brewster, MA
W1QLS, Donald B. Crane, Rockville, CT
WA1UPN, Kenneth G. Harrison, Clearwater, FL
W2JND, Everett T. Smith, Syosset, NY
WA2STD, John J. Green, Port St. Lucie, FL
WB2VAZ, Wayne E. Johnson, Cranford, NJ
K2WE, William T. Enders, LaGrangeville, NY
KB3AK, Robert F. Cantarera, Newark, DE
KA3AZS, Sharon Herath, Severna Park, MD
K3EYN, Edward M. McKeefrey, Pittsburgh, PA
W3USJ, Carl J. Fritz, McKeesport, PA
WB4AIH, Arthur A. Hayes, Hermitage, TN
W4BRK, Samuel C. Sweeny, New Bern, NC
K4CCF, W. Roy Hughes, Rockmart, GA
K4CET, J. Roland Livotte, Hialeah, FL
W4CFP, William H. Coe, Sarasota, FL
W4CLQ, Joseph Sydorwicz, Anderson, SC
K4CNY, Anthony B. Green, Chattanooga, TN
W4CTX, Arthur Stryker, Delray Beach, FL
KA4DCV, Thomas Bucala, Sneads Ferry, NC
K4GVF, William T. Corl, Port Saint Lucie, FL
WB4OTK, Everette E. Roach, Reidsville, NC
W4RP, Harvey P. Barton, Winter Park, FL
WA4RRF, Ralph L. Clifford, Virginia Beach, VA
*W4RUJ, Raymon L. Headstrom, Gainsville, FL
WB4TTG, Lewis Fogel, N. Miami Beach, FL
W4UMV, Harrison G. Adkins, Fort Mill, SC
K4ZW, Jesse Jacobson, N. Miami, FL
W5BHO, David H. Calk, Houston, TX
W5BR, William O. David, Broken Arrow, OK
W5KYN, George H. Abbott, Gladewater, TX
W5QCM, Reynold A. Champagne, Las Cruces, NM
WB5TKY, Henry W. Pfizenmaier, San Antonio, TX
W6BON, Armand Humburg, San Francisco, CA
WB6CBL, Charles F. Fox, Imperial Beach, CA
K6CI, Stephen C. Hobart, San Juan Capistrano, CA
W6CIC, Ruth M. Smith, Ventura, CA
KA6CLT, Charles T. Watkins, Hemet, CA
K6CM, Robert A. Crain, San Diego, CA
W6DR/ex-W3BXJ, William G. Dickman, Palos Verdes Estates, CA
WB6DWH, Peter H. Remple, San Bruno, CA
W6END, Alfred A. Dowers, Costa Mesa, CA
K6PVI, William R. Turley, Tehachapi, CA
K6REO, James M. Downey, Bishop, CA
W6TBI, Frank J. Bornowski, Alpine, CA
W6VJ, Charles W. Larsen, Vista, CA
WB6YGO, Robert M. Murtahug, Santa Barbara, CA
W7ADU, Earle P. Skow, Tigard, OR
ex-W7AHE, Robert J. Stanley, Seattle, WA
W7DR, Robert J. Taylor, Seattle, WA
WB7EKC, John H. Payne, Olympia, WA
W7IWI, Donald D. McKee, Kevin, MT
WB7NSP, John B. Skewis, Paradise, CA
W8BUR, Clinton, Frickman, Cincinnati, OH
W8CLV, Stanley E. Weber, Arcanum, OH
W8DCN, Fred W. Dupslaff, Ann Arbor, MI
WA8DFA, Clarence H. Sullivan, Georgetown, OH
WD8DLL, Paul F. Smith, Struthers, OH
K8HTN, Robert W. Porter, Scanan, OH
WD8LQZ, Lowell T. Hyer, Wilmington, OH
W8OBJ, James L. Stone, Taylor, MI
W8OJR, James H. Brown, Harrisville, WV
WB8QHZ, Roy E. Pitzer, Hamersville, OH
W8VUY, George J. McDonald, Newark, OH
W9ABH, D. John Hutchinson, Waupun, WI
K9BCJ, Julian E. Gannon, Chicago, IL
WD9BDF, Cecil H. Harper, Prairieton, IN
WA9CAR, James E. Giberson, Decatur, IL
W9DVA, Virgil M. Dieter, Madison, WI
W9JPK, Carl H. Stanfield, Milwaukee, WI
W9PSY, Gene C. Finn, Princeton, IL
K9QKY, Edward J. Svec, Beaver Dam, WI
W9TKT, William F. Bidinger, Mount Prospect, IL
WØAOU, Robert A. North, Webster Groves, MO
WØCAD, Carl R. LeMon, Minneapolis, MN
KØDTS, Harold H. Marburger, Shenandoah, IA
WØMSX, Dannie L. Bess, St. Louis, MO
WAØQLS, Dr. Emil F. Tiesen, Freeman, SD
ex-WØTXQ, Arthur W. Dahl, Detroit Lakes, MN
VE1GX, Charles L. Girvan, Yarmouth, NS
VE3GFP, C. H. Picard, Oakville, ON
VE3WW, Theodore S. Welsman, Waterloo, ON
VE6GK, Herbert M. Nicholson, Olds, AB
KV4JB, Samuel Cluett, St. Croix, VI

*Life Member, ARRL

# Strays

The Reverend Kathryn B. Baines, WD4ASX (second from left), recently was ordained a pastor in the Florida Synod, Lutheran Church in America (LCA). The first woman pastor to serve in the LCA in Florida, Kathryn is shown with her father, the Reverend Charles A. Burkey, K4EVA (right), her husband, Lieut. (j.g.) Barry A. Baines, USNR, WD4ASW, and her mother, Lois Burkey.

## CERTIFICATE WORLD AWARDS

☐ Amateurs can obtain four new certificates by qualifying for the Old South, Mississippi, Old Man River and Capitols of the United States awards. For a copy of the requirements for each award, write to Certificate World, Rte. 2 Box 72, Fulton, MS 38843.

## HAMFESTERS AWARD

☐ The Hamfesters Radio Club (IL), W9AA, will be operating on 28.600 MHz from 1700 UTC September 22, to 1700 UTC September 23, for any amateur wishing to earn the Worked All Hamfester Members Award (WAHM). To be eligible, hams in the U.S. (but outside Illinois) must work five Hamfester members. Amateurs in Illinois must contact 10 club members in the state. Outside the United States, three Illinois Hamfesters must be worked. Eligible amateurs can receive the WAHM award by submitting a list of contacts containing calls, frequencies, dates and names of Hamfester members to the club at P. O. Box 42792, Chicago, IL 60642.

# The World Above 50 MHz

Conducted By
William A. Tynan,* W3XO

## Locator Systems

The advantages of having a straightforward means to determine the location of a station being worked have long been recognized. About all any of us do at present is try to get the name of the city nearest that station and look it up on a map. Few amateurs know their geographical coordinates in longitude and latitude. Besides, these are quite complicated numbers with degrees, minutes and seconds (°, ′ and ″) as well as east and west longitude, and north and south latitude, to contend with. A shorthand method of expressing approximate locations would be a real boon. It would provide the necessary information for calculating beam headings and distances, quite simple in these days of programable calculators and home computers. It could form the basis for various types of awards or contest multipliers and it could provide us with the incentive to learn more about the geography of our planet.

### The QRA Locator System

Such a shorthand system, based on a grid, has been in use in Europe for a number of years. Known as the QRA Locator System, it was created by vhfers to meet the needs discussed above. Many have heard of this system but few, outside of Europeans, know how it works. A number of people have written to Headquarters asking that a *QST* article be presented describing the system. Many of them have questioned whether or not the QRA Locator System can be extended beyond Europe.

In response to these requests, this column will indicate why it is not suitable for expansion, and will present some systems which may be appropriate for worldwide use.

Fig. 1 shows the basis for the QRA Locator System. The blocks are each 2° in longitude by 1° in latitude. The block with its southwest corner at the intersection of the zero meridian and 40° North is designated AA. The block to the east is BA, the one to the west is ZA. Thus, the first letter denotes blocks to the east and west of AA. Similarly, the block to the north of AA is called AB and the one to the south is AZ. As shown in the figure, all of Europe, and part of Africa, is thus divided into 2° × 1° blocks using the sequence outlined above. Careful examination of the figure immediately reveals a flaw in the QRA Locator System, preventing its worldwide use. There are just not enough letters in the alphabet to accommodate blocks of this size without being forced to repeat. But more about that and what can be done about it later.

The basic blocks used in the QRA Locator System are too large to provide an accurate indication of location, although they are useful as contest multipliers and DX collectibles. Working these blocks is quite the sport on the vhf bands in Europe. In order to achieve a more accurate determination of location, each block is divided into 80 subblocks. These are designated 01 through 10 from west to east across the most northerly row, and 71 through 80 across the most southerly row. Each of these subblocks is further divided into nine "sub-sub" blocks designated "a" through "j," beginning in the top center with "a" and proceeding clockwise around to "h" in the upper right corner with "j" in the center. These smallest blocks are approximately three miles on a side. A typical QRA Locator for a station in West Germany might be EL45b.

### GEOREF: An RSGB Proposal

A letter from SSA VHF Manager SM5AGM outlines discussions held at several IARU Region 1 meetings on replacing the QRA Locator System with something more flexible that could be used worldwide. RSGB representative G3SEK proposed that a system known as GEOREF be adopted. However, this proposal met with some opposition from delegates from Eastern bloc countries since this is the system used by NATO. Basically, GEOREF divides the earth into 288 squares, each 15° on a side. Using larger (and thus fewer) squares means that one can avoid repeating symbols. The GEOREF squares are designated AA through ZZ beginning at 180° West and 90° South, with the first letter denoting the east-west position as in the QRA Locator System. Each of these squares is then subdivided into subsquares, each 1° per side. These subsquares are designated AA through QQ, with AA in the southwest corner. Finally these subsquares are further subdivided into 1′ squares designated 0000 through 5959, again using the same convention of beginning in the southwest corner with the east-west designator first. The GEOREF designation for the location of W3XO, which has a geographical coordinate location of 76° 58′ West and 39° 05″ North, works out to be GJPK0105.

### A New Locator System

In order to achieve a system which might be acceptable to everyone, EA8EX has come up with a new system that is somewhat similar to GEOREF. This system, as slightly modified by SM5AGM, is illustrated in Fig. 2. The earth is divided into 36 slices in the longitudinal direction. Thus, each slice is 10° in width. Since there are only 26 letters in the alphabet, these longitudinal slices are designated by a combination of Ø to 9 and then A to Z providing the needed 36 single-digit designations. Counting begins at 180° West longitude as in GEOREF. Like all the previously described systems, the first character denotes east-west position. In a similar manner, the earth is divided into 36 five-degree slices north-south. The same number letter designation system is used here also with Ø at the South Pole and Z at the North Pole. This results in the earth being divided into 1296 rectangles, each measuring 10° in longitude by 5° in latitude. Each of these rectangles is further divided into 900 subrectangles of 20′ in longitude by 10′ in latitude. The longitudinal rectangles are denoted by Ø through T (the third character), while the latitude direction rectangles are represented by the same combination. This is the fourth character. In this proposal, a further division takes place in which each of these rectangles is again split into 900 more rectangles using the same number-letter combination and arriving at a six-character designation pinpointing a rectangle on the earth's surface measuring 40″ in longitude by 20″ in latitude. This represents about 0.5 miles in the east-west direction and 0.3 miles in the north-south direction. Using this scheme, the writer's QTH becomes AP9T2F.

The EA8EX/SM5AGM proposal certainly does the job of establishing locations very precisely and does not require more than one character per piece of information, which is the drawback in using longitude and latitude numbers directly. However, this writer feels that it may be somewhat complicated in its use of both numbers and letters in order to count past 26. It may also be a trifle exotic in breaking down to such small rectangles. The fact that rectangles are used rather than squares may also lead to some confusion. For these reasons, I have concocted a system of my own which I offer for consideration along with the others described.

This system is similar to GEOREF in that it divides the earth into 15° slots longitudinally but it uses 10° in the north-south direction. One does not need 15° slices in this direction as only a 180° span is involved. Also, I begin my longitudinal count at the zero meridian, mostly because it seems more logical than starting at 180° West, as GEOREF does. Like GEOREF, however, I begin latitude count at the South Pole. Thus, the rectangle just north of the equator would be K and the one at the north pole would be T. Note that I do not use the letters I and O, in order to prevent confusion with the numbers Ø and 1. As in the other systems, the longitude character comes first. As a further breakdown, I propose to subdivide these 15° × 10° rectangles into 150 squares, each of which is 1° on a side. Using 1° squares is logical as it is a convenient division and is the method by which multipliers are defined in the ARRL UHF Contest. These squares would be designated by A through Q in the west to east direction and A through H in the south to north direction. For the final breakdown, the simple expedient of subdividing each 1° square into 100 subsquares, each 6′ or about 7 miles per side, is used. These I would designate by Ø to 9 with ØØ at the southwest corner and 99 at the northeast corner. Under this system, the QTH of W3XO becomes UNPKØØ, certainly much shorter and easier to transmit than the complete longitude and latitude. For an exchange in the UHF Contest, I would merely send UNPK rather than 7639. If more precise location is required for some reason, I feel that it is better to use longitude and latitude rather than complicating the locator system with further subdivisions.

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730, or call 301-384-6736 and record your message.

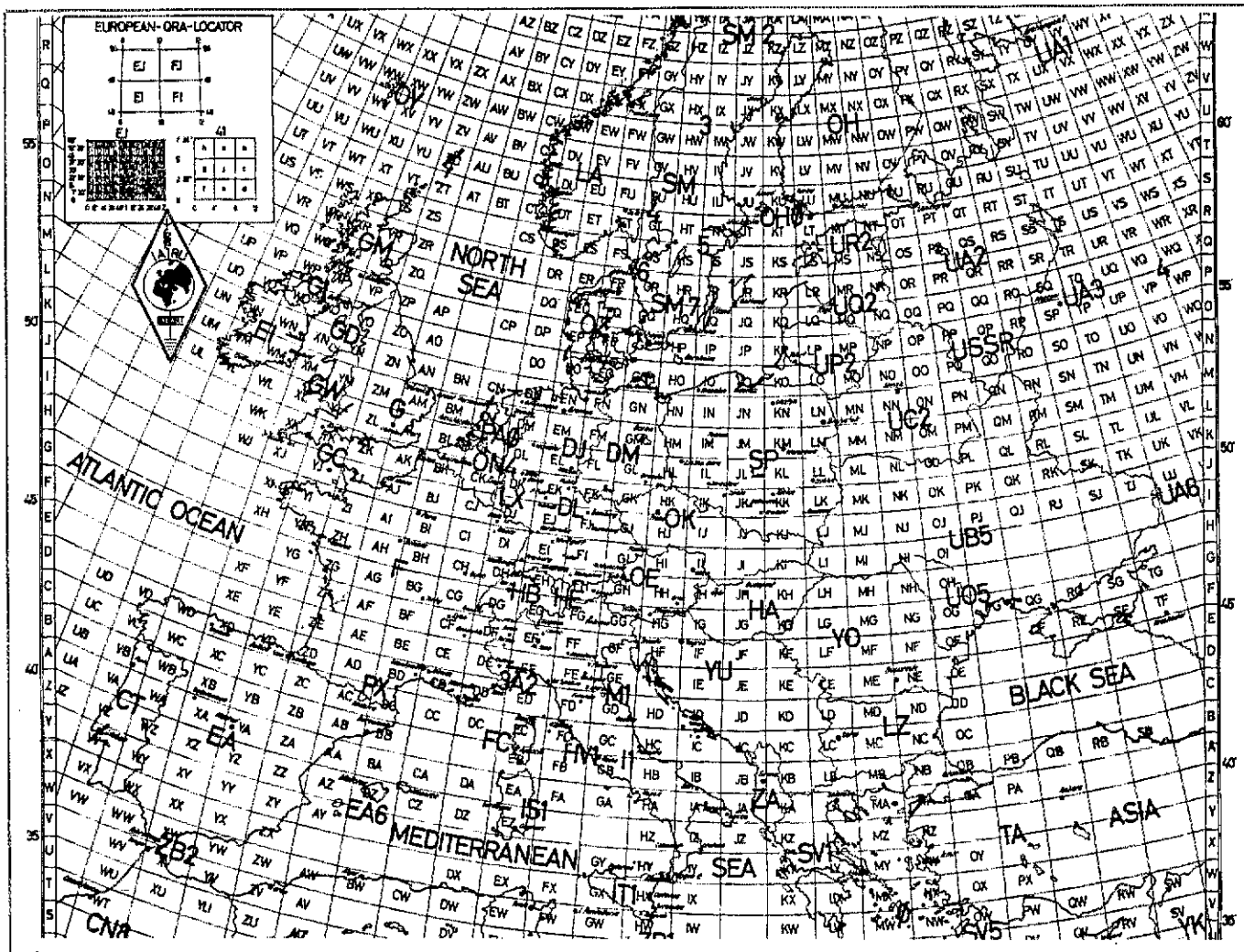



Fig. 1.

The advantages of adopting some sort of worldwide locator system appear to be great. Let us, as vhfers, take the lead, even though others will also benefit from the system. After all, it was European vhfers who got the present QRA Locator System going and it has proved very useful to them. Give the matter some thought and let me know your views as to the kind of system we should consider as a recommendation to the rest of the world's amateurs. You probably have some suggestions of your own. I would like to see them. As in most things, that which is best is usually that which has been given the most careful thought by the most people.

## FLASH! FIRST 70-CM WAS

Just at deadline, word arrived that WØYZS has completed the first WAS on 70 cm. For the final state, Mike took his portable moonbounce station to the QTH of WA7DKZ in WY, where he contacted his own station back in Kansas City, MO, with KØTLM at the controls. This followed QSOs during the weekend of June 29 and July 1 with WA1NGR/3 DE, who was put on the air as a result of a quick trip by WA1TZV, and K1LPS who appeared on the band from VT. In this horserace, WØYZS noses out K2UYH who, after picking up three new states as a result of his own trip to MS, AR and LA; now needs only WY. Mike's achievement has been the result of much hard work by many people in addition to himself. Although it is certainly a great honor to be the first, there is no discredit on the second, or any that follow. This should be only the beginning of a long list of those who have achieved 70-cm WAS. Just as on 2 meters, once it has been

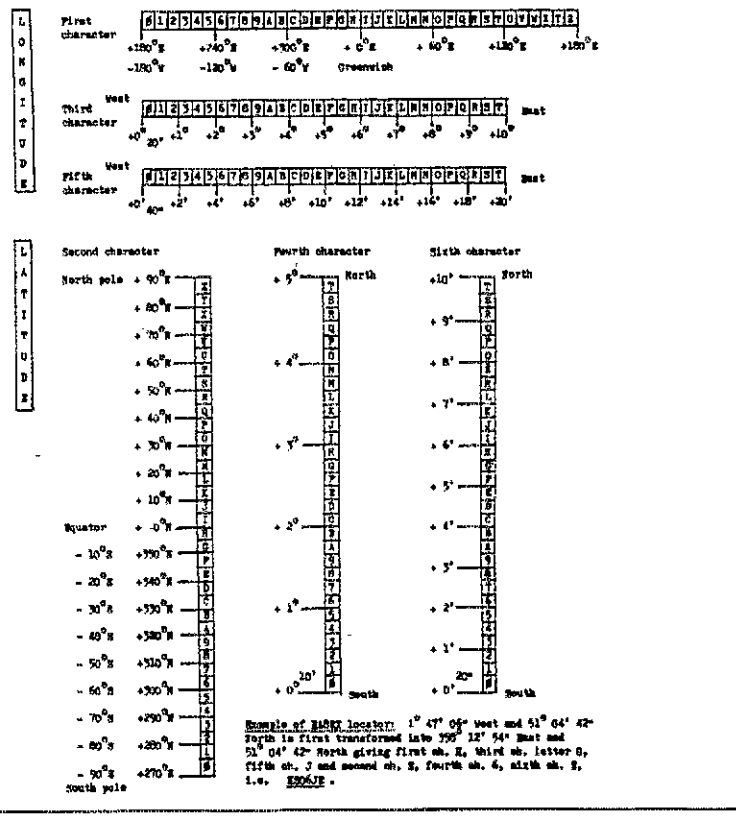



Fig. 2 — EA8EX World Wide Locator, modified by SM5AGM.

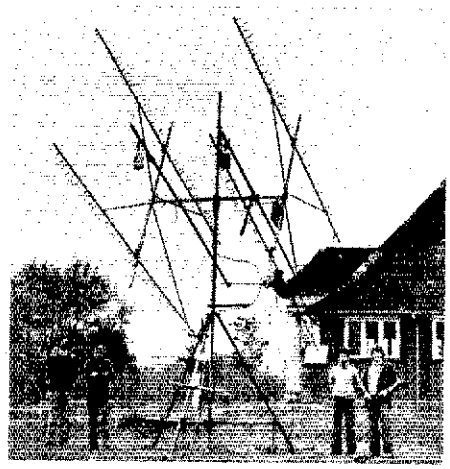
done, the list should grow year by year. Congratulations to those who have made it and good luck to those who are still trying.

## RECORD-BREAKING 70-CM WORK SPANS THE PACIFIC FROM THE MAINLAND TO HAWAII

After many successful attempts over the years since the HI-to-CA duct was first conquered on 2 meters and later on 1-1/4 meters by W6NLZ and KH6UK, this famous tropo path has finally been bridged on 70 cm. W6FZJ (now W1JR) almost succeeded in working KH6BZF in August 1973, only to be thwarted by an equipment failure, but this time the amateur spirit was not to be denied. After hearing the KH6HME beacon on Mauna Loa beginning about 0000 UTC, July 18, WB6NMT placed a phone call to the islands only to find that the proprietor of the beacon could not make the trip up the mountain for several hours because of work commitments. As the evening wore on, the signal faded and peaked until finally at 0517 UTC, KH6HME, now operating portable from the 5000-ft level was being copied in San Diego. Contact was immediately established, first on cw and then ssb, for a new 70-cm terrestrial record with signals peaking at 5 × 7. Thereupon, W6YDF, WB6ESQ and WB6WLR up the coast also made the grade.

What next? Anyone for 23 cm and higher? Even 3 cm with Gunn diode power levels is not beyond the realm of possibility.

In the meantime, congratulations to those who have accomplished a long-sought objective.



The Oxford University, G3OUR, group. Left to right are G3WDG, G3YGF, G8HDR and G4CNV. The four 27-element 27-foot-boom loop Yagis, although successful in working a number of 70-cm EME stations, have since been replaced by a 20-foot dish with quick polarization change capability.

## MID ATLANTIC STATES VHF CONFERENCE

The Pack Rats entry in the vhf conference circuit will be held this year on October 6 at the Warrington Motor Lodge, 4-1/2 miles north of the PA Turnpike on Rte. 611. An all-day program of talks sure to be of interest to vhfers is planned, followed by a social hour and buffet dinner. The next day, the famous Hamarama will be held nearby. Since it is sponsored by the Pack Rats, and is one of the biggest flea markets on the East Coast, it often has more of interest to those who inhabit our portion of the spectrum than most such affairs. For more information on both events, contact Ron Whitsel, WA3AXV, P. O. Box 353, Southhampton, PA 18966. Please include an s.a.s.e.

## ON THE BANDS

**6 Meters** — True, the 1979 Es season may not rank among the best but, nevertheless, it did have its moments of glory. One such moment came around 2100 UTC June 29 when KH6IAA broke through to the East Coast, permitting many 5s, 2s, 3s and 4s to snag a very-hard-to-get state, not to mention a new country as well as another continent. This conductor was fortunate to be among the lucky ones this time, thanks to a number of area band watchers who sounded the alarm. The evening before, several stations heard and some worked a station signing KH6FU, which is not listed in the *Callbook*. We are still waiting to track that one down. From his end, KH6IAA reports picking up seven new states while working stations from MA to NC along with a few 5s, 6s and 7s. Al also notes a good opening to the West Coast July 4. That evening (July 5 UTC) the 6s and 7s were treated to one of their now famous JA openings.

Another breakthrough came in the early morning hours, Eastern time, on July 4. Although this one did not involve many stations it nevertheless showed that "it can happen." At about 0130 EDT (0530 UTC), N2ASC was roused from his musing by a signal from his 6-meter receiver. It proved to be VE8BY. Dan then heard WL7ACY, Fairbanks, AK, and worked him along with WL7AFA nearby. At about the same time, K1TOL reports an opening to VE5, 6, 7 and 8. Lefty is sure that he also heard a KL7, probably AL7C. Through K5ZMS comes word from the other end of the circuit. WL7ACY states that between 0527 and 0643 he worked VE8BY, N3ASL, WA3USH, WB3KNU, N2ASC, WA8DBW, WA8WQP, WA1NGR/3, WB9OAI, WD9DUK, WD0FDZ, WD0FDJ along with 2 VE4s and a VE5. I also understand that K3MWV worked WL7AFA for state number 50. If so, I am sure that Dick's is the first 50-state, 50-MHz WAS for a 1, 2 or 3. Congratulations to a fine 6-meter operator. You can be certain that this nocturnal flurry spurred a lot of late night operating over the next few days, with accompanying red eyes the following mornings. But, alas, no repeat!

A few days earlier, on June 27, WL7ACY caught an opening to AZ, CA, OR and WA beginning about 0430 UTC. Dave says it had been nine months since his last 6-meter opening. It was very welcome. He runs a voice tape loop on 50.108 and monitors the band frequently.

What is certain to be classed as the best double-hop opening of the year occurred July 7. Between 1930 and 2050 UTC, WA3WUL reports working 19 6s as well as K7ICW and K7NV NV. Signals were exceptionally strong, permitting Bruce to hand out hard-to-get DE contacts to stations running as little as 8 watts.

Picking the best weekend of the season, June 30 and July 1, K1TOL, W2KHQ and WA2PVV cleaned up the band from FP0OO. Altogether, 650 QSOs were made with 35 states including K7KV WA. Near misses were had with WA7FPO AZ and W6XJ. WA2PVV writes that the group is especially indebted to FP8HL for his help in arranging things. Henri is now active on the band with a Swan-250 and the 5-element beam they used. He is looking for a VOX unit for his rig and will put on a beacon if someone can supply him with one.

Another DXpedition popped up and pleasantly surprised everyone the following weekend. VP5HCX, operated by WB4OSN and others from south FL, did not have the same conditions which blessed FP0OO but they did quite well in the eastern part of the country and provided a new country for many, especially those who have been on 6 meters for only a year or so.

Speaking of new 6-meter operators, W9IP, well-known 2-meter devotee, writes that in his first two weeks of operation he has worked 46 states and a number of VEs plus VP2VDL, ZF2CT, KP4s EKG and Q, KV4s KV and FZ, KG4BN, HI8WPC and VP2MX, but alas no South Americans! Some have it rough, Mike! Another success story is that of WB3CPR. Fred has been on about two months with a Swan-250 and 4-element beam and, as of mid July, had amassed 48 states, having worked KH6IAA and KL7ALJ on June 29. The last two needed for WAS? SC and CT!

**2 Meters** — Probably the biggest 2-meter news for this reporting period concerns the extensive Es session which took place Sunday evening following the close of Field Day. Many have pointed out that we often get 2-meter Es during this particular weekend. W5JTL MS files the most complete report on this opening. George lists 26 stations worked between 2329 UTC June 24 and 0056 UTC June 5. These include seven 1s, including WA4MMP/1 RI for a new state, six 2s, eight 3s, and five 4s, including three as close as NC. He says that he was in QSO with K5BMG and WA5TUD discussing the possibility of a repeat of the June 26, 1976 Es opening as the weather conditions, including widespread thundershowers across the southeastern part of the country, were very similar, when W2AZL broke in. From then on it was a hectic hour and a half. Another station reporting success on this opening is WA2PMW NY. Lou added two states to his total in the form of contacts with W5JTL MS and K5BMG LA in what was to him a short session. He now stands at 30. W1RJA's account lists contacts with stations in TX, LA, OK and MO. Ed says that the signals came and went very rapidly, almost like m.s. From south FL, WB4KGY sends along the list of stations worked by him as well as N4AFB, WB4TSI, WB4YJG and K4GFG. All contacts listed were with 9s and a few 8s. K4GFG logged 27 while N4AFB made the grade with three, which is very good when one considers that Dick was running a barefoot IC-202 into a 4-element beam!

In another much shorter and less extensive Es opening, at about 2100 UTC July 5, WB9WXM IL reports working VE1UT with S-9 + 40 dB signals, while VE1ASJ came up with WA4GPM VA, KB9DU IL and WA8KCW OH.

This being the season for it, there were also widespread tropo openings in various parts of the country that are too numerous to report. Such conditions should be especially good, at least through October, so be on the lookout.

M.s. is another popular mode with 2-meter state-hunters. I'll try to have a preliminary summary of the Perseids in the October column, but remember that many avid operators don't wait for major showers to set up skeds. WB2DIN/8 is one of these. During the Cygnids, Bob ran with WA4LYS FL at 1100 UTC July 14 and exchanged calls almost immediately. A few minutes later they completed on an overdense burst which produced S-9 signals for about 10 seconds. This QSO raised WB2DIN's state total to 31 since he took up residence in WV.

Too late for inclusion in the August column, I received word of WA7ADK's plans to operate Perseids from a 10,000-ft mountain in UT. Jerry expects to hold forth from the same vantage point during the September VHF QSO Party. Those wishing skeds may call 801-825-8798. He pleads for more material in the column from his part of the country. So do I, Jerry. What goes in reflects the information I receive.

**70 Cm** — K2RIW notes that activity on the band is increasing steadily. In the June VHF QSO Party, Dick reports working 140 stations in 23 sections using a single 19-element Yagi. But watch out — he is putting up an array of 16 of them!

K5JL passes along word of the first successful 70-cm EME contact by a ZL. ZL2BCG and ZL3AAD have been working on their systems for about a year, and ZL2BCG recently made the grade. I am sure that ZL3AAD will not be far behind. Most of us don't realize the difficulty of getting a moonbounce station going in many countries; it's a real accomplishment when some of these fellows get on. ZL2BCG's set-up consists of 16 EYE type Yagis, a homebrew R1W final and an NE-64535 preamp. ZL3AAD is using 8 of the same antennas and otherwise a similar lineup.

The K2UYH EME DXpedition to MS, LA and AR last spring, in addition to meeting its main objective of providing these rare states to state-hungry moonbouncers and creating interest in 432 EME, also produced some fine publicity for Amateur Radio. While set up near the QTH of W5JTL, the operation received lengthy and very positive coverage in the *Vicksburg Evening Post*. The equipment used consisted of a special portable package assembled by K2UYH, including an array of 8 F9FT Yagis.

Some of the better-performing 70-cm preamps checked at the Northeast VHF/UHF Conference this past May included a V-244 by W1JR which produced a noise figure of 0.95 dB, three entries at 1.3 dB, an MSC-80000 submitted by K2UYH, and NEC-64535 jobs by W1GAN and K1LPS. Another K2UYH unit, this one employing a V-244, was measured at 1.45 dB. Of the 25 preamps entered, 17 showed noise figures of less than 2.0 dB. Things have come a long way in the past few years.

**23 Cm and Down** — Just in case anyone thinks that good tropo conditions don't extend much above 500 MHz, K4QIF Suffolk, VA reports his 1296 MHz results during the June VHF QSO party. Rusty lists 11 stations contacted from SNJ to EMA. He notes that even W1JR's 1 watt was producing signals up to S-7.

WB5LUA near Dallas calls for more activity on 23 cm. Al now has his 2C39 producing 20 watts and can work K5JRH and W5LDV Houston over a 250-mile path. But he laments the lack of other stations to contact. He offers to compile a nationwide list of stations active on the 1296 portion of the band. Those wishing to be listed may send an s.a.s.e. to Al Ward, Rte. 2, Box 65A, McKinney, TX 75069, for a report form. One suggestion made by WB5LUA is for a national calling frequency such as those on the lower-frequency bands. He offers 1296.1 as his idea on this. On the other hand, K6ZMW says that the West Coast has settled on 1296.0. It seems to this conductor that 1296.1 would be preferable for the same reason that 70-cm terrestrial activity has moved to 432.1. As 23 cm comes into its own, EME is certain to become one of the major modes. It would appear appropriate to clear the portion of the band most likely to become used for this weakest of weak-signal modes. Contending that moonbounce can take place anywhere fails to recognize the realities often inherent in the amateur frequency allocations of other nations. Relatively few countries have the 85-MHz-wide band that we do.

# Hamfest Calendar

**Alabama:** The second annual Central Alabama Hamfest is Sept. 8-9 at the Montgomery Civic Center, 300 Bibb St., Montgomery. The FCC will administer exams beginning at 8 A.M. on Sept. 8, so bring your Form 610s. All activities indoors. Talk-in on 04/64. For details, contact Ed Sensintaffar, WA4NKU, 745 Dubuque Dr., Montgomery, AL 36109, or Sam Windham, WB4RGX, 1834 Shoreham Dr., Montgomery, AL 36106.

**California:** The Williams Hill Amateur Radio Relay Society's third annual Smoked Hamfest will be held Sept. 30 at the San Antonio Mission, King City. Barbeque, flea market, prizes. Hamfest is in commemoration of the hams who worked the Marble Cone fire in 1977. For more information, contact Ed Gribi, WB6IZF, 51280 Pine Canyon Rd., King City, CA 93930, tel. 408-385-6164.

**Colorado:** The Boulder ARC's BARCFEST '79 is Sept. 23 at the National Guard Armory in Boulder. Talk-in on 10/70 and 52. For details, contact Mark Call, N0MC, 4297 Redwood Ct., Boulder, CO 80301, tel. 303-442-2616.

**Georgia:** The Amateur Radio Club of Augusta hamfest is Sept. 16 at the Julian Smith Casino in Augusta. Prizes, flea market, cw contest, MARS meetings. Talk-in on 34/94. For more info, write to Mike Dickens, WA4GLV, c/o ARCA, P. O. Box 3072, Augusta, GA 30904.

**Georgia:** The Central Georgia ARC's hamfest is from 8 to 5, Sept. 30, at the City Recreation Center, Watson Blvd., Warner Robins. Talk-in on 25/85, 52 and 3.975 lsb. Call or write Bill Atkins, WD4ASB, 201 Avalon Dr., Warner Robins, GA 31093, tel. 912-923-3454.

**Georgia:** The sixth annual HAMNIC of the Lanierland Amateur Radio Club is Sept. 23 at the Lake Lanier Islands Dogwood Pavilion, Gainesville. Many prizes, plenty of food available. $2 fee to enter Lanier Islands. Picnic, hiking, swimming, camping. Trailer hookups available. Talk-in on 07/67. For details, write to Bob Cochran, W4DNX, 607 E. Lake Drive, Gainesville, GA 30501.

**Georgia:** The Northwest Georgia ARC's annual Rome Hamfest is Oct. 7 at Coosa Valley Fairgrounds, Rome. Gates open at 9 A.M. Talk-in on 34/94 and 085/685. Details available from Harold Dale, WB4AEG, Box 274, Adairsville, GA 30103.

**Honduras:** The Radio Club of Tegucigalpa will sponsor the FRACAP Convention Sept. 27-30. For details, write FRACAP, P. O. Box 149C, Tegucigalpa, D.C., Honduras.

**Illinois:** The fourth annual hamfest of the Sangamon Valley Radio Club is Sept. 23 at the Sangamon County Fairgrounds in New Berlin, 15 miles west of Springfield. Variety of exhibits, prizes, activities for the whole family. Write to Richard I. Osland, K9FNB, SVRC, 1025 S. 6th St., Springfield, IL 62703.

***Indiana:** The Grant County ARC will hold its hamfest Sept. 23 at the 4-H Fairgrounds, Marion. Admission $2.50, under 12 free. Ticket price includes all prize drawings. Flea market, tree bingo. Talk-in on 19/79 and 52. For more info, contact Jay Beall, WD9IZA, P. O. Box 47, Swayzee, IN 46986.

**Indiana:** The annual hamfest of the Porter County ARC is Sept. 9 from 8 to 3 at the Porter County Fairgrounds, Valparaiso. Admission $2. Free indoor and outdoor set-ups. Talk-in on 96/36 and 52. Write Porter County ARC, P. O. Box 453, Valparaiso, IN 46383.

**Iowa:** The 1979 ARRL Midwest Convention and Cedar Valley ARC hamfest will be held Oct. 19-21 at the Five Seasons Center, Cedar Rapids. Banquet speaker Senator Barry Goldwater, K7UGA. Many prizes, forums. Flea market. FCC exams on Oct. 20, registration required. Talk-in on 16/76, 34/94 and 52. For more info and reservation material, write CVARC, Box 994, Cedar Rapids, IA 52406.

**Kansas:** The Sandhills Amateur Radio Club will sponsor a hamfest on Sept. 16 from 9 to 5 at the 4-H Building on the fairgrounds, Garden City. Talk-in on 3935 kHz, 31/91 and 52. For details, contact The Sandhills Amateur Radio Club, Garden City, KS 67846.

***Maryland:** The Foundation for Amateur Radio will hold its annual hamfest at the fairgrounds in Gaithersburg on Sept. 30. Large flea market, food service, exhibits, ladies events, supervised children's program, many prizes. Free parking. Tickets are $2; $6 for sales space; $5 for tailgaters. Call or write Ron Levin, W3GBU, 802 Greenview Ct., Reisterstown, MD 21136, tel. 301-833-1816.

**Massachusetts:** The annual auction of the Hampden County Radio Association will be held Oct. 5 at Feeding Hills Congregational Church, intersection of Rtes. 57 and 187, Feeding Hills. Doors open at 7 P.M., auction starts at 8 P.M. For more info, contact Jeffrey J. Duquette, K1BE, P. O. Box 346, Southwick, MA 01077, tel. 413-569-6739.

**Michigan:** The seventh annual Adrian ARC hamfest is Sept. 23 at the Lenawee County Fairgrounds, Adrian. Prizes, games, programs. Talk-in on 31/91 and 52. Tables cost $5 per 8 feet; $3 per 4 feet; $1 per 8 feet trunk space; $2 inside space with your table. For info, write Adrian ARC, P. O. Box 26, Adrian, MI 49221 or call 517-262-3597.

**Michigan:** The Blossomland Fall Swap Shop is Oct. 7 at the Berrien County Youth Fairgrounds, Berrien Springs. Advance tickets $1.50; tables $2, sales restricted to radio and electronic items. Contact Charles White, 1940 Union Ave., Benton Harbor, MI 49022.

**Michigan:** The Genesee County Radio Club, the Bay Area Radio Club, Lapeer County Radio Club, Saginaw Valley and the Shiawassee County Radio Club are sponsoring the second annual Five-County Swap-n-Shop from 7:30 to 4 at the Southwestern High School in Flint. Prizes, refreshments. Talk-in on 52, Hainer repeater 147.27 and Great Lake's repeater 146.91. $2 for adults, under 12 free. For further info, write Don Williams, WD8QPM, 5114 Knapp Dr., Flint, MI 48506.

**Michigan:** The annual Swap-n-Shop of the Grand Rapids Amateur Radio Association is Sept. 15 at the Hudsonville Fairgrounds, Hudsonville. Gates open at 6 A.M., sales start at 8 A.M. Talk-in on 16/76, 63/03 and 52. For details, contact GRARA, P. O. Box 1333, Grand Rapids, MI 49501.

**Michigan:** The seventh annual L'anse Creuse Amateur Radio Club Swap-n-Shop is Sept. 16 at L'anse Creuse High School, Mt. Clemens. Cash prizes, hourly drawings, plenty of food and parking. Talk-in on 69/09 and 52. Tickets $1 in advance, $2 at the door. For tickets or information, send s.a.s.e. to L'anse Creuse ARC, 3488 Ashley, Pontiac, MI 48055.

**Michigan:** RADAR, Inc.'s third annual Swap-n-Shop is Oct. 7 from 9 to 3 at Kennedy High School, Taylor. Admission $2. Door prizes, food, free parking. Talk-in on 93/33, 99/39 and 52. For more info, write to RADAR, Inc., P. O. Box 1023, Southgate, MI 48195.

**New Hampshire:** The Connecticut Valley FM Association hamfest is Sept. 23 from 9 to 5 at the King Ridge Ski Area, Sutton. Take exit 11 off I-89. Indoor/outdoor flea market, games, exhibits. Overnight camping for self-contained units, food served in ski lodge. Advance tickets $1.50, $2 at the gate. For reservations or further info, contact Cheryl A. Breuning, 84 Myrtle St., Newport, NH 03773.

**New Jersey:** The South Jersey Radio Association hamfest is Sept. 9 at Pennsauken Senior High School, Hylton Rd., Pennsauken. Cost $2, tailgate $3, inside table $5. For details, contact Bruce Eichmann, WA2NBM, 204 E. Lake Blvd., Marlton, NJ 08053, tel. 609-983-0106.

**New York:** The fourth annual Elmira ARA International Hamfest is Sept. 22 at the Chemung County Fairgrounds near Elmira. Free flea market, technical talks, displays. Great food, prizes. Talk-in on 96/36, 10/70, and 52. Write to John Breese, WA2FJM, 340 West Ave., Horseheads, NY 14845.

**New York:** The Hall of Science ARC second annual hamfest is Sept. 16 from 9 to 4 at the municipal parking lot, one block from Queens Blvd., 80-25 126th St., Queens. Sellers $2, buyers $1. Free parking, refreshments, prizes. Talk-in on 96/36 and 52. For details, contact Edward Seltzer, Hall of Science Radio Club, 50-49 186th St., Flushing, NY 11365.

***New York:** The eighth annual Hamburg International Ham-o-Rama '79 is Sept. 14-15 at the Erie County Fairgrounds, just south of Buffalo. Outdoor/indoor flea market, displays, womens programs, code contests and more. Admission $3 in advance, $4 at the door, under 12 free. Outside flea market $1, indoor $5. Prize drawings every 15 minutes. Talk-in on 31/91 and 52. For further info, contact Jim Ciurczak, WB2IVO, Niagara Falls, NY 14304, tel. 716-297-0539 or Carl Leisner Sr., WB2OXB, 138 Louis St., Cheektowaga, NY 14225, tel. 716-632-7998.

**New York:** The Orange County ARC will hold its annual auction Oct. 6 at Munger Cottage, Cornwall. $1 admission; door prize. Auction begins at 1 P.M. Talk-in on 52. For details, contact Bill Lazzaro, N2CF, 11 Jefferson St., Highland Mills, NY 10930.

**New York:** The Tu-Boro Radio Club auction is Sept. 20 from 6 P.M. to 10 P.M. at Odd Fellows Hall, 149-14 14th Ave., Whitestone. Talk-in on 62 and 52. Donation $1. Write to Tu-Boro Radio Club, c/o Odd Fellows Hall, 149-14 14th Ave., Whitestone, NY 11357.

***North Carolina:** The Brightleaf, New Bern and Onslow amateur radio clubs will sponsor the Eastern North Carolina Hamfest Oct. 7 at the Craven County Fairgrounds, New Bern. Talk-in on 01/61, 16/76 and 52. Hourly drawings, programs, activities, overnight camping available. Ticket price $3. For details or to register, write Eastern North Carolina Hamfest, P. O. Box 7311, Greenville, NC 27834.

***Ohio:** The 37th annual Findlay Hamfest, sponsored by the Findlay RC, will be held Sept. 10 (not Sept. 9, as listed in August *QST*), at Riverside Park, Findlay. Tickets $1.50 in advance, $2 at the site. For tickets or info, send s.a.s.e. to Clark Foltz, W8UN, 122 W. Hobart, Findlay, OH 45840.

**Ohio:** The Greater Cincinnati ARA's 43rd annual hamfest will be held Sept. 16 at Strikers Grove, one mile north of Ross on Rte. 128. Air show, transmitter hunt, music, talks, exhibits, flea market. Advance registration is $4. For more info, send s.a.s.e. to Lillian B. Abbott, K8CKI, 1424 Main St., Cincinnati, OH 45210.

**Pennsylvania:** The Butler County Amateur Radio Association hamfest is Sept. 9 at the Farm Show Grounds, Roe Airport, Butler. Outdoor flea market free. Indoor $2 per eight feet without table, $3 with table. For details, contact Fred Young, WB3HGC, 195 Robbie Way, Portersville, PA 16051, tel. 412-368-3567.

**Pennsylvania:** The Central Pennsylvania Repeater Association's sixth annual High Rise Hamfest is Sept. 16 from 8 to 3 at the Park and Shop Garage, 200 block of Walnut St., Harrisburg. $3 admission, spouses and children free. Door prizes, protected parking for 1100 cars. For more info, write to CPRA, P. O. Box 6284, Harrisburg, PA 17112.

**Pennsylvania:** The third annual Mid-Atlantic States VHF Conference is Oct. 6 at the Warrington Motor Lodge, Rte. 611, Warrington. Advance registration $3, at the door $4. Price includes admission to the Mt. Airy VHF Radio Club flea market Oct. 7 from 8 to 4 at Bucks Co. Drive-in Theater, Rte. 611, Warrington. Cost for flea market alone $2, tailgating $2 per space. Bring own table. Talk-in on 52. Information for both events available from Ron Whitsel, WA3AXV, P. O. Box 353, Southampton, PA 18966, tel. 215-355-5730.

**Pennsylvania:** The Radio Association of Erie's annual hamfest is Sept. 23 at Rainbow Gardens, Waldameer Beach Park, Erie. Talk-in on 34/94 and 52. Cost is $3; prizes. Flea market vendors charged $5 per car. Commercial displays, exhibits and food available. Contact Frank Grace, W3NR, P. O. Box 844, Erie, PA 16512.

**Pennsylvania:** The annual Skyview Radio Society Swap-n-Shop will be held Sept. 16 at Sokal Camp, Lower Burrell. Registration $1. Prizes, good food, plenty of shade. For details, send s.a.s.e. to Jim Jackson, K3VRU, RD 1, Box 7A, Apollo, PA 15613.

**Pennsylvania:** The 30th annual Gabfest of the Uniontown ARC will be held Sept. 8 on the club grounds, Old Pittsburgh Rd., Uniontown. Registration $2. Many prizes, free coffee, other food and refreshments. For more info, write Uniontown ARC, c/o 438 Braddock Ave., Uniontown, PA 15401, tel. 412-437-5060.

**Washington:** The Walla Walla Valley Radio Amateur Club will hold its 33rd annual hamfest Sept. 22-23 at the Milton-Freewater Community Building. Free admission and parking. QCWA, ARRL and dealer displays. Contests for homebrew, DX cards, antiques and homecrafts. Potluck lunch Sept. 23 at 12:30. Talk-in on 52 and repeaters. Write WWVRAC, Box 321, Walla Walla, WA 99362.

*ARRL Hamfest

# Coming Conventions

**September 9**
**Illinois State, Rockford, IL**
**September 28-30**
**New England Division, Hartford, CT**
**September 29-30**
**Kentucky State, Louisville, KY**
**October 5-7**
**Dakota Division, Sioux Falls, SD**
**October 5-7**
**West Gulf Division, Houston, TX**
**October 13-14**
**Tennessee State, Memphis, TN**
**October 19-21**
**Midwest Division, Cedar Rapids, IA**
**October 19-21**
**Southwestern Division, Anaheim, CA**
**October 20-21**
**Roanoke Division, Norfolk, VA**
**November 17-18**
**Florida State, Clearwater, FL**

**ARRL NATIONAL CONVENTIONS**

**July 25-27, 1980**
**Seattle, WA**
**March 13-15, 1981**
**Orlando, FL**

## NEW ENGLAND DIVISION CONVENTION

**September 28-30, 1979, Hartford, CT**

The Connecticut Amateur Radio Society, in conjunction with other area clubs, is sponsoring the New England Division Convention this year at the Sheraton hotel in Hartford, CT.

As usual, an absolutely sparkling program on both technical and operational sides of Amateur Radio will be presented. While the technical programs will emphasize new developments, we are bringing some famous old timers out of retirement to talk to you. Names like By Goodman, W1DX, a pioneer of ssb; John Huntoon, W1RW; Les Cushman, founder of Cushcraft; Lew McCoy, W1ICP, and many others will be speaking. A complete program on DX and contesting, including the Spratly expedition will be sponsored by the Yankee Clipper Club. One other important point: all the latest hot scoop on WARC from both ARRL and FCC. Talks on RTTY, antennas, microprocessors — you name it — it's here! In addition, regularly scheduled free bus trips to ARRL hq. and W1AW are available. The exhibits include practically every major manufacturer plus many dealers who have come to sell and deal!

And for those with other interests — what a program!! We guarantee no ham radio for you — lots of special prizes and activities, all held in the beautiful Sheraton Hotel and Civic Center with its many unique shops.

The banquet will be held in the Cloisters restaurant in the hotel and you'll have your choice of lobster, steak or duck — including wine — certainly not your typical banquet! We promise plenty of entertainment and music, plus a major banquet prize for both men and women.

Advance registration is $4.75; $6.50 at the door. Some awards are restricted to those who preregister. (Closing date for advance registration postmark September 15th; include s.a.s.e. or pick up at door.)

Banquet tickets are $24.50 and attendance at the banquet is limited to the seating capacity of the restaurant. Send your check (no cash please) for tickets to: Stewart C. Davis, K1KTB, 135 Grissom Rd., Manchester, CT 06040.

## KENTUCKY STATE CONVENTION

**September 29-30, 1979, Louisville, KY**

The Kentucky State ARRL Convention and ninth annual Greater Louisville Hamfest will be held on September 29 and 30 at the West Hall of the Kentucky Fair and Exposition Center. Take Fairgrounds exit off either I-65 or I-264 and follow QSY signs.

There is a gigantic indoor air-conditioned exhibitors area and flea market. ARRL President Harry Dannals, W2HD, will be the featured speaker at the Saturday night banquet. The FCC will give upgrade exams on September 29th by appointment only. Write address below for Form 610. The completed form must be returned to the same address no later than September 8. The schedule of forums includes: ARRL, ARES, DX, Antennas, Army MARS, Air Force MARS, Microprocessor, Kentucky Nets, Ladies Program, and Slow Scan Demo.

Registration is $3 in advance — $3.50 at the door; banquet is $9.75. For information, advanced registration, etc., write Greater Louisville Hamfest, P. O. Box 34444, Louisville, KY 40232, tel. 502-634-0619.

## DAKOTA DIVISION CONVENTION

**October 5-7, 1979, Sioux Falls, SD**

The 1979 ARRL Dakota Division Convention October 5, 6 and 7 will be held at the Sioux Falls Airport Ramada Inn located off exit 81 on I-29. Talk-in on 146.16/76.

Activities begin at 6 P.M. on Friday. Forums on Clipperton Atoll 1978 DXpedition by WA4WME, ARRL antenna presentation, FCC direction-finding, moonbounce, Red Cross and Amateur Radio, and more.

Special convention room rate, $23 double occupancy. Deadline for special rate is September 21. Contact Sioux Falls Ramada Inn, tel. 605-336-0650. Camping facilities located on nearby Interstate exits. Registration $15; $16 after September 1. Convention only $6; $7 after September 1. For further information, write Sioux Falls Amateur Radio Club, P. O. Box 91, Sioux Falls, SD 57101.

## WEST GULF DIVISION

**October 5-7, 1979, Houston, TX**

The ARRL West Gulf Division Convention, Houston Com-Vention 79, will be held October 5-7, 1979, at the Dunfey Houston Hotel, located on the Southwest Freeway (U.S. 59) in the Sharpstown area. Houston Ham Conventions, a nonprofit Texas corporation, in association with the Houston-area Amateur Radio clubs, takes pride in bringing this convention to Houston, the largest and most dynamic city in the Southwest.

The program features an outstanding array of activities, including ARRL and FCC forums, FCC exams, state-of-the-art technical seminars and contesting, DX, traffic and MARS sessions. Presentation of a recent major DXpedition will highlight the operating activities. Transmitter hunt, ladies activities, flea market, banquet and dance, commercial exhibitors, prizes and NASA and Astrodomain tours round out some of the other convention activities.

Advance registrations are available at $5 per person from Houston Ham Conventions, Inc., P. O. Box 79252, Houston, TX 77024. Registration at the door will be $7 per person. Further information, including exhibitor booth details, may be obtained from HHC at the above address.

## TENNESSEE STATE CONVENTION

**October 13-14, 1979, Memphis, TN**

The 1979 Memphis Hamfest and ARRL Tennessee State Convention will be held Saturday and Sunday, October 13 and 14, at the Mid-South Fairgrounds. All activities will be held inside the 34,000-square foot, climate-controlled youth building. Featured activities include FCC exams, giant flea market, new-equipment dealers, computer exhibits, forums, ladies activities, and traditional hospitality party Saturday night. There will be many prizes including a microcomputer.

The FCC will administer Technician, General, Advanced and Extra Class license exams. To take a test, bring a copy of your present license and appear at 8 A.M. Saturday, October 12 at Christian Brothers College, across the street from the Fairgrounds. The FCC will also participate in the forums and be available for questions at their booth at the exhibit area.

The giant flea market will be inside and is fast becoming known as one of the largest in the Southeast. Spaces can be rented for $3 each per day; tables are furnished. Set-up beginning 6 P.M. Friday, October 12.

The exhibit area will feature computer exhibits and amateur applications, an official FCC booth and new amateur and computer equipment dealers. Forums and education seminars will include antennas, DX, Army MARS, ARRL and FCC. Ladies activities will include official Elvis Presley tours and a lecture on self defense. The hospitality party Saturday night promises to be another good one.

For your convenience there will be plenty of on-site trailer hookups and special motel rates are available at the Holiday Inn near the Overton Square area. To make your own reservations call 901-278-4100 and mention the Memphis Hamfest. Talk-in is on 146.34/94 and 146.25/85. For more information write to: Memphis Hamfest, P. O. Box 3845, Memphis, TN 38103 or call Clayton, K4FZJ, 901-274-4418.

## SOUTHWESTERN DIVISION CONVENTION

**October 19-21, 1979, Anaheim, CA**

The ARRL Southwestern Division Convention will be held October 19-21, 1979 at the Sheraton-Anaheim Hotel located at Ball Road and Interstate 5 in Anaheim.

Activities begin on Friday evening with registration and exhibits from 4 P.M. to 9 P.M. Registration will continue from 8 A.M. to 3:30 P.M. on Saturday, with the exhibits and technical sessions running from 9 A.M.-3:30 P.M.; FCC testing will run until 3:30 P.M. as well. The ARRL Forum is scheduled from 4 P.M. until 5:30 P.M., with a no-host cocktail party being held in the beautiful hotel courtyard until the 7:30 P.M. banquet. Beginning at the stroke of 12:01 A.M. PST on Sunday morning, the inspiring Wouff Hong pageant will be presented. At 9 A.M. Sunday morning the various breakfasts will be held and the exhibits will again be open until noon.

An extra event for those who can make it will be a family evening at Disneyland starting at 4 P.M. and continuing until midnight, with unlimited use of *all* rides plus free parking for the one price of $6. Tickets will be available at the convention.

Pre-registration deadline is *September 15*. Advanced registration complete program, banquet, exhibits and technical sessions is $17, $19 at the door. Banquet only (limited to 1000) $12. Exhibits and tech sessions $5 preregistration, $6 at door. Ladies program and luncheon $6, preregistration only.

For more information and preregistration, contact: HAMCON, P. O. Box 1227, Placentia, CA 714-993-7140.

# 50 Years Ago

**September 1929**

The Editor urges use of pure c.w., but doesn't like the idea of an F.R.C. regulation banning modulated c.w. on the principle that amateurs should be unfettered.

A feature of this issue is an extensive description of a low-cost ($150 maximum) phone and c.w. rig to meet current technical standards. Push-pull circuits abound, even in the crystal oscillator.

W8GIZ rigged up a trolley system for moving an ammeter along his Hertz antenna, from which he was able to determine the best design parameters and optimum feed point — with a single wire, of course.

Lou Hatry has found some useful improvements in the "all-purpose" superhet described in an earlier issue, mostly as concerns the local oscillator injection circuit, and method of winding coils.

Messrs. Dart and Atwater of Westinghouse unravel for us some of the mysteries of the various classes of amplifiers.

A station which hasn't replaced its wavemeter with a modern frequency meter just isn't up to snuff, says K.V.R. Lansingh, who urges use of the League's standard frequency broadcast system for calibration.

W8AFM has been logging short-wave broadcast signals, and from his detailed records and observations has produced a "propagation prediction" table for DXing on the 40-meter band.

Mrs. W8CNO, writing for the distaff side, says an XYL is the intermediate step between a YL and an OW.

A first-rate installation at W9CJC is the station description this month.

# 25 Years Ago

**September 1954**

Electronic keys are becoming the rage, and W2IMU presents a miniature (with six tubes) version of the "Tur-Key."

6 and 2 meters are popular bands for mobile work, and W1HDQ shows us some of the better antenna ideas.

There's a commercial version, but you can build your own panoramic adapter and visually observe a band of frequencies simultaneously, using info supplied by W2TGP.

Novices who have TVI difficulties can make good use of an inexpensive low-pass filter, designed by W1ICP, which can be built for less than 50 cents.

W1CTE economizes at the other end of the power scale — he has constructed a kilowatt rig at minimal expense by judicious bargain hunting.

The League's "lightning calculator" can be made even more useful in design work if you follow the suggestions of W2AWH and W1FWH for extending the scale ranges.

W5CA's delving into his personal ham radio history brings a considerable tinge of nostalgia for most of the rest of us.

W2YFM's converter/preselector is broadbanded, bandswitching, and improves performance of surplus receivers.

W1DBM presents the second part of his civil defense installation description, this one on the r.f. section and filters.

The versatile "Ranger" is the subject of this month's recent equipment review. — *W1RW*

# Strays

## BEAUTY PAGEANT OPERATION

The Southern Counties Amateur Radio Association (NJ) will operate special-events station K2BR at the Miss America Pageant in Atlantic City, NJ, from September 1 to 8. Approximate frequencies of operation are: cw — 3560, 7060, 14,060, 21,060; Novice — 3730, 7130, 21,130; Phone — 3935, 7235, 14,280, 21,380. Personal traffic to and from the contestants will be accepted. QSL to K2BR, 591 White Horse Pike, Egg Harbor, NJ 08215 (s.a.s.e. please).

## *QST* congratulates . . .

Wayne C. Sellers, WA5YHM, who has been inducted into the Mass Communications Hall of Fame at Texas Tech University. Sellers is editor and publisher of the *Palestine Herald-Press* in Texas.

Jack C. Nelson, W2FW, who received the Volunteer of the Year Award from the Schenectady (NY) Mental Health Association.


Here's the way it was done back in 1933. This is the portable station of W8DKE (now silent key W1VG). The receiver was a Silver Marshall; the transmitter was crystal controlled and ran 50 watts to a 210 final. The antenna was a Hertz. The jointed antenna pole visible in the left photo was put up easily to support one end of the antenna. The other end of the antenna was fastened to a nearby tree. Plenty of contracts, including DX, were made with this station on 80, 40 and 20 meters. The photo at the right shows the operating position inside the trailer.

# Public Service

Conducted By Robert J. Halprin,* K1XA

## On the Threshold of Ham Radio's Apogee

Times keeps on slipping into the future, a song tells us. Though the AMSAT Phase III-A Satellite won't be launched until March 1980, at the earliest, the in-depth planning of all aspects of the satellite has been underway for a long time. Phase III has important ramifications for the future of the Amateur Service; unlike the present amateur satellites, Phase III will offer an average of eight hours of reliable propagation per orbit (there will be approximately two orbits per day). Also unique is the concept of specialized service channels at the outer edges of the passband. There will be a 150-kHz passband, with special cw channels at the low end, 124 kHz of mixed-mode general amateur operation in the middle, and special ssb channels at the high end. In an emergency, all routine communications will cease; specific emergency notification procedures will be formulated and disseminated at a later date (an emergency-calling frequency may also be shared with another service on one of the ssb channels). Phase III will utilize a Mode B transponder; that is, you transmit on 70 centimeters and receive on 2 meters.

It is being recommended to the AMSAT directors that one of the cw channels be allocated as the National Traffic System channel, for the daily handling of authorized formal traffic. At one of the Phase III planning conferences, this writer raised his hand to leave the room and wound up the NTS channel coordinator. Seriously, though, it should be an exciting challenge.

It is envisioned that the primary use of the NTS segment will be for TCC (transcontinental) schedules. Traffic *nets*, as such, won't be pushed because the satellite will not be in the same place at the same time each day. Nor will TCC-type functions be all the action, because the traffic handling potential or utility is unlimited. If capabilities and conditions permit, net controls can direct stations on NTS area, region and section nets to QSY to the spacecraft, instead of down five, to handle their traffic. Most importantly, traffic "hotlines," for dispatching emergency/priority traffic during crises, should be relatively easy to set up. A 24-hour NTS schedule is very much in the hearts and minds of the people in the traffic community also; Phase III may cause or contribute to the ultimate expansion.

On the subject of expansion: Remember the war protesters who chanted "The whole world is watching"? On this new satellite, the whole world will be *listening*. Amateurs from many different countries will get exposure to daily, efficient NTS operations (a network they may have heard or read about, but never actually *heard*) so we may see the day when the National Traffic System becomes the *Inter*National Traffic System.

The satellite will give us a more reliable means of contact with South and Central America, where communications disruptions aren't uncommon and third-party agreements are common. Though we don't have third-party traffic treaties with European nations, it's no secret that amateurs there have a great interest in formal traffic handling. Let's hope that Phase III helps secure those third-party agreements. A worldwide traffic system beckons.

As a comparison with another interest area, the traditional problem with RTTY traffic handling is that RTTY freaks don't care about traffic and traffickers don't care to acquire RTTY gear, even though it's the most efficient way to handle messages, especially in high-volume situations. This is a similar case. At present, there are few NTSers involved in satellite work and vice versa. But for the NTS channel to be a success, we need coordination, cooperation and *participation*. For traffic handlers, forthcoming issues of *QST* will detail the equipment needed to access the spacecraft (briefly, 1000 watts ERP on 435 MHz — 10 watts into a 10-dB amplifier into a 10-dB antenna with circular polarization). And we'd certainly appreciate the old hands at the satellite game trying to get involved in organized public service activities. The NTS channel can't suffer from neglect; otherwise it will cease to be the NTS channel. You never know; something "really" important may take it over, like the county hunters . . .

It will require much planning and work to make this particular channel what it should be and we'd like to hear from those interested in taking part in the effort. The intent is not to get too heavy, though, as AMSATer WA2LQQ points out: "The prospects for accomplishment are truly enthralling. And the promise of productive public service, scientific advancement, technical innovation, international cooperation and just plain fun in 'hamming' makes these exciting times indeed for Amateur Radio." Traffic devotees in particular should keep in mind that North America is no longer the only game in town.

### NEW RTTY NET

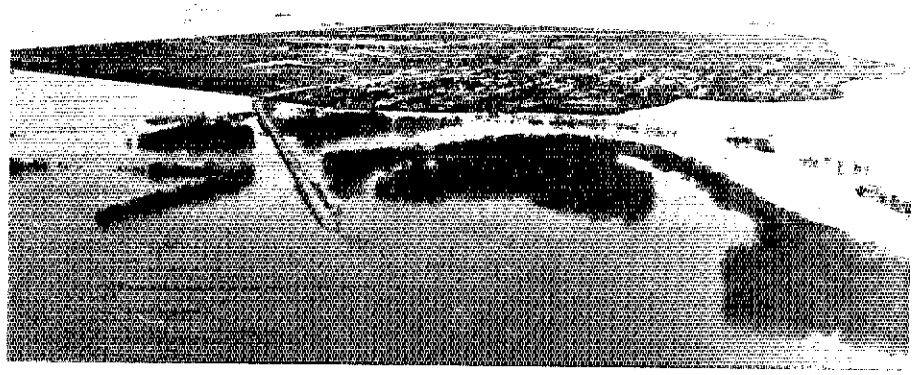
The New England Teleprinter Net — NETN — meets Monday evenings at 2030 local time on 3620 kHz. Manager K1DFS invites all those in the New England area interested in RTTY traffic handling to check in.

### MARS REFILES

A recent telephone call from Air Force MARS asks that amateurs who are originating traffic that is obviously going to have to be refiled into the MARS circuits to please include the name, address and telephone number of the third party who is signing the message.

### CRASH LANDING

Luckily, Skylab did not cause any difficulties, but the ARRL field organization was fully alerted in the event that Amateur Radio intervention was required. WIAW also transmitted daily updated orbital data on Skylab's descent, thanks to AMSAT Vice President of Operations K1HTV, who provided the information. It just goes to show that your friendly, neighborhood WIAW frequency is the place to be to find out the latest Amateur Radio developments.



No, this is not the latest addition to the DXCC Countries List. It is Morris, MB, completely isolated by the swollen Red River. When this photo was taken, the dikes were still holding back the flood. See "Communications Service of the Month."

### GROUND ZERO — CONTINUED

Tornadoes — April 10, 1979: As K5BYF and WB5NDN were leaving work about 4:15 P.M., they were informed that a tornado had been spotted near Chattanooga, OK, heading northeast. Neither of them was able to get to the Comanche County emergency operations center quickly enough, so WA5CUJ opened the Southwest Storm Warning Net and dispatched storm spotters.

On arrival at the EOC in the Comanche County court house, WB5NDN opened communications on W5KS for civil defense. K5BYF called for operators to man the Red Cross communications center. K5BYF then started southwest with the other spotters to try and locate the funnel.

The first sighting of the funnel on the ground was made by an amateur who reported to the EOC. The c.d. director was notified and the warnings were sounded. After the cell passed, amateurs skirted the area to give c.d. and Red Cross the approximate area

*Asst. Communications Manager, ARRL

damaged. With the help of WD5ETB, EC Cado County, 2-meter communications were established with Oklahoma City. The Oklahoma Phone Emergency Net was convened on 3900 kHz for handling traffic. The Red Cross station in Oklahoma City, W5LOW, was linked by WD5ETB, until they were able to come up to OPEN, where direct contact was possible. Later, when we heard of the disaster at Wichita Falls, we attempted to establish communications with them. Communications were relayed from c.d. and Red Cross to W5KS on 2 meters. Requests for hospital supplies and other items were coming in so KA5EGD was assigned to operate from Fort Sill, where he coordinated the requests and arranged for supplies to be flown down by copter. At 9:15 P.M., another warning was sounded and we again sent out spotters but this one passed east of Lawton without touching down. By 7:30 P.M., health and welfare traffic was coming in heavily and nets were established on 80, 40, 20 and 2 meters to handle the load. These nets operated continuously until April 14.

All local amateurs in the nets worked hard and long; the more experienced ones led the way and the lesser ones followed and learned quickly. — *K5BYF, EC, Comanche County, OK*

## THE RACES EDGE

An item in June *QST* with the same title asked for input on RACES activity throughout the U.S. Several letters were received and they seemed to fall into two logical groups. The first group was made up of those who were interested in RACES and wanted to know how they could become involved. In the second group were those who were already connected with RACES, including two amateurs who serve as RACES radio officers over a political jurisdiction, a county in one case and a state in the other.

The message from the second group was quite clear and, if it is shared by others involved in RACES who didn't respond, could prove to be an interesting discovery. The respondents in this category all felt that closer cooperation and/or combination of RACES and ARES was in the best interest of both groups; where a group functioned as both RACES and ARES, it could avail itself of the benefits of both organizations. These amateurs clearly see advantage to a coordinated effort rather than a fractured effort of resources and talents.

To understand why the ARES members do not have a similar viewpoint, we come back to the first group. In this group were those who wanted more information on RACES, including how it worked and how to "join." The best article on this subject I have seen to date was prepared by Bud Cone, WA4PBG, on behalf of the Virginia SCM, as an article published in the section publication *The Virginia Ham*. It goes through the history of RACES, including the 1976 FCC Order which dramatically changed the nature of RACES and, to quote Bud, "It made it possible and facile for AREC (now ARES), whose members are all enrolled in and certified by RACES, to operate in service of a disaster with great flexibility." Entire ARES groups can become certified as RACES simply by approaching the local civil authorities in the political jurisdiction of the group and advising them of their availability. Where no RACES groups exist this is simple enough but will frequently run into the complication that the authorities will not be knowledgeable in RACES, especially the RACES of the 1976 FCC Order. In this case, the amateurs will have a little explaining to do and will need a little knowledge themselves. There are several items that can help:

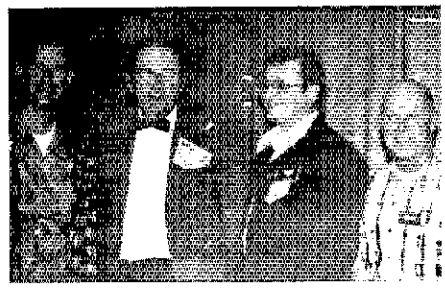
1) FCC Rules and Regulations, Part 97 (Amateur Radio Service), available in the ARRL *License Manual* ($4) or from the Government Printing Office, Washington, DC 20402 ($1.40, stock no. 004-000-357-8).

2) May 1976 *QST*, page 52, for a discussion of RACES today.

3) ARPSC-LO Bulletin, October 1976, available from ARRL hq. for an s.a.s.e.

In the case where a RACES organization already exists, there should be no problem for an individual amateur to join. Judging from the responses to the first "RACES Edge," there should also be possible accommodation in those cases where an ARES and a RACES group already coexist in the same area. There is benefit to being able to "switch hats" between RACES and ARES and not just for the obsolete notion of "war-related emergencies." RACES can cover any emergency and is being utilized more in this role than as a standby for "enemy attack."

One final bit of information is that I am aware of active RACES organizations in the following states: Colorado, New York, New Jersey, Alabama, Virginia, Pennsylvania, Missouri, West Virginia, Wisconsin, and some areas of California, Texas, Oklahoma, Kansas, Maryland, Massachusetts, Arizona, Oregon and Kentucky. Information for your area may be available from your ARRL Section Emergency Coordinator or from the emergency preparedness agency in your state. Judging from the letters received, one thing that might be useful in these pages in the future is names and addresses of amateurs who are RACES coordinators in various areas of the country. — *Bill Farone, N4NK*



Last October's New England Convention in Boxboro, MA, featured the reunion of the notorious NH brothers: from left, W7NH, SCM W1NH, NM N1NH and OTS K1NH. Guess what state they're from? *(W1TN photo)*

## PUBLIC SERVICE DIARY

□ Columbia, SC — February 18. Local hospitals were faced with a severe personnel problem due to the extreme snow and sleet that crippled the city. They had to find a way to get their shift personnel from their respective homes to the health centers; they needed both four-wheel drive vehicles and communications support to coordinate the operation.

On short notice, Amateur Radio operators from the Columbia ARC organized an effective team armed with fm hand-helds and traveling in donated vehicles, they set up dispatchers, manned all vehicles and began transporting essential personnel to allow area hospitals to continue required health care. (WA2FFY)

□ Caracas, Venezuela — May 14. A request for medicine for a patient in a local hospital was received by W8PLV/YV5 with the indication that the medicine was available in Miami. And through the Intercontinental and Maritime Mobile Nets, the medicine was located and sent via air. To accomplish this required the concerted efforts of many amateurs in many parts of the world. It was determined through ham radio that the medicine was not available in the U.S. Through WB8NEH, who contacted the Ohio State University hospital, the generic name was obtained and finally located in Baranquilla, Colombia, and was shipped to Caracas by HK3WL. (W8PLV/YV5)

□ Bay Minette, Al — May 30. A chemical truck carrying 8000 gallons of a flammable liquid stopped four miles north of Bay Minette and discovered it was leaking the fluid. Fire, police, county sheriff and state troopers, as well as K4JIE, responded. K4JIE established communications from the scene of the emergency utilizing the Mobile repeater and its invaluable autopatch. (W5TIL)

## AMATEUR RADIO EMERGENCY SERVICE REPORTS

□ Southfield, MI — April 8. The assistance of the Oakland County and City of Southfield RACES was requested by the c.d. to aid the fire department during an ice storm emergency. Twenty-one amateurs responded to the first call-up and they were dispatched to fire department runs involving downed wires, thus allowing the release of valuable fire department vehicles and trucks. Approximately 50 runs were made until 5 A.M.

The assistance of RACES was also requested to handle Red Cross shelter traffic regarding supplies, local situations and information between shelters and Detroit headquarters. (WB8SIW, EC Oakland Co.)

□ Salt Lake City, UT — June 8. A malfunction in telephone switch equipment shut down all phone service to the downtown area including service to two hospitals. Local amateurs were called in to relay emergency traffic in and out of the hospitals. The autopatch facilities of WR7AKN, WR7AFT and WR7AIU were utilized to accomplish this task. (WA7ZBO, SEC UT)

□ Colorado Springs, CO — June 24. Local hams relayed information during the search for a missing five year old. Hf communications were established between the Denver EOC and Colorado Springs, while vhf was used between the base camp and the searchers. (K3PUR, EC District 22)

□ Algona and Manson, IA — June 28. A killer tornado struck northwestern Iowa and for 12 hours, th only means of communications was provided b Amateur Radio operators in the stricken area (W0IYW, SEC IA)

□ ARRL Section Emergency Coordinator Report For June, 34 SEC reports were received, denoting total ARES membership of 16,194. This is a si percent increase as compared with reports received la June (32) and a four-percent increase in ARE membership (15,614). Sections reporting were Alt Ariz, Conn, Del, EBay, EMass, EPa, Ind, Iow Kans, Mar/NF, Mich, Miss, Mont, NFla, NNJ, NTe Ohio, Okla, Orange, SV, SDgo, SF, SJV, SBar, SC Pac, SFla, SNJ, Va, Wash, WVa, WPa, Wisc.

□ The half-year summary of SEC reports, includir late reports, follows: 204 reports were received fro 50 different sections. During the first half of last yea 215 reports from 46 sections had been received. press time, the following sections have a 100-perce reporting record: Alta, Ariz, Del, EMass, EPa, In Kans, Mich, NFla, Ohio, Okla, SDgo, SJV, SF SNJ, Va, WVa, WPa.

## COMMUNICATIONS SERVICE OF THE MONTH

Morris, MB — May 31. Through my kitchen windov watch the receding Morris River, now several hundr feet away, still pouring water and silt into the R River. Over a week ago, this same window was tota submerged; all that remains is silt on the walls a floors.

The past 30 days have been the longest I have ev spent in isolation and frustration. Thousands of pe ple were evacuated; first the farms and then as t waters rose, the diked towns were evacuated as we leaving only work crews and the emergency agencie

As the water rose to within a few feet of the di tops, the armed forces were called in to patrol t dikes and the town. In 1966, after a long history flooding, most of the towns near the Red River bu up the present dikes. Unfortunately, they fell short a scant foot and all the roads were cut off, leaving o ly boat and helicopter as the means of transportatio

To appreciate the picture, imagine a lake about miles wide and 100 miles long with four isolated tow dotting the watery landscape. For awhile, it w Manitoba's third largest lake. The Emergen Measures Organization (EMO) and the wa resources agencies had depended on landline co munications, but as the demand increased, the lir were plugged and many went under. With the backl of traffic increasing and no backup as yet set up, ARES was activated at the request of the EMO and effectively filled the gap. (The EMO is the agency Canada that controls and coordinates all other age cies in a disaster.)

At Winnipeg, SEC VE4TR and Asst. SEC VE4 were called in for a briefing at EMO headquarters discuss the establishment of base stations in Winnip and Morris. It was decided to use the Winnip repeater facilities, which would provide ad coverage, and the control station was set up in building that best suited the delivery of traffic to agencies involved. Traffic was handled for the EM water resources, hospital services, Red Cross, fo municipalities, as well as the traffic from concern relatives. There was a problem in finding enou operators with the know-how to handle traffic at control; the result was that many experienc operators did longer stints in order to train newcomers.

At the control, things were a bit hectic. This AR group had only one SET under its belt and work under the watchful eye of the EMO left no room error. A few loused-up messages could have bee disaster in itself. Coordinating helicopter schedules rotate operators and keeping accurate logs of all t fic were only some of the headaches involved.

A total of 85 amateurs were involved. Some had ficulty in getting time off, others spent their holid in isolation and others neglected much home work spent all their time at the control station or at isola outposts. Despite the length of the emergency considering the lack of training on the part of ma participants, it was a successful venture. There will no fat paychecks, only the self satisfaction that it a job that had to be done and was done well. *VE4PG, SCM Manitoba*

## REPEATER LOG

According to reports received between June 20 a July 20, the following repeaters and simplex frequ cies were involved in the delineated public serv events.

| | Weather Emergency | Criminal Activity | Medical Emergency | Vehicular Emergency | Search and Rescue | Fire | Miscellaneous | Total |
|---|---|---|---|---|---|---|---|---|
| VE1HAM | | | | | | | 1 | 1 |
| VE1SYD | | | | | | | 1 | 1 |
| WR4ACY | | | | 1 | 28 | | 1 | 30 |
| WR4ACZ | | | | | 1 | | | 1 |
| WR4ADJ | | | | | | | 1 | 1 |
| WR4ALM | | | | 1 | | | | 1 |
| WR4AZM | | | | | | | 1 | 1 |
| WB4HHN | | | | | 1 | | | 1 |
| WR5ABA | | | | | 8 | | 1 | 9 |
| WR5ABE | | | 1 | | | | | 1 |
| WR5ABY | | | 1 | 1 | 42 | 1 | 1 | 46 |
| WR5ADP | | | | | 1 | | | 1 |
| WR5AJG | | | | | 2 | | | 2 |
| WR5APK | | | | | 2 | | | 2 |
| WR5APN | | | | | 1 | | | 1 |
| N5DD | | | | | 4 | | | 4 |
| WR7AEL | | | | | 2 | | | 2 |
| WR8ABI | 4 | | | | | | | 4 |
| W8MAR | 1 | | | | | | | 1 |
| K8ZIS | 1 | | | | | 1 | | 2 |
| WR9ACM | | | | | 1 | | | 1 |
| WRØACD | 1 | | | | | | | 1 |
| WRØADD | | | | | | 1 | | 1 |
| WRØAFV | 2 | | | | | | | 2 |
| WRØAIP | 2 | | | | | | | 2 |
| KØGCJ | | | | | 1 | | | 1 |
| WBØSBH | 4 | | | | | | | 4 |
| WAØVEZ | 4 | | | | | | | 4 |
| Simplex | | | | | | | 2 | 2 |
| TOTAL | 19 | 2 | 3 | | 94 | 3 | 2 | 7 130 |

## NATIONAL TRAFFIC SYSTEM

Simulated Emergency Test is October 6 and 7; announced elsewhere in this issue. All net managers should have received the SET newsletter with reporting forms. We look forward to a successful enterprise. Both sixth-region managers resigned due to relocation - WØKON to Hawaii and WA6ZZL to Tennessee. 2RN-F certificates: W2UEZ (first annual), K2HD N2TW WA2SPL WB2BNY WB2KDC (second annual), W2CQB W2IT W2WSS K2PL K2VX AA2S WB2EUF (third annual), K2UF WA2CIY WA2ZJP (fourth annual), W2SQ K2AV K2UYK W2BIW WA2ELD (fifth annual), N2IC W2MLC WA2ICB (sixth annual), W2ZEL (eighth annual), W2TZ (ninth annual), W2RQ (10th annual), W2MTA (11th annual), W2RUF (12th annual).

## June Reports

**Area Nets**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| EAN | 90 | 2341 | 26.0 | .995 | 89.4 | |
| CAN | 90 | 1337 | 14.9 | .476 | 97.8 | |
| PAN | 60 | 1333 | 22.2 | .623 | 99.3 | |
| **Region Nets** | | | | | | |
| 1RN* | 60 | 579 | 9.7 | .537 | 94.3 | 97.8 |
| 2RN | 121 | 713 | 5.9 | .447 | 91.2 | 90.0 |
| 3RN* | 30 | 122 | 4.1 | .363 | 100.0 | 96.7 |
| 4RN | 120 | 1214 | 10.1 | .424 | 73.9 | 100.0 |
| RN5 | | | | | | 100.0 |
| RN6 | 89 | 891 | 10.0 | .321 | 93.9 | 100.0 |
| RN7 | 120 | 692 | 5.8 | .571 | 99.0 | 100.0 |
| 8RN | 89 | 547 | 6.1 | .319 | 92.6 | 93.3 |
| 9RN | 118 | 574 | 4.9 | .289 | 89.0 | 99.2 |
| TEN* | 56 | 349 | 6.2 | .265 | 75.7 | 93.3 |
| ECN | | | | | | 58.9 |
| TWN | | | | | | 97.8 |
| **TCC** | | | | | | |
| TCC Eastern | 170[1] | 697 | | | | |
| TCC Central | 200[1] | 698 | | | | |
| TCC Pacific | 117[1] | 587 | | | | |
| Sections[2] | 5598 | 22,985 | 4.1 | | | |
| Summary | 6641 | 35,659 | 5.4 | | | |
| Record | 5834 | 27,574 | 15.9 | | | |

*incomplete report

[1]TCC functions not counted as net sessions.

[2]Section and local nets reporting (179): ASN (AK), AENB AEND AENJ AENM AENS AENV (AL), ARN OZK (AR), ATEN HARC (AZ), SDNN (CA), CN CWN HNN (CO/WY), CN CPN NVTN RTN WESCON (CT), DEPN (DE), AFPN EBN FAST FMTN FPON FPTN GN NFPN PBTN PEN QFNS SPARC TPTN (FL), GSN GTN WGN (GA), I75M TLCN (IA), IMN MTN (ID/MT), ILN ILPN (IL), ICN ITN QIN (IN), KPN KSBN KWN QKS QKS-SS (KS), KNTN KRN KTN KYN MKPN (KY), LAN LRN LSN LTN (LA), EM2MN EMRI EMRI-SS EMRIPN HHTN (MA/RI), MEPN MMN, MSN MTN WRIN (MB), MDD MEPN (MD/DC), AEN SPSN (ME), MACS MITN MNN QMN UPN (MI), MSN MSPN PAW (MN), MON TNT (MO), APN NPN (MR/NF), MSN MTN (MS), CMN CNCTN NCSSBN THEN (NC), WNN (NE), MCN NJN NJPN NJSN OBTTN SPARTN UCEN (NJ), RRN (NM), BAVTN WDN (NY), BN BNR BRTN EOTN HCARC ONN OSSBN TSRAC (OH), ATWN NOSN OAN OFON OLN ONON OTWN STN (OK), CMN LN ODN OLN OSN (ON), 16/76TN AREST ARESTN BSN JCCARES OSN PDXARES (OR), EPA APAEP&TN LVN PTTN WPA WPA2MTN WPAP&TN (PA), WQV/UHF (PQ), CMN CNN SCSSBN (SC), NJO SDMN SDN SDSSN SDTSEWN (SD), SATN SPN (SK), MCRN RCAN TN TNN WTVWN (TN), DFW TEX TTN (TX), BUN UCN (UT), SVEN VFN VN VNTN VSBN VSN (VA), GSFM (VT), SCARES WARTSN WSN (WA), BEN BWN WIN WSBN (WI), HBN WVN WVNN WVPN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

## Transcontinental Corps

K5MAT back in the saddle temporarily as W5KH visits the Soviet Union. WA4CCK also taking care of business for N2YL, who is on a cross-country (U.S.) trip. TCC-C(D) certificates to WD4HIF WB5MVR WB5OXE W9NXG AFØO and WAØYVT.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| TCC Eastern | 181 | 93.9 | 1905 | 697 |
| TCC Central | 210 | 95.2 | 1386 | 698 |
| TCC Pacific | 120 | 90.0 | 1184 | 587 |
| Summary | 511 | 93.0 | 4475 | 1982 |

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

## TCC Roster

The TCC Roster (June): Eastern Area (N2YL/K3KW, Directors) — W1s KX NJM, WA1ZAZ, K1s BA EIR GN SSH XA, W2s CS CQB FR GKZ MTA RQ, WA2s ICB SPL, N2YL, W3s FAF PQ YG, WA3WQP, K3s KW NGN, W4s JK MEE SOQ UQ, WA4CCK, WB4PNY, K4s BKX KNP, N4KB, W8PMJ, WB8WTS, K8KMQ, VE3s GOL SB. Central Area (W5GHP/W9JUJ, Directors) — WD4HIF, WN4KKN, N4MD, W5s KLV RB, WA5s BHF INJ IQU RKU, WB5s FDP MVR NKC OXE SDD, K5s GM MC, N5s TC TS YL, W9s CXY DND JIJ JUJ NXG, N9TN, WØs AM HI, WAØs TNM YVT, KØs EVH EZ, AFØO. Pacific Area (W5KH, Director) — N5s MR NG, W5s JOV KH, K5MAT, N6s GW PZ WP, W6s EOT OA VZT, WB6PVH, W7s AK DZX EP GHT LYA VSE, K7HLR, ADØA, WØKON, KØs BN DJ, WBØTAQ, VE7ZK.

## Independent Nets (June 1979)

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| Amateur Radio Telegraph Society | 30 | 1818 | 272 |
| Central Gulf Coast Hurricane | 30 | 162 | 2240 |
| Clearing House | 25 | 168 | 348 |
| Empire Slow Speed | 30 | 85 | 302 |
| Hit and Bounce | 30 | 349 | 499 |
| IMRA | 26 | 348 | 908 |
| New England Novice | 26 | 70 | 249 |
| New England Teleprint | 4 | 129 | 13 |
| North American SSB | 26 | 211 | 191 |
| Washington Region PON | 18 | 18 | 310 |
| West Coast Slow Speed | 30 | 109 | 269 |
| 20-Meter ISSB | 24 | 316 | 596 |
| 75-Meter ISSB | 30 | 387 | 917 |
| 7290 Traffic | 47 | 447 | 2821 |

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

## Public Service Honor Roll June 1979

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 SCM). 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. 5; (9) Participating in a public service event, 5 points, max. 5. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

| | | | |
|---|---|---|---|
| | 141 WD8KZX | 118 W9JUJ | |
| 202 WD4COL | 131 WA2SPL | 117 WB2RMI | 115 WB2EAG WA3PXA |
| 194 K4TH | 127 WD4CNQ | WA8GMT AFØE | 114 AA2H |
| 160 W7VSE | 125 W1TN | 116 WD4ISN | WB5NKD WA5RVT |
| 113 WA3WQP K4SCL WD8NKA | 93 WA4CCK K8AAZ | 80 VE1WF WD4AWN AG4D | WD4LMJ WA4NBE AC5Y |
| 112 N4NK | 92 WA4LGT | K4JGW N4LE K4XE | 69 K1BZO WB1CGK W1TM |
| 111 WD4HIF WA4PFK | 91 N2CR W2SQ | N5RB | N3APS K5SOR KB8EQ |
| 109 AF2L W2ZOJ | W4OGG WA4STO VE5HG | 79 W1HL AA5J | 68 K4VHT N8ABA |
| 108 WB6PVH | 90 WB1CPF K2GCE | N6GW WDØAIT | 67 WA1LOU KØDJ |
| 107 WA2MFV WB5NKC | WA2TUH N5TC | 78 WA1YMN WA4VKD | WBØHOX |
| 106 WD8LRT | WB8OMQ 89 K4DZM | 77 VE3DPO | 66 KB2KW AA3S |
| 105 W2UEZ | W5VMP WAØTNM | 76 W5DTR KB8GC | WB5CIT W9JIJ |
| 104 VE1RI | 88 VE3JRT VE5WM | KØEZ 75 | NØAHA |
| WA1UAX WA3NAZ | 87 KA1CC | WA2ZJP WA4EYU | 65 WA1UUA AG3R |
| 101 W5KLV | WB3JYZ KB4N | W4JK W4ZJY | KA4BUI N4PQ |
| WD8NYN | 86 WB5LBR | N8CW WB8WTS | WA4ZPZ |
| 100 N2APB | 85 WB2HDU | WB8YRY 74 | WD8KBW 64 |
| 98 VE3GOL | W2MTA | WB3JZA WB5LAT | KK4M W6JXK |
| W7GHT K7GXZ | 84 W4ANK | WB5YDD 73 | 63 K8DL |
| 97 W1RWG | N4WA | WB1BYR WB3GZV | 61 N3AKC |
| WB2TOM W6OA | VE5AE WB5MVR | W4PIM KAØAIT | W4FMN WA4YIU |
| 96 WA1TBY | WB8MTD 83 | 72 WA2OVE | K5DPG W5SBE |
| W1UD | K4BKX | K2VX | WB8YDZ |
| WB5MMI KØPIZ | WB4WYG WØFT | VE3KK N5BA | WØKJZ |
| 95 KB4QZ | 82 WA4JDH | 71 KA1BJY | 60 WA5QFD |
| WB4QBB | WB4ZOJ | N2AIU | WBØBMR |
| K5TL | 81 WA2MVQ | AF4T | 56 WB2RMJ/T |
| KB6FR | WA2UWA | WB5SDD | 43 |
| W8VPW | VE3GT | WA7IHS | KA2BGX/N |
| 94 N4CCT | W9XD | 70 K1JHC | 42 WB2KTR/T |

## Brass Pounders League June 1979

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: W2ZOJ, WB3JZA, K9UTQ, WBØHZL.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM 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 standard ARRL form.

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| WØWYX | 36 | 1635 | 315 | 1320 | 3326 |
| W3CUL | 407 | 917 | 1201 | 31 | 2556 |
| KA9CPA | 14 | 713 | 47 | 300 | 1074 |
| WA4JDH | | 456 | 446 | 2 | 904 |
| W9JUJ | | 440 | 385 | 2 | 827 |
| WA3WQP | 11 | 386 | 394 | 24 | 815 |
| WAØHJZ | | 463 | 9 | 316 | 788 |
| WA2SPL | 64 | 256 | 353 | 30 | 702 |
| K5OWK | 295 | 15 | 323 | 8 | 641 |
| W4JK | | 308 | 290 | 3 | 601 |
| WB3GZU | 51 | 233 | 293 | 21 | 598 |
| W7VSE | 6 | 271 | 255 | 54 | 586 |
| WD4COL | 49 | 275 | 150 | 101 | 575 |
| W5TI | 11 | 262 | 285 | 15 | 573 |
| W5KLV | 3 | 301 | 229 | 18 | 551 |
| N4MD | 6 | 285 | 241 | 4 | 536 |
| W4MEE | 4 | 16 | 269 | 247 | 536 |
| W3VR | 231 | 91 | 201 | 10 | 533 |
| WBØMTA | 62 | 189 | 279 | 3 | 533 |
| WA4CCK | 2 | 267 | 242 | 4 | 515 |
| WB3JZA | 10 | 199 | 305 | 3 | 514 |
| WB4PNY | 3 | 275 | 225 | 10 | 513 |
| KØYFK | | 252 | | 252 | 504 |
| Multioperator station: | | | | | |
| K3NSN | 2119 | 800 | 800 | 417 | 4236 |

BPL for 100 or originations plus deliveries:

| | | | |
|---|---|---|---|
| WA3ATQ | 247 | WD9CIS | 110 |
| W5UH | 226 | K7NTS | 109 |
| W3BBN | 197 | WØHTA | 106 |
| K4TH | 121 | WBØHZL | 105 |
| K1BCS | 120 | WØBMA | 103 |
| K1DFS | 118 | | |
| Multioperator station: | | | |
| WA4PUP | 127 | | |

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

# How's DX?

Conducted By Clarke Greene,* K1J

## First Annual "How's DX?" Readers Poll

A group of us, all high schoolers at the time, used to meet on 75 meters almost every night. We'd talk about school, electronics, sports, contests and the usual range of topics teenage hams might discuss over the radio. Very harmless, even in retrospect. But, 75 meters being 75 meters, these little gatherings always attracted a following. Hecklers and jammers always found us. Even when we changed frequency.

Rather than accept this harassment, we took a new approach. About once an hour we had what we called "audience participation time." It was truly amazing what would be heard when we invited all those listening to offer comments. Rare was the evening when silence would prevail. Not only did the hecklers really put on a show (which they inevitably did anyway), but a number of really interesting guys checked in. We all met a lot of fascinating people that way.

It's now audience participation time for you out there in DXer land. On a subsequent page is the first "How's DX" Readers Poll. We want to find out where your interests lie. Are you all beginners? Experts? Is DXing a pleasant pastime or a rabid disease? Who are you? Where are you?

Aside from the satisfaction of sticking it to this conductor, it is only fair that you be rewarded for filling out the form, addressing an envelope and using your own stamp. So, out of all the surveys that are postmarked before September 20, 1979, we will choose three at random. If that doesn't work we'll go by call areas. Well, forget the call areas. Anyway, to those three readers we'll send a brand new 1980 DX *Callbook*. Not quite like *Reader's Digest*, but it's the thought that counts, right? From our survey, we hope to find out what you DXers are interested in, and how serious you really are.

In the USSR the hams are *very* serious. A. R. Vavrus, W9BZF, sent along this translation of an article from *Radio* magazine. Reading about the zeal which the Soviets pursue the hobby might make some of you who are still unhappy about incentive licensing feel somewhat guilty.

### *Language Aspects of Amateur Contacts*

"One may safely say that ssb is the most widespread form of amateur communication throughout the world at the present time. In our country it is also very popular. Soviet amateurs successfully communicate with the rarest DX stations of the world and receive certificates in international contests requiring a great deal of effort and skill.

What factors determine success in making international phone contacts?

The first factor is the material and technical level of the station. Today a considerable number of Soviet amateurs are equipped with state-of-the-art receivers and transmitters. These, as a rule, are transceivers using modern components and produce a high quality, strong signal. More and more clubs and individual stations are using directional, high gain antennas.

The second factor is what one might call the "sport incentive." This means that the amateur should have a high level of skill, he should be in good physical condition and his morale should be high. He should recognize prefixes easily, have a good knowledge of geography and know how signals behave at various frequencies and at various times of the day. It is also important that the station have a good collection of manuals and technical literature. All these conditions are satisfied naturally as the amateur becomes more active and experienced.

Finally, the third factor — the subject of the present article — is the matter of language. It is well known that many Soviet amateurs have a satisfactory command of English, which is today the basic language of international radio contacts. However, for the majority of our amateurs the lack of proper language preparation is a serious handicap in making a larger number of contacts and in getting better results. Of course, in international contests where the QSO is stereotyped, the amateur has no particular problems. The situation is much worse in day-to-day international operation when a fully developed QSO takes place, and also when working DX stations.

How can we help the amateur to acquire the minimum phonetic, lexical and grammatical rules of English needed for carrying on amateur communications? We think this is possible by starting English language courses in the technical classes of DOSAAF[1], as was done in the Tyumen Radio School. Such courses should be arranged to last about six months. Of course, self-study is also possible, but it is more effective to study as a group in a classroom. Practice has shown that daily, two-hour classes over a six-month period (let us say, from November to April) give good results.

It is highly desirable that classes be conducted by a teacher who has an adequate command of English. The teaching process is broken up into two stages: the first stage, mastering the phonetics, where one may use as illustrative material the vocabulary of amateur contact; and the second stage, learning the grammar, accompanied by lessons in the form of "situation games" as well as by independent practice including operating a radio station.

In the first stage, it is important to analyze the peculiarities of English pronunciation as fully as possible. One should analyze all the sounds and how they correspond to the letters of the alphabet as well as their sound in various positions in a word. As examples one should choose words which are the subject matter of an amateur exchange. The words should be accompanied by their transcription as found in English-Russian dictionaries.

In the second stage of study, lexical and grammatical material should be selected which is connected with radio contacts. The material may be introduced in an arbitrary order, but the following is preferable; call, answer, signal report, name, city and a typical closing. Subjects for conversation are: equipment, antennas, weather, geography of the QTH, certificates and awards, contests and helpful phrases of various types. Slang which is used only in the U.S. should be avoided.

The instructor must take into account the varied language preparation of the students. It is probably useful to begin the teaching from the basics. If one begins from the very beginning, the students who studied English earlier may use the introductory phonetic portion as remedial work. The teaching should be conducted with the use of tapes. This makes it possible to repeat the required text as often as necessary.

In bookstores and libraries one finds a large number of various texts and aids for studying English. For class work one can select an appropriate textbook. There are, however, still no specialized texts in this field.

For stimulating interest in language learning, it would be very useful to give a special language examination as one does for code. We believe this would make for better operating procedures in the bands and further enhance the reputation of Soviet amateurs.

### DXAC: What It Is and How It Works

The name DX Advisory Committee appears regularly in *QST*. From policy suggestions made to the ARRL Board of Directors to reports to the membership, the DXAC is involved with all types of DX-related matters.

The subject drawing the most concern from DXers, as evidenced from the comments received by the DXAC, is the practice of contacting DX stations by means of prearranged lists. A "DX Operating Techniques and Ethics" subcommittee (W1OT, N4MM and N6RJ) has studied the problem since August 1978. The product of their study, a modification to the "DX Operating Code," appears elsewhere in this column as part of the tear-out page containing the survey.

Many readers are unfamiliar with the workings of the DXAC. The following section should familiarize you with the workings of the group, and show the best path for you to offer your opinions on subjects pertaining to DX.

#### *DX Advisory Committee Operations Outline*

1) The chairman shall oversee the total operations of the committee, including appointing the vice-chairman, corresponding secretary and any subcommittees deemed necessary, and make decisions in procedural matters not covered in this outline or in the rules and regulations concerning advisory committees. When the committee is tasked by the Board of Directors to provide it with information or advice on any matter, the chairman shall appoint a subcommittee chairman within 30 days after such a task has been directed, and shall direct said subcommittee chairman to appoint two DXAC members of his own choosing to serve with him. At that time he shall establish a date for receipt of said subcommittee's report, assuring that adequate time will be available for a vote of the whole committee should such a vote be required to properly respond to the direction of the Board. He shall also authorize the use of League funds as required, for bonafide committee expenses including telephone calls, postage and stationery. The chairman will review the vice-chairman's monthly report and see that the committee's recommendations are presented to the League staff and/or Board, as appropriate to the situation. A copy of all of the chairman's correspondence with the League staff or Board shall be sent to each committee member. The review shall also include an examination of the activity of each committee member. The chairman shall take positive action to keep membership participation at 100 percent, and shall seek the replacement of those who are unable to take an active part in the operations of the committee.

2) The Headquarters liaison will numberially all correspondence received for the committee. He will make a weekly distribution to the DXAC of any and all material received at Headquarters for the DXAC during the preceding week. The Hq. liaison will make distributions of informal material to DX bulletins when provided by the chairman. When he receives a ballot from the vice-chairman, the Hq. liaison will send each committee member a copy and a stamped envelope addressed to the vice-chairman.

3)The chairman will list the items on

*7815 Mandan Rd., Apt. 102, Greenbelt, MD 20770

[1]Roughly, the Soviet equivalent of MARS.

# First Annual "How's DX" Readers Poll

First, let's find out about you.

1) How long have you been a ham?

☐a) 2 years or less
☐b) 2-5 years
☐c) 5-10 years
☐d) 10 years or more

2) How long have you been DXing actively?

☐a) 2 years or less
☐b) 2-5 years
☐c) more than 5 years (I remember the first Clipperton expedition)
☐d) I only dabble at DXing

3) How many countries do you have confirmed? (i.e., DXCC total)

☐a) 100 or less
☐b) 101-200
☐c) 201-300
☐d) over 300

4) How many hours a week do you devote to Amateur Radio? (This information will not be revealed to your spouse, parents or girl- or boyfriend.)

☐a) 2 or less
☐b) 2-5
☐c) 5-10
☐d) over 10

5) How much of this time is spent DXing?

☐a) less than half
☐b) more than half
☐c) I'm a DX fanatic (that means 100 percent of my hamming is DXing)

6) Do you subscribe to a DX bulletin?

☐a) yes
☐b) no

7) Are you a member of a DX club?

☐a) yes
☐b) no

Now it's time (gulp) for you to cast judgement upon us.

8) Where in your literary diet does "How's DX" fit?

# DX Operating Procedures and Guidelines

Compiled By John Kanode, N4MM

For many years DX operating procedures have consisted of split-frequency operation and transceive-type operation with good operator control. Recently, several other methods have emerged which, if not used properly, cause frustration, unhappiness and undue interference. These operations are known as lists, DX nets and roulette.

Described below are the different DX operating procedures and how and when to use them. Following these recommendations should increase everyone's pleasure in working DX, and in being DX operators, resulting in smooth, efficient operation which will allow as many amateurs as possible to make good DX contacts.

### Split-Frequency Operation — Best Procedure of All

Split-frequency operation is, by far, the best method to use and results in less confusion, interference and frustration than other procedures. In split-frequency operation, the DX station transmits on one frequency and receives on another. This method gives the highest QSO rate, allowing more amateurs to contact the DX station. Anyone considering going on a DXpedition should plan to take proper equipment along so that split-frequency operation can be used. Any DX operator planning to purchase a transmitter/transceiver should purchase one that has split frequency capability or has the provisions for use of an external VFO.

It is recommended that a DX station operating phone transmit outside the U.S. phone subbands, when possible, and "listen up" (listen higher in frequency) for U.S. stations and "listen down" (listen lower in frequency) for other non-U.S. stations. Examples: *Phone* — DX station transmits on 14.190 MHz, listens for U.S. stations from 14.200 to 14.230 MHz and listens for others from 14.180 to 14.160 MHz.

*CW* — DX station transmits on 14.020 MHz and listens up from 14.025 to 14.035 MHz.

No more bandwidth should be specified than the absolute minimum that permits rapid separation of the calling stations. Not everyone on the band is interested in calling the DX station, and the interests of others should be respected.

### Transceive Operation — Requires Experience and Control

In this method of DX operation, the DX station transmits and receives on the same frequency. This takes less bandwidth than split frequency operation, but more so than operating split, its success depends on operator control and experience. There are three important points that lead to a successful transceive operation:

1) Experience and maintaining proper control;

2) A good to excellent signal;

3) Knowing when and how to divide a pileup.

Handling a pileup is an art and one must maintain firm control of the situation and know what to do to regain control should it be lost. There are some DX operators who can handle a pileup no matter how big it gets. But there are times when it is advantageous to divide the pileup in order to reduce it to manageable limits. There are many good methods now in use to divide a pileup. The most common method is by call districts.

Example: The DX station requests calls from the first U.S. call district. After working a specific number (usually three to 10), the DX station requests calls from the second U.S. call district, moving on to the other areas until he or she finishes with WØs. Then he requests non-U.S. stations, working a specific number of these.

Whatever sequence is used, it can be repeated as long as the DX station so desires. However, once a sequence is started, it should be continued until completed. This gives everyone a fair chance to have an opportunity to contact the DX station.

If the DX station's time is limited, the number of QSOs per call area can be reduced to, for example, three QSOs per district instead of 10. Whichever way the DX station decides to divide a pileup, he must be very firm and not QSO stations out of turn, even though some *will* call out of turn. To do so will encourage others to follow, leading to on-the-air bickering, and, in short order, chaos on the frequency. To prevent stations from calling out of turn, the DX station should announce often that he or she is dividing the pileup and the method being used to do so.

Another important factor in a successful transceive operation is that the DX station should have a good to excellent signal, so that calling stations will know who the DX station has acknowledged. Weak DX stations tend to be overcome by their own pileups and no one calling can be sure who has been acknowledged, if anyone. When this happens, QSO rates go down and confusion takes over. Then, the best approach for the DX station is silence until the pileup reduces itself to a low level or goes away. The DX operator regains control by announcing that he or she is going to divide the

☐a) "How's DX" is my meat and potatoes; I read it every month

☐b) "How's DX" is a lot like oysters; I only read it during months with an "R" (about half the time)

☐c) I read "How's DX" only when the menu appeals to me

☐d) "How's DX" is in the same class as water buffalo hoof a la mode

9) Over the past few months, what column topics have you enjoyed reading about?

☐a) How to be a QSL manager

☐b) Adventures in Ham Radio

☐c) Do-it-yourself DXpeditions

☐d) OSCAR/Phase III

☐e) QRP

☐f) operating techniques (e.g., the list or split-frequency operation)

☐g) 80-meter DX

☐h) other _____

10) Is "How's DX" meeting your needs?

☐a) yes

☐b) no

Here's the bonus question, as promised:

11) Do you think list operations ought to be counted toward DXCC?

☐a) yes

☐b) no

Please send this completed survey to: How's DX Readers Poll, c/o ARRL, 225 Main St., Newington, CT 06111, ATT: "How's DX" Editor. Thank you!

Optional essay question: What would you like to see in "How's DX"?

Name _____ Call _____

Street _____

City _____ State _____ ZIP _____

# DX Operating Procedures and Guidelines (cont.)

pileup and the method that he is going to use. Again, whichever method the DX operator uses, he must stick to it and give everyone a fair chance of obtaining a QSO with him.

**DX Networks — More Orderly, But Slower**

DX nets have been set up for many purposes. Some are for certain areas, club members, and so on. Some are for working DX only. They range from fully "open" nets for all to those controlled as to who can check in and when. For the most part, the DX operators who participate in these DX nets are permanent residents. They check in regularly and, with a reasonable effort, almost anyone can obtain a contact with them. If the DX station desires to participate in these DX nets, he or she has the right to do so.

Any net operated for the sole purpose of working DX should be operated in such a manner that all non-DX check-ins are given a fair chance to work the DX. Many of the guidelines used in transceive operation can be applied to DX net operations. Rare or semi-rare DX stations with limited time should refrain from using DX nets because of the resulting low QSO rate. DX nets are helpful to those DX operators who do not have the proper equipment to operate split frequency and/or the experience to operate transceive only.

**Lists — Limited Use Only**

List-style DX operations are, in some cases, the *only* way to work a DX station. However, it should be understood that lists should be used only when other DX operating procedures are not possible. Below are some guidelines that can make list operations run smoothly, be fair to almost everyone, and reduce interference to all.

Conditions under which lists should be used: (1) DX operator cannot speak English or understand it well or at all; (2) DX operator is *inexperienced;* (3) DX station has a very weak signal because of poor antenna or location, low power, or poor propagation.

List operation guidelines: Take a list for a DX station only if he asks or desires to do so. Do not pressure him. If it is determined that he is inexperienced in DX operating procedures, one could suggest a list operation, but leave the decision up to the DX station.

Take lists only for real-time operation. Old lists taken on a previous day or on different bands should not be used. Many on these lists do not show up, leading to frustration to those on frequency. It wastes time.

Prearranged lists should not be used. Lists that are not accessible to all who can hear the DX station should be avoided.

Only stations designated by the DX station to take lists should do so. When taking a list for a DX station, propagation differences should be taken into account. If necessary, the M.C. (master of ceremonies or list-taker) should direct one or two alternates in different areas to pick up the stations whom the M.C. cannot copy because of propagation. This gives all a fair chance to get on the list.

The M.C. should have good to excellent copy on the DX station, so that control can be maintained at all times. Lists should conform to the DX station's desires as to content, number per call area, length, and so on. It is much better to take a short list, about 20 stations or so, run them, then come back and pick up a second group of 20, repeating this procedure for as long as the DX station is willing to do so, than to take a list of 300 stations in one swoop.

Never relay signal reports and call sign corrections. If it is really a QSO, the DX station should be able to copy the call and report of the station he is working without the help of the M.C.

The M.C. should be clear and concise in giving instructions as to what he and/or the DX station desires. The instructions should be repeated often to reduce confusion and to inform those who have just arrived on frequency what is going on.

When working a DX station in a list operation, conform to the DX station's desires as to length of QSO. If the DX station is giving only signal reports, do likewise and do not give your name, QTH or a weather report. If the DX station gives reports and his name, be courteous and give him the report and your name; but in any case, conduct the QSO clearly and quickly so that others can also have a chance to work him. Think of others.

Remember, list operations should be used only when required, not as a replacement for other unaided DX operating procedures.

**Roulette — Should Not Be Used**

At times, a DX station may appear on a predetermined frequency and announce that he will listen for callers within a certain band segment and will answer callers *on their own frequency.* This shotgun technique is referred to as roulette. This method is not at all recommended for DX operating, and should be highly discouraged. It causes confusion, encourages bootleggers, has a very poor QSO rate, results in questionable QSOs, and produces a lot of unnecessary QRM.

The above suggestions are aimed at increasing your DX operating pleasure. In behalf of the DX Advisory Committee, the author welcomes your comments.

DXAC agenda and identify them as internal or external. He will provide the membership with a monthly report, to be sent to the Hq. liaison for distribution, which will list: (a) the agenda items of the month ("named month"), (b) the schedule for voting on these agenda items. The report will be sent to the Hq. liaison during the first week of the month following the reporting month. The duties of the committee members should be reviewed periodically by the chairman and, if desired, reallocated in a revised DXAC Operations Outline, provided that all committee functions are maintained.

4) External agenda items are voted on by the DXAC after soliciting comments from the League membership. For internal agenda items, such comments are not solicited. Both types of agenda items may originate in a recommendation made from within or outside the DXAC, but no item may be submitted for the agenda by any persons other than the current members of the committee, the Hq. liaison and the Board liaison. Internal agenda items should be commented on by all interested DXAC members during the three-month period following the named month on the agenda and will be voted on in the fourth month following the named month on the agenda. A committee member may amend or withdraw his agenda item, provided that the request is made in written form, reaching Hq. by the end of the month following the named month. Following this period, if an external agenda item, the Hq. liaison will have it published in *QST* along with an announcement that the committee seeks comments and recommendations from the League membership through Headquarters. External agenda items will be voted on in the fourth month following publication in *QST*. If a situation develops in which a recommendation by the committee is desired, and if the normal deferment of voting until the fourth following month would cause the recommendation to be submitted too late to be of value, the chairman may announce a suspension of the normal four-month period and call for a vote at a time appropriate to the existing situation. The chairman shall be prudent in his application of this procedure.

5) Based on the schedule and list of agenda items in the chairman's monthly report, the vice-chairman will prepare a ballot for the items to be voted on and send it to the Hq. liaison for distribution. The vice-chairman will provide the membership with a monthly report, to be sent to the Hq. liaison for distribution, on what the results were on those items last voted upon, to include the total membership vote by call sign, indicating yes, no, abstention or no ballot cast. Members whose ballots have not reached the vice-chairman within four weeks of the date of the mailing by the Hq. liaison will be recorded in the monthly report as having cast no ballot.

6) The duties of the corresponding secretary shall be to acknowledge receipt of all correspondence from outside of the committee and to notify those correspondents what action, if any, was taken upon their recommendation.

7) The duties of all committee members shall include taking an active part in the operations of this committee. They shall mark and mail their ballots to the vice-chairman within 10 days of receipt, serve on subcommittee when appointed, and open lines of communication with DX-oriented groups and individuals in their area. Any member who feels that he will be unable to fulfill the duties of his office should submit a letter of resignation to the chairman.

8) Committee members will vote on items officially placed on the agenda during the term of their appointment. A member whose term ends on December 31 would still vote on agenda items bearing December or earlier dates. The newly appointed members will vote on agenda items bearing January or later dates.

## DX PORTFOLIO

*Special Prefixes in The Netherlands:* In The Netherlands 1979 is the 50th year since the first ham license was granted. To commemorate this important milestone in the history of the Amateur Service, PTT has allowed the use of a special prefix from October 10 till November 10, 1979. *All* amateurs in The Netherlands may place a 5 in front of the existing figure in their prefix. So, PAØ becomes PA5Ø, PA1 becomes PA51, PA2 becomes PA52, PA3 becomes PA53, PDØ becomes PD5Ø, etc.

In the mid 1960s it seemed like someone was always mounting a country-hopping expedition. Often, these expeditions lasted for months. The bands were constantly alive with DXers waiting for the next new one to come on.

Between wars and other world political situations, the marathon DXpedition has rarely been seen in the 1970s. Now, in a letter from Scotty Meadows, K5CO, we learn that these exciting days are about to return.

"It looks like the trip to the Indian Ocean by Dave, N2KK (also FØCGP, FRØCGP, FHØCGP and 3V8KK) is a go. Scotty, K5CO (also TT8SM, K5CO/5A, 7P8MA and 9H1FC), will also be there for part of the trip. I (Scotty) will leave and join Dave after he has made some travel and transportation arrangements.

"Dave is planning to leave the U.S. on November 15, 1979 to start his more than three months of DXing. He is planning to be at J28 for the CQ World Wide DX Contest. That should start things off with a bang. From J28 he will travel to FR/Reunion for the first phase of the long Indian Ocean operation.

"Operation from Reunion should start around the first of December 1979. During his operation and stay on Reunion, Dave will be arranging transportation to the other spots we want to operate from. 3B8 is only 110 miles away and 3B7 and 3B9 are close by, also. It is not difficult to obtain operating permission for these countries as they were part of France until a short time ago and they still have close ties. Part of Dave's time will be used in setting up the travel schedule to FH8, D68, FR7/G and FR7/J. The order and time of operation from each of these will depend upon ways and means of getting to each. Plane, boat or swim! We are looking into a chance of operation from 5R8 land. From the U.S. this is a very difficult arrangement. We feel it will be much easier once we arrive at Reunion. You know, the closer you get, the easier it becomes in dealing with people when you are in the area. If permission can be obtained we will be sure to do so.

"Dave, N2KK, who is a professional photographer and has traveled extensively throughout the world will be there on assignment to do a series on the islands. He is to do a series of pictures and articles for the French Department of Tourism. He will be taking many pictures of the islands, so he will have many to show when he returns.

"When it comes to operation, Dave's favorite band is 80 meters and he wants to do a lot of operation on 80. He should have a good signal with a KW and phased verticals.

"Myself, I like 20, 15 and 10, so between the two of us we can cover all of them including 40. While Dave is taking care of low bands I will run the pack on the upper ones. I plan to be on with a TH2 triband and good power. I can hear the pack now!

"Presently, a 4BTV vertical is being modified with a special coil for 160. We will give that one a try also. This antenna is being donated and modified by Dave's good friend N6DX. Frank Wolk, N5FW, president of Spectra Sales has donated a Ten-Tec Omni for the trip. Frank is the local distributor for Ten-Tec in the Dallas area. We appreciate all the help we receive.

"Dave has written permission from the French government for operation in that area. This was obtained when he received the assignment to do the photos there. This permission was given by the Department of Telecommunications in Paris. The administration of Reunion is from Paris, while the other islands are administered from Reunion.

"When Dave has all the arrangements completed from Reunion I will fly down and join him. Who could pass up a chance to operate from that part of the world, from all those rare places?

"We are going to take the Indian Ocean off the wanted list, going to try for 100k contacts. Both of us would appreciate any help or advice you yourself or as a group could extend us. Feel free to write any advice or comments you have." Scotty Meadows, 820 Intervale, Garland, TX 75043.

# QSL Corner

The use of the ARRL Membership Overseas QSL Bureau has skyrocketed since it began in 1976. In 1977, 888,000 QSLs were shipped to various foreign bureaus for distribution to their members. The following year, 1.2 million cards were sent — an increase of 35 percent. This figure was surpassed in the *first six months* of 1979, with 1.3 million cards having been dispatched by the end of June. More than 20,000 amateurs use the bureau each year.

As the bands opened up and Old Sol worked his magic on the atmosphere, each member sent more cards per dollar each year, from 52 in 1977 to 70 in 1979. Or, to put it another way, the bureau shipped 5900 pounds of cards in 1977 — and 8000 pounds in the first six months of 1979 alone.

The s.a.s.e. previously requested with each submission of QSLs will no longer be required, since confirmation slips have been eliminated. Your cancelled check will now serve as confirmation that your cards have been received at Headquarters for distribution. There will be no cutback in service. Weekly overseas mailings will continue.

The flat $1 fee for each use of the bureau will be replaced by a graduated fee schedule: $1 per pound or portion of a pound of QSLs (155 cards average one pound). For example, 1 pound = $1, 1.5 pounds = $2, 2 pounds = $2, 3 pounds = $3, etc.

Any ARRL member can utilize this outgoing service by observing these criteria: (1) Sort QSLs alphabetically by call sign prefix (A4, AP, CE, F, G, GI, A, VK1, 3D2, etc.). (2) Enclose the address label from the brown wrapper of your current *QST*. (3) Enclose the proper fee for the QSLs being forwarded ($1 per pound or portion of a pound).

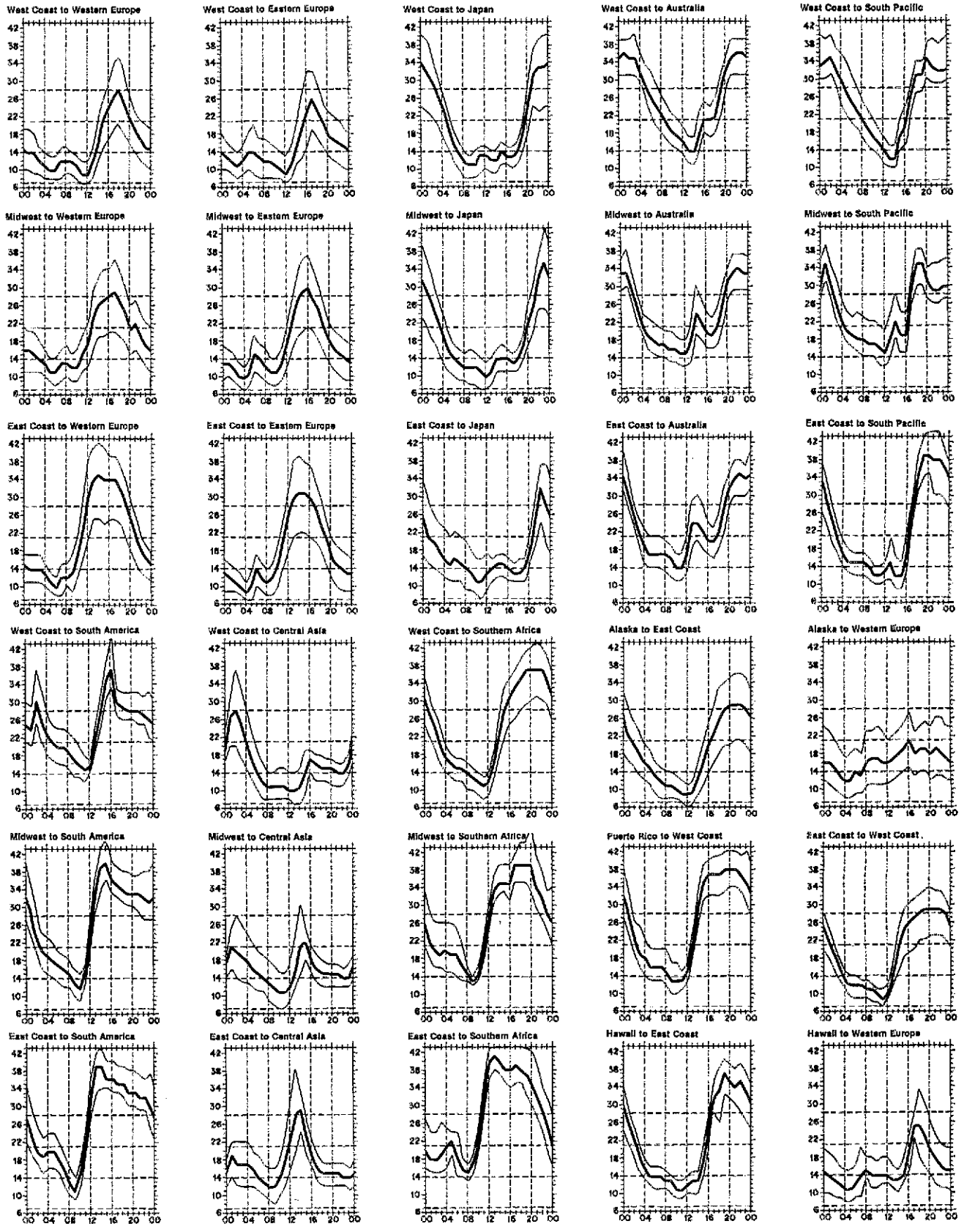
Here is some QSL information for the eager ones who would like to QSL direct. It is passed along as we receive it and, therefore, may not be accurate.

CFØZN (CE3ZN)
CK2DXU (VE2EF)
CK2EF (VE6AZB)
CX7AAR (AA1U)
DL1VJ/T X (DL1VJ)
F6DCQ/HBØ (F6DCQ)
FGØDDS/FS (W2QM)
FGØDDV (W2QM)
FK8CR (W7OK)
GU5CKW (DK9KX)
IG9DMK (I2DMK)
J3ABP (K5KG)
JA7IT/1D1 (JH6BRG)
JF1IST/7J1 (JA1HQG)
KH2AD (W6TPC)
KH6LW/KH7 (KH6JEB)
KL7USA (KL7GNT)
KZ5EK (DL1HH)
M1Y (IØMWI)
VE1AST (VE1AIH)
VE8RCS (WA7OBH)
VO6ONT (VO1HP)
VP1MT (XE1BV)
VP1MT (W5XW — 50 MHz only)
VP2DXC (W8UVZ)
VP2MEH (K8DD)
VP2MFA (KA8AMX)
VP2MFE (AC8W)
VP8MI (W4MWT)
VR3AH (WB4PRU)
VR7AR (W7OK)
WB8UIG/DU2 (WB9MFC)
YN1HFC (WØSA)
XE2II (W5XW) VHF QSO Party June 9-11
ZB2EO (K3MNW)
ZE6JP (K6AQV)
ZF2CN (WB4AXN)
5H3KS (K5VT)
5NØDOG (W4FRU)
5NØNAS (WB9MFC)
9J2TJ (W8JW)
9L1JT (K4ZIN/6)
CK2CRS Canoe Kayak World Championship Radio Station (VE2FIT)
H44PG P. O. Box 606, Honiara, SI.
KX6BU P. O. Box 444, APO San Francisco, CA 96555
UR2 Stations Estonian Central Radio Club, Box 125, Tallin, USSR.
3D2ER Rai Singh 19 Le Hunte St., Suva, Fiji Islands
5NØNAS P. O. Box 2873, Lagos, Nigeria, West Africa

This information was made available by W2QL, WA3ELE, AA4ML, W5XW, W6PTC, K8DD, WB9MFC and WØSA. Many thanks. — *Tom Manus, WB1ACZ*

## DX QSL MANAGER VOLUNTEERS

WB1GLH, WB3LHY, WBØYHX.




When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for 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). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11, for complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Asterisk indicates long-path circuits. Data are provided by the Institute for Telecommunication Sciences, Boulder, CO. These predictions for September 15 to October 15, 1979, assume a sunspot number of 151, which corresponds to a 2800-MHz solar flux of 194.

# 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 ARRL DXCC List. You may also submit cards to endorse your award in 20-country increments through 240, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from April 1 through April 30, 1979. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

## New Members

### Mixed

CT1CV/100 KL7IXZ/108 ZS6BQT/100 WB2KPE/138 WA4WEB/164 N5JM/104 K7SZN/120 W9NT/100
DL5NA/103 LA2BG/109 9Y4NP/249 WB2RWT/110 WA4WTN/100 W5QOT/102 W7QMU/105 W9RW/198
EP2LA/123 OK1AYN/109 W1AUQ/101 W3GCZ/100 WB4AGT/102 W5YB/105 AI8W/109 WB9LCA/103
FP8DX/208 SM5FEX/120 WA1ZFS/100 WA3LOS/124 WB4FMU/104 WB5PYL/106 K8SYH/101 WB9UQP/103
GU4EON/112 VE1BDT/134 WB1AIE/121 WB3DNA/101 WB4OKY/109 WD5HRX/102 K8UE/110 WD9CPX/121
HS4AFD/114 VE3IEN/101 WB1BVQ/100 WB3JNX/104 WD4HFK/122 K6QC/148 W8FI/114 WD9DEE/120
IØAEC/159 VE6WV/100 K2QF/104 WB3JUK/115 WD4IHV/183 K6XN/123 WB8PHO/109 WD9IIX/135
ISØDTK/124 VE7AQR/120 K2UK/105 AC4X/105 WD4LWC/103 W6FGX/102 WB8VPA/146 AFØO/103
JR2XRH/119 VE7BBJ/101 N2AQH/104 AJ4J/108 K5GKC/110 W6SZN/100 WD8JTT/110 KØPW/110
JA6PWN/108 VR1Z/105 W2DHI/130 K4CNW/138 K5JII/102 WA6BXV/103 WD8LVQ/125 NØDZ/110
KA6KJ/105 YU1LW/227 W2OOJ/109 W4RAL/120 K5KV/121 WB6DMB/106 K9IE/103 WBØLXM/102
JA7AOU/113 YU2CCB/187 W2TDQ/248 WA4DEP/119 K5MFE/113 WB6OYJ/110 K9MZJ/104 WBØRNP/109
KA7MS/124 YU3CC/201 W2ULO/104 WA4OHX/118 K5RE/108 WB6PGX/104 K9SR/100 WBØTXV/118
JA8TRT/104 YU3GI/220 WB2JXZ/119 WA4OPV/101 KB5BY/103 WD6CRM/102

### Radiotelephone

DF1QM/110 JH6NUR/125 W1MRJ/113 WB3HAK/104 WD4LWC/103 K6XN/107 KB8DB/108 WB9GHN/100
DL7WE/113 JH8GWW/104 WB1CRG/192 K4GXH/162 AA5O/104 N6HE/103 W8RSW/108 WB9LCA/102
EA4QR/112 JY4MB/108 WB1EZL/101 K4URK/100 K5EJO/216 W6ZPV/158 WB8VPA/146 WD9CPX/121
GM4CUB/100 LA9GV/228 K2YGM/107 N4BBA/106 KB5AC/109 WA6KEY/103 WD8JSC/105 KØRDJ/104
I2LVM/106 LX1JX/101 N2AQH/102 WA4OHX/108 KB5DN/104 WA6VHZ/100 WD8LVQ/122 KØSE/101
I4LRH/106 SV1EX/108 W2TDQ/230 WA4QQV/115 N5AJW/114 WB6DMB/101 K9BLX/102 WØEJ/117
I8INW/125 TG8NE/100 W2ULO/103 WB4OKY/109 W5QOT/100 WD6DLK/124 KB9DE/119 WØULU/100
IT9ZRQ/120 TG9GI/121 W2WZ/110 WB4YNL/104 WA5HLQ/101 W7LXR/115 W9RW/128 WBØTNY/110
IØAEC/151 VE1BDT/128 WA2CBB/111 WD4CZD/104 WB5IKT/110 WA7ECU/108 W9ZX/140 WBØTXV/115
JA1HEE/105 VE3IEN/100 WB2KPE/136 WD4IHV/145 WB5TED/110 WB7FDE/106 WA9JWL/108 WBØYEX/100
JK1NLS/106 VK3BHN/115 N3AKH/100 WD4KXB/140

### CW

DK9MB/100 JR2XRH/103 UB5WE/102 YV1TO/101 K2YGM/108 W4MPY/104 K5EJO/103 W6OKX/155
EP2LA/106 JA6PWN/108 VE2WA/104 W1GL/203 WB3JUK/112 W4RAL/108 K5KX/101 K8ZH/122
F9XL/103 JA8TRT/104 VE7DLM/102 WA1FCN/101 W4LOO/100 WD4IHV/108 K6QC/108 WØRJU/113
I4CJW/111 OK1DKW/100

## 5BDXCC

AF5M 9Y4NP DK6ED VE7IG OZ5VT OK3KFF K5PP

## Endorsements

### Mixed

DJ5JH/312 SMØCCE/334 W1QUS/261 WA2WSX/246 WA4DWN/208 W5UXE/120 WA7OBO/219 W9BG/363
DK6ED/166 SMØGMG/246 W1QV/290 WB2HJW/179 WA4JTI/290 W5VFJ/162 WB7OUL/203 W9IT/258
EP2MW/163 SP5HS/200 W1RBU/164 K3ND/290 WA4MCH/167 W5ZWX/315 AE8B/167 W9MYG/240
F2NB/291 SP6FER/120 W1VV/270 K3NR/172 WA4SKE/169 WA5KTZ/160 K8NN/297 W9QWM/244
F2VX/302 SP9DH/238 WA1NSJ/202 W3AC/325 WA4TLI/270 WA5TOS/204 K8OT/159 W9WNB/332
F6DCQ/273 VE3AMJ/243 WA1UUA/120 W3ARK/239 WA4VDN/130 WB5ZGP/139 K8RCT/245 W9YH/187
F9XL/180 VE3DGX/255 WB1CRG/196 W3GG/322 WB4FOT/200 K6CLV/194 K8TMK/220 WB9BXX/3/118
HB9BGN/252 VE3GJH/258 AF2L/140 W3GOH/254 WB4RJG/125 K6PU/333 N8AA/310 WB9LFD/161
HB9T/250 VE3HHS/182 K2IAB/148 W3LB/320 WD4ABN/150 K6SP/280 N8HI/179 WB9TIG/204
HK7UL/220 VE6KY/139 K2MQ/180 WA3EEE/143 WD4RCO/141 K6YCM/218 N8SW/204 KØCS/220
I3LLD/304 VK2BC/250 K2OVS/140 AA4DR/268 K5BZU/292 K6YK/255 W8LBM/321 KØDEQ/222
I7HH/323 ZE2KV/178 K2PF/120 AA4M/256 K5EJO/225 N6VR/270 W8ME/182 KØEOU/212
ISØLYN/161 ZL1AJU/322 K2UFT/159 AA4S/306 K5EOA/161 W6MUS/224 W8QFR/310 KBØEN/219
JA3DGC/302 AC1O/165 K2VC/120 K4IR/282 K5UR/326 W6NPY/252 W8UVZ/228 NØRR/310
JA7JAA/255 AD1C/183 K2YGM/245 KC4B/167 N5AX/278 W6OKX/253 WA8KEM/140 NØSS/224
KP4AM/260 K1CC/265 KB2EN/142 N4ATK/270 N5CB/180 W6ZYC/310 WD8BOH/208 WØBWJ/204
LA1ND/123 K1DFC/326 N2DT/232 N4CC/318 N5IH/141 WA6YQW/198 WD8IXV/180 WØEJ/165
OE1BFW/220 K1DP/180 N2MF/120 N4GG/288 N5JR/204 AD7Z/209 WD8KZS/121 WØGKE/300
OE8RT/320 K1DRN/332 W2AYJ/354 N4IR/180 W5CPI/280 K7JH/160 K9ARZ/204 WØSI/235
OK1DH/248 K1GFH/202 W2HAZ/270 N4NX/291 W5HJA/344 K7SB/200 K9PPY/324 WØYZB/272
OK1MP/330 K1WVX/164 W2HKE/140 N4ZS/200 W5JW/315 K7WA/136 K9TUS/243 WAØDUB/310
ON4PA/343 W1AIO/179 W2LZX/283 W4BFB/127 W5MCO/310 W7ETZ/317 K9WG/140 WAØTKJ/272
OZ8BZ/320 W1HGA/321 W2PPG/328 W4BUW/234 W5MUG/316 W7FP/262 KB9DE/122 WBØFCY/134
PY2YP/194 W1HSP/187 W2REH/310 W4NZR/162 W5QPH/157 W7LR/255 N9AGC/202 WBØGZR/178
PP5YC/290 W1IKB/269 W2WZ/142 W4YKH/221 W7YKN/161 N9EV/140 WBØSNG/160
SM4EMO/220 W1PL/233 W4YV/305

### Radiotelephone

CE3OE/241 I7HH/323 ZP5CBL/180 WA2CIF/160 W4EPZ/327 W5VFJ/154 W7ELU/261 WB8TRY/142
CN8CX/171 I7RNH/290 K1CMI/260 WA2NHE/244 W4OJP/158 AE6T/170 W7FP/262 K9ARZ/189
CT1NQ/153 IØPNM/232 K1DFC/259 WB2HJW/139 WA4ABC/141 K6AXC/251 W7GLU/158 K9KB/254
CT1WB/277 JA3DGC/286 K1DRN/332 K3MA/165 WA4HNL/168 K6OQ/119 W7YKN/161 K9UAA/200
CT2BB/264 KP4AM/260 K1WVX/164 W3AC/318 WA4JTI/280 K6PU/274 WB7OUL/201 N9AGC/202
CT2SH/244 LU8CW/220 W1HGA/321 W3GG/315 WA4MCH/127 K6SUC/126 WB7TAZ/121 N9BA/209
EA3OD/203 OE1BFW/209 W1HSP/150 WB3BGI/164 WA4OPW/293 K6SX/240 K8NN/260 W9RKP/243
EP2MW/146 OK1MP/310 W1SEB/324 WB3EFC/120 WA4TLI/250 K6YCM/216 K8TMK/220 W9TC/206
EP2TY/179 PY2JY/272 WA1DPX/130 AA4S/256 WB4KJZ/144 W6MUS/221 N8SW/196 W9YH/153
F2VX/295 PP5YC/284 WA1GBA/180 K4NJS/271 W5GZ/270 W6ZYC/306 W8CBA/220 W9ZM/350
F6DPE/112 VE3AMJ/242 WA1HJZ/228 K4UAS/241 K5IH/224 WA6DTG/212 W8DOG/219 WB9LFD/161
HB9BGN/237 VE3DGX/249 WB1DQC/182 K4YYL/335 K5UR/321 WA6FPB/300 W8LBM/308 WB9ZAH/199
HBGJ/315 VE3GJH/253 K2IAB/142 N4CC/301 N5IH/139 AD7Z/200 W8PCA/223 KØIUC/260
I1TBE/280 VE3HHS/167 K2MQ/161 N4NX/284 W5CPI/199 K7FE/181 W8QGP/4/128 NØSS/191
I4ZSQ/323 VE3MRS/234 W2LZX/274 W4BUW/215 W5MUG/252 W7AE/260 W8RT/310 WØBWJ/204
I5AFC/253 YV1TO/148

### CW

DL1PM/219 JA1QER/148 SM6CRH/163 AD1C/161 K3EQ/126 N4NX/187 K6YK/198 K8FU/120
DL9TJ/125 JA7JAA/201 SMØCCE/200 N2AC/180 K3NR/147 WA4MCH/143 N6VR/130 W8UVZ/201
F6DCQ/200 OH2BDA/150 SMØGMG/246 W2LZX/173 KD4Z/140 K5UR/230 W6TOR/121 WD8AHS/122
JA1JRK/271 OH2BN/201 AC1O/160 WB2FFY/124 N4GG/119 N5JR/203 WB7ASF/143 W9RW/140

The ARRL DXCC is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 20-country increments through 240, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from May 1 through May 31, 1979. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

## New Members

**Mixed**

DF3FI/122 DL8YT/111 DL∅FU/117 F6ETL/100 HA3KHC/100 I1IGI/110 I2DMI/130 I8EWM/104 JA3BAG/114 JA6AXD/235 KG6SX/101 OE2LCL/119 OZ3RC/120 PA∅PCA/109 PY2ZBG/104 TI2DO/100 VE1ABU/108 VE2AQS/TG9/156 VE6CJO/122 VE7DUS/105 VP1MPW/104 YU3TRI/100 ZS6BNY/105 4Z4UW/120 K1GVW/102 K1VRT/100 W1ZR/110 WA1ZAK/104 K2KYH/100 K2PX/109 K2PZ/104 W2HKM/115 W2IQZ/111 W2SR/144 W2XQ/102 WA2DPJ/109 WA2PID/102 WA2RXM/105 K3AER/110 K3DQ/100 K3SME/155 N3RW/101 W3ECN/100 W3EVG/124 W3PLI/109 WA3ZKL/100 WB3DIP/101 WB3HDP/110 K4CM/108 K4ZIN/102 N4AOB/119 N4VG/115 WA4NOG/100 WA4OAX/101 WB4ETD/104 WB4GJR/108 WB4PRM/120 WB4UME/101 WB4WOW/119 AE5V/100 AI5A/101 K5BDX/107 K5JI/104 K5JUC/107 N5ED/109 WB5CRG/102 WB5UCS/171 WD5BCY/100 N6NW/103 WA6CWY/105 WA6GUT/100 WA6IGU/105 WA6QDR/108 WA6ZYG/109 WB6VFF/121 WD6ALW/100 AE7P/103 K7KEE/120 N7ADY/103 WB7EEI/159 WB7WRA/103 AC8C/106 K8AV/115 K8WD/103 KB8ED/110 WD8MOV/116 WD8RIU/110 KB9DR/100 N9BX/216 W9HI/103 W9KBV/203 W9WBY/103 WD9DNL/108 WD9GIC/106 K∅JFV/156 W∅RIC/145 WB∅DLC/100 WB∅JDK/102 WB∅RSH/120 WB∅SSN/100 WD∅FSI/107 WD∅FZJ/104

**Radiotelephone**

DJ3KV/110 DJ8EM/156 DL∅FU/110 EA5ACA/151 G2HJT/109 GM3OM/109 I2DMI/125 I3TQE/127 J6LFZ/122 JI1NOY/100 JA2BOV/103 JA5AXD/229 KH6HIF/181 KL7HDS/108 KL7HRN/111 OE2LCL/118 VE2AQS/TG9/151 VE2DU/123 VE3EGO/124 VE3HZH/106 VE3JPJ/100 VP2MJE/100 XE1OX/108 ZF1HJ/119 K1DAP/210 W1RVO/113 W1VEI/104 WA1LOU/115 W2LLS/102 WA2MUA/118 WA2HVZ/120 WB2BTC/116 WB2LAP/103 K3CIS/128 W3DR/109 WB3JKG/106 AA4MW/130 K4KAK/129 KB4BU/140 N4AVB/101 N4VG/112 WA4PFD/243 WA4QCY/105 WB4ENN/105 WB4GJR/107 WB4JFM/100 WB4VNZ/108 WB4WOW/117 WD4ELE/100 WD4GSE/106 WD4PMU/101 K5PR/108 K5SSB/108 KA5V/104 N5AHS/103 WA5EFN/∅/107 WB5CRG/100 WB5UCS/141 WB5VZA/145 N6ACU/101 WA6AUQ/120 WB6AFJ/102 WD6BYF/104 AA7C/106 AF7O/101 K7QLC/119 WB7OHW/100 K8HV/130 K8WD/103 KB8ED/103 N8AFR/105 N8AKF/100 WB8DUC/101 WD8LJX/150 WD8MOV/113 N9ACX/104 N9BX/182 N9MP/208 WA9TIM/202 WB9GLB/109 WB9ZIX/100 WD9CUP/137 K∅JFV/117 W∅NZA/120 W∅RIC/123

**CW**

DF4QW/105 EA8FD/120 JR1FVW/110 JA2IDN/100 JA3BAG/105 JA6CNL/138 VE7CIQ/100 AD1O/102 N1TZ/103 W1ZR/104 K2PX/108 K2QD/100 WA2NPY/101 W3FAF/101 W3HAZ/104 W4WJ/174 WB4UME/100 K5BDX/100 W5HQL/107 N6FT/120 AA7C/109 W7IIT/133 WA7ZLC/130 K8AV/105 K8HV/100 WD8DZO/109 N∅OA/103 WB∅TTL/104

**Radioteletype**

DF2FU W9RY

## 5BDXCC

CT4DB OK3TCA K1IK YU2RTW OZ3PZ SM3CXS N5FG W∅SR UP2OU WA4LOF

## Endorsements

**Mixed**

CT2AK/320 CT4BD/227 DA1RA/178 DJ4AX/324 DJ4PI/327 DK3AD/W3/188 DK5WS/276 DL1YA/305 DL9YG/166 EA2HW/144 EA2IA/279 EA6CE/184 G3FXB/355 G3DOG/250 G3KDB/312 GW4BLE/200 HB9AOU/260 HB9BFS/160 JA1ELY/311 JA1QXY/273 JA5PUL/265 JA6CNL/295 KL7HCC/240 KL7JDR/121 LA4AT/128 OE1GHC/289 OH2BFJ/245 OH2KP/181 OH3NM/180 ON4NC/357 PY1ZBJ/186 PY2BW/312 PY2ZGF/129 PY4OD/333 SM6CMU/273 VE3BX/321 VE4AE/221 VE7BAF/163 VK2BAN/140 YU2RTW/280 4Z4GH/219 AB1U/220 K1KTB/163 K1MEN/270 K1VR/272 K1VSK/263 N1AC/249 N1YL/255 N1ZT/230 W1BL/254 W1IAS/338 W1WEF/139 WA1LOU/120 WB1CCH/201 WB1CRG/216 WB1GZE/131 K2IGW/241 K2TGE/134 N2CW/293 N2KA/267 W2ABM/260 W2KI/182 W2TQC/344 W2VJN/315 WA2CBB/308 WA2LMW/266 WA2MUA/145 WA2MTI/188 WA2NDB/126 WB2LOF/250 AE3T/302 K3NB/120 K3NL/315 K3UC/150 N3JC/222 W3CRG/181 W3KLR/141 W3NKM/356 W3NV/302 W3PN/333 W3TVB/271 W3YO/160 WA3SXH/280 AA4MW/144 AA4NC/172 AA4T/240 AB4Z/240 K4CXY/200 K4KBL/260 K4KFH/268 K4LTA/251 K4OCE/309 K4RZ/261 K4TO/306 KB4BU/160 N4NW/264 N4OE/122 N4RR/290 N4TO/329 N4VZ/295 W4BD/268 W4FUI/182 WA4DPU/220 WA4JJW/200 WA4KEY/102 WA4LOF/260 WA4OUF/254 WA4WQH/121 WA4WYN/263 WB4LPP/208 WB4NDX/250 WB4OPG/225 WB4OSS/320 WB4PRU/199 WB4YHV/264 WD4CXV/161 WD4KRK/120 K5DK/121 N5HB/160 N5RO/220 W5LW/265 W5VJG/219 W5VSZ/236 WA5IGD/200 K6CBL/270 KB6JJ/160 W6HYG/347 W6JD/254 W6OMR/282 WA6TLA/261 WA6TOO/220 WB6JPZ/164 WB6SRK/138 K7WE/180 N7UT/234 W7CE/259 W7FY/205 W7IIT/155 W7IYW/273 AD8P/187 K8GG/209 K8HV/172 K8IA/290 K8IP/315 K8ZR/300 W8GE/258 W8XX/319 W8YA/326 WB8JEY/272 WD8AHS/220 WD8KCO/148 AA9M/240 K9DID/240 K9GX/185 K9QVB/243 K9UR/138 K9ZO/260 K9ZZ/188 W9DDX/164 W9RY/290 WA9LBO/124 WA9WWT/137 WB9SLV/219 WB9TIY/173 WD9CUP/140 K∅JPX/122 K∅LD/200 K∅YST/230 W∅CDC/265 W∅PT/240 W∅SYK/356 WA∅VKF/239 WB∅NAA/160 WD∅BNC/180

**Phone**

CX7BF/252 DA1RA/167 DJ2RB/210 DK5AD/W3/164 DK5WS/276 DL7JK/156 EA7EU/200 F3SG/161 F6AOI/310 F6DZU/254 F9JS/187 G3DOG/214 G3NLY/333 G4DKT/151 HS1BG/144 I1FNX/270 I2LXA/140 I5KKW/240 I∅GFP/244 I∅RKF/180 JA1ELY/309 JA5PUL/259 JA6CNL/204 KC6GF/138 KH6OR/337 KL7HCC/220 KL7JDR/121 OE3KTA/221 PA∅KB/249 PY1ZBJ/184 PY2AQQ/254 PY2BW/302 PY3BXW/327 VE3BIF/240 VE3EFX/180 VP9CP/199 XE1J/290 XE1NI/160 XE1XF/120 6W8DY/325 AB1U/141 K1GXU/250 K1KTB/163 K1MEM/209 K1NLQ/161 N1AC/203 N1ZT/202 W1BAL/261 WA1PEL/220 WB1CRG/211 K2TGE/130 N2BJ/205 N2CW/261 N2KW/217 W2NCL/222 W3HCW/200 W3KLR/141 W3NKM/354 W3NV/302 W3PN/273 WA3LNQ/207 WB3CIW/199 WB3FOB/200 AA4NC/134 K4OCE/225 K4ONF/220 K4TO/270 N4NW/255 W4DPS/326 W4ELB/310 W4LWP/121 WA4RXS/121 WB4NDX/250 K5YY//200 W5CB/272 W5HEZ/202 W5ILR/183 W5RNG/330 W5VJG/219 W5VSZ/219 WB5KSU/120 K6CBL/150 K6PO/251 N6AFD/119 W6EHA/250 W6HYG/337 W6OMR/230 W6RGQ/188 W6VZZ/180 WA6AHF/325 WA6PJR/172 WB6SRK/138 WB6VTE/198 K7GEX/263 W7EKM/305 W7NCD/139 AD8P/159 K8BTH/200 K8GG/208 K8IP/212 K8ZR/297 W8NXF/302 W8SET/276 W8XX/314 WD8BSX/159 WD8KCO/137 K9AB/328 K9FYZ/219 K9GX/185 K9LKA/326 K9QVB/166 W9DDX/163 W9GBC/139 W9IFJ/222 W9KQF/319 W9NIO/160 W9RY/265 WB9RPY/120 WB9SLV/148 K∅LD/190 W∅BK/310

**CW**

DK5AD/W3/141 JA1QXY/205 KL7HCC/140 PY2BW/157 PY2DFR/139 YU2RTW/242 K1TO/160 N2CW/199 W2WZ/115 KE4I/220 N4RR/200 W4NBP/200 W5SVZ/150 K6CBL/220 K6RK/122 W6JD/202 WA6TLA/240 N7UT/202 K8IP/135 K8SW/140 W8RT/219 K9QVB/162 N9KW/120 W∅CAW/180

## DXCC NOTES

*Reminder:* Those wanting to update their DXCC totals for the December 1979 *QST* DXCC listing must submit confirmation during the month of September. They must reach Headquarters on or before September 28, 1979 to be listed. You must comply with DXCC rule 5 including the once-a-year exception to update the listing.

# Strays

### I would like to get in touch with . . .

☐ hams with experience in modifying vhf high-band, fm commercial radios to operate on the 2-meter band. Contact Dale E. Miller, W5RRP, 4001 W. Bank Expy., Apt. 3, Marrero, LA 70072.

☐ hams interested in starting a 160-meter cw net on 1801 kHz. Contact Dave Hardacker, W7TO, 1745 S. Thurmond, Sheridan, WY 82801. For information on 160-meter cw operation, send an s.a.s.e.

☐ amateurs involved in auto racing and stock cars. Contact Adlia M. Gillihan, WA6BWR, Box 656, Fairfield, CA 94533.

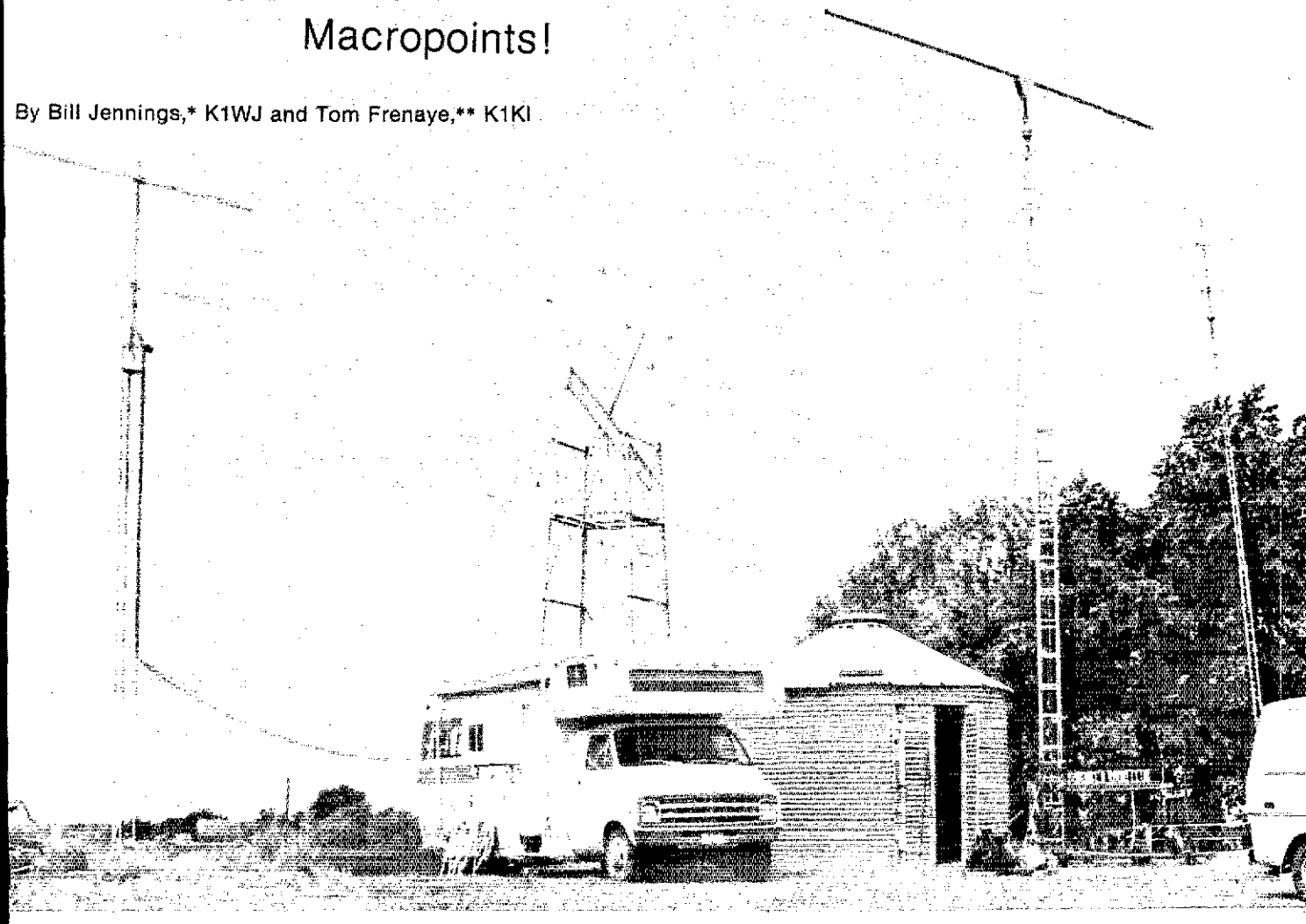
☐ amateurs who were radio operators aboard Great Lakes vessels from 1926 to 1928. Contact Maurice H. Nelson, W9FL, 301 Oak Knolls Ave., Rockford, IL 61107.

# Results, June VHF QSO Party

## Microwaves Mean Macropoints!

## 1979

By Bill Jennings,* K1WJ and Tom Frenaye,** K1KI



WØRGU, multiop, Minnesota.

Mountaintops and microwaves. Megahertz and memories. These are the things of which the ARRL June VHF QSO Party is made.

The 1979 contest, held June 9 and 10, was no exception in those respects. The June bash saw monster mountaintop multiop stations, the "mini Field Day style" out-to-have-a-good-time group efforts, the serious home-station competitors as well as the ops who fired up on fm to "help the contesters out," laser-microwave contacts and a-m QSOs on 6 and 2 meters. Whatever you want in vhf-uhf operating, this contest probably had it.

The comparison boxes, score listings and *soapbox* comments contained in this report document what really went down during the contest much better than a couple of paragraphs that paraphrase those statistics could. So, it'll suffice if we say that the total number of logs received was up to 520 (from 464 in 1978), there were several dandy single-operator efforts as well as four multiop scores over the 200-k point mark, and enough new division records were set for us to safely assume that the 1979 June VHF QSO Party was an unquestionable success.

We'll devote the rest of our editorial space to various comments on and discussions of problems that were encountered during the contest. As always, we welcome your comments, praise (hi!), ideas and criticisms. We look forward to hearing from you!

Mountaintopping as always is a popular pastime during the summer contests. A number of problems other than equipment failure occasionally come up.

During the June contest, at least one mountaintop was descended upon by two groups, both claiming to have permission from the authorities. The result? The group that arrived last made the first one dismantle antennas and look for another site. Unsportsmanlike conduct? You be the judge.

The mountaintop kilowatts are always berated for poor signal quality or working people who weren't really there. Those that put together everything for a big effort once or twice a year have it even harder as those who think they own the band suddenly find it hard not to be king. The mountaintop stations do have to be careful to ensure their signal quality is as good as possible — after all, they will be the loudest thing around in most cases. The unusually strong signal will often tear apart the front end of nearby receivers. It's much easier to blame the mountaintopper than to blame your own equipment for what appear to be spurious signals up and down the band.

On the other hand, the once-a-year mountaintopper had better be familiar with his equipment *in case there is a problem.* Operating courtesy can solve many of the

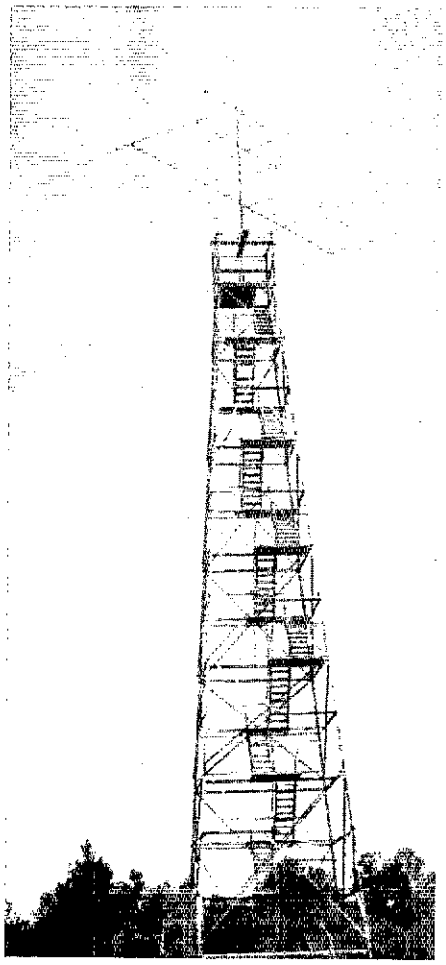
*Communications Asst., ARRL
**Asst. Communications Manager, ARRL

Rick, KA1BFK, tries his hand at a little 2-meter action for the K1CZ multiop effort from the backwoods of Maine.

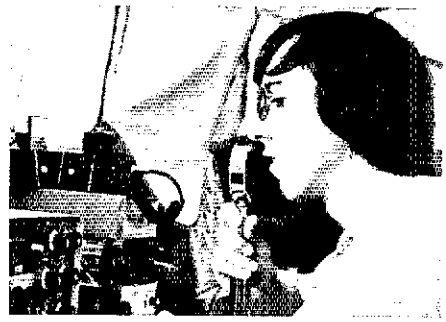
We think that Gloria, WA7YAX, is trying to tell us something about vhf contesting from Idaho. Note the open novel next to the SB-110A.

**Division Leaders**

| *Single Op* | *Division* | *Multiop* |
|---|---|---|
| WB4NXY/2 | Atlantic | W3CCX/3 |
| N9SS | Central | WB8HUC/9 |
| KØVXM | Dakota | WØSD |
| WB4JGG | Delta | WB4LHD/5 |
| WA8TTS | Great Lakes | W8DJY |
| WB2WIK | Hudson | WA2SNA |
| WBØZXU | Midwest | WØOHU |
| K1FO | New England | W1FC |
| WA7RTA/7 | Northwestern | N7NW/7 |
| K6KLY | Pacific | N6AMG |
| K4WO | Roanoke | W4BFB |
| WBØTTW | Rocky Mountain | NØKV |
| WD4IYS | Southeastern | W4VO |
| N6VI | Southwestern | W6XJ |
| WA5HNK | West Gulf | K5CM |
| VE1ASJ | Canadian | VE2KV |
| — | DX | XE2BC |



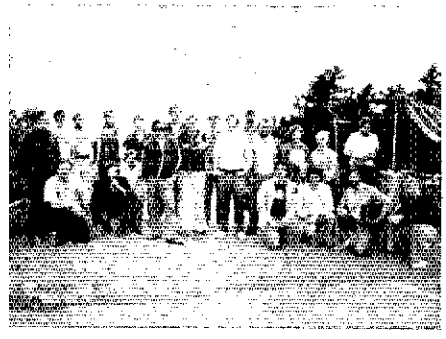
Although K4WO was operated as a single-operator station by WA4GPM this time, this surplus fire-watch tower, which took nine months to disassemble and reconstruct at WO will see duty in the future as the antenna support for multioperator vhf contest groups.

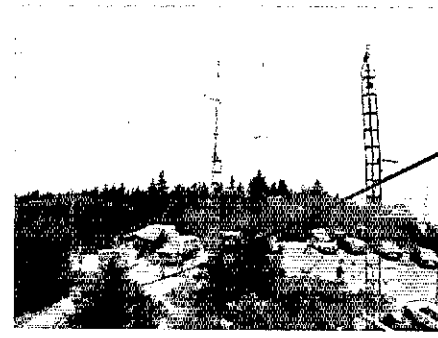


WD4MBK talkin' it up on 6 from W4ATC/4, VA.

**Top Ten**

| Single Operator | | Multioperator | |
|---|---|---|---|
| *Call* | *Score* | *Call* | *Score* |
| K1FO | 68,634 | W1FC | 236,856 |
| WB2WIK | 49,876 | W3CCX/3 | 215,750 |
| K4WO | | W2SZ/1 | 208,241 |
| (WA4GPM, op) | 49,595 | W3BBS | 200,954 |
| K1ZZ | 45,900 | WA2SNA | 112,908 |
| W1JR | 42,579 | W1XM | 91,485 |
| WA2FGK | | WØOHU | 68,796 |
| (K2LNS, op) | 39,280 | N2SB/2 | 61,596 |
| WB4NXY/2 | 38,320 | K5CM | 60,610 |
| WA8TTS | 38,064 | WB2CAM | 57,889 |
| K1PXE | 37,920 | | |
| WA1TZV | 35,642 | | |





Numero uno in the multioperator category, W1FC, the Barnstormer ARC. The people (well most of 'em, anyway) and their antenna system.

hassles but nothing is more infuriating to lowlanders than the mountaintopper who says "thanks for the signal report; it must be your receiver. CQ contest. . . ."

The mechanics of the contest presented some problems of their own for more than a few of the participants who submitted entries. We'll list a few of the "No-Nos" that can be seen here from the log-checker's seat.

1) Time. The rules say that operating time can total *no more* than 28 out of the allotted 35 hours. Yet some folks, especially the multis who run a station on each band, tend to be a little sloppy in their time-keeping. A word to the wise: Adding a "few minutes here and there" past the allotted time to the 28 hours allowed for the contest period comes under the heading of "rubber clocking" and *may* present grounds for disqualification of the entry in question.

2) Exchanges. Complete exchanges (in this case, the name of the ARRL Section) must be acknowledged and recorded in your entry for *each and every* QSO claimed for contest credit. Enough on this.

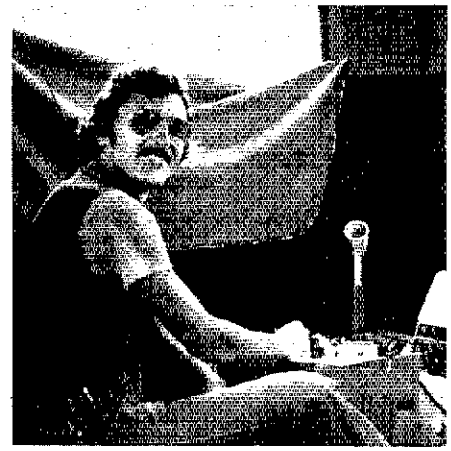
3) Duplicate QSOs. A station may be worked *only* once per band, regardless of mode. Check your log during the contest period and especially after the contest for duplicate QSOs. Dupes found during our log-checking process are bad news. Large reductions in total score and possible disqualification can result from dupes left in your entry.

The bottom line after all this ranting is, read the contest rules. Follow those rules to the letter. And spend the time to check your entry for completeness and accuracy. It'll be worth the trouble in the long run.

This year seems to be the one in which the use of uhf bands has bloomed, especially for the multioperator stations. The 432-MHz band was loaded with signals: K2RIW reported in

**All-Time Division Leaders**

| Single Operator | | | | Multioperator | | |
|---|---|---|---|---|---|---|
| *Call* | *Score* | *Year* | *Division* | *Call* | *Score* | *Year* |
| WA2DPU | 43,351 | 78 | Atlantic | W3CCX/3 | 215,750 | 79 |
| K9HDE | 33,572 | 77 | Central | W9NWE | 48,195 | 78 |
| WAØCSL | 21,808 | 77 | Dakota | WØOHU/Ø | 60,164 | 77 |
| WB4JGG | 17,458 | 79 | Delta | W4BFB/4 | 74,404 | 78 |
| WA8TTS | 38,064 | 79 | Great Lakes | K8III | 90,522 | 78 |
| WB2WIK | 49,876 | 79 | Hudson | WA2SNA | 112,908 | 79 |
| WAØMRH | 20,435 | 77 | Midwest | WØOHU | 68,796 | 79 |
| K1MNS | 75,537 | 78 | New England | W1FC | 236,856 | 79 |
| K7GWE | 20,515 | 74 | Northwestern | W7LYE/7 | 35,776 | 77 |
| N6NB | 69,184 | 77 | Pacific | WA6JUD/6 | 81,213 | 76 |
| K4WO | 49,757 | 79 | Roanoke | W4BFB | 57,013 | 79 |
| WAØTVZ | 22,935 | 77 | Rocky Mountain | WB5AXC/5 | 23,424 | 76 |
| W4GJO | 32,292 | 62 | Southeastern | W4VO | 28,450 | 78 |
| K6YNB | 60,342 | 76 | Southwestern | W6AMT | 105,080 | 76 |
| WA5HNK | 34,151 | 77 | West Gulf | K5CM | 60,610 | 79 |
| VE2DFO | 24,012 | 78 | Canadian | VE3ONT | 82,188 | 74 |
| W2BN/C6A | 18,700 | 77 | DX | XE2BC | 23,961 | 78 |



N4VC, AL, teamed up with WD4DGF to join the ranks of multioperator stations in Tennessee in the June VHF QSO Party past.

**Area Leaders**

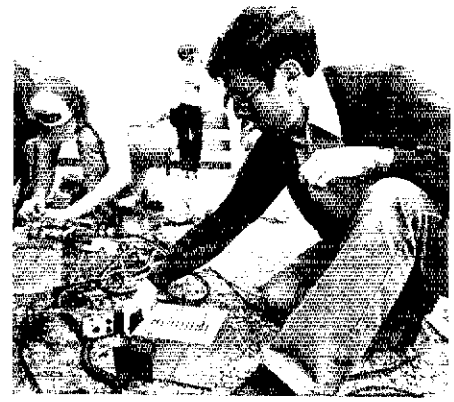
**Multioperator**

| | *W1FC* | *W4BFB* | *W6XJ* | *N7NW* | *WØOHU* |
|---|---|---|---|---|---|
| 50 | 453/45 | 272/45 | 178/40 | 150/27 | 400/57 |
| 144 | 794/25 | 435/15 | 219/12 | 145/8 | 274/16 |
| 220 | 59/17 | 31/4 | 57/5 | 42/2 | 10/7 |
| 432 | 102/23 | 17/7 | 39/7 | 23/3 | 31/11 |
| 1296 | 19/9 | · | 6/6 | 4/2 | · |
| 2.3 | 7/5 | | | | |
| 3.4 | 5/5 | | | | |
| 5.7 | 5/5 | | | | |
| 10 | 9/5 | | | | |

**Single Operator**

| | *K1FO* | *K4WO* | *WA5HNK* | *WA7RTA* | *N9SS* |
|---|---|---|---|---|---|
| 50 | 132/27 | 161/40 | 338/49 | 74/26 | 273/53 |
| 144 | 321/22 | 362/20 | 65/9 | 53/7 | 125/14 |
| 220 | 38/15 | · | 1/1 | 7/2 | 1/1 |
| 432 | 85/21 | 69/15 | 27/5 | 8/2 | 17/8 |
| 1296 | 13/8 | · | 2/1 | | · |

The emphasis is on different bands in different parts of the country. Compare your results to those listed above (QSOs/multipliers) to see how you can become a giant killer.



The W8GK/8 ops ready the 10-GHz gear for their 56-mile QSO with WA4PGI. This QSO was the happy ending to a tale of woe that included losing the 432 equipment to lightning.

with 140 QSOs and 23 sections for NLI, while K8WW found 94 QSOs and 22 sections from OH.

Moving up one notch to 1296 were 45 stations, 22 of them multiops. Activity was concentrated in the East/Northeast but 15 stations west of the Mississippi completed at least one QSO. Even in the sparsely populated (microwave-style) West, K6ZMW squeezed out 9 QSOs in six sections, with a 220-mile QSO to N6CA/7 the prize catch. The frequencies above 1296 were almost the exclusive territory of the multioperator groups. The distinction between the biggest multiop groups was almost completely due to the microwave contacts and multipliers. Nine groups were successful on 10 GHz. Credit for the longest QSOs goes to W1FC — WA1KPS (70 mi), W8GK — WA4PGI (56 mi), W3BBS — K3RYL/2 (35 mi) and W6OAL — K6MEP (22 mi).

With the emphasis shifting toward the higher frequencies, the top single-operator stations may have to get into the act in the near future. What limits are there for microwave contacts? Many seem to think that line-of-sight conditions are necessary, but that isn't so. Work by G3RPE, reported in *Break-In*, April 1979 (New Zealand), indicates the following:

"The basic conditions for scatter communications at amateur level in the centimeter band are: 2 kHz of passband in the receiver, and 180-cm paraboloid reflectors at both ends. Then the standard combinations become:

| Band | Power Output | ERP | Distance |
|---|---|---|---|
| 1.3 GHz | 40 W | 16 kW | 600 km (360 mi) |
| 2.3 GHz | 30 W | 30 kW | 500 km (300 mi) |
| 5.7 GHz | 2 W | 10 kW | 400 km (240 mi) |
| 10 GHz | 1 W | 16 kW | 400 km (240 mi) |

The limit here is transmitter stability; the higher the frequency, the more stability becomes important. Aiming two-dish antennas is difficult, but add to that a signal that is changing in frequency, and the problem can be insurmountable.

Because some groups have microwave capabilities and other do not, some friction has developed. What is the ethical way to make microwave contacts during a contest? A multiop station might wait years for another 5.7-GHz station to show up nearby. So why not prearrange some contacts? Build transceivers for 2.3 through 10 GHz and have a friend visit an adjacent mountaintop. The rules do limit the use of a transmitter to one call sign only so five people using the same equipment can't be worked for contest credit.

Is it ethical to use one antenna for several stations while switching transmitters? It is within the present rules but maybe the rule needs to be strengthened to, say once a station (tx, rx, antenna) is used to contact one or more other stations during the contest it cannot be used under another call sign.

As always, the areas with the smaller sections (East-Northeast) will have the scoring advantage. With the acceptance of the latitude-longitude grid system in the uhf contest, maybe the vhf contests should undergo the same metamorphosis.

One of the ultimate goals is to encourage the use of the microwave bands. Members of the multioperator station should be allowed to make these microwave DXpeditions. Once enough microwave equipment is in use, multiop groups may even begin to talk to each other, heaven forbid! One of the problems in log checking is that we seldom receive logs from these satellite groups to confirm both ends of the QSO.

The Barnstormer ARC (W1FC/1) maximized the microwaves in the June contest, but not without a lot of sweat and planning. Their 2.3-, 3.4- and 5.7-GHz stations consisted of 1150-MHz, 500-mW crystal-controlled sources

**Multiplier Leaders**

**50 MHz**

| Call | Multipliers | Call | Multipliers |
|---|---|---|---|
| WA1LUJ* | 34 | N6AMG* | 20 |
| W1XM* | 33 | W6OAL* | 21 |
| K1TOL | 41 | K6MEP* | 18 |
| W1FC* | 45 | K6KLY | 17 |
| WA1MAG* | 37 | W6XJ* | 40 |
| W2SZ/1* | 44 | WB6LBR | 18 |
| WA1RWU* | 39 | W6YKM/6 | 26 |
| K2CBA* | 32 | WA7JTM* | 22 |
| WB2WIK | 37 | WA7FSI | 16 |
| WA2FGK/2 | 33 | K7NV | 28 |
| WA2SNA* | 32 | N7AKB* | 35 |
| WB4NXY/2 | 36 | WA7RTA/7 | 26 |
| W2HRW | 33 | N7DB/7* | 30 |
| N2SB/2* | 38 | N7NW/7* | 27 |
| K2NE* | 37 | WA7KYM | 30 |
| K2BWR* | 32 | WB7UJY | 16 |
| K2OEQ* | 32 | | |
| N2JY* | 32 | WB8BGY | 38 |
| WA2IKO* | 32 | WA8TTS | 41 |
| | | K8AT | 33 |
| W3CCX/3* | 45 | W8DJY* | 37 |
| W3BBS* | 45 | W8VP* | 40 |
| WB3CZG* | 36 | WB2DNE/8 | 39 |
| W3ILG* | 35 | K3LNZ/8* | 38 |
| W3XO | 35 | W8GK/8* | 35 |
| WB3LSY | 37 | | |
| WB3CBB | 32 | W9SS | 53 |
| W2CNS/3* | 40 | W9IP | 46 |
| W3GNR/3* | 37 | GW3NJY/ | |
| WA3CPH/3* | 36 | W9 | 31 |
| | | K9RO | 47 |
| WA4CQG | 35 | W9ZX* | 37 |
| W4VO* | 39 | W9NFE | 28 |
| K4WO | 40 | WA9PKL | 27 |
| W4WHK | 35 | WB8HUC/9* | 35 |
| WA4KKY* | 39 | WA9KGQ | 27 |
| W4BFB* | 45 | WB9OPD | 39 |
| K1FJM/4 | 44 | WA9LZM | 28 |
| WD4MGB | 40 | | |
| WB4BND | 36 | WBØTTW | 27 |
| WD4LWL* | 37 | NØKV* | 47 |
| WB4JGG | 35 | WBØZXU | 42 |
| N4CD | 41 | WBØTEM | 38 |
| | | WØOHU* | 57 |
| WB4LHD/5* | 48 | NØLL | 46 |
| N5DL* | 44 | WØXG | 31 |
| WA5FDF* | 41 | KØTLM* | 47 |
| WA5UUD | 42 | WAØCSL | 31 |
| WA5YOU* | 37 | KØVXM | 43 |
| WB5LUA | 37 | WBØYQS | 32 |
| WD5FXM | 43 | WØSD* | 53 |
| WB5KTC | 37 | | |
| WB5FCR | 39 | VE1ASJ | 34 |
| K5CM* | 66 | VE2KV* | 29 |
| WA5HNK | 49 | VE3CKU | 24 |
| K5LZO | 46 | VE3AEA/3* | 18 |
| | | XE2BC* | 17 |
| | | XE2IL* | 23 |
| | | VP2VDL* | 17 |

**144 MHz**

| Call | Multipliers | Call | Multipliers |
|---|---|---|---|
| K1FO | 22 | W7LUX | 5 |
| K1ZZ | 22 | WA7JTM* | 5 |
| K1PXE | 21 | N7AKB* | 6 |
| WB1ALW | 22 | WA7RTA/7 | 7 |
| W1FC* | 25 | K7KOT | 5 |
| W2SZ/1* | 23 | N7NW/7* | 8 |
| WA1RWU* | 22 | | |
| | | WA8TTS | 19 |
| W2YX | 22 | K8AT | 21 |
| WB2WIK | 24 | WB8PAT* | 17 |
| WB2CUT | 22 | W8DJY* | 16 |
| WA2SNA* | 23 | W8VP* | 21 |
| K2GE* | 23 | WB2DNE/8 | 16 |
| WB2CAM* | 22 | K3LNZ/8* | 20 |
| K2NE* | 22 | W8GK/8* | 21 |
| K2LWR | 25 | WB2DIN/8* | 20 |
| W2AV | 24 | | |
| | | N9SS | 14 |
| W3CCX/3* | 25 | W9IP | 18 |
| W3BBS* | 24 | GW3NJY/ | |
| WB3CZC* | 24 | W9 | 14 |
| WA3CPH/3* | 24 | WB9NTL | 16 |
| | | W3EP/9 | 19 |
| WA4EWA | 17 | WA9MCJ | 14 |
| AK4T | 17 | WB8HUC/9* | 13 |
| K4WO | 20 | W9LTU* | 12 |
| WA4SBC | 17 | | |
| W3IY/4 | 18 | WBØZXU | 13 |
| WA4HHP | 20 | WØOHU* | 16 |
| WA4KXV | 18 | WØRWH | 14 |
| K4QIF | 22 | K4ZLE/Ø | 12 |
| WD4GXN | 19 | KØTLM* | 11 |
| | | AIØL* | 12 |
| WB4LHD/5 | 11 | WØSD* | 12 |
| N5DL* | 15 | | |
| WA5FDF* | 10 | VE1ASJ | 21 |
| WB5LUA | 12 | VE1UT | 16 |
| K5CM* | 16 | VE2KV* | 15 |
| K5LZO | 14 | VE3FN | 21 |
| | | VE3AEA/3* | 17 |
| N6AMG* | 11 | | |
| K6BPC* | 10 | | |
| WB6ESQ* | 9 | XE2BC* | 10 |
| K6MEP* | 11 | | |
| W6XN | 9 | | |
| W6XJ* | 12 | | |
| W6YKM/6* | 9 | | |

**220 MHz**

| Call | Multipliers | Call | Multipliers |
|---|---|---|---|
| K1FO | 15 | W3CCX/3* | 18 |
| K1ZZ | 11 | W3BBS* | 21 |
| K1PXE | 16 | W2CNS/3* | 11 |
| W1JR | 11 | W3GNR/3* | 10 |
| W1XM* | 13 | | |
| W1FC* | 17 | W4VO* | 3 |
| W2SZ/1* | 19 | WA4IPI | 3 |
| | | W4CQ* | 3 |
| K2CBA* | 12 | N4SM* | 4 |
| WA2FGK/2 | 11 | W4PAR/4* | 3 |
| WA2SNA* | 15 | W4GG/4* | 3 |
| W2EIF | 11 | W4BFB* | 4 |
| WB2CAM* | 11 | K4LHB | 9 |
| K2BWR* | 13 | K6LEW/4 | 5 |
| K2YCO | 12 | W4ATC* | 5 |
| | | WA4WZQ* | 3 |
| | | WD4FVP* | 3 |
| | | K5CM* | 2 |
| | | N6AMG* | 5 |
| | | W6CN | 5 |
| | | W6NXB | 5 |
| | | K6BPC* | 5 |
| | | WB6ESQ* | 5 |
| | | W6OAL* | 6 |
| | | K6MEP* | 6 |
| | | WB6FTW/6 | 5 |
| | | W6XJ* | 5 |
| | | W6YKM/6* | 8 |
| | | WA7RTA/7 | 2 |
| | | K7HSA | 2 |
| | | N7DB/7* | 2 |
| | | K7AUO* | 2 |
| | | WB7UUP | 2 |
| | | N7NW/7* | 2 |
| | | W8DJY* | 2 |
| | | W8VP* | 7 |
| | | K3LNZ/8* | 7 |
| | | K9XY | 3 |
| | | WØOHU | 7 |
| | | KØTLM* | 2 |
| | | WØSD* | 3 |
| | | VE2KV* | 9 |
| | | VE3BQN | 8 |
| | | VE7XF | 2 |
| | | XE2BC* | 5 |

**432 MHz**

| Call | Multipliers | Call | Multipliers |
|---|---|---|---|
| K1FO | 21 | W6YKM/6* | 6 |
| K1ZZ | 16 | | |
| K1PXE | 20 | W7LUX | 2 |
| WB1ALW | 16 | WA7RTA | 2 |
| W1JR | 19 | K7HSA | 2 |
| W1XM* | 19 | W7TYR | 2 |
| WA1TZV* | 16 | W7JXU | 2 |
| W1FC* | 23 | N7DB/7* | 2 |
| W2SZ/1* | 23 | K7AUO* | 2 |
| | | K7KOT | 3 |
| K2CBA* | 21 | W7YOZ | 2 |
| K2RIW | 23 | N7WW/7* | 3 |
| W2VC | 20 | | |
| WA2SNA* | 20 | WA8TTS | 18 |
| K2GE* | 18 | K8AT | 12 |
| K2BWR* | 17 | WB8PAT | 10 |
| | | K8WW | 22 |
| K3SXA | 16 | K8DIO | 14 |
| W3CCX/3* | 22 | W8DJY* | 12 |
| W3BBS* | 22 | W8EAG | 13 |
| WB3CZG* | 15 | K3LNZ/8* | 11 |
| W3IP | 18 | | |
| | | N9SS | 8 |
| WA4IPI | 10 | GW3NJY/ | |
| WD4EKA/4* | 10 | W9 | 8 |
| K4WO | 15 | K9RO | 5 |
| N4CD | 10 | K9MBX | 7 |
| WA4SBC | 16 | WB9QBU | 6 |
| W3IY/4 | 11 | K9SLQ | 6 |
| WD4GXN | 15 | WA9JFM | 9 |
| K4QIF | 17 | | |
| | | WBØZXU | 6 |
| WB4LHD/5 | 6 | WØOHU* | 11 |
| N5DL* | 5 | WØRT* | 4 |
| WA5FDF* | 6 | KØCJ | 4 |
| WB5LUA | 6 | KØTLM* | 5 |
| K5CM* | 9 | KØALL* | 4 |
| WA5HNK | 5 | KØVXM | 5 |
| | | WØSD* | 6 |
| N6AMG* | 5 | | |
| N6VI | 5 | VE1UT | 11 |
| K6BPC* | 6 | VE1SJ | 8 |
| WB6ESQ* | 6 | VE2BBK | 14 |
| W6OAL* | 6 | VE2KV* | 12 |
| W6XN | 5 | VE3BQN | 11 |
| W6XJ* | 7 | VE3FN | 10 |
| | | VE6SW | 1 |
| | | XE2BC* | 4 |

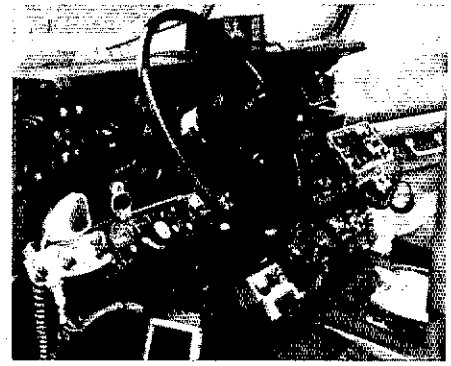
* Indicates multioperator station

with PLL. The output was multiplied by two, three and five using varactor multipliers (300 mW at 2.3 GHz, 200 mW at 3.4 GHz and 100 mW at 5.7 GHz) and fed to the antenna through a stripline 20-dB coupler and directional ferrite circulator. The coupler samples a small amount of transmitter power which acts as the local oscillator. This is applied to one input of a ring-mixer. The main transmitter source is offset by 4 MHz from the mobile units. After multiplication this becomes 8 MHz at 2.3, 12 MHz at 3.4 and 20 MHz at 5.7 GHz. Since the transmitter source is the receiver local oscillator, this frequency difference is the i-f frequency. The 10-GHz setup consisted of Gunnplexer transceivers separated in frequency used as the i-f strip. Thanks to K1KA for the W1FC microwave station information.

## Soapbox

When I got to Norfolk, VA, with my ski gear for departure via military transport, I found that I was 102 pounds over my baggage allowance for the flight to KG4-land. Wore out one knee of my suit pants with my pleading. I must be convincing since I was able to get on the C-141. Left the entire station that was donated by SMIRK there and KG4AN is now on 6 meters for good . . . conditions were not the best . . . had 360 QSOs on 6 before the contest and only 89

during the contest . . . (W2BN). 6-meter conditions were good to the south but poor to the West Coast (VE2KV). The miniature livestock (bugs) that kept us company did not in the least detract from our enjoyment of our tremendous station location (3000 feet high atop a mountain in southwestern PA) . . . Mother Nature put on a fine water show, creating a lake in the middle of our camp on the first day and she chased us off the mountain on Sunday evening with another water show and a heavenly electrical display, just as the 6-meter band had opened for the first time that day . . . All told, we worked 33 states and Canada, not too bad for our first contest — we shall return. 73 de "The Bug Mountain Boys" (WA3CPH/3). A typical springtime coastal tropo opening created excellent band conditions from VE1-land to North Carolina on Saturday night, Sunday morning and Sunday evening . . . I would like to note in particular that activity was spread out nicely on 2 meters as a result of the 144.2 calling frequency (K1PXE). A meteor sked with W1FC on 50 MHz produced a QSO in just a few minutes. This mode should be used more often, particularly during the hours when activity is normally low . . . 220 MHz has real potential, but we need more activity. The real benefits of this band will be realized when the activity increases . . . the 2-meter EME array worked well on terrestrial paths and made up for the otherwise poor conditions on this band (WØVB/WØRGU). Wow!! What a tropo opening on 1296 on Sunday night. I can't wait until I get more than 20 microwatts to that dish . . . Even with such a poor setup, I was able to work four stations in three sections, including W2SZ/1 150 miles away. That comes out to about 7,500,000 miles per watt!!! (WA1TZV). We operated from a high point here in flat South Jersey. Our ground elevation was 180 feet above sea level, which is about as high as you can get in SNJ . . . The duct that ran up the coast on Sunday night was fantastic. We didn't even know if the 1296 gear worked until this test, and wow, does it ever. That band had to be the most fun. Our antenna relay failed, so antenna switching on 1296 was done by N2SB and WB2NPE while WB2RVX manned the key. We looked like three drunk clones of Marconi, listening for New England on 1296! We wish all our competition gud luck in September and we will be in there going strong (hopefully). Projects to improve our sigs on 432 and 6 meters are now underway. This section (SNJ) is becoming very competitive and we love it. *K2NE, Look Out!!* (N2SB/WB2NPE/WB2RVX and N3RG).



Feast your eyes on the rolling communications center of K6LEW/4, VA. What you sees on the outside ain't necessarily what you sees on the inside.

## Feedback

In reference to the 1978 ARRL June VHF QSO Party (see page 89 of November 1978 *QST*), W2BN/KL7, listed as a single-operator station, should have been listed as the multioperator station certificate winner for Alaska. QST

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Scores are listed in order, single-operator stations first within each section. From left to right: call, score, number of QSOs, number of multipliers, bands operated (A-50 MHz, B-144 MHz, C-220 MHz, D-430 MHz, E-1215 MHz, F-2.3 GHz, G-3.4 GHz, H-5.7 GHz, I-10 GHz).

## U.S.A.

### 1

#### Connecticut

K1FO 68,634-589-93-ABCDE
K1ZZ 45,900-513-75-ABCD
K1PXE 37,920-347-79-ABCDE
WB1ALW 19,440-348-45-BCD
WA1UQC 17,543-318-55-ABD
K1EM 15,456-336-46-AB
WA1ZNT 9984-256-39-AB
W9KDR/1 8946-173-42-ABD
WB1CWZ 6920-134-43-ABD
K1KI 6169-199-31-A
WA1CVN 3520-110-32-AB
W1FAJ 3198- 96-26-BCD
WB1EYI 2680-105-26-BCD
W1BYX 2040- 76-24-ABCD
W1VD 1728-108-16-B
KA1BU 1638- 91-18-B
KA1BRD 1320-120-11-B
WA2PIV/1 1050- 75-14-B
WB1HJC 1027- 79-13-B
WA1LOU 560- 34-16-ABC
KA1EA 520- 52-10-B
WA1LUJ(K1s GNW VSC ZKR, WA1HYN,WB1EAT,oprs) 40,320-546-70-ABCDI
WA1GTP(+K1VYU) 13,600-239-50-ABD

#### Eastern Massachusetts

W1JR 42,579-366-83-ABCDEF
K1FWF 11,952-249-48-AB
WB1FUB 10,395-231-45-AB
W1GXT 9791-172-43-BCDE
K1DAT 8775-225-39-AB
K1GVM 7918-191-47-ABD
WB1FKF 6984-173-36-ABD
WA3IOD/1 5632-152-32-ABCD
K1TR 4437-153-29-AB
N1AIS 3819-201-19-B
N1HR 3040-152-20-B
WA1AYS 2780-137-20-ABD
W1CRL 2592- 66-36-ABD
WB1FOD 676- 52-13-AB
W1JGT 210- 19- 7-BDE
W1AYG 120- 8- 5-E
W1XM(AG1E,N1MK,W1XG, WA2EYC,WA4ITG,oprs) 91,485-760-95-ABCDE
N1AMF(+WB1CAL) 1504- 94-16-B

#### Maine

K1TOL 9120-228-40-A
W1YTW 2684- 61-22-CD
WB1AAF(+K1s IO MON,WA1s RCY TFJ,N2EB,WA2s NKL YBA) 24,492-423-52-ABDE
K1CZ(+K1TMJ,WA1BFO) 1764- 42-42-AB

#### New Hampshire

WA1TZV 36,642-419-71-ABCDE
WB1CJT 13,156-227-52-ABD
AG1J 8064-162-42-ABCD
W1EJ 6162- 98-39-ABDE
WA1NPZ 3132-116-27-AB
W1JSM 1581- 93-17-B
WA1GDR 720- 48-15-AB
W1NH 2- 1- 1-C
W1FC(+AF1T,AB1A,N1sAAP ALO BC,K1s KA KEC PEK PQO LL GW RX VR FWE WHS WIS CF KXL ZRT DXC DUW HNZ IBX FJH LLB,WA1s ZSF ZTC ZPA MZC NPN HON JIR KPS YRT) 236,300-1649-139 -ABCDEFGHI

#### Rhode Island

WA1PBR 19,026-242-63-ABCD
W1XJ 9306-240-33-BD
K1COW/1 5502-131-42-ABCDE
WB1FSS 4422-134-33-AB
WA1CSO 4040-202-20-B
WA4MMP/1 2475- 75-33-AB
W1UHE 1960- 52-15-D
KA1AZT 169- 13-13-B
N1DM 114- 19- 6-B

#### Vermont

W1AIM 11,700-173-60-ABCD
K1LPS 11,385-163-55-ABCD
K1GYT 2200- 88-25-AB
WB1BZR 216- 24- 9-B
WA1MAG(+KA1CXD,WA1s JEX NBU UYU,WB1s ADH HIH) 19,380-310-60-ABCD
W1TKZ/1(K1s OGF TK UR, N1ACN,WA1s PQY YOJ YAU ZLQ,WB1s BUM ELJ,WB2SBW, oprs) 17,787-352-49-ABDEF

#### Western Massachusetts

K1WGN 7682-147-46-ABD
W1JP 3591-189-19-B
WB1ABF 3097-163-19-B
K1JX 2660-133-20-B
N1PF 1863- 81-23-AB
WA1UOL 1416- 59-24-AB
K9ES/1 1079- 84-13-B
K1JG 99- 11- 9-B
W2SZ/1(K1s DH RQ XR,WA1s RKS UGE,WB1CBH,W2GN,N2FU,K2s MM TR UF,WA2s FKS SPL,WB2s BXP CFP GFP GSW PKO, WA8USA,oprs) 208,241-1426-121-ABCDEI
WA1RWU(+AC1T,K1BW,KA1APR, WA1ECR,WB1CAC) 56,416-614-86-ABCD
WA1WRM(+WA1s UWX WRK, WB1AKT) 7881-213-37-AB

### 2

#### Eastern New York

W2YX 19,698-402-49-AB
WA2TEO 14,550-274-50-ABC
K2GSF 1836-108-17-B
WA2ANZ 714- 46-14-BC
K2DNR 216- 12- 9-B
WB2GTP 45- 15- 3-B
AB2J(+AB2I,W2s AWX KBH PVS, WA2TIF,WB2s GXF NKN) 56,526-99-72-ABCDE
K2CBA(+AG2X,K2s QE WF,WA2s FPF GUS,WB2BYP) 49,588-427-92-ABCDE

#### New York City - L.I.

K2RIW 6440-140-23-D
K2OVS 5400-150-36-AB
WA2SLY 2940-105-28-AB
WA2EUS 2166- 81-22-BD
WA2WZW 1479- 87-17-B
N2NK 344- 43- 8-A

#### Northern New Jersey

WB2WIK 49,876-631-74-ABD
WA2FGK/2(K2LNS,opr) 39,280-436-80-ABCD
N6NB/2 13,038-211-53-ABCD
WA2CWA 12,558-322-39-AB
N2ADH 10,836-301-36-AB
WB2QOQ 10,716-230-38-ABC
WB2TPH 7527-172-39-ABD
WB2CUT 6424-292-22-B
WB2WIH 4352-107-32-ABCD
W2VC 4340- 70-28-DE
W2AD 3876-180-19-BCD
WB2NCF 2025-135-15-B
WB2CHE 2014-106-19-B
WA2IFG 799- 47-17-B
WA2KKZ 798- 35-21-BD
K2PG 765- 51-15-B
WB2BJH 624- 78- 8-B
K9EOP/2 480- 28-10-BC
WA2ZRT 272- 34- 8-B
WA2SNA(K2s BJG LPG,KA2EPL, K2ELW,N2AAZ,W2s IHM LVT MJA,WA2s HLE JSW JUO UPK, WB2s ARS JCP JUO LHG QEA, WD2AAI,oprs) 112,908-1164-97-ABCDE
K2GE(K2s FD KFE,N2AYM,W2TIN, WA2s GUM NXK OJH ONA,WB2s NXK PLU SNN UYX,K9ZBV,oprs) 93,217-619-73-ABCD
WB2TSY(+WA2UNN,WB2RVO) 1200-100-12-B

#### Southern New Jersey

WB4NXY/2 38,320-408-80-ABCD
W2EIF 29,638-300-73-ABCDE
WA2KOK 24,486-321-64-ABCD
W3CXU/2 18,915-188-65-ABCDE
WB2CUD 15,540-219-60-ABCD
WB2GEX 10,824-246-44-AB
W2PAU 4662-122-37-ABC
AB2Y 3507-167-21-AB
W2HRW 3185- 65-49-AB
WB2QIU 3182- 86-37-AB
WB2YCH 1300- 62-20-ABC
W2ORA 990- 66-15-B
N2SB/2(+WB2s NPE RVX,N3RG) 61,596-602-87-ABCDE
WB2CAM(+WA2ZQW,WB2WNX) 57,889-711-73-ABCD
K2NE(+AF3T,N3RZ,WA3RKM, WB3DCT,KA2BOP) 51,034-589-79-ABCD
K2BWR(+K2ZRJ) 38,982-322-89-ABCDE
WA2DKB(+WB2s JGQ VWW) 22,200-333-60-ABD
N2ASU(+WB2WRP) 7334-193-38-AB

#### Western New York

WA2BPE 20,604-304-63-ABCD
K2YCO 19,296-216-72-ABCDE
K2LWR 8550-342-25-B
W2AV 4560-190-24-B
W2WGL 2705- 65-19-B
W2QUC/2 2500-125-26-AB
K2QGR 2835-135-21-B
K2NV 1125- 75-15-AB
WA3EFE/2 1105- 65-17-A
WB2ELB 714- 36-17-ABD
WA2SZY 310- 31-10-B
N2HP 270- 25-10-ABD
K2DEQ(+WA2s JKF KGM YRG, WB2s IEY KGL RJL) 30,317-391-71-ABCD
WA2ZJF(K2s RKW JJI IJ,WA2s RQC MYU,WB2s FBP NFB KCG MYZ, KA2AZS,oprs) 20,886-316-59-ABCDE
WB2RRK(+WA2s IVD YFB,WB2YIK) 17,760-271-60-ABCD
WB2UEE(WB2s BGI EFB KLD,oprs) 17,472-241-64-ABCD
N2JY(+WB2KIW) 15,370-252-53-ABCD
WA2IKO(+K2FU,WA2TPU, WB2PGU) 12,803-201-59-ABCD
WA2ZKD(+W2HY!) 7831-163-41-ABCD
AF2K(+WA2s CBT CBU DHB) 4640-157-29-ABCD
WA2AAZ(K2MPE,WA2s GAI MCD REC,WB2TGU,oprs) 2808-117-24-AB

### 3

#### Delaware

K3SXA 25,992-305-72-ABCD
AC3T 336- 32- 8-BC
W3CGV 180- 15- 9-ABD
AB3D 128- 8- 8-D
K3HVG/3(+W3BNN) 6160-176-35-AB

#### Eastern Pennsylvania

K3IWK 10,710-196-51-ABD
N3DG 6842-289-22-ABC
AE3T 5248- 82-32-AB
N3ET 2926-154-19-B
WA3HIT 2480-144-14-ABC
WB3KNU 2438-106-23-AB
AA3W 1078- 39-22-BC
K3IUV 825- 27-15-ABCDE
WA3EYD 400- 20-20-AB
WA3KFT 154- 22- 7-AB
WB3AOU 147- 21- 7-A
K3KEL 49- 7- 7-B
WB3CCX/3(AE3T,K3s BPP ELX IUV MWV QQ,N3s EG MW,W3s HMU HQT IJT KKN,WA3s AXV JUF NFV NUF WAS YUE, WB3CDE,WA1YHO,K2EVW, WA2DPU,WB2SZK,oprs) 215,750-1381-125 -ABCDEFGHI
W3BBS(AE3E,K3s AEFMF IJ IJ JSZ PGI RYL VYA,KA3s AFY CAT,KB3DF,N3AAX,W3s GPY OWP PFX VA,WA3s BRN UGP VVG VVJ,WB3s ACE ADS AMY BYP EFH ESS EUP FVJ HTK JTT,WB2IJT,oprs) 200,954-1192-131 -ABCDEFGHI
WB3CZG(+K3s MKZ SAE,KA3AJH, N3AVC,WA3NVS,WB3s CKQ ELY IWZJ 90,475-979-75-ABD
W3HZU(K3GDI,WB3s AWJ BWG, opls) 16,744-316-52-ABC
W3ILG(+WA2GBG,WB3FUR) 12,614-238-53-AB
WB3FXJ(+WB3GZE) 5200-260-20-B
W3LP(W3s GFN JUZ,WA3CUQ, oprs) 5049-153-33-AB
WB3FFW(+KA3BLP) 3720-248-15-B
WB3JYO(+W3ICC,WA3s FEH ZPA,WB3KRW) 3234-129-22-ABC
W3EEK(+VE3HOH,W3JLQ, WB3DFJ) 1940- 97-20-B
W3CWE(+KA3CAZ,WA3PHL) 686- 49-14-B

#### Maryland - D.C.

W3XO 24,684-335-68-ABD
K3HCE 23,058-327-63-ABD
WB3LSY 16,856-301-56-AB
WA3DMF 12,320-205-55-ABCD
W4NVW/3 4794-140-34-ABC
W3IP 4250- 85-25-CD
W3JPT 3510-131-26-ABD
WB3CHS 3096-172-18-B
KJ6SR/3 2983-157-19-B
WA3EQL 2940-140-21-B
K3ZJ 1584- 88-18-AB
W3HQX 1394- 82-17-B
WA3YKI 1200- 75-16-AB
K3RJ 594- 54-11-B
WB3IUT 361- 19-19-B
W3TFA 288- 26- 9-ABCD
W3BQU 270- 30- 9-B
KA3ALC 238- 34- 7-B
K3RXK 32- 7- 4-BD
W3PGA(K3s CBX FRX PHH ROJ KB3EL,N3s AID IT,WA3s FHV HZJ LAW TJN,WB3s AXP BIT, oprs) 19,376-332-56-ABCD
K3TVO(W3FG,WA3s TID YBY, WB3s EKH ICL LCH,oprs) 16,066-265-58-ABCD
W3EAX(N1QG,N2AVC,WA3s WHE YMH YTP ZKH,WB3IEJ, oprs) 14,418-225-54-ABCD

#### Western Pennsylvania

WB3CBB 5292-147-36-AB
W3CSA 3690-123-30-AB
W3KWH(WA3FYJ,opr) 2052- 76-27-AB
W3KJM 220- 20-11-A
W3CNS/3(+W2IOG,K2s LDU LZF OS,WA2s VCM YRL ZQN,WB2s KAO TNL) 47,229-424-91-ABCDEI
W3GNR/3(+W3s DQF IJT,K3s PS TFL,WA3s BUX FFC GQU IHK J6V,WB3s DDA DVR,KA3s AWL BZQ CJJ) 36,126-409-81-ABCD
WA3CPH/3(+KB2s AH EF,K3SPI, WA3QKM,WB3HHS) 27,877-455-61-ABC

### 4

#### Alabama

WA4CQG 10,752-175-56-ABD
WA4NPL 6929-169-41-AB
WA4EWA 2058- 42-42-ABD
W4XP 902- 37-22-ABD
KA4AOK(+KA4CFZ) 3597-109-33-AB

#### Georgia

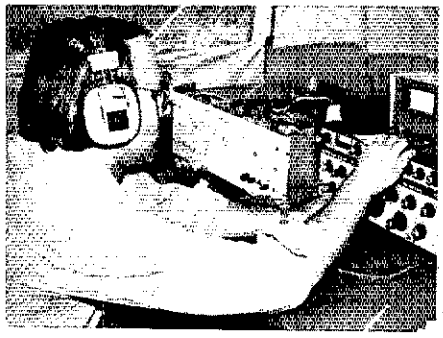
WB4MBN 216- 24- 9-AB
W4LNG 160- 20- 8-B
W8WTA 60- 12- 5-AB
N4UZ 38- 19- 2-AB
AK4T 34- 17- 2-B
W4VO(K4s AEK CKS,WA4IBI, WB4s AEG REX YWK,WD4JLI, oprs) 22,143-347-62-ABD
WB4NMA(+WI4IIS) 16,416-282-54-ABD
N4SJ(+WB4s NNW NPA,WD4s DXD PSF) 588- 98- 6-B

#### Kentucky

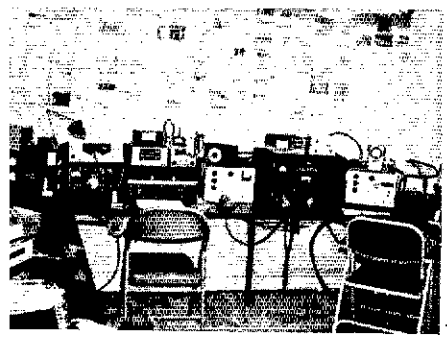
WA4IPI 7830-221-29-BCD
K4UKI 924- 84-11-B
W4SMU 468- 49- 9-BD
WD4EKA/4(+W4VHB,WA4s CBX CUS KYS OGV,WD4s AGO MDK) 10,850-205-50-ABD

#### North Carolina

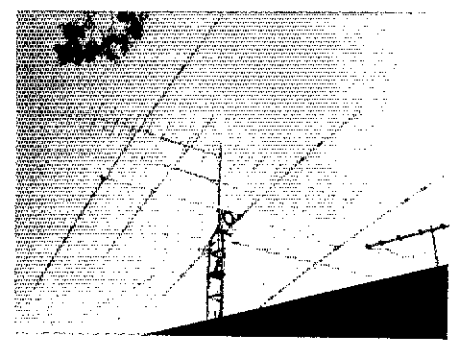
K4WO(WA4GPM,opr) 49,575-592-75-ABD
K4GMP 7896-188-42-AB
K4ROM 1968- 82-24-AB
WB4HFL 1560- 65-24-AB
AA4VK 1342- 61-22-A
WA4GBE 960- 44-20-ABD
WB4MKY 738- 41-18-AB
N4AJF 308- 28-11-AB
W4ZZ 92- 23- 4-B
W4CQ(Multiop) 12,864-371-32-ABCD



K3RYL does 1296, W3BBS-style from eastern Pennsylvania.



The station equipment and antennas of WB2WIK, used to establish the number-two single-op score in this June QSO Party.



N4SM(+KA4FZN,KB4BT, WD4MCH) 12,690-257-45-ABCD
N4AMR/4(+AE4Z,WA4s JTI QZQ) 9867-299-33-AB
W4PAR/4(W4s LYV UIJ UKZ WAU OTI,K4s HGK SWN,N4s BOE ARF, WA4s HAZ EPV KFF JVD PZT, WB4s EMG HCP HCM LSJ VMC, WD4s KUN LYG NTE NTF OLF GET,WA4ASD,oprs) 5332-156-31-ABCD
W4GG/4(N4JB,W4s ACY AKU MR, WB4UJH) 3408-126-24-ABC

**Northern Florida**

WB4BSZ 6468-139-44-ABD
W4OCW 4644-119-36-ABD
W4WHK 3745-107-35-A
K4AWS 2368- 74-32-A
WB5MAC/4 529- 23-23-AB
WA4KKY(+WA4CCH,WB4s GHA VSK) 8228-187-44-AB

**South Carolina**

N4DT 6669-155-39-ABCD
K4KAE 2720- 79-32-ABD
WA4LDU 2240- 79-28-ABD
WB4FEV 2178- 99-22-AB
WB4NBK 308- 22-14-AB
WD4CHS 40- 8- 5-B
W4BFB(K4s BF CEB SE MQG, WA4s VCC YQQ,WB4s PCS FOU YFD,WD4s LMM ABZ ODM FPL AEI,AA4s R, 7Z SC,KK4L,N4AFY, oprs) 57,013-755-71-ABCD
WB4TMT/4(+WA4BFQ,WD4s KED MFG NBE) 1024- 64-16-AB

**Southern Florida**

WD4IYS 13,200-273-48-ABD
K1FJM/4 12,006-259-46-ABD
WD4MGB /440-186-40-A
WB4BND 2952- 82-36-A
K4GFG 640- 40-16-AB
WA4HEF 640- 40-16-B
WB4KGY 40- 20- 2-B
WD4LWL(Multiop) 4810-130-37-A

**Tennessee**

WB4JGG 17,458-280-58-ABD
AF4K 828- 69-12-B
W4FLW 231- 21-11-AB
WA4DFS 120- 20- 6-B
W4TZG(+WA4KJY,WD4KWV) 9660-202-46-ABD
W4SGI(+K4WS,W4LQE,WA4IRG) 8424-255-36-ABCDE
N8DS/4(+K8ZES,WA8KJJ, WB8KSQ) /812-214-36-ABD
N4VC/4[+WD4DGF] 1164- 97-12-B

**Virginia**

N4CD 23,232-341-64-ABCD
WA4SBC 19,880-279-56-ABD
W3IY/4 18,354-299-57-ABD
N4QIF 12,144-177-46-BDE
WD4GXN 11,232-271-36-ABD
K4LHB 10,305-194-45-ABCD
K6LEW/4 3480-105-29-ABCD
WA4HHP 3280-164-20-B
WA4KXV 2826-157-18-B
N4APK 165- 15-11-AB
N4AZI(AB4L,KB4N,WB4WTC, oprs) 12,156-336-37-ABD
W4ATC(AA4OO,N4BYK, WB4TQD,WD4MBK,oprs) 11,408-212-46-ABCD
WA4WZQ/4(+K4YBC,KA4HKK, WA4WZP,WD4GQU) 10,373-243-41-ABCD
WD4FVP(N4IV,KA4s FGY HIW IHL,WA4s FSC QOI WGY,WD4s GXD HSN,oprs) 5104-159-29-ABC

**West Indies**

KG4BN(W2BN,KG4s EP HC,oprs) 1869- 89-21-A

## 5

**Arkansas**

W5SEP 784- 28-28-A
WA2QVI/5 684- 37-18-ABD
WB5NBC 480- 48-10-B
WD5FXX 336- 28-12-A
WB4LHO/5(KA4AOV,WA4NVM, WB4s CHZ OVT NWE,WD4GXI, oprs) 17,160-253-65-ABD
N5DL(+WD5s CAN CAP CLR, KA4DTF,N9ACI,WD9EAG) 11,466-176-63-ABD
WA5FDF(+K5ETU,WB5JAR) 9006-150-57-ABD

**Louisiana**

KB5LE 6240-164-40-AB
WA5UUD 6090-145-42-A
WB5LBT 3344- 85-38-ABD
N5JM 112- 16- 7-A
WA5YOU(+K5BMG,WB5s NIF WZA) 5612-119-46-ABD

**Mississippi**

W5XX 1254- 57-22-AB
WB5QCB(+WA4AUX) 49- 7- 7-A

**New Mexico**

W5FF 2139- 68-31-ABC
WB5AQX 1750- 70-25-A
K5MAT 420- 53- 7-ABC
W5IXR 108- 15- 6-ABC

**Northern Texas**

WB5LUA 14,364-223-57-ABCDE
WD5FZM 13,950-292-45-ABD
WB5KTC 12,833-276-41-ABD!
WA5VJB 11,295-243-45-ABC
WD5HDM 5845-158-35-ABD
WB5FCR 3861- 99-39-A
K5OHU 2232- 72-31-AB

**Oklahoma**

K5CM(+K5SW,N5s CG KW) 60,610-613-95-ABCDE

**Southern Texas**

WA5HNK 30,225-433-65-ABCDE
K5LZO 29,512-479-62-ABCD
K5EI 3937-127-31-AB
WA5IYX 3724-133-28-A
N5AF 200- 25- 8-A

## 6

**East Bay**

N6AMG(+N6IG,WA6VEF, WB6BJO,WD6FGA,W1ARR) 27,388-586-41-ABCD

**Los Angeles**

N6VI 3196-163-17-ABCD
W6CN 1044- 38- 9-BC
N6YB 616- 17- 4-BC
W6NXB 340- 34- 5-C
WB6BDQ 255- 50- 3-ABC
K6ZMW 162- 9- 6-E
W6PFE 63- 7- 7-BC
K6BPC(WA6HXD,WB6YVP, KJWH,oprs) 7344-193-27-ABCD

**Orange**

W6HK 2204- 83-19-ABCD
WB6ESQ(+W6SSN,WA6PMX,WB6s QIA SSO) 8910-225-30-ABCDE

**Santa Barbara**

WA6OYS 1377-120- 9-BC
W6OAL(+AG6K,WA6EJO, WB6IMM,WB9KMO) 17,955-295-45-ABCDEI
K6MEP(K6s ELQ VMN,N6MA, WA6s DJS FPX IJZ,WB6GNS, oprs) 2296- 41-41-ABCDEI

**Santa Clara Valley**

K6KLY 3654-115-29-ABD
W6XN 3014- 89-22-BCDE
WB6JNN 704- 52-11-BD
WA6EKJ 520- 65- 8-B
K4FTO/6 259- 37- 7-AB
K6SLQ(K6MO,opr) 224- 30- 7-BD
AJ6T 36- 9- 2-D
W6IJWJ 36- 12- 3-B

**San Diego**

WB6FTW/6 2420- 96-20-ABC
N6CW 1184- 74-16-AB
W6XJ(+K6s HAA JYO,KD6R,N6s MN NR,WA6IGY,WB6IMV) 42,490-499-70-ABCDE

**San Francisco**

WB9LOZ/6 1440-156- 9-BC
K6RFT 108- 18- 6-B

**San Joaquin Valley**

WB6LBR 1300- 50-26-AB
K6YK 405- 27-15-A
W6DPD 374- 31-11-ABC
W6TLY 315- 45- 7-B
AE6W/6 200- 25- 8-B
W6TO(WA6SBM,WB6s INM ITM TIA VOG,oprs) 2210- 91-17-ABCD

**Sacramento Valley**

W6SX 24- 12- 2-C
W6YKM/6(+K6UJK,WA6EZM, WB6KBZ) 21,879-366-51-ABCDE

## 7

**Arizona**

W7LUX 231- 28- 7-BD
WA7JTM(+WA7s JTL LYI,WB7VVD) 6728-218-29-ABCD

**Idaho**

WA7FSI/7 1044- 58-18-AB
WA7YAX 260- 20-13-AB

**Montana**

W7KNT 490- 35-14-A
WA7PDC 50- 10- 5-AB
N7ALX(+WA7KHQ) 34- 34- 1-B

**Nevada**

K7NV 2044- 73-28-A
N7AKB(+K7ICW) 3854- 94-41-AB

**Oregon**

WA7RTA/7 5495-142-35-ABCD
K7HSJ 1404- 85-12-ABCDE
W7TYR 1040- 65-13-ABCDE
W7JXU 871- 61-13-ABD
WA7RQS 62- 31- 2-B
N7DB/7(+WA1GFM,WA7ECY, WB7PMP) 9879-239-37-ABCD
K7AUO(W7UDM,WB7FHF,oprs) 1248- 77-13-ABCD

**Utah**

WA7ADK(+WB7QVZ) 96- 24- 4-B

**Washington**

K7KOT 3696-143-22-ABCD
W7YOZ 3040-139-19-ABCDE
W7KFS 1246- 89-14-AB
W7KKE 770- 65-11-ABD
KB7AQ 592- 74- 8-AB
WB7UUP 412- 86- 4-BC
WA7BTG 399- 57- 7-A
W7IDZ 98- 14- 7-AB
N7NW/7(+K7s ND WTG,WA7NAN) 18,354-364-42-ABCDE

**Wyoming**

WA7KYM 1024- 32-32-AB
WB7UJY 832- 52-16-A

**Alaska**

WL7ACY 52- 26- 2-AB

## 8

**Michigan**

WB8BGY 13,720-273-49-ABD
AF8Z 5775-157-35-ABD
WD8DSV 2574- 99-26-AB
WB8AAX 1254-114-11-B
K8BGZ 828- 92- 9-B
WA8ULG(+KA8CQM,WA8s MFL MGO QBG VXE,WB8s PGK WXS, WD8JOM,oprs) 5104-167-29-ABD

**Ohio**

WA8TTS 38,064-445-78-ABD
K8AT 26,400-372-66-ABD
WB8PAT 11,300-202-50-ABD
K8WW 4136- 94-22-D
K8DID 3816-144-23-BD
WB8VSU 3612- 86-11-B
K8DW 2970-101-27-ABD
WA8SVV 2047- 89-23-AB
W8LCY 814- 74-11-B
WD8MSF 625- 25-25-AB
WD8QME 400-100- 4-B
K8MR 75- 15- 5-B
W8DJY(+W8ULC,WA8s IUQC WXT, WB8s EEX NFJ,WD8s DZN KVR) 40,937-577-67-ABCD
W8VP(W5UA,K8AL,KA8s DGCC DUH,W8LBB,WA8AHD,WB8s DQE ERB ONY TRK TSI YCZ, WD8s AHV AKI LVJ QJB,oprs) 39,970-559-70-ABCD
WD8RZG(+WD8s IQJ RUW) 1800- 90-20-A
WD8QMP(+KA8EHA) 161- 41- 4-B

**West Virginia**

WB2DNE/8 15,565-283-55-AB
W8AEC 4920- 91-40-ABD
W8UT 64- 8- 4-D
K3LNZ/8(WA3s EOQ NZL OYW, W4PSJ,WA4LJQ,oprs) 36,708-437-76-ABCD
W8GK/8(K8s BS CG WMX, KA8ALA,N8AMS,W8DL,WA8OKG, WB8s GDY ZLY,WD8s BCY JYM JYN OZT,oprs) 23,464-410-57-ABI
WB2DIN/8(+N8II,KA8CPI, W8BQPU) 20,822-341-58-ABD
K8BO(+WA8WDK,WB8s CNN WJJ WJL,WD8s EAV MPX,oprs) 6858-254-27-AB

## 9

**Illinois**

N9SS 33,060-416-76-ABCD
W9IP 26,624-416-64-AB
GW3NJY/W9 24,122-437-53-ABD
K9RO 24,320-365-64-ABDE
K9SM 3090-103-30-AB
K9MBX 2432-134-16-BD
WB9SNR 2193- 80-17-BDE
WB9GBU 1980-112-15-BD
W9IVT 1485- 99-15-AB
AE9F 693- 99- 7-B
WA9AHZ 620- 31-20-A
W9IFA 338- 26-13-ABD
W9ABA 165- 33- 5-B
W9ZX(+WB9VDV) 9120-190-48-AB
WD9GGY(+WD9BHK) 234- 39- 6-B

**Indiana**

WB9NTL 7667-183-41-ABCD
W9NFE 6588-183-36-AB
WA9PKL 5724-159-36-AB
K9KB 5673-183-31-AB
K9SLQ 4495-155-29-ABD
W3EP/9 3667-193-19-B
WA9MCJ 1568-112-14-B
KA9ASH 1425- 72-19-ABCD
K9DZS 1026- 57-18-AB
WD9EME 540- 54-10-B
W9CGI 494- 38-13-AB
WB9FNR 294- 42- 7-B
N9RC 261- 29- 9-B
WB8HUC/9(WB8s GEU GEW GEX GEY,WD8MQG,oprs) 18,096-377-48-AB
W9LTU(+WB9s DAG OAG SEF) 3321-123-27-AB

**Wisconsin**

WA9KGQ 5662-145-38-ABD
WB9OPD 4719-121-39-A
K9XY 2945- 87-31-ABCD
WA9LZM 2790- 93-30-AB
WA9JFM 2214-102-18-BD
WA8CUH 1332- 66-18-ABD
WB9ROE 666- 37-18-AB
N9TD 441- 49- 9-B
WB9PDK 26- 26- 1-B

## 0

**Colorado**

WB0TTW 7744-242-32-AB
W0KJY 3625-119-29-ABCD
WB0WEC 3025-113-25-ABCD
WB0VGC 2240-112-20-AB
W0DYR 930- 62-15-A
N0BO 132- 42- 3-BD
N0KV(+K4AJQ,AA0L,K0VXC, KA0CHA,N0s BZ DV,W0s MBZ YNE,WD0GNM) 17,435-308-55-ABCD
WB0IKJ(+W0OZL,WB0s NOX OPV) 5600-175-32-AB
K0IPH(+AA0R,AC0Y,KA0DEH, KB0CY,WD0s DJU HQS) 5040-171-28-ABCD

**Iowa**

WB0ZXU 18,117-279-61-ABD
WB0TEM 10,927-218-49-ABD
W0OHU(+K7YB,AE9M,K9s AKS CHZ,W9UD,WB9QPI) 68,796-715-91-ABCD

**Kansas**

N0LL 11,752-226-52-AB
W9QDA 315- 35- 9-B
W0RT(+K0OBY) 2573- 77-31-ABD

**Minnesota**

W9XG 7137-183-39-AB
K0CJ 2064- 79-24-ABD
W0UC 816- 51-16-AB
W0PEC 77- 18- 4-B
W0RGU(+K0s GJX SE,KA0CRO, KB0AA,W0VB,WA0s QWY ULE, WB0MBO,WD0HEB) 20,916-317-63-ABCD

**Missouri**

WD0CFU 2268- 84-27-AB
W0RWH 2212-158-14-B
W0JRP 2175- 75-29-AB
WB0TNX 756- 45-14-ABCD
WB0WGG 484- 22-22-AB
N0ALV 480- 40-12-A
KA2LE/0 420- 35-12-B
W0JKC 266- 38- 7-AB
KB1LM(+AJ0E,N0AJI,WA0WPJ, WB0DKS,WD0HIC) 19,648-287-64-ABCD
AI0L(+KA0AWY,N0JL,W0s OTF YRL,WB0ZHB) 6401-173-37-AB

**Nebraska**

WB0YSG 588- 43-12-BD
W0NR1/0(+W0LJF,WB0GCC) 1950- 78-25-A

**North Dakota**

WA0CSL 5735-185-31-A
W0RIB(+WB0UOR) 3605-103-35-AB
K0ALL(+AJ0K,WA0s ZOK ZNJ, WH0s JLP MLU) 2346- 62-34-ABD

**South Dakota**

K0VXM 16,232-262-56-ABD
WB0YQS 9020-201-44-ABD
WB0ULX/0 128- 15- 8-ABD
W0SD(+AA0F,K0s AG HF QC, KB0ES,N0AIT,WA0UFS, WD0HOJ,WA2VEY) 33,670-433-74-ABCD

# VE

**Maritime - Newfoundland**

VE1ASJ 17,380-316-56-AB
VE1UT 5982-185-27-BD
VE1BNN 1975- 75-25-AB
VE1SJ 756- 33-17-BD
VE1BCZ 184- 46- 4-AB

**Quebec**

VE2BBK 4329- 79-39-ABD
VE2KV(+VE2s FMF FMI FRJ FSM NW YU,VE3BT2) 26,664-365-66-ABCDE

**Ontario**

VE3BQN(VE3CRU,opr) 12,348-223-49-ABCD
VE3FN 4092-111-31-BD
VE3CKU 3432-143-24-A
VE3GCE 2016-126- 8-B
VE3CRA 264- 22-12-A
VE3HAB 90- 18- 5-B
VE3AEA/3(VE3s FDP HCI IQZ IRW,oprs) 9143-211-41-ABD
VE3ESE(+VE6HKS) 1722-123-14-B

**Alberta**

VE6SW 78- 12- 6-ABD

**British Columbia**

VE7XF 792- 63-12-ABC
VE7ASM/7(VE7s ALJ AOU ASI BBB BN,oprs) 724- 88- 8-AB

# DX

**Mexico**

XE2BC(Multiop) 13,728-248-39-ABCDE
XE2II(+K5HVC,W5XW,WA5NAD) 2461-107-23-A

**British Virgin Islands**

VP2VDL(WB2RLK,AI4R,oprs) 1003- 59-17-A

**Check Logs**

W1WHL,WA1MUG,K4EJQ,K7ICW, WA2AFE,W2CC,KP6BC/2,WA6ZKC

# Results, Second Annual ARRL EME Competition

By Tom Frenaye,* K1KI

Interest in weak-signal work on the vhf bands seems to be increasing rapidly. This year's EME Competition was attended by 103 stations, an increase of more than 10 percent from last year.

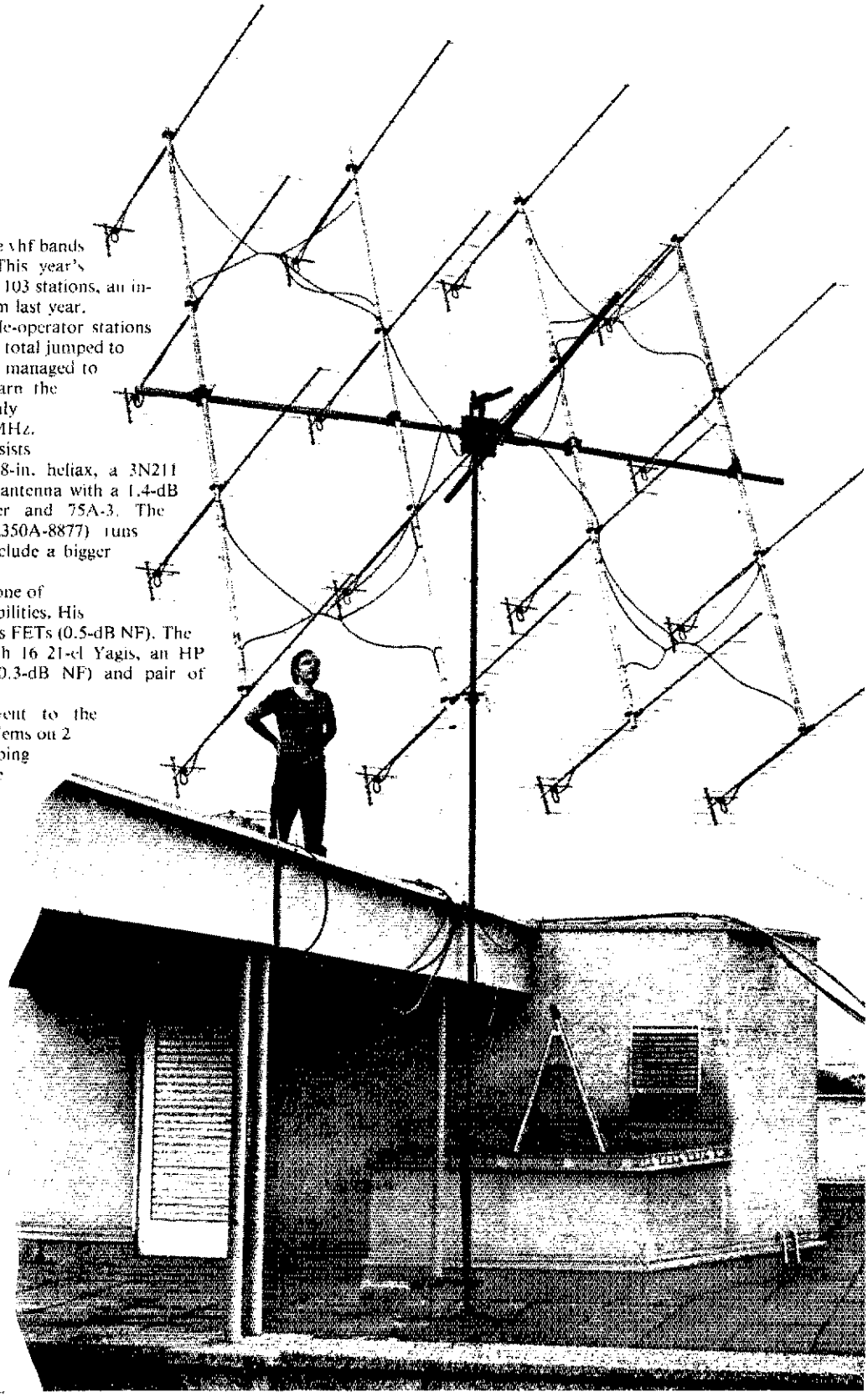
The average QSO total for single-operator stations last year was 6.9, while this year the total jumped to 13.1 — quite an increase! K1WHS managed to work a total of 39 stations to earn the number one spot. This was with only one weekend of operation on 144 MHz. The complete setup at K1WHS consists of a 160-el collinear fed with 7/8-in. heliax, a 3N211 MOSFET preamp mounted at the antenna with a 1.4-dB noise figure, homebrew converter and 75A-3. The homebrew transmitter (6360-4CX350A-8877) runs 1000 watts. Plans for next year include a bigger and better antenna.

Number two went to WB5LUA, one of the few with both 144 and 432 capabilities. His preamps both use DXL 3501A GaAs FETs (0.5-dB NF). The top 432 honors went to F9FT with 16 21-el Yagis, an HP HFET1101 GaAs FET preamp (0.3-dB NF) and pair of 4CX250Rs.

Multioperator honors again went to the K2UYH group with 37 QSOs. Problems on 2 meters prevented them from topping their score from last year. The K3NSS super antenna was put on both 144 and 432 this year with a resulting score nearly double the top score from last year, despite a myriad of equipment problems.

Seems that the choice of weekends didn't turn out to be the best, with low moon declinations hurting a number of stations. Next year we'll do better. The sun didn't help either, with unsettled magnetic activity making Faraday rotation a big problem.

Again, everybody stuck to 144 and 432 for the most part, though PAØSSB (NE64535 preamp) did work W6YFK on 1296 with solid signals (even ssb).



The YU2RGC station consists of an NEC 645 receiver with 600-Hz filter, a pair of 4CX250Bs and 16 23-el Yagis. *(YU2RTX photo)*

*Asst. Communications Manager, ARRL

## ECHOES

Most signals averaged 6 dB above the noise (F9FT). Most contacts were made on CQs. U.S. activity on 432 was very low (K5JL). Please use positive declination next year (SM6CKU). Schedule the contest for the summer or fall. Many stations wanted to get on but it is very tough to get things going during the winter months (WA1JXN). Pleased to work all continents again this year (VE7BBG). Finished up my WAS with KH6 and KL7 (WBØZXU). Power line noise was very bad (DK5LA). My first contest. May have 1296 next year (VE4MA). Was still hearing JA6CZD with the moon 2.3° below the horizon (K4QIF). For a reason that remains a mystery, transmit capabilities remain far inferior (WA3VSJ). Largest number of Europeans ever heard (W8WN). Impossible to make some QSOs with everybody between 144.004 and 144.006 (I2MBC). Too much QRM (WA4NJP). 432 sounded like the 40-meter Novice band (K3LFO/K3NSS). The decision of the big guns not to schedule during the contest has its pros and cons. The Europeans felt (rightly so) that they were at a disadvantage because we could easily set up via the telephone. On the other hand, it effectively eliminated the marginal EME group. I can just barely make it with 4 14-el Yagis and would have loved just one QSO (W5UWB). Heard bursts from many stations but no valid QSOs. Next year will be better (OK1DAK/OK1KIR). The EME boys are very helpful to newcomers (WA7JUO). QST

**Line scores list: Call, score, stations heard, stations worked, multipliers, band (A-144 MHz, B-432 MHz, C-1296 MHz)**

| Single Operator | | | Antenna |
|---|---|---|---|
| K1WHS | 70,200-47-39-18-A | | 160-el colinear |
| WB5LUA | 63,800-10-10- 7-A | | 160-el colinear |
| | 19-19-15-B | | 16 13-el Yagi |
| F9FT | 48,600-31-27-18-B | | 16 21-el Yagi |
| K5JL | 46,800-28-26-18-B | | |
| ZE5JJ | 45,900-28-27-17-B | | 10 meter dish |
| PAØSSB | 45,600-23-23-18-B | | 6 meter dish |
| | 1- 1- 1-C | | 6 meter dish |
| SM6CKU | 42,500-31-25-17-B | | 8 meter dish |
| WA1JXN | 40,000-40-25-16-A | | 8 16-el Yagi |
| K5BMG | 39,100-23-23-17-A | | 8 16-el Yagi |
| OK1FGA | 38,400-30-24-16-A | | 8 15-el Yagi |
| JA6CZD | 35,700-24-23-17-B | | 10 meter dish |
| DF9KR | 30,800-23-22-14-B | | 16 10-el quagi |
| F2TU | 30,400-20-19-16-B | | 6 meter dish |
| DL7YCA | 30,000-20-20-15-B | | 16 19-el Yagi |
| VE7BBG | 26,000-20-20-13-B | | 6.6 meter dish |
| I2UOR | 25,200-23-18-14-B | | 8 meter dish |
| GW4CQT | 24,700-19-19-13-A | | 160-el colinear |
| W1FN | 22,800-22-19-12-A | | |
| WBØZXU | 19,800-40-18-11-A | | 8 16-el Yagi |
| W1JR | 19,500- 1- 1- 1-A | | 4 19-el Yagi |
| | 14-14-12-B | | 16 21-el Yagi |
| WB5LBT | 18,700-17-17-11-A | | 16 7-el loop Yagi |
| WBØQMN | 15,300-19-17- 9-A | | 8 14-el Yagi |
| YU2RGC | 14,300-13-13-11-B | | 16 23-el Yagi |
| K9KFR | 12,600-14-14- 9-A | | 16 8-el quagi |
| DK5LA | 12,100-26-11-11-A | | 160-el colinear |
| SM7BAE | 12,000-14-12-10-A | | |
| W4WD | 12,000-12-12-10-B | | 16 4b-el J beams |
| VE4MA | 9,000-11-10- 9-B | | 8 19-el Yagi |
| DJ8QL | 8,000-10-10- 8-B | | 7.6 meter dish |
| WA7BJU | 7,700-24-11- 7-A | | |
| W8IDU | 7,700-11-11- 7-A | | 160-el colinear |
| K4QIF | 6,400-14- 8- 8-B | | 6.6 meter dish |
| FØMD(DK4XI) | 6,300-25- 9- 7-A | | 16 9-el Yagi |
| G4DZU | 6,300-12- 9- 9-A | | 4 14-el Yagi |
| SM3AKW | 5,600- 9- 8- 7-B | | 16 17-el Yagi |
| WA4GPM | 5,400- 9- 9- 6-A | | |
| N7NW | 4,900- 8- 7- 7-A | | 4 16-el Yagi |
| WA4CQG | 4,800- 8- 8- 6-A | | 4 16-el Yagi |
| WAØLPK/KL7 | 4,200- 9- 7- 6-A | | 4 16-el Yagi |
| K4GL | 3,600- 8- 6- 6-A | | 160-el colinear |
| VK5MC | 3,600- 6- 6- 6-B | | 6.6 meter dish |
| WØSD | 2,500-14- 5- 5-A | | 8 14-el Yagi |
| JA9BOH | 2,500- 1- 0- 0-A | | 8 10-el Yagi |
| | 6- 5- 5-B | | 8 14-el Yagi |
| W7JF | 2,400- 7- 6- 4-A | | 4 16-el Yagi |
| KH6IHP | 2,400- 6- 6- 4-A | | 4 16-el Yagi |
| JA6DR | 1,600- 4- 4- 4-A | | 12 meter dish |
| WA3VSJ | 900-25- 3- 3-A | | 16 3-el quad |
| I4EAT | 900-14- 3- 3-A | | 4 14-el Yagi |
| K1MNS | 400-11- 2- 2-A | | 8 16-el Yagi |
| WA4AUY | 400- 6- 2- 2-B | | |
| W8WN | 100-18- 1- 1-A | | 4 16-el LP Yagi |
| KØKE | 100-18- 1- 1-A | | 8 8-el Yagi |
| G5CSZ(W4FAY) | 100-12- 1- 1-A | | 4 21-el Yagi |
| K9XY | 100- 5- 1- 1-A | | 8 8-el quagi |

**Multioperator**

| | | |
|---|---|---|
| K2UYH(WB2s HHH PKY,W3HQT,oprs) | | |
| 88,800- 2- 1- 1-A | | 9 meter dish |
| 39-36-23-B | | 9 meter dish |
| I5MSH(+I5TDJ) | | |
| 53,200-28-28-19-B | | 11 meter dish |
| G3WDG(+G3YGF) | | |
| 28,000-26-20-14-B | | 6.6 meter dish |
| K4PKV(+WB4EXW) | | |
| 18,700-17-17-11-A | | 4 19-el Yagi |
| I2MBC(+I2s FUM SVA SXZ ZFN,I5MZY) | | |
| 11,700-22-13- 9-A | | 8 16-el Yagi |
| WA7JUO(+W4FAY) | | |
| 5,600-25- 8- 7-A | | 160-el colinear |
| UK2BAS(UP2s BBC PAJ,oprs) | | |
| 4,900- 7- 7- 7-B | | 72 4-el Yagi |
| W2AV(+K2OS,WA2ZKD) | | |
| 2,000-15- 5- 4-A | | 4 12-el LP Yagi |
| WA4NJP(+WB4NMA) | | |
| 600-23- 3- 2-A | | 8 9-el Yagi |
| G3OUR(G3s WDG YGF,G4s BUO EZN GFX,G8s LYB RHI,oprs) 400- 3- 2- 2-A | | 4 16-el Yagi |

**Non-amateur Equipment**

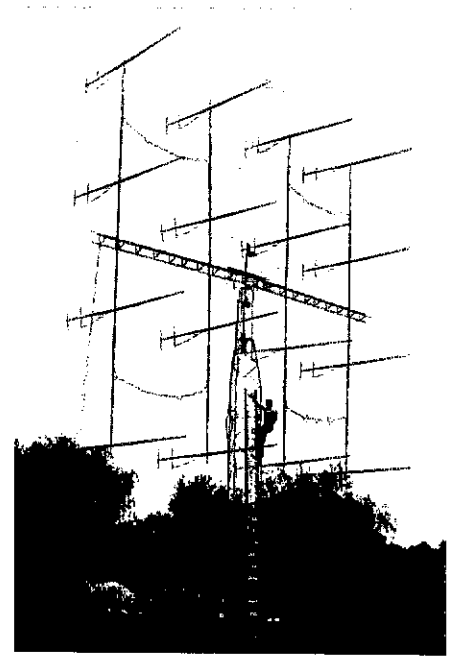
| | | |
|---|---|---|
| K3NSS(W1ZX,K3s JYD LFO,WJPJM,W5CQ,K6LEW, N7BW,oprs)210,000-30-27-13-A | | 23.7 meter dish |
| 35-33-22-B | | 23.7 meter dish |

**SWL**

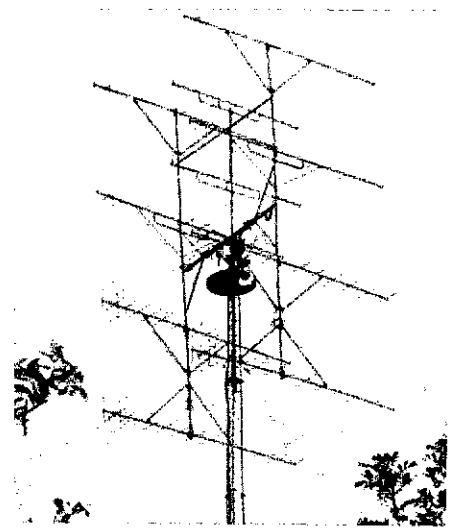
| | | |
|---|---|---|
| PAØXMA | (144 - 11 stations heard) | 4 10-el Yagi |
| W5UWB | (144 - 8 stations heard) | 4 14-el Yagi |
| K2QR | (144 - 1 station heard) | 1 15-el Yagi |
| G8EKB/W1 | (432 - 10 stations heard) | 16 8-el quagi |
| OK1KIR(OK1s DAI DAK DCI DKW,oprs) | (432 - 5 stations heard) | 5 meter dish |

**Other Active Stations**

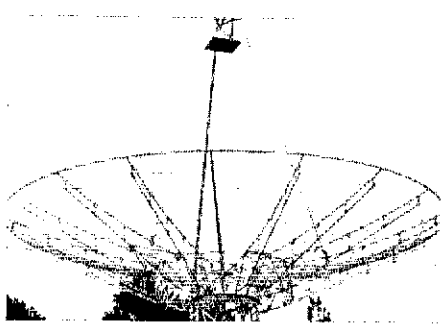
K1FO WA1TFH W1XP K2CBA K3PGP K4IXC K5GW W5ITI WB6ESQ WB6NMT W6PO W6YFK WA7BBM W7GBI K7ICW K7KOT W7UBI K9HMB K9IMM WØPW WØVB WBØYSG G4DGU I8CVS LX1DB OZ9CR SM4DHN SM5BFK VE7BQH XE1RY YU1PKW YV5ZZ ZL2BCG



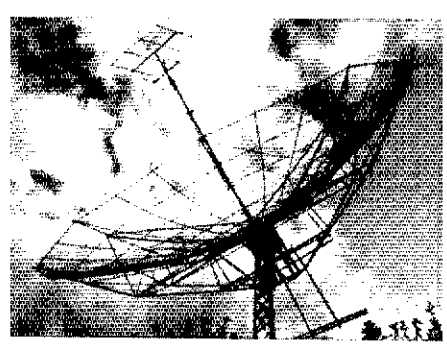
K9KFR's 16 8-el quagis put the finishing touch on his EME system (TS-700A/3N204 preamp/4CX250s) the weekend before the second half of the contest.



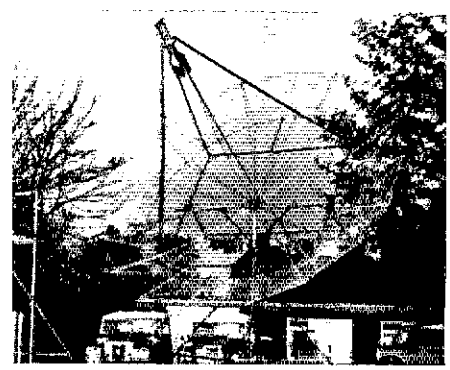
The 160-el array of DK1FGA, along with a homebrew 1.2-dB NF converter and 800-watts input earned the number 10 single operator position.



ZE5JJ's homebrew station includes this 9.9-meter dish, a pair of 4CX250Bs, and NE24406 GaAs FET preamp (0.6 dB). With it, he earned fifth place.



JA6DR makes himself heard with his 7213 amplifier and 12-meter dish. A 3SK48 provides a 1.2-dB noise figure for his preamp.



The G3WDG 6.6-meter dish performed well along with the Plessey GaAs FET GAT4 preamp (0.7 dB) and pair of 4CX250Bs.

# Simulated Emergency Test Announcement

## Hams to SET new records on October 6 and 7!

By Robert Halprin,* K1XA

While the World Administrative Radio Conference is in full swing in Geneva, Amateur Radio operators on this side of the Atlantic will get their second opportunity of 1979 to demonstrate their massive emergency communications capability. Last month's article on Wichita Falls et al showed why a trained organization is vital to the public welfare. Two SETs were put on the agenda for 1979 to permit a smooth transition from a January activity to an October one. See December 1978 and June 1979 *QST* for the whys and wherefores of the rescheduling.

Mark your calendar; October 6 and 7 is when the ARRL one-two punch of the Amateur Radio Emergency Service and the National Traffic System get to strut their stuff. With a reasonable expectation of better weather, more daring simulated scenarios will be planned. In the recent past, we have seen amateurs participate in fascinating simulated public service activities — like the search for King Kong in southern California, an attempted terrorist takeover in the Midwest, a runaway barge loaded to the gills with toxic chemicals in Ohio and a jet plane crash in Colorado.

If this sparks your interest, then you could be wondering, "How do I participate?" Here's how. Most local activity will center on 2 meters. If you have a 2-meter fm radio, you're golden. You should contact your local emergency coordinator and tell him you're interested. If you are unable to find out who that is, the next step is to get ahold of your SEC (see below) or SCM (page 8). These are the folks who coordinate the SET activities in your area.

Your EC will clue you in to what activities will occur on SET weekend. The EC may invite you to join ARES, which simply requires you to fill out a card denoting your band capabilities and your willingness to participate in ARES exercises.

Many ARES groups work closely with the government civil preparedness, RACES, Red Cross, Salvation Army, REACT and other agencies. There should be more than enough assignments for everyone. If your locality does not have an emergency coordinator, perhaps you or another ham could volunteer. Again, contact your SEC or SCM.

Those of you who are more low-band oriented can get in on the SET action by helping out on your section National Traffic System net. Most every ARRL section has at least one net meeting on 75/80 meters (as well as local nets on vhf). We suggest you familiarize yourself with traffic-handling procedures; the ARRL *Net Directory*[1] is a good source. In an emergency, it is imperative that all stations go about handling communications and traffic in a standard format. If possible, report into net sessions before SET to get to know the routine. The net manager will announce what extra scheduling will happen during the weekend.

Although October 6 and 7 is the official weekend, groups are free to hold their SETs on any two-day period between September 1 and October 31 to coincide with the time when amateur activity, public service value and mass-media exposure can be the greatest. All SETs held within the designated period will be included in the SET results in an upcoming issue of *QST*. The deadline for all reports is January 31, 1980.

On the subject of reports, all ARRL League Officials automatically get a SET newsletter and reporting forms. Those of you who aren't affiliated with the ARRL field organization but are public service coordinators of some type should contact the Communications Department at ARRL hq. for the special SET mailing. A compilation of timely reports is one way that we can document the unique ability of Amateur Radio to provide "professional-sounding" communications.

For SET, all nonroutine test messages should carry the word TEST before the precedence, e.g., Test Priority on phone or TEST P on cw. As a further step to insure test messages will not be construed as the real thing, use the words TEST MESSAGE in the first two words of the text. Do not use TEST in the precedence or in the text of a routine message. A routine message is a routine message, regardless of whether or not it was drafted for the SET. For improved efficiency and fewer Excedrin headaches, try to avoid using long words such as participating, communications, etc., in texts whenever possible.

To prevent SET messages from dragging out beyond the SET period, the handling instruction HXB is used. Loosely interpreted, HXB means "cancel message if not delivered within the SET period; send a service message to originating station." For SET messages sent during exercises held on a date other than the primary weekend, use HXB followed by a number, e.g., HXB48, which means "cancel message if not delivered within 48 hours of filing time; send a service message to originating station." If the message is not a test message and you would like to have it delivered even after the SET is over, don't use HXB at all.

Would you be able to communicate if you suddenly lost electrical service? This happens in many emergencies. Some exercises and net sessions will operate on the assumption that commercial power has been disrupted. Equip yourself with some sort of emergency-power source or battery-operated rig.

History has shown that when real emergencies develop, hams are willing to assist and are extremely generous with their time. Yet it is also evident that amateurs without adequate training can be more of a detriment than a help. Those are the ops who come out of the woodwork to ooze all over the emergency nets. Don't be one of them. Participate in this learning experience. It's actually fun.

[1]Available from Hq. for a 9 × 12-inch addressed envelope with 41-cents postage.

The Harris County (TX) ARES was active during the SET. Shown here are (l to r) W5UZJ, W5SPD and WA5RRI, taking care of the southeast sector operations. *(K5AZ photo)*

*Assistant Communications Manager, ARRL.

## Section Emergency Coordinators of the American Radio League

### Canadian Division

*Alberta*
E. Roy Ellis, VE6XC
RR 1, Box 2, Ft. Saskatchewan T8L 2N7

*British Columbia*
Harold E. Savage, VE7FB
4553 West 12th Ave., Vancouver V6R 2R4

*Manitoba*
Brian J. Lenius, VE4TR
Box 18, Group 4, RR 1, Anola R0E 0H0

*Maritime/New Foundland*
James S. G. Pratt, VE1ASW
27 Birchfield Crescent, Halifax, NS

*Ontario*
Charles H. Powers, VE3APK
1393 Bridge Rd., Oakville L6L 2C8

*Quebec*
Adrien Michaud, VE2DEA
1630 St. Croix Blvd., Montreal H4L 3Z8

*Saskatchewan*
Bill Munday, VE5WM
132 Shannon Rd., Regina S4S 5B1

### Atlantic Division

*Delaware*
David R. Elzey, W3PQ
513 Woodmere Rd., Milford 19963

*Eastern Pennsylvania*
Robert A. Josuweit, WA3PZO
9 Derwen Dr., Havertown 19083

*Maryland-DC*
Rupert D. Phillips, W3HJH
Rte. 3, Box 350, Mechanicsville 20659

*Southern New Jersey*
Austin B. Prestwood, Jr., W2HOB
6 Kingsley Rd., Mount Holly 08060

*Western New York*
David Struebel, WB2FTX
39 Park Blvd., Lancaster 14086

*Western Pennsylvania*
Gerald R. Patton, WA3VUP
1504 Third Ave., Duncansville 16635

### Central Division

*Illinois*
R. G. Martin, Jr., W9AES
2134 W. Ridgeview Dr., Decatur 62521

*Indiana*
Bruce B. Woodward, W9UMH
6208 Bramshaw Rd., Indianapolis 46220

*Wisconsin*
Gary D. Maples, W9OAK
1006 Marquardt Rd., Wausau 54401

### Dakota Division

*Minnesota*
Keith M. Graham, KØHJC
222 Monroe, Anoka 55303

*North Dakota*
Mike Mankey, WBØTEE
1318 Pocatello Dr., Bismarck 58501

*South Dakota*
James M. Nance, WAØTNM
Rte. 2, Box 69, Colome 57528

### Delta Division

*Arkansas*
Ralph D. Bartow, WD5IRB
6915 Knollwood, Little Rock 72209

*Louisiana*
Gary Uildriks, WB5IYH
2844 Anita Ave., Baton Rouge 70805

*Mississippi*
Charles E. Bardsley, WB5FXA
2425 Pascagoula St., Pascagoula 39567

*Tennessee*
Milo Ward, WB4DYJ
Rte. 3, Box 360C, Laurel Rd., Clinton 37716

### Great Lakes Division

*Kentucky*
Gerald Hite, WB4ZML
3517 Schaffner Dr., Louisville 40216

*Michigan*
Dale R. Williams, WA8EFK
291 Outer Dr., Dundee 48131

*Ohio*
Ralph A. McDonough, K8AN
Box 240, RD 2, Adena 43901

### Hudson Division

*Eastern New York*
Paul S. Vydareny, WB2VUK
259 N. Washington St., N. Tarrytown 10591

*New York City-Long Island*
Paul A. Lindgren, WA2UWA
8 Cooper Ln., P. O. Box 1158, E. Hampton 11937

*Northern New Jersey*
Robert Weingaertner, WB2VUF
4 Leddell Rd., Mendham 07945

### Midwest Division

*Iowa*
Harold M. Rozenberg, WØIYW
104 Lincoln SE, Bondurant 50035

*Kansas*
W. D. Bemels, WØKL
40 Rockwood Dr., Ottawa 66067

*Missouri*
Robert S. Mulford, WBØFKY
1406 Peggy Cir., Lees Summit 64063

*Nebraska*
Stephen O. May, WAØASM
2830 S. 42nd St., Lincoln 68506

### New England Division

*Connecticut*
Robert Warzocha, W1SY
12 Wooding Rd., Yalesville 06492

*Eastern Massachusetts*
Douglas A. Chisholm, WA1BLG
41 Birchwood Rd., Wilmington 01887

*Maine*
Martin B. Bernstein, WA1YUW
6 Frye, Lewiston 04240

*New Hampshire*
John Johnston, K1RSC
RFD 1, Lake Rd., Exeter 03833

*Rhode Island*
David A. Tessitore, K1DT
680 Putnam Pike, Greenville 02828

*Vermont*
H. A. Preston, W1VSA
RFD 1, Charlotte 05445

*Western Massachusetts*
Robert H. Phoenix, WA1DNB
44 Carew St., South Hadley 01075

### Northwestern Division

*Alaska*
Frank Pratt, KL7FSE
7446 East 20th Ave., Anchorage 99504

*Idaho*
Harold Short, WA7UHW
923-10th St., Rupert 83350

*Montana*
Joe D'Arcy, W7TYN
1916 Haggin Ave., Anaconda 59711

*Oregon*
Dwight J. Albright, W7HLF
1678 Orchard Home Rd., Medford 97501

*Washington*
Joseph N. Winter, Sr., WA7RWK
819 N. Mullen St., Tacoma 98406

### Pacific Division

*East Bay*
Charles R. Breeding, K6UWR
3130 Raleight Ct., Fremont, CA 94536

*Nevada*
Ralph E. Covington, Sr., W7SK*
P. O. Box 11874, Reno 89510

*Pacific*
Len Withington, Jr., KH6CKJ
4746 Likeni St., Honolulu, HI 96818

*Sacramento Valley*
Ross W. Forbes, WB6GFJ
1205 E. 22nd St., Apt. 204, Marysville, CA 95901

*San Francisco*
Kenneth S. McTaggart, N6KM
272 Fourth St. E., Sonoma, CA 95476

*San Joaquin Valley*
Leland Rhoy, WA6YAB
4817 N. Crystal, Fresno, CA 93705

*Santa Clara Valley*
Edward A. Gribi, Jr., WB6IZF
P. O. Box 984, King City, CA 93930

### Roanoke Division

*North Carolina*
C. F. Bino, K4CJZ
2401 Deverow Pl., Greensboro 27407

*South Carolina*
Richard McAbee, W4MTK*
205 Jewel St. NW, New Ellenton 29809

*Virginia*
William A. Farone, N4NK
210 Midfield Rd., Bon Air 23235

*West Virginia*
George Puzzuole, K8QEW
3616 Morgan Dr., Weirton 26062

### Rocky Mountain Division

*Colorado*
Leo E. Oyler, WØGOW
P. O. Box 63, Fort Collins 80522

*New Mexico*
R. B. Goodman, W5ALR
12109 Glen Canyon Rd. NE, Albuquerque 87111

*Utah*
Larry Jacobs, WA7ZBO
3123 W. Hayden Way, Salt Lake City 84118

*Wyoming*
Gregg G. Wood, WB7EIN
901 Cahill Dr., Cheyenne 82001

### Southeastern Division

*Alabama*
Robert B. Folsom, K4WYT
404 Navaho Dr., Enterprise 36330

*Canal Zone*
Oscar Leigh DuPre, KZ5OD
P. O. Box 284, Balboa Heights

*Georgia*
William D. McDowell, K4SWJ
4533 Chamblee-Tucker Rd., Tucker 30084

*Northern Florida*
Fred K. Marchman, WA4WBM
901 E. Missouri Ave., New Port Richey 33552

*Southern Florida*
William J. Johnson, AA4WJ
1119 Lady Elaine Dr., Valrico 33594

*West Indies*
Julio A. Negroni, KP4CV
269 Georgetown St., Rio Piedras, PR 00927

### Southwestern Division

*Arizona*
Willard L. Haskell, AC7D*
3915 N. Campbell Ave. Sp. 102, Tucson 85719

*Los Angeles*
Ben Vickers, WB6FRM
621 N. Hendricks St., Montebello, CA 90641

*Orange*
Fried Heyn, WA6WZO
962 Cheyenne St., Cosa Mesa, CA 92626

*San Diego*
Arthur R. Smith, W6INI
4515 Melisa Way, San Diego, CA 92117

*Santa Barbara*
D. Paul Gagnon, N6MA*
3800 S. J St., Oxnard, CA 93030

### West Gulf Division

*Northern Texas*
Weldon J. Blair, N5WB
1612 Glenwick, Plano 75075

*Oklahoma*
Howard O. Townsend, WA5MLT
2324 Morgan Dr., Norman 73069

*Southern Texas*
Linden B. Sisk, AL5N
12719 West Club Ln., Houston 77099

*No appointed Section Emergency Coordinator; SCM listed.

# Operating News

Conducted By John F. Lindholm,* W1XX

## A Consumer Advocate's Report: The Price of Boiled Ham

Basically, there are two types of hams . . . boiled and baked. The boiled types ferociously savor every conceivable type of contest. Every weekend isn't enough.

Then there are baked hams who have no use for contests. Hate 'em. They're a nuisance, clutter up the bands, break up ragchews. They just oughta do away with all those silly contests. And baked hams are not all from Virginia.

Now, your writer is boiled. Been boiled for years. Sometimes more boiled than at other times. So how can you expect an objective view of contests if the author is boiled? Difficult, maybe even impossible. But I hope my scientific training is sufficient to overcome. In fact, in view of what's to follow, it would not surprise me if I were accused of being baked. At least half baked.

For years, Headquarters has received letters of complaint from amateurs who can only operate on weekends, and feel that decent QSOs cannot be conducted anymore without some contester coming on frequency with his Magnum-boomer after-burner to n-plus-one Strato-crusher steerable array at 200 feet calling "CQ Contest." Tree leaves for blocks around stand at attention when the monster is keyed. A helicopter propeller is used to cool this rock crusher. Cries for relief have seemingly gone unheeded. Contests have bred more contests. There's hardly a weekend that the QRPer with a wet string at 30 feet does not have to contend with the contest mania. All the way from the World War-type contests to the Baffin Island QSO Party.

Now we all know the arguments about the virtues of instilling good operating habits in the brethren via contest operating. Makes you more efficient . . . prepares you for emergency communications. Contest experience miraculously transforms a complete klutz into a W4KFC. And it's all probably true. But need we go overboard? Just how many contests are really needed to accomplish the worthy objective of cultivating better operating practices?

Perhaps the guy who claims he can't find a clear spot on the weekend to have a ragchew has a legitimate beef. There are times that, because of contests, it is difficult to find a clear spot on the band of your choice. Contests have grown willy nilly, a quilt patchwork that belongs in the house that Jack built. Some semblance of order as to the frequency and duration of contests must be restored, if indeed it ever did exist. What to do?

Any action must include consideration of contests sponsored both by ARRL and by those sponsored by other folks. Let's start with the home front.

Great strides have been taken to limit the duration of ARRL contest periods. In the case of the ARRL DX Competition, for example, that trend can be traced back to the earliest years. What started out as a continuous two-week Transatlantic test, this year was reduced to one weekend per mode, after many years of 96 hours per mode stretched unmercifully over four grueling weekends. With little exception, this change has been hailed by the contest community as the greatest thing since memory keyers. The November Sweepstakes operated as a 40-hour contest for many years over four weekends, and has been on the 24-hour two-weekend format successfully now for several years. Starting in October, the popular CD Parties, held three-times annually for Communications Department appointees (one open), are being reduced to operate 10 out of 12 hours per mode, thus cutting in half the on-the-air time.

This past June, ARRL sponsored a short-notice two-hour contest in the wee hours of the morning on 80 meters. This Midnight Special was tremendously successful with both the usual contest crowd and the non-contesters alike relishing the fast format. Are these quickie non-prime contests the way of the future?

What can be done to bring about sanity in contests sponsored by others? Obviously, any attempt to exercise persuasion is by indirect means. But since the pages of *QST* are used to promote many of these activities, is it not time that we be more selective in what we publish? Censorship, you ask? Perhaps so, but is it legitimate to publish rules for a contest for which awards are only available to the members of the sponsoring group? Or how about the guy who dreamed up the contest whose sole object was to work him . . . only? Or contests that are already announced in the sponsoring group's newsletter and are closed to non-members? Or the contests that yield a certificate for making two contacts, provided the log is submitted with appropriate portraits of George Washington? Then there are the civic-pride patriots that sponsor the world working Podunk Hollow. Judicious use of the pages of *QST* for contest announcements, it would appear, is well warranted.

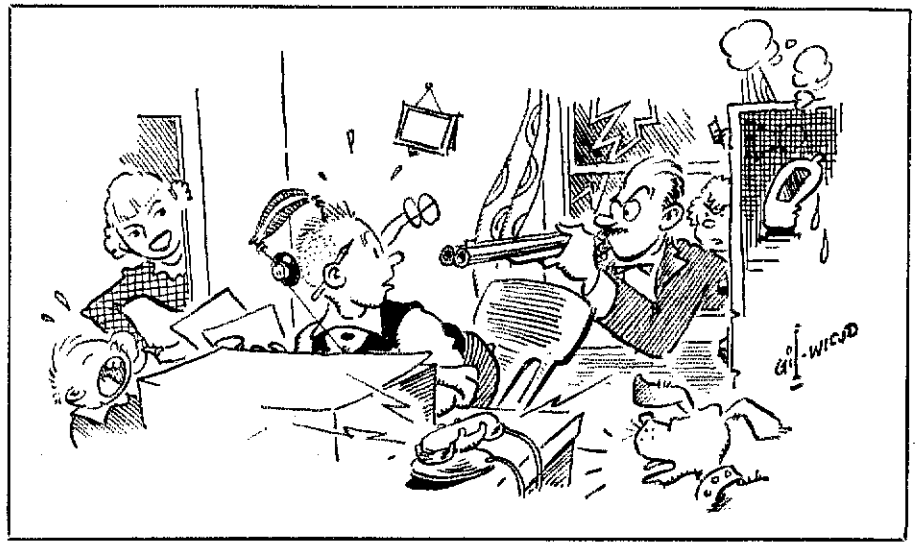
Then there is the matter of better coordination of contests, ARRL's and others. For example, ARRL sponsors a 160-meter contest in December, while another worthy contest on that band is sponsored a mere few weeks later in January. Isn't that a bit ridiculous? How about some consolidation and coordination for this Top-Band promotion?

How do we judge whether a contest is worthy of the spectrum space it takes up? That's an "in the eye of the beholder" question. But we should judge merit on the basis of the objectives. For example, the objective of initiating the 10-meter contest was to promote 10-meter activity when 10 meters was in the dredges of the sunspot cycle. As popular as the 10-meter contest is, it clearly does not meet that objective, since generally that band does not need any contest boost. Does that mean we should now liquidate the 10-meter contest?

Thus, the promotion of contests and the boiled hams who thrive on them does require that a toll be paid in terms of spectrum usage — and kilowatt hours of fossil fuel consumed. So the question is, how much do we really pay for a boiled ham? If you are a boiled ham and think these concepts are half baked, drop us a line and let us know how you feel. If you are baked, and think we should be boiled in oil, let us know that, too. Anyone for an SP-ham?

### W1AW NOTE

The complete W1AW summer operating schedule appears in May *QST*, page 89. A W1AW schedule also is available on request from ARRL headquarters. Please enclose an s.a.s.e. See the "Contest Corral" section of *QST* for times and dates of W1AW Code Proficiency Qualifying Runs.



"So you like contests . . ."

*Communications Manager, ARRL

| | OSCAR 7 | | | OSCAR 8 | | | SOVIET RS | | |
|---|---|---|---|---|---|---|---|---|---|
| *DATE (UTC)* | *Ref. Orbit* | *Time (UTC)* | *Long. W.* | *Ref. Orbit* | *Time (UTC)* | *Long. W.* | *Ref. Orbit* | *Time (UTC)* | *Long. W.* |
| 1 Sept. | 21,928 | 0052:46 | 78.5 | 7593J | 0042:49 | 55.4 | 3706 | 0041:23 | 357.2 |
| 2 Sept. | 21,941 | 0147:03 | 92.1 | 7607J | 0047:53 | 56.7 | 3718 | 0046:03 | 359.9 |
| 3 Sept. | 21,953 | 0046:23 | 76.9 | 7621A | 0052:58 | 57.9 | 3730 | 0050:44 | 2.6 |
| 4 Sept. | 21,966 | 0140:40 | 90.5 | 7635AJ | 0058:02 | 59.2 | 3742 | 0055:24 | 5.4 |
| 5 Sept. | 21,978 | 0040:00 | 75.4 | 7649X | 0103:06 | 60.5 | 3754 | 0100:04 | 8.1 |
| 6 Sept. | 21,991 | 0134:17 | 89.0 | 7663A | 0108:10 | 61.7 | 3766 | 0104:45 | 10.8 |
| 7 Sept. | 22,003 | 0033:38 | 73.8 | 7677AJ | 0113:15 | 63.0 | 3778 | 0109:25 | 13.5 |
| 8 Sept. | 22,016 | 0127:55 | 87.4 | 7691J | 0118:19 | 64.3 | 3790 | 0114:06 | 16.3 |
| 9 Sept. | 22,028 | 0027:15 | 72.3 | 7705J | 0123:23 | 65.5 | 3802 | 0118:46 | 19.0 |
| 10 Sept. | 22,041 | 0121:32 | 85.9 | 7719A | 0128:27 | 66.8 | 3814 | 0123:26 | 21.7 |
| 11 Sept. | 22,053 | 0020:52 | 70.7 | 7733AJ | 0133:32 | 68.1 | 3826 | 0128:07 | 24.4 |
| 12 Sept. | 22,066 | 0115:09 | 84.3 | 7747X | 0138:36 | 69.4 | 3838 | 0132:47 | 27.2 |
| 13 Sept. | 22,078 | 0014:29 | 69.1 | 7760A | 0000:27 | 44.8 | 3850 | 0137:27 | 29.9 |
| 14 Sept. | 22,091 | 0108:46 | 82.7 | 7774AJ | 0005:31 | 46.1 | 3862 | 0142:08 | 32.6 |
| 15 Sept. | 22,103 | 0008:06 | 67.6 | 7788J | 0010:35 | 47.3 | 3874 | 0146:48 | 35.3 |
| 16 Sept. | 22,116 | 0102:23 | 81.2 | 7802J | 0015:40 | 48.6 | 3886 | 0151:29 | 38.1 |
| 17 Sept. | 22,128 | 0001:44 | 66.0 | 7816A | 0020:44 | 49.9 | 3898 | 0156:09 | 40.8 |
| 18 Sept. | 22,141 | 0056:00 | 79.6 | 7830AJ | 0025:48 | 51.2 | 3909 | 0000:26 | 13.3 |
| 19 Sept. | 22,154 | 0150:17 | 93.2 | 7844X | 0030:52 | 52.4 | 3921 | 0005:06 | 16.01 |
| 20 Sept. | 22,166 | 0049:38 | 78.1 | 7858A | 0035:57 | 53.7 | 3933 | 0009:47 | 18.7 |
| 21 Sept. | 22,179 | 0143:55 | 91.7 | 7872AJ | 0041:01 | 55.0 | 3945 | 0014:27 | 21.4 |
| 22 Sept. | 22,191 | 0043:15 | 76.5 | 7886J | 0046:05 | 56.2 | 3957 | 0019:07 | 24.2 |
| 23 Sept. | 22,204 | 0137:32 | 90.1 | 7900J | 0051:09 | 57.5 | 3969 | 0023:48 | 26.9 |
| 24 Sept. | 22,216 | 0036:52 | 75.0 | 7914A | 0056:14 | 58.8 | 3981 | 0028:28 | 29.6 |
| 25 Sept. | 22,229 | 0131:09 | 88.5 | 7928AJ | 0101:18 | 60.0 | 3993 | 0033:08 | 32.4 |
| 26 Sept. | 22,241 | 0030:29 | 73.4 | 7942X | 0106:22 | 61.3 | 4005 | 0037:49 | 35.1 |
| 27 Sept. | 22,254 | 0124:46 | 87.0 | 7956A | 0111:26 | 62.6 | 4017 | 0042:29 | 37.8 |
| 28 Sept. | 22,266 | 0024:06 | 71.8 | 7970AJ | 0116:31 | 63.8 | 4029 | 0047:10 | 40.5 |
| 29 Sept. | 22,279 | 0118:23 | 85.4 | 7984J | 0121:35 | 65.1 | 4041 | 0051:50 | 43.2 |
| 30 Sept. | 22,291 | 0017:44 | 70.3 | 7998J | 0126:39 | 66.4 | 4053 | 0056:30 | 46.0 |
| 1 Oct. | 22,304 | 0112:01 | 83.9 | 8012A | 0131:41 | 67.6 | 4065 | 0101:11 | 48.7 |
| 2 Oct. | 22,316 | 0011:21 | 68.7 | 8026AJ | 0136:48 | 68.9 | 4077 | 0105:51 | 51.4 |
| 3 Oct. | 22,329 | 0105:38 | 82.3 | 8040X | 0141:52 | 70.16 | 4089 | 0110:31 | 54.1 |
| 4 Oct. | 22,341 | 0004:58 | 67.2 | 8053A | 0003:43 | 45.6 | 4101 | 0115:12 | 56.9 |
| 5 Oct. | 22,354 | 0099:15 | 80.8 | 8067AJ | 0008:47 | 46.9 | 4113 | 0119:52 | 59.6 |
| 6 Oct. | 22,367 | 0153:32 | 94.3 | 8081J | 0013:52 | 48.2 | 4125 | 0124:33 | 62.3 |
| 7 Oct. | 22,379 | 0052:52 | 79.2 | 8095J | 0018:56 | 49.4 | 4137 | 0129:13 | 65.0 |

Have you listened to OSCAR 8 yet? It is available to anyone with a good-quality, 10-meter or 70-cm receiver. To track it, you'll need an OSCARLOCATOR and the above reference-orbit information (also available on W1AW bulletins). It orbits the earth every 103 minutes; the morning and evening passes occur at approximately the same times each day. Decoding the telemetry from the beacon is a simple matter using the ARRL OSCAR telemetry forms, available from Hq. for an s.a.s.e. When you return it, we'll send you a colorful OSCAR 8 QSL card.

To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.490 MHz on Mode A, 145.960 MHz on Mode B, and 435.160 Mode J, during O 7 and O 8 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays; Mid States at 0200 UTC; West Coast at 0300 UTC, all on 3850 kHz lsb); (international net at 1800 UTC Sundays on 14,280 kHz usb).

**Notes**

1) The times and longitudes are for the satellites' first equator crossing each day, which is called the reference orbit.
2) Due to spacecraft problems, OSCAR 7 will not be maintained in any specific mode.
3) All Monday orbits are reserved for QRP use only. Use a maximum of 10 watts erp. Wednesdays are reserved for special experiments. Schedule O 7 experiments through AMSAT, O 8 experiments through ARRL. At no time exceed 10 W erp using Soviet RS.
4) The OSCAR 7 Mode B and OSCAR 8 Mode J transponders invert signals. Upper sideband into the uplink becomes lower sideband on the downlink.
5) O 7 progresses an average of 28.737712° W. per orbit in a period of 114.944795 minutes. O 8 progresses an average of 25.804838° W. in a period of 103.219352 minutes. RS period is 120.3894 minutes. RS progresses 30.227° W.
6) O 8 modes of operation are Mondays and Thursdays — Mode A. Tuesday and Friday — Mode AJ. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D.

**Spacecraft Frequencies**

| *Spacecraft* | *Uplink* | *Downlink* | *Beacon* |
|---|---|---|---|
| O 7 | | | |
| Mode A | 145.850-145.950 MHz | 29.400-29.500 MHz | 29.502 MHz |
| Mode B | 432.125-432.175 MHz | 145.975-145.925 MHz | 145.972 MHz |
| O 8 | | | |
| Mode A | 145.850-145.950 MHz | 29.400-29.500 MHz | 29.402 MHz |
| Mode J | 145.900-146.000 MHz | 435.100-435.200 MHz | 435.095 MHz |
| RS | | | |
| Mode A | 145.880-145.920 MHz | 29.360-29.400 MHz | 29.401 MHz |

Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq. OSCAR locators for O 7, O 8 and Soviet RS are available in the new *Satellite Communications* package at your dealer or direct from ARRL: $4.75 U.S., $5.50 elsewhere.

# Strays

## ARABIAN KNIGHTS

☐ Ham and CB radio operators combined their skills to provide communications for the Mount Whitney 50-mile Arabian horse endurance race, held recently in Lone Pine, CA. One-hundred riders traveled the grueling race course, which runs through rugged desert and mountain terrain.

The annual race previously had been monitored exclusively by the Eastern Sierra Citizens Radio Association. This year, W6DHK, WA6ZAE and WB6YZY of the Bishop (CA) Amateur Radio Club offered to supplement communications via 2 meters. The hams used an 8-element Yagi antenna for emergency communications during the race. Traffic, including a request for a horseshoer and medical assistance for a broken nose and several minor injuries, was handled by the ham and CB team effort. After the race, one official said, "Communications (for the race) were never better." — *Cal Turner, WB6YZY*

The ham radio communications' effort for the 50-mile Mount Whitney Arabian horse endurance race included contacting a horseshoer for this steed in need. *(WB6YZY photo)*

## ANNIVERSARY QSO PARTY

☐ The Arrowhead Radio Amateurs Club (MN) is sponsoring an anniversary QSO party to celebrate 50 years of organized Amateur Radio in the Duluth, MN/Superior, WI, area. The contest, to be held October 20 and 21, is open to all radio amateurs. For details, send an s.a.s.e. to ARAC-50, 123 E. 1st St., Duluth, MN 55802.

## BICENTENNIAL OPERATION

☐ To celebrate the bicentennial of Horseheads, NY, the ROOKIES Amateur Radio Club will operate station N2HG from the town for 24 hours continuous, beginning at noon on September 22. Listen for N2HG on the 75-meter ssb band around 3.975 MHz. To receive a special commemorative certificate of the event, send a large s.a.s.e. to Horseheads Bicentennial Amateur Radio Station, Zim Center, Horseheads, NY 14845.

# Contest Corral

## A Roundup of Upcoming Operating Events

Conducted By Tom Frenaye,* K1KI

## SEPTEMBER

### 1-2

**LZ DX Contest,** sponsored by the Bulgarian Federation of Radio Amateurs. (Revised rules just received — those printed in August *QST* are not correct.) 24-hour period (UTC) on September 2. Cw only, single or multioperator. Call CQ LZ DX. Exchange signal report and ITU zone. Suggested frequencies: 3.510-3.590, 7.005-7.040, 14.010-14.090, 21.010-21.125, 28.010-28.125 MHz. Score six points per LZ QSO, three points for QSOs with other continents and one point for QSOs in your own continent. Multiply by total number of ITU zones worked on all bands (max. 375). Separate logs for each band. Summary sheet should include list of zones worked on each band plus usual declaration that rules were followed. Awards. Mail by October 1, 1979 to BFRA, Contests, P. O. Box 830, Sofia, Bulgaria 1000.
**10-Meter Portable Contest,** August *QST*, page 89.
**Amateur RTTY Art Contest** (through November 30), August *QST*, page 89.
**Skokie Aviation Enthusiasts Contest,** August *QST*, page 89.

### 5

**West Coast Qualifying Run** (W6OWP prime, W6ZRJ alternate). 10-40 wpm at 0400Z. The run takes place at 9 P.M. PDT on September 4. Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send to ARRL for grading. Please enclose your full name, call (if any), and complete mailing address. A large self-addressed envelope will help expedite your award/endorsements.

### 8-9

**ARRL VHF QSO Party,** August *QST*, page 62.
**European DX Contest (WAE),** phone, July *QST*, page 88. Entries not on official contest forms may be classified as check logs. Late rules change: Multioperator stations are only allowed to change bands one time within a period of 15 minutes, except for working a new multiplier.
**Pennsylvania QSO Party,** August *QST*, page 89.
**AC-DC Contest,** August *QST*, page 89.

### 9

**North American Sprint,** August *QST*, page 89.

### 11

**W1AW Qualifying Run,** 10-35 wpm at 0200Z (10 P.M. EDT, September 10). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. May *QST*, page 89, carries the complete W1AW schedule of code practice and bulletins, or send an s.a.s.e. to ARRL for a copy. Other details per the September 5 listing.

### 12-14

**YLRL Howdy Days,** sponsored by the Young Ladies Radio League, from 1800Z September 12 until 1800Z September 14. Only contacts between women operators permitted. No crossband. No net contacts. Only one contact with each station. Score two points for each YLRL member worked and one point for each nonmember. No multipliers. Logs must be received by October 15 by Margaret Williams, KI4W, 965 Redwood Circle, Virginia Beach, VA 23462.

### 15-16

**Scandinavian Activity Contest,** cw, August *QST*, page 90.
**CAN-AM Contest,** phone, August *QST*, page 90.
**Washington State QSO Party,** August *QST*, page 90.
**Kentucky QSO Party,** August *QST*, page 90.
**Maryland-District of Columbia QSO Party,** sponsored by the Maydale ARS, from 2000Z September 15 until 0000Z September 17. All amateur bands including OSCAR may be used. The same station may be worked on each band and mode. No repeater contacts. Exchange serial number, signal report and QTH (county for MDC stations except for independent cities of Baltimore and Washington; ARRL section or country for others). Suggested frequencies: cw — 75 kHz from the low end; phone — 25 kHz from the high end. 10 and 15 meters on the half hour. Score two points per contact (double points for 15 and 10 cw). MDC stations multiply by total number of ARRL sections and countries worked. Others multiply by total number of MD countries and independent cities worked (max. 26). Awards. Separate logs for each band/mode. Summary sheet must have name, call and address in block letters, along with signed declaration that all rules and regulations have been followed. Mail by October 15 to Maydale ARS, c/o C. E. Andersen, W3XE, 14601 Claude Ln., Silver Spring, MD 20904.

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**ARRL Frequency Measuring Test,** August, *QST*, page 90.

### 22-23

**Scandinavian Activity Contest,** phone, August *QST*, page 90.
**KZ5 QSO Party,** sponsored by the Canal Zone ARA, 24-hour period September 23. All bands, all modes. Next-to-last weekend of KZ5 activity. Awards for contacts with five CZARA members or 25, 50 or 100 KZ5 stations. Send to Canal Zone ARA, Box 407, Balboa, Canal Zone.

**Texas QSO Party,** sponsored by South Texas ARC, full 48-hour period. Exchange serial number, signal report and county (TX) or state, province or country (others). TX stations score two points for U.S. phone contacts, three points for cw and five for DX. Others score two points per TX phone contact, three for cw. Bonus of 25 points for contact with club stations, WD5DOS. All modes 10-160 meters. Suggested frequencies: cw — 3560 7060 14,060 21,060 28,060; phone — 3900 7270 14,300 21,370 28,570. Dupe sheets required for more than 250 QSOs. Logs must be received by December 1, 1979. Mail to South Texas ARC, 14302 Kellywood, Houston, TX 77079.

### 24

**High-Speed Code Test,** sponsored by W1NJM/Connecticut Wireless Association, begins at 0130Z (Sunday evening, September 23, in the U.S. and Canada). Call-up begins at 0115Z with a 15-minute call-up. Frequencies approximately 3636/7085. Important instructions sent at 0130Z. Speed for the call-up and instructions is 25 wpm. The first test run starts at 0150Z. It will be at 60 wpm and lasts five minutes. 55 wpm at 0200Z, 50 wpm at 0210Z, 45 wpm at 0220Z and 40 wpm at 0230Z. Hope to have K6DYX or W6OWP carry the same transmission for West Coast participants on 3690/7025. Send copy to George Hart, W1NJM, 66 Highland St., Newington, CT 06111.

### 25

**W1AW Qualifying Run,** 10-35 wpm at 1300Z (9 A.M. EDT). See September 11 for more details.

### 29-30

**CAN-AM Contest,** cw, August *QST*, page 90.

**KZ5 QSO Party,** last weekend of KZ5 activity, see September 22-23 for more details.

**Delta QSO Party,** sponsored by the Delta Division of the ARRL. From 1800Z September 29 until 2400Z September 30. Work Arkansas, Louisiana, Mississippi and Tennessee stations. Exchange serial number, signal report and QTH (county/state for Delta stations; ARRL section or country for others). Delta Division stations multiply number of contacts by number of ARRL sections worked for final score (no DX multipliers). Others multiply number of contacts by number of Delta Division counties worked (max. 316). Suggested frequencies: cw — 50 kHz from low end; Novice — 3725 7125 21,125 28,125; phone — 3990 7290 14,290 21,390 28,590. Awards. Achievement award for contacting five different stations in each Delta Division state. Mail logs by October 21 to Malcolm Keown, W5XX, 213 Moonmist, Vicksburg, MS 39180.

**Classic Radio Exchange,** Sponsored by Southeast ARC, from 2000Z September 30 until 0300Z October 1. Object is to restore, operate and enjoy older equipment with like-minded hams. Exchange your name, signal report, state/province/country, receiver and transmitter type (homebrew send PA tube type). Same station may be worked again with different equipment combinations. Call CQ CX or CQ Exchange. Noncontestants may be worked for credit. Suggested frequencies: cw — 60 kHz from low end; Novice — 3720 7120 21,120 28,120; phone — 3910 7280 14,280 21,380 28,580. Multiply total QSOs by number of different receivers, transmitters, states, provinces and DX countries worked on each band/mode. Multiply that total by your own Classic Multiplier — total years old of all receivers and transmitters used, three QSOs minimum per unit. Awards. Mail to Stu Stephens, K8SJ, 2386 Queenston Rd., Cleveland Heights, OH 44118. S.a.s.e. for results.

**College Radio Scrimmage,** sponsored by the Penn State ARC, from 1900Z September 30 until 0100Z October 1, ssb only. Idea is to put long-lost alumni in touch with their alma mater. Entry classes: alumni and college station. One transmitter only. Exchange name of college, junior college or university you last attended and the last two numbers of the year you graduated or will graduate. Club stations substitute "Amateur Radio Club" for number. Noncollegians substitute "high school" for college name. Sample exchange: "Harvard 77." Stations may be worked once per band. Multiply total QSOs times number of different college/junior college/universities worked. Suggested frequencies: 1815 3895 7230 14,280 21,355 28,560. Awards. S.a.s.e. for results. Logs must be received by November 1, 1979. Send to Penn State ARC, K3CR, 202 Engr. Unit E, University Park, PA 16802.

## OCTOBER

### 4

**West Coast Qualifying Run,** 10-35 wpm at 0400Z (9 P.M. PDT October 3). See September 5 for more details.

### 6-7

**ARRL Simulated Emergency Test,** this issue, page 103.

**VK/ZL Oceania DX Contest,** phone, sponsored by the Wireless Institute of Australia, from 0000Z October 6 until 1000Z October 7 (cw: October 13-14). Exchange signal report and serial number. Oceania stations count two points for VK/ZL contacts, one for others. Others count two points for VK/ZL contacts, one point for other Oceania contacts. Multiply QSO points by sum of VK/ZL call areas worked on each band for final score. Awards. Separate logs for each band. Single-band entries accepted. Logs must be received by January 31, 1980. Send to WIA Contest Manager, VK6NE, 388 Huntriss Rd, Woodlands, West Australia 6018, Australia. Send one IRC for results.

*Asst. Communications Manager, ARRL.

**California QSO Party,** sponsored by the Northern California Contest Club, from 1800Z October 6 until 2359Z October 7. Single-operator stations limited to 24 hours, with off times clearly marked. Stations may be worked once per band. CA stations send serial number and county; others send serial number and state, county or country. Each contact worth two points. CA stations multiply QSO points by multiplier of states and VE call areas (VE/VO 1-7 and VY1 for a max. of 58). Others use CA counties (max. 58) for multiplier. Suggested frequencies: cw — 1805 3560 7060 14,060 21,060 28,060; Novice — 3725 7125 21,125 28,125; phone — 1815 3895 7230 14,280 21,355 28,560. Awards. Entries must be mailed by November 1, 1979 to NCCC, c/o Alan Brubaker, K6XO, 34456 Colville Pl., Fremont, CA 94536. Enclose business-size s.a.s.e. for results.

**October QRP QSO Party,** sponsored by the QRP ARC International, from 2000Z October 6 until 0200Z October 8. Members exchange signal report, state/province/country and QRP number. Nonmembers exchange signal report state/province/country and power input. Three points for member QSOs, two for nonmembers. DX contacts (non-W/VE) count four points. Power multipliers: more than 100 watts input × 1; 25-100 watts × 1.5; 5-25 watts × 2; 1-5 watts × 3; less than 1 watt input × 5. Suggested frequencies: cw — 1810 3560 7060 14,060 21,060 28,060 50,360; Novice — 3710 7110 21,110 28,110; phone — 1810 3985 7285 14,285 21,385 28,885 50,385. Awards. Entry should include full log data plus equipment, antenna and power used. Large s.a.s.e. for results. Entries must be received by October 31, 1979. Mail to QRP ARC Contest Chairman, E.V. Sandy Blaize, W5TVW, 417 Ridgewood Dr., Metairie, LA 70001.

## 10

**W1AW Qualifying Run,** 10-35 wpm at 0200Z (10 P.M. EDT October 9). See September 11 for more details.

## 13-14

**ARRL CD Parties,** eligible Communications Department appointees and League Officials will be notified separately.

**VK/ZL/Oceania DX Contest,** cw, see October 6-7 for more details.

**9 Land QSO Party,** sponsored by III Wind Contesters, from 1800Z October 13 until 2359Z October 14. Operate a maximum of 24 hours. Illinois, Indiana, Wisconsin stations exchange signal report, county and state. Others exchange signal report and state, province or country. Suggested frequencies: cw — 1805 3560 7060 14,060 21,060 28,060 vhf; Novice — 3725 7125 21,125 28,125; phone 1815 3895 7230 14,280 21,355 28,600 vhf. Two points per QSO. IL/IN/WI stations multiply QSO points by sum of states/provinces/countries and 9 Land counties for final score. Others multiply QSO points by 9 Land counties for score. Awards. Indicate new multipliers clearly in the log. Mail logs (with large s.a.s.e.) to III Wind Contesters, c/o John W. Sikora, WB9IWN, 8155 Woodlawn St., Munster, IN 46321.

## 20-21

**Worked All DM Contest**

**Jamboree on the Air**
**RSGB 21 MHz cw Contest**
**Missouri QSO Party**

## 27-28

**CQ World Wide DX Contest,** phone

## NOVEMBER

2
ARRL Frequency Measuring Test
3-4
ARRL Sweepstakes, cw
10-11
OK DX Contest
European DX Contest (WAE), RTTY
IPA Contest
17-18
ARRL Sweepstakes, phone
24-25
CQWW DX Contest, cw

## DECEMBER

1-2
ARRL 160-Meter Contest
8-9
ARRL 10-Meter Contest

# In Training

### 80-METER VFO PROJECT

"But I *still* don't get it!" How many times have you, as an instructor, heard that phrase after you've carefully explained something three or four times? Is there something wrong with the way you're explaining things? Probably not. The written or spoken word is often the least effective means of teaching a concept. Unfortunately, it is often the only practical approach. With Amateur Radio we are lucky enough to have a good alternative — construction.

There is nothing like handling the components, reading the schematic, soldering it all together, and watching it work to gain a clear understanding of a particular circuit. "Okay, fine," you may be saying, "but how is building something practical in a classroom situation?"

Consider the variable frequency oscillator; it is ideal for a Novice class. The circuit shown in Fig. 1 uses mostly junk box parts and does not cost very much to build. At the end of the course, a few modifications can be made for those who wish to utilize it as a QRP transmitter (see parts description with Fig. 1). What follows is a brief outline for incorporating this construction project into a Novice course. For a more complete outline that is based on the ARRL Instructor Guide, send 25 cents and an s.a.s.e. to C&TD, ARRL hq.

*Lesson 1:* Pass out the parts kits, schematic, and list of tools to be obtained by the next class. Then, briefly discuss how the oscillator will be used along with the course.

*Lesson 2:* Demonstrate soldering technique. Discuss the function of the battery and resistors and solder R1-3 and the battery connector in place. Use a VOM to demonstrate voltage drop.

*Lesson 3:* Have students practice using Ohm's Law to calculate the voltage drops across R1 and R2, using the VOM to check their answers.

*Lesson 4:* Discuss the physical characteristics of different types of inductors and have the students solder L1 in place.

*Lesson 5:* Discuss the values of C1, 2, 5 and the function of each in the circuit. Solder components in place. Discuss resonance and point out the tuned circuit on the schematic. Solder C3, 4 and 6 in place.

*Lesson 6:* During the discussion of transistors, show how to identify the leads on Q1 and solder in place.

*Lesson 7:* Bring in a receiver and have each student listen to his or her oscillator on the receiver.

*Supplemental session:* For those students who are interested in making the oscillator into a QRP transmitter, discuss the need for the modifications and help each student incorporate them and calibrate the tuning dial against an accurate receiver. — *Jeanette M. Stumbo Zaimes, ABIP*

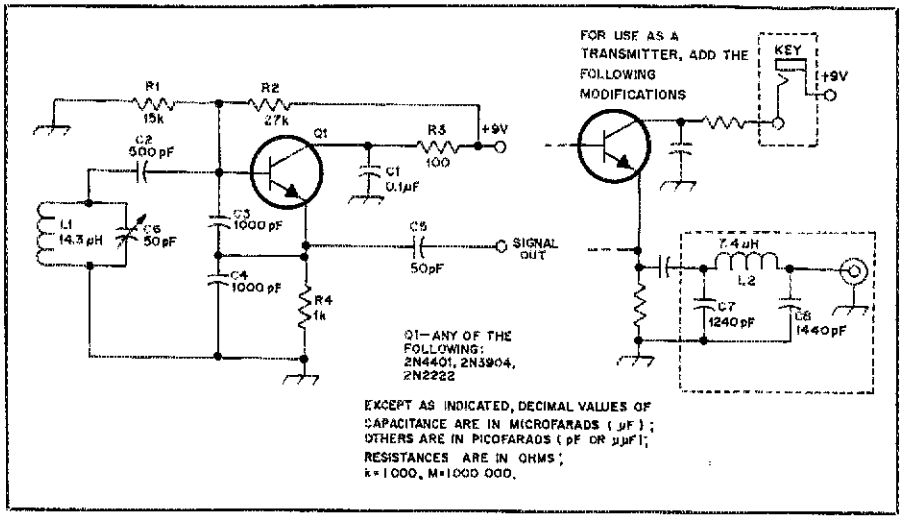


Fig. 1 — Schematic diagram of the VFO. To use it as a QRP transmitter, the fixed-value capacitors should be polystyrene or silver mica. The air-variable capacitor should have a calibrated vernier dial. Leads should be kept as short as possible.

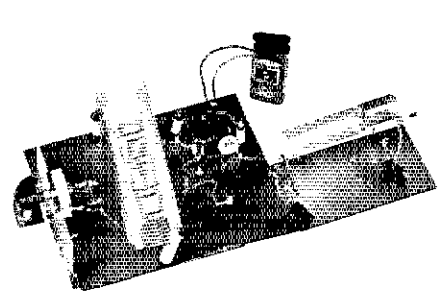

Fig. 2 — This is the finished VFO, with the optional pi network filter on the small board to the right. Construction is on a standard pc board with megohm resistors used as standoffs and then painted white to avoid confusion with the circuit components. Components are arranged in such a way as to match the schematic diagram.

# Station Activities

A-1 OPR ✕ EC ✕ DXCC ✕ RCC ✕ WAS ✕ STM ✕ OES ✕ OTS ✕ NM
SCM ✕ ARES ✕ OVS ✕ SEC ✕ OBS ✕ TCC ✕ OO ✕ NTS ✕ WAC ✕ CP ✕

## CANADIAN DIVISION

**ALBERTA:** SCM, Sydney T. Jones, VE6MJ — SEC: VE6XC. The Peace Country Amateur Radio Club at Grande Prairie now has a beacon on 50.048 MHz using the call VE6ARC with a power of ten watts and would appreciate reports to VE6XD. The Lakelan D Amateur Club at Heinsburg held a successful hamfest recently and despite the rain a good time was enjoyed by all. VE6HO and VE6MJ attended the QCWA banquet in Vernon BC. The Northern Alberta Radio Club was active on Field Day from the Andrew area. VE6BGJ now has ten meter endorsement and is enjoying phone operation. Traffic: VE6AVZ 44, VE6BBL 18, VE6ABC 14, VE6MJ 4.

**MANITOBA:** SCM, Peter Guenther, VE4PG — Asst. SCM: VE4JP. SEC: VE4TR, NMs: VE4s NM TE IZ VJ AGB. With one emergency over, ARES operators have been asked to stand by if Skylab decides to pick Manitoba for a landing site. Most guys are now on holidays and all activity on all nets is down. A large group of amateurs participated in the big Manitoba Marathon and did a fantastic job. All in all, 1979 so far has been a hectic year for ARES, as well as many others that are not in that group. MEPN: QNI 790, QTC 28, sess 30; WRIN: QNI 86, QTC nil, sess 4, MTN: QNI 64, QTC 19, sess 19; MMN: QNI 365, QTC 36, sess 30; MSN: QNI 12, QTC 12, sess 8. Traffic: VE4RO 96, VE4PG 37, VE4QJ 27, VE4JA 19, VE4AEJ 11, VE4CR 8, VE4LB 8, VE4NE 8, VE4AES 2, VE4GB 2, VE4FK 1, VE4OO 1.

**MARITIME-NFLD:** SCM, Aaron D. Solomon, VE1OC — ASCM: VO1FG. STM: VE1WF. SEC: VE1ASW. NMs VO1JN VE1WF. Silent Key: VE1GC. Hosp. VE1LO VE1SZ. 15 CB Am. conducted Gr. Search for 2 missing boys in Baddeck. Old Timers' Mini-Hamfest Mt. Allison, Sackville Aug. 4-5, 1980 Mgr. Conv. Chairman VE1QD; Sec. VE1RI. Address P. O. Box 1051, Sydney, N.S. B1P 6J7. Field Day Rpts. from VE1FO/1 VE1JV/1 VE1TL/1 VE1WN/1. 19 Fred. ARC mem. supp. Comm. Miles for Millions Walk. 7 Woodstock Am. also participated in similar Walkathon. VE1BSU opr. VE0MBT enroute Bermuda on yacht Mouette II. VE1AIH VE1AST oprs. VE1AIH/1 from Sable Island. 5 CF personnel to opr. Sable Is. Aug. 2-9 Sp. Call. VE1WF app't. ECN Mgr. Congrats VE3FXT to opr. GT3 WNE. VO1FG/1 VE2BAG/1 VE3AXC/1 VE3CPB/1 N4BMC/1 WD4MZS vacating in NS and PEI. APN: Sessions 30, QNI 180, QTC 99/87; NPN: Sessions 21, QNI 404, QTC 6. Traffic: VE1WF 260, VE1RI 139, VE1LCR/RO 58, VE1OC 22, VE1BMN 20, VE1KR 15, VE1XF 6.

**ONTARIO:** SCM, Larry Thivierge, VE3GT — SEC: VE3APK. STM: VE3GOL. In the 1979 Wisconsin QSO party VE3KK placed first for non-Wisconsin entries. Other VE3s participating were DAP and FEA. Special congratulations are in order to VE3BMG. Immediate Past President of the Scarborough ARC, he was the driving force in arranging to have the ARRL National Convention held in Toronto in 1977. Under his leadership, the club grew to a membership of 350. For these and his many other contributions to the community, he received a citation from the Borough of Scarborough, Recreation and Parks Committee at a special recreation recognition night. As he was holidaying in the UK, the award was accepted on his behalf by his son, accompanied by daughter of VE3GOL whom were head table guests. Regretfully I announced the following have become Silent Keys: VE3s BEK FGL IZ and WV. VE3WV was the original holder of that call and was licensed many years ago using his initials, AB and then 3AB. VE3GFN worked 16 countries on cw using a borrowed HW-8 running 3 watts. WA1PVN relocating to Ottawa on behalf of his company. VE3AC, an OO appointee, sent a card to WA1BWV for operating A3 on 21, 178 kHz only to find he hasn't been on the air for nearly three years. This years FD will probably set a record for the coldest yet. Bancroft ARC has installed the following officers: VE3KFA, pres.; VE3EEY, v. pres.; and VE3KBU, secy/treas. OSN holding a second session nightly on 3667 kHz at 0200 Z. VE3BNV presented with the Jim Jarvie Memorial Award for his unselfish efforts to amateur radio, both in Metro and Peterborough, congratulations. VE3s EZJ HLD IIU IJY and JAR have received the Windsor ARC's "Rose City Award." VE3IJU relocated to VE2 land, "Hamletter," published by the Wheaton community Radio Amateur Inc., carried a DX article by VE3GWM/C6A. VE3KVA has his advanced. VE3AIJM is credited with the rescue of three people who were on a sinking sailboat in the Caribbean. VE3ASH has a new neighbour, VE3KHQ. Traffic: (June) VE3GOL/3 423, VE3KK 187, VE3GT 165, VE3HGJ 132, VE3ISW 128, VE3DPO 113, VE3GFN 110, VE3JRT 87, VE3FZG 81, VE3SB 75, VE3CYR 68, VE3JPP 62, VE3BVG 32, VE3APK 27, VE3GJG 24, VE3HCS 23, VE3IMR 21, VE3FHZ 17, VE3AJN 15, VE3ANJ 13, VE3AWE 11, VE3DUK 11, VE3DVE 10, VE3FGV 10, VE3GNW 9, VE3JHE 8. (May) VE3BZR 14, VE3DUK 12, VE3AC 10.

**QUEBEC:** SCM, Harold Moreau, VE2BP — SEC: VE2DEA. Congrats to WB1EZI/VE2 for his participation in last April CD Party: Lets have more stations in the next Oct. Party. It seems that bad weather did not stop many stations from participation in FD, as our section was well represented. Silent Key VE2DS. VE2EAR est tres actif sur le 20 metre et s'approche bien vite du DXCC. Traffic: VE2EC 34, VE2DEA 22, VE2FFE 22, VE2EKC 16.

**SASKATCHEWAN:** SCM, Norm Waltho, VE5AE — SEC VE5WM. NMs: VE5HG VE5DC. Sask and Manitoba amateurs will be doing some experiments with a balloon being launched from Gimli MB and going to Moose Jaw SK on or around the 17 July 79. The balloon is approx 900 ft high and 700 ft wide and will have two 45 gallon drums full of sand for ballast, it will have a 2-meter simplex repeater on 147.33 MHz and it also has a beacon on 432 MHz. The North Battleford repeate is now up and operating. VE5TT has been doing experiments on the Lucky Lake repeater VE5RPR on 223.5 MHz output. SPN (May) 618 QNI, 55 QTC; SPN 721 QNI, 66 QTC; SATN 304 QNI, 19 QTC. Traffic: VE5AE 39, VE5WM 18, VE5HG 16, VE5DC 15, VE5BO 9, VE5QY 3.

## ATLANTIC DIVISION

**DELAWARE:** SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STM: W3QQ W3WD. PSHR: N3AKC 53, K3JL 43. W3DKX is in hospital for major surgery. We wish him well. N3AOA (U of Del WA3GAY op) is home from school for summer healing leg broken in motorcycle accident. N3AKC is new DTN NCS. WA3ZBI has moved from PA to his summer home in Millville, welcome. The June Ham Campout at Tuckahoe Acres had good turnout. More than 20 hams and visitors enjoyed the activities. W3WYO preparing for permanent move to FL. DEPN: QNI, 65, Tfc 10; DTN: QNI 313, Tfc 50. Traffic: (June) N3AKC 66, W3QQ 42, WB3DUG 21, WB3GXD 17, WA3WIY 17, W3WD 16, K3JL 15, WA3DUM 5. (Mar.) WA3DUM 14.

**EASTERN PENNSYLVANIA:** SCM, Geo. S. Van Dyke, Jr., W3HK — SEC: WA3PZO. STM: K3NGN. NMs: K3KW W3VA WB3BKV WA3WQP. Net Repts: EPAEP&TN: QNI 391, QTC 104; EPA: QNI 596, QTC 297; LVN: QNI 16, QTC 38; PFN: QNI 263, QTC 314; PTTN: QNI 333, QTC 135; AREC (2): QNI 12. OVS repts: W3GOA WA3BJO W3CL. OBS Repts: W3VA K3EBZ N3AIU W3AVJ WB3JYZ W3ID WA3ERG WB3JZA. OO Repts: W3RJ K3NSN WA3RPG W3KEK. BPL: K3NSN W3CUI W3VR WA3WQP WB3JZA WA3ATQ. PSHR: WA3WQP N3AIU WB3GZV A3GR WB3JYZ KB6FR/3 WA3EPG W3GOA WB3JZA. FD msgs recd fm: Abbington ARC, Tioga Co ARC, Reading Radio Club, Beacon Radio Amateurs, Warminster Radio Club, Delmont Radio Club, Garbon Co ARC, Susquehanna Radio Club, Renn Wireless Assoc. Sorry to hear of Silent Key W3DGX. We are also losing two big tfc handlers W3CUL and W3VR. Both in Florida, 12001 Kay Dr North, Seminole, FL 33542. K3IAZ after a swell job has released NM of PFN to WA3WQP. WA3PZO asks is there an EC in your County? If not then why not you! New Officers: Mt Airy Radio Club: W3HQT, pres.; W3IIT, vice pres.; WB3HHO, corr. secy; K3IGX, record. secy.; K3GAS, treas.; W3HMU N3AHI WA3NFV WA3JUF WA3WAS, dir. WA3ATQ makes BPL but somehow gets missed! Guess we all survived the space station coming down. K3NGN moved to new QTH. Will be QRT until 8-15-79. Most reports got here on time this month. FD is over, hope all had lots of fun. W3ID needs a sheep for his lawn. If you move, tell your PO then I'll get it too. W3HJ did a lot of OO reporting. GMK says inverted V does real well. Anyone find a substitute for gas? Traffic: K3NSN 4236, W3CUL 2556, WA3WQP 815, KB6FR/3 534, W3VR 533, WB3JZA 514, WA3ATQ 368, K3KW 360, AA3B 168, W3IPX 138, N3AIU 133, K3NGN 98, W3DP 82, WB3GZV 80, AG3R 80, N3CD 71, W3VA 69, WB3JYZ 62, W3ID 32, K3YL 23, W3CL 16, WA3YOE 12, W3ADE 9, WA3VIL 9, K3EBZ 8, WA3RPG 8, W3BUR 6, W3RJ 6, K3NB 4, K3AI 1, W3AVJ 1, WA3BJO 1, WB3ELA 1, W3EU 1, W3GMK 1, W3GOA 1, W3HK 1, W3KEK 1.

**MARYLAND — DISTRICT OF COLUMBIA:** SCM, Karl R. Medrow, W3FA — At the MEPN picnic K3ORW and AA3S tied for the highest number of ckins out of the 32 members who earned MEPN Section Net Certificates. W3DKX led 8 commended for liaison duty, and K3TNM lead the 11 who were cited as top NCS. Congrats to WB3GZU, he's back to making BPL this June. Field Day messages received from K3PZN K3LDE W3ZH AB3A W3VPR WB3IVO K3EF and K3CEZ. Congrats to KA3BUK to Advanced class. WB3HAH volunteered to help in the SKYLAB nets. W3DFW got a mobile home trailer as a present from the XYL on Father's Day! KA3CUK is working DX at home and from his vacation spots. WB3EPN is on a western visit and may check into WWV! W3CDQ attended the YLRL 40th birthday convention, and has no summer skeds pending. W3ECN is ready to serve in any capacity. W2HXT was sending cards from Mark Twain country. With the nets. Net Net Manager Sessions/Traffic/QNI Average. MDC PON/W3OYY for May 5/10/22.2, for June 4/11/20. Washington County 2-mtr net/WB3GEJ 5/1/16. WR PON/W3DFW 18/18/17.2. MEPN/AA3S 31/88/21.2. No Toppers but W3ADO NA3AGM N3APS WB3BFK and WA3IHW missed 3 or less. W3PQ is manager of MDD. KB3AP worked Field Day from home with the dipole at new heights! WB3JRW is mobile and plans to make 100 percent on the MEPN. W3WBY was in on some good 2-meter openings. WA3WTQ is back from FCC school. W3TFP has a new receiver. N3APS visits 6 land and then it is 4 years away to college. N3SJ is busy on the eastern shore. K3CRW has a big traffic count. N3AQV is moving that key faster and faster. AA3S is recomputing PSHR points! K3IU keeps thinking personal computers and soon! WB3KDQ gets in a few licks. N3QA is moving to a bigger farm. WB3CES spent a week camping. N3IT was an attendee at the YLRL. Traffic: WB3GZU 598, N3APS 64, K3IU 62, N3QA 48, K3ORW 44, AA3S 40, W9VJD/3 36, N3SJ 28, KB3AP 20, W3WBY 20, N3AQV 18, N3IT 12, WB3JRW 14, WB3CES 6, WB3KDQ 5.

**SOUTHERN NEW JERSEY:** SCM, Bill Luebkemann, WB2LCC — SEC: W2HOB.

| Net | Mgr | Time(PM) | Freq. | Sess. | QNI | QTC |
|---|---|---|---|---|---|---|
| NJN/E | AF1L | 7 | 3695 | 30 | 548 | ???/249 |
| NJN/L | AF2L | 10 | 3695 | 30 | 396 | ???/139 |
| NJPN | K2VX | 6 | 3950 | 34 | 628 | ???/257 |
| JSARS | WA2HEB | 8:30 | 91 | | | |
| MCN-AA2H | | 10:30 | .075 | 30 | 264 | 110/90 |
| SJVN | WB2LCC | 10:30 | 27 | 30 | 133 | 95/75 |
| SPARTN | KB2EV | 10:30 | 94 | 30 | 180 | 91/86 |

Another Field Day has come and gone, and from all reports received so far it was as successful as ever. Messages were received from over 10 different clubs giving details of their operations, and these were much appreciated. With any luck, someone in our section will take first place! Another big topic for discussion was ARES restructuring, as detailed in the latest issue of QCD. Many comments were sent to the league by the SEC and ECs, and now it's a wait and see game to see if they sink in. Want to voice your comments? Meet the hottest hot shot of them all? K1XA will be at the October 10 meeting of the West Jersey Radio Amateurs. He will speak on ARES and related activities from his viewpoint as ARRL public service coordinator. The location is not yet known so contact me for details as the date draws closer. This is one you won't want to miss!!! Traffic: KB2EV 126, AA2H 121, WA4JRP 86, N2AFN 74, N2AJG 66, WA2GXU 56, K2UL 48, N2ALS 45, KA2CDF 41, WA2ONW 37, WB2LCC 35, WA2HEB 34, W4NLC 30, WA2GTJ 23, WD2AHO 20, WA2WUL 16, WB2HUV 14, WB2UGA 12, WA2UNJ 12, AA2C 7, WB2PUW 3.

**WESTERN NEW YORK:** SCM, Lonnie J. Keller, WA2AOG — STM: W2MTA. SEC: WB2FTX. Received Field Day messages from 16 groups in the section — FB participation by all! Welcome to WNY to KB2GT in Utica, running a FT-101E into an indoor dipole. After last winter's reign of destruction, WA2ZJP has reinstalled his tribander, this time with a 3" boom. W2FR QSY to ME at least until fall with a new radar installation. W2ZOJ picking up as asst. mgr. for NYS while W2GS is absent. If you are a member of the Chemung County AREC Assoc., Clarkson ARC or the Syracuse VHF Club Inc., drop me a line and let me know if your club is still active. Hope to see you at the Hamburg Ham-O-Rama Sept. 15-16. ESS mgr. W2WSS reports that even with the summer doldrums the 3590 crew is averaging over a dozen check-ins per session. Welcome to new OTS-II KA2BGX, who also made PSHR this month. Other PSHR listees are W2ZOJ WA2MFV N2APB W2MTA and WA2ZJP. Looks like the new format is being well accepted. Please note the new address on Page 8 of each issue — I'm still getting letters with mixed new and old addresses. I may get it eventually, but if it's your monthly report it may not make the deadline I have to have it in by. Also, try to get your reports to me by the fifth of each month! Thank you! Nice turnout for the First Annual Lake Erie Hamfest in Dunkirk on July first. See you next year! Traffic: (June) N2APB 181, WA2MFV 156, W2RUF 144, W2ZOJ 134, W2FR 88, W2PZL 86, WA2HSB 84, W2MTA 78, W2TZ 77, WA2ZJP 65, WB2OTC 55, W2RQF 45, WA2AOG 41, WB2VSJ 37, WB2EOX 31, KB2GT 25, WB2OMZ 24, AF2K 20, WA2AIV 8, WB2NAO 6, KA2BGX 4, K2VR 3. (May) WA2ELD 304.

**WESTERN PENNSYLVANIA:** SCM, Otto L. Schuler, K3SMB — ASCM: N3PM. STM: W3YQ. SEC: WA3VUP. Ass't SECs: WA3LJW & WA3JBQ. NMs: W3NEM W3KUN W3MML & WA3PXA.

| Net | Sess. | QNI | QTC | kHz | Time Day |
|---|---|---|---|---|---|
| WPACWN | 30 | 340 | 101 | 3585 | 7:00 P Dy |
| WPAPTN | 30 | 343 | 129 | 3983 | 6:30 P Dy |
| WPA2MTN | 30 | 446 | 112 | 146.28/88 | 8 P Dy |
| PATTN | | | | 3610 | 6:30 P Dy |
| WPA RACES | | | | 3990.5 | 9:00 A S |

Silent Key is W3UE/W3KQD our sympathy is extended to his family. His friends will miss him very much. New Novices are KA3CPS KA3CUR KA3DEN and KA3ELJ. The WPACW Picnic will be held at the usual grove in Cook Forrest on Sept. 30. All section amateurs are welcome. Bring your food and liquid refreshments. Local net is Quad County FM Net on K3PS/R 146.13/73 on Su. 1900 local time. The Du Bois ARES members provide communications for the firemans parade. Washington County ARES provided the same for the American Heart Assn. "Run for Life" event 9 amateurs participated. 13 Ally County Amateurs provided communications for the 34th National Blind Golfers Championships at the Pittsburgh Field Club, it was sponsored by the Pgh Rotary Club. It was a most gratifying experience for us. N3ALQ and K3GFT two of the amateurs helping at the club were also blind, thanks to all. In Indiana County, K3GL an avid DXer, hosted VU2CK and his XYL, also a ham, from New Delhi, India. I understand local amateurs there had an enjoyable evening with them. Enjoyed visits to Field Day sites, but gasoline cut them short. Traffic: WA3PXA 282, W3NEM 160, W3EGJ 122, N3EE 104, K3SMB 62, N3FM 58, W3MML 58, AC3N 46, W3SMV 41, WB3JDI 38, WA3UNX 38, W3UHL 36, K3HCT 28, W3EKG 16, N3ASB 15, W3VQV 14, W3KUN 12, W3ATQ 10, W3RUL 10, WA3VRE 10, WB3BOB 9, W3LOD 7, WB3GZR 5, AF3B 4, WA3QNT 4, AB3X 4, N4DR 3, W3SN 3, N3KB 2, N3UA 2.

## CENTRAL DIVISION

**ILLINOIS:** SCM, Edmond A. Metzger, W9PRN — Asst. SCM: W9RYU. SEC: W9AES. NMs: WA9KFK W9JSR. Cook County EC: W9HPG.

| Net | Freq. | Times/Days | Tfc. | Sess. |
|---|---|---|---|---|
| ILN | 3690 | 2330/0300 Dy | 258 | 60 |
| ILL phone | 3915 | 2245 Dy | 203 | 30 |
| NCPN | 3915 | 1300/1800 Dy | 144 | 46 |
| IEN | 3940 | 1400 Su | 9 | 4 |
| W9VEY | | 2 Mtr | 11 | 4 |
| MEM Stn | | | | |

The Field Day reports coming in promise an all time high in amateur participation for preparation of emergency work. N9AMF and KA9ACU are now General Class licensees. WB9KOS/R is a new completely microprocessor controlled repeater in Rockford. It is on 147.195/147.795 MHz. W9HOT reports that 9R daytime Net passed 177 messages during 58 sessions and that the Illinois stations checked in were W9JIJ W9NXG W9YCE WD9DDP WB9NVN and W9HOT. The Peoria Hamfest will be held on both Sat and Sun September 15th and 16th. K9PD/R (22/82) at Danville has a new 400 foot antenna. WB9YJC attended summer music festival at the U of I. WD9FOD KB9BI AG9Y WB9HVD and WD9HAQ were elected officers of the Lamoine Emergency Radio Club for 1979-80. Net Manager, W5KLV, of the CAND states that 448 messages during 60 sessions were sent on the Ninth Region Net. Illinois was 100% with check ins by WA9TZL WB9VVX WB9YJF W9HOT W9NXG W9YCE and W9IJJ. New appointment this month is WB9PUK as Official Traffic Station. The Sangamon Valley Radio Club will hold their annual Hamfest in New Berlin on the last Sun of September. KA9EWC is a new Novice in Decatur. Traffic: (June) W9JIJ 441, W9HOT 249, W9NXG 248, WB9JSR 106, N9TN 103, K9SW 100, WD9DMV 98, K9BVE 96, WA9KFK 96, W9KR 95, K9PNG 90, W9OBS 86, W9YCE 66, W9OK 58, N9MX 50, K9EEA 47, K9DAC 46, WD9BEX 44, W9LNQ 40, W9OYL 39, W9PRN 30, K9SW 24, WA9AQN 24, W9HPG 8, WB9VLW 2, WD9EBQ 2, and KA9ALR 1. (May) K9EEA 25.

**INDIANA:** SCM, J.M. Kell, W9LTU — SEC: W9UMH. STM: W9JUJ. NMs: ICN N9AEI, QIN WB9UYU. ITN open. June net reports time in UTC and freq in kHz.

| Net | Freq. | Time | QNI | QTC | Sess. |
|---|---|---|---|---|---|
| ITN | 3910 | 1330/2230 Dy | 2981 | 333 | 90 |

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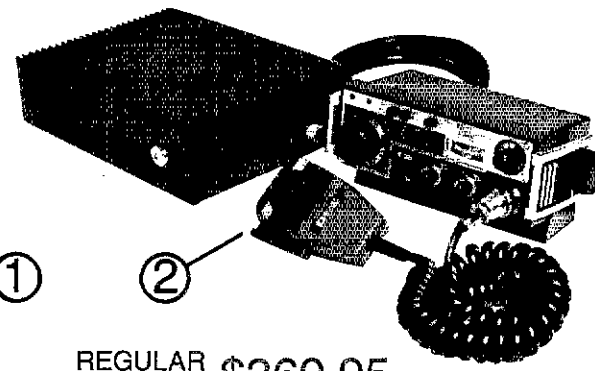


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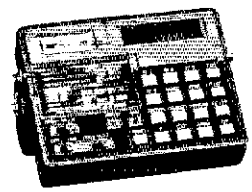

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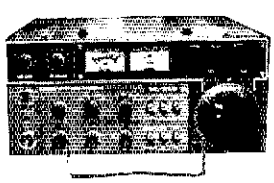

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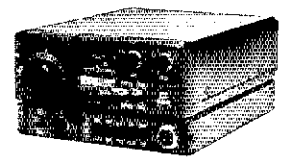

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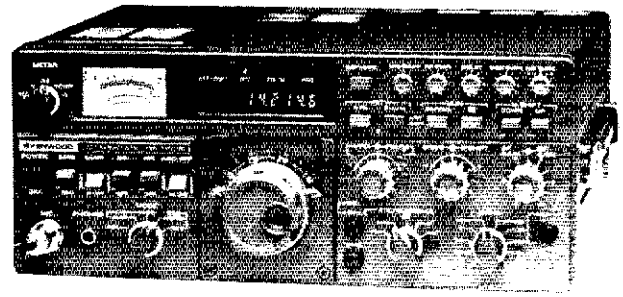

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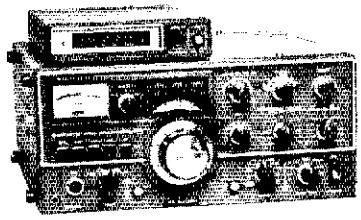

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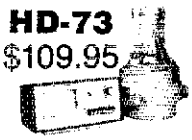

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IN only 93% represented D9RN. 100% on DCAN. If you participated in all of June's activities this year you were busy. First weekend was Anderson Hamfest. Second weekend was the ARRL VHF QSO Party. A lot of activity, but very disappointing band conditions. Heard an Ohio ham on 2-m say he didn't know there were that many hams in IN. W9LTU participated with equipment provided by WB9DAG and help from WA9OAG and WB9SEE. Alot of fun. Third weekend was the Central Division Convention in Milwaukee. HR report called the crowd on 400 disappointing, but those of us in attendence found the lack of crowds pleasant. Atmosphere was very relaxed and informal. Time to talk with everybody. IN people in attendance were W9JUJ W9UMH K9PVW N9AEI KA9CVZ AA9U WB9OIG WB9OLE W9LTU. Fourth weekend was Field Day. Elkhart Red Cross ARC, AD9V/9, reported their best year ever. 1205 contacts in class 3A. Ind Bell Ham Club, W9LYU/9, had 1055 in class 2A. A lot of others active, but no report. Have you planned your Oct Simulated Emergency Test yet? Traffic: W9JUJ 827, WB9UYU 108, N9AEI 149, W9OLW 142, WD9CIS 141, W9FC 139, W9XD 114, W9EI 106, W9TG 72, W9DLF 63, K9FZX 59, K9WWJ 50, WA9OKK 49, WB9VJE 49, WB9IHH 29, W9HUF 23, WA9QCF 21, W9CMT 16, WA9OHX 12, N9PS 12, KA9BSF 11, K9TKE 10, W9IOH 9, K9UXW 8, W9WEI 8, WA9GJZ 7, K9BUQ 6, K9CGS 6, AA9U 5, W9CM 4, K9FG 3, W9BDP 2.

**WISCONSIN:** SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. NMs: W9AYK W9IEM WB9ICH WB9ZRE W9DM K9LGU K9EN. Nets freq time QNI QTC Mgr. BWN 3985 1145 Z M-S 772-760. W9AYK. BEN 3985 1700 Z Dy 517-84 W9IEM. WSBN 3985 2230 Z Dy 834-191 WB9ICH. WNN 3725 2215 Z Dy WB9ZRE. WIN-E 3662 0000 Z Dy 254-82 W9DM. WIN-L 3662 0300 Z Dy 175-50 K9LGU. Wi EX PO 3925 1701 Z M-F 472-32 WA9NIX. WD9IWE WB9FSD have Extra. KA9EMF has Tech. New Novice, wife of WB9ICH, KA9EVZ. W9OT is now in Monroe. New Novice La Crosse, KA9EFR. Central Division convention was very good, excellent speakers. New Novice West Salem, KA9EZR, father of W9NQ. New Novice Baraboo, KA9EYJ, the late W9FMI's grandson. Hope everyone had a good time on FD. New Novices Waupaca, KA9ELK KA9ETD KA9ETF. New Tech Harshaw, WD9DHT. KA9EAC now General awaiting new call. KA9EHI has Novice, N9ATG has Tech. exKA9DWO. From Stevens Point area KA9AWD WD9CYW WB9ICO all Generals. WD9AQY is now N9AOZ. KA9CKY is now N9ATA and has Tech. All from Oshkosh area. New General, Rhinelander, WD9CYT. KA9CPA made BPL. Glad to see Wisconsin stations active in CAN and D9RN. Northwoods traffic net had 447 checkins, 30 pieces traffic handled. (this net is on .34-94, 6:30 PM daily). Traffic: KA9CPA 1074, W9CXY 152, W9YCV 145, WB9YPY 119, K9FHI 105, W9IEM 103, W9DND 99, WD9DHF 87, AF9T 58, W9UCL 57, WB9ICH 55, WD9ESZ 50, W9DM 45, K9UU 42, WB9ESM 41, K9AKG 39, W9FDY 38, N9CP 38, AG9G 36, KB9FM 35, WB9RRU 32, K9CPM 31, K9JPS 29, W9LDO 28, W9SQJ 27, K9AQ 26, W9GKO 26, WA9DXW 22, WB9KPX 20, WB9JSW 17, K9VSO 14, K9ANV 12, WA9WYS 8, WB9YPZ 6, KB9CT 6, WA9LWJ 4.

## DAKOTA DIVISION

**MINNESOTA:** SCM, Helen Haynes, WBØHOX — SEC, KØHJC. STM: AFØO.

| | | | | QNI | QTC |
|---|---|---|---|---|---|
| MSPN N | 3945 | 12:05 P | WØOPX | 472 | 63 |
| MSPN E | 3929 | 5:45 P | WØDUW | 503 | 147 |
| MSN 1 | 3685 | 6:30 P | AFØO | 223 | 99 |
| MSN 2 | 3689 | 10:00 P | KØPIZ | 150 | 49 |
| MSSN | 3710 | 5:30 P | WDØBFR | | |
| MWX | 3925 | 6:15 P | WBØUKI | 281 | 229 |
| PAW | 3925 | 9-12<br>1-5 | WAØEPZ | | |

It seems to some that the grass is greener in other places. WØLYN has moved to New Hampshire; while WBØZFG his XYL, KNØDUA have departed to Tuscon Az. WDØEVS and family are settling in KY; and WBØZBK and OM WBØZBL, are settling in Austin, TX. Good luck you people. K2SV/Ø was married July 8 and on Aug. 1st hung out his shingle, Dr. of Neurosurgery in Lincoln, NE. AFØO states its fun to work DX and she was proudly showing her DXCC certificate. Upgrades this month have been Novice to Gen WDØGVX KAØCKK, Tech to Gen. NØANU Glennville, KAØBS Albert Lea. Congratulations to you all. The Novice roundup in the Albert Lea area is KAØDPT KAØFFU KAØCKJ, KAØCNE. Traffic: WAØTFC 209, KØPIZ 162, AFØO 145, WØDUW 131, WDØUKI 88, WAØYVT 63, WDØCGM 58, KAØAIT 55, WBØHOX 53, WBØNZB 51, WØRIQ 48, WBØZBJ 45, KØCSE 43, WDØFFE 39, WØOPX 37, KAØBZP 16, WØRQJ 21, NØAHA 15, AEØM 15, WAØCCA 13, WØUMX 7, WBØJYT 3.

**NORTH DAKOTA:** SCM, Lois Jorgensen, WAØRWM — SEC: WBØTEE. OBs: WØDM. NM: WAØCRH. During a recent severe storm the NWS lost contact with Williston due to construction work tearing the telephone wires. With the help of WDØGRC and WDØAPE of the Willison Club, they got their info. Devils Lake Club and Ramsey Co. CD have established an emergency room at the Court House, fully equipped for communication and ready for any emergency. Congrats to those that upgraded: KAØDYP KAØBOA to Tech, KAØCAC KAØCAF WBØTAB to General, WBØVUJ to Advanced. WBØWIB to Extra. FD was a good success considering the conditions. Hettinger Club was at Reeder with 7 Hams. Fargo Club had two sites: WØCZ was at Horace and WØILO was at Grandin. Three Rivers Club at Abercrombie with 14 hams, Williston at Medicine Hill Lodge.

| Net | Freq | Day/Time CDT | Sess | QNI | QTC | Mgr |
|---|---|---|---|---|---|---|
| Goose River | 1990 kHz | Sunday/0900 | 5 | 46 | 0 | WØCDO |

Traffic: WAØRWM 74.

**SOUTH DAKOTA:** SCM, Lydia S. Johnson, WØKJZ — Ass't SCM: WØDVB. NMs: WØs WE HOJ MZI NEO TNM UEN VRE. SEC: WAØTNM. WBØZYR provided communications to CD Hqtrs, WBØMRR, Watertown when a tornado struck. New owners of WRØAEE are WBØs MWJ MJY, KØs OTZ QYD. Lake Area Club officers are KØOTZ, pres.; WBØJWQ, vice pres.; WBØJTM, secy.; WBØMWJ, treas. Cancellations of following appointments either by their requests or non activity are EC: WAØMRY KØFHN KØGH WBØGTY WØPRZ WAØZXV. Need ECs for Codington, Marshall, Bennett, Yankton/Clay, Brown, Minnehaha, Pennington Counties! FD messages received from Clubs: LARK, Signal Hill with 7 operators; Lincoln 10 operators; Huron 15, with 10 AREC operators; Brookings 10; Sioux Falls 35 with 6 AREC members. PSHR earned by WDØBMR 60, WAØTNM 89, WØKJZ 61

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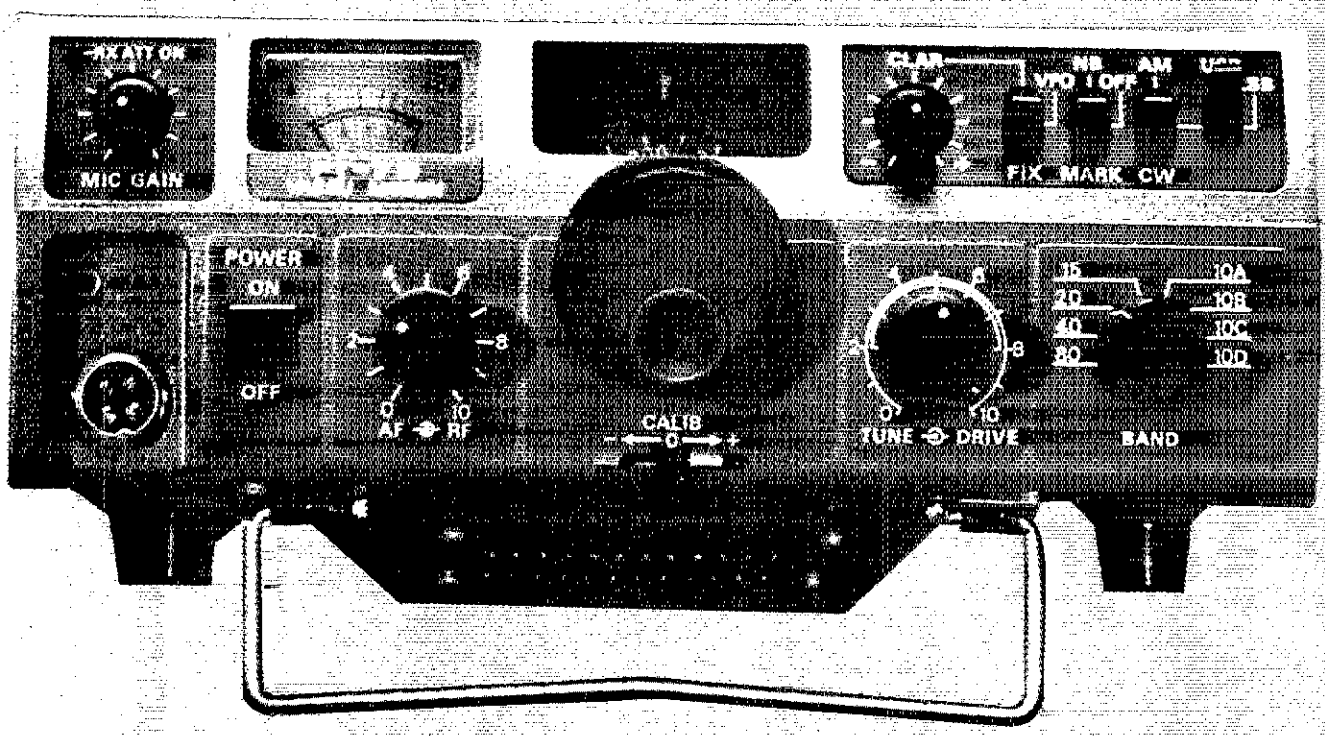


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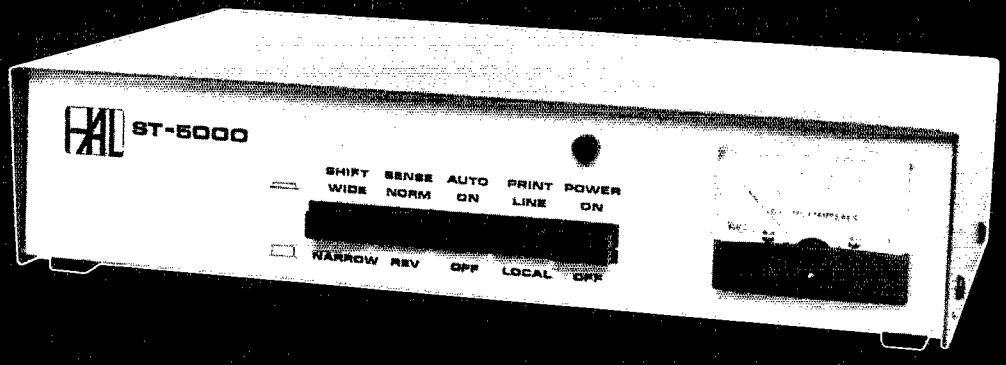


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points. Traffic: (June) WAØTNM 113, WAØVRE 98, KØAIE 82, WØHOJ 80, WØDVB 78, KØFRE 77, WØKJZ 71, WDØBMR 52, WDØGVZ 36, WØMZI 31, WØID 18, WBØEVQ 6, WØZWL 5, WBØOMF 2. (May) WBØEVQ 13, (Apr.) WBØEVQ 29.

## DELTA DIVISION

**ARKANSAS:** SCM, S. M. Pokorny, W5UAU — SEC: WD5IRB. NMs: AD5D W5MYZ W5POH WA5ZWZ. Nets: Freq time/day QNI QTC Mgr. OZK: 3760 0000/Dy 151 20 W5MYZ; ASN: 3745 0030/T-Sa WB5WPV; NEAWN: 146.01/76 0030/T-Sa WA4YWJ, SCARC: 28.765 0130/Su 0030/M 97 6 WD5HJC; APN: 3.937 1100/M-Sa 844 45 W5POH; M-Bird: 3928 2130/M-F 530 13 WA5ZWZ; ARN: 3.995 2330/Dy 1055 78 AD5D. Your SCM made his 4th annual Field Day tour, stopping at Mountain Home group and Harrison group. Sorry the NWAARC boys couldn't get together for Field Day this year and my stop in this area was disappointing. Its not to early to start planning for next years Field Day exercise. Would like to hear from some of the groups in the Southern part of the state about their plans for next year so I can plan a trip in your area. Especially the Camden, El Dorado and Magnolia areas. ORs AD5D 4 WB5WWA 4. Traffic: AD5D 41, W5POH 28, K5DW 26, W5UAU 24, K5BIL 14, W5BLP 6, WB5WWA 2, WB5GOH 1.

**LOUISIANA:** SCM, S. T. "Tom" Losey, Jr., K5TL — Asst SCM: K5DPG. SEC: WB5IYH. STM: N5YL. NMs: N5RB K5ARH N5IB WD5CMA WB5IYH. N5EK W5YZL K5DPG WB5LBR all active on DRN5. Good news for RACES and LEN Net members, WB5IYH is back on the air and ready to take up where he left off. W5VMY new president of SARA, congrats. Had many messages from Clubs and individual groups around the Section during Field Day activity. I'd say that Louisiana was well represented on the air, it was alot of fun here in my city, but I'm glad its over. Congrats to the Jefferson ARC for starting their club net on 80 meters. They had more than three times as many QNI as they've been having on ht. New officers for the NO VHF Club are: WA5BLG, pres., WA5TMD, v-pres.; WB4MEU, secy; N5GJ, treas. New officers for Delta DX Assn. are: K5KR, pres.; W5ZPA, v-pres.; K5WF secy.; WA5YFQ, treas. New OTS appointments go to WB5UWI and KA5EDB, keep up the good work. The Traffic Bulletin still need your help.

| Net | Freq. | Time/Day | QNI | QTC | Mgr. |
|---|---|---|---|---|---|
| LAN | 3615 | 7 & 10 PM Dy | 320 | 190 | N5RB |
| LTN | 3910 | 6:30 PM Dy | 410 | 103 | K5ARH |
| LSN | 3703 | 7:30 PM M-F | 74 | 8 | N5IB & WD5CMA |
| LRN | 3587.5 | 6:30 PM Su | 8 | 10 | N5RB |
| RACES | 3993.5 | 8:00 AM Su | | | WB5IYH |
| LEN | 3910 | 9:00 AM Su | | | WB5IYH |

Traffic: W5GHP 229, N5RB 131, K5TL 119, WB5LBR 87, N5ES 80, N5EK 45, N5ARH 32, K5TTC 24, K5DPG 14, W5YN 12, WD5GJB 8, WB5IKT 7.

**MISSISSIPPI:** SCM, E. Ed Robinson, W5XT — SEC: WB5FXA. Well, June has gone by for another year and the biggest news for most of us was Field Day. From reports and on the air talks it seems FD was one of the biggest and best yet for the state. Very fine reports from areas including Jackson(Capital),MS. Coast, Laurel & Hattiesburg, Northeast MS.,Tupelo,Univ. of MS., Picayune, Tombigbee, & Delta. Also with June begins hurricane season and another reminder of possible emergencies. Tri-State Hamfest at Senatobia was a great success this year and everyone enjoyed fine time, eye-ball QSOs and prizes. Please continue to support all the nets. CGCHN:(WB4PGB)Sessions 30, QNI 2240, QTC 162. MSBN: (K5WSC)Sessions 30, QNI 2132, QTC 91. MTN:(K5OAF) Sessions 30, QNI 168, QTC 49. MSN:(WD5GNR)Sessions 13, QNI 45, QTC 14. MsRACES:(N5AMK)Sessions 4, QNI 162, QTC 5. Capital AEN:(WD5IDK)Sessions 4, QNI 61. JCARCEN:(WD5DCI)Sessions 23, QNI 279, QTC 10. Traffic: K5OAF 112, W5EDT 92, N5AMK 81, WD5IKD 42, WB5TRZ 37, WB5SNB 34, W5XT 31, W5WZ 20, WB5UPN 12, WD5DCK 12, WA5OKI 9, WD5CSU 8, K5MK 8, WA5IDF 7.

**TENNESSEE:** SCM, O. D. Keaton, WA4GLS — SEC: WB4DYJ. Asst. SCM: WB4PRF. STM: W4ZJY. The Crossville Hamfest was very successful with its new sponsor. I am sure the Plateau ARC will continue this Hamfest. WA4CNY was a repeat winner of the SCM Traffic Award for 1979 with 4228 QTC. The Tenn. Council of ARC's officers are: WA4CNY, chair; W4NZW, v-chair; W4HPG, secy/treas. W4EBT has been appointed NM of the Roan Co. ARES Net which operates on 147.72/.12 Th. at 0000 UTC. Net Certificates have been issued to WA4SGP WB4PZB WA4WJD WA4BWW WB4WHC WA4ELL K4ALX W4ZLW WA4GZZ WB4JGL WD4DGF WA4CPM WA4WMG: WA4JRN N4AWB WD4LEF K4XE KB4CH W4NIT WA4QOS. The Tenn. Traffic System's nets report: phone, Sessions-189, QNI 6114, QTC-684. cw, Sessions-74, QNI 499, QTC-226. TLC functions 11 @ 12%, Traffic 9. By this time you have the CVRA ballot; this is your opportunity to express your preference whether the Tenn. Section should join the CVRA, please make your vote count. Traffic: WA4CNY 193, WB4BKF 147, AF4T 109, W4ZJY 103, W4OGG 91, K4JGW 66, WB4ZSZ 64, N4UC 61, K4XE 54, W4PFP 50, WB4PRF 47, WA4FMR 32, WA4GLS 31, WA4WVW 19, K4WOP 18, W4VJW 14, WB4DYJ 13, WA4DKC 12, W4CSY 10, N4BBB 9, WA4IQL 8, W4EWR 6, W4NJR 6, W4TYV 5, K4DEC 3.

## GREAT LAKES DIVISION

**KENTUCKY:** SCM, Joseph Miller, K4DZM —

| Net | Time/EDST | kHz | QNI | QTC | Net Mgr. |
|---|---|---|---|---|---|
| KRN | 6:30 AM M/F | 3959 | 451 | 56 | W4BEJ |
| MKPN | 8:30 AM Dy. | 3959 | 950 | 120 | WA4JTE |
| KTN | 6:45 PM Dy. | 3959 | 949 | 124 | WA4AVV |
| KNTN | 7:00 PM Dy, 9:00 AM Sa/Su | 3727 | 352. | 172 | KB4OZ |
| KYN | 8:00 PM Dy. | 3600 | 221 | 108 | WA4IGS |
| KSN | 11:00 PM Dy. | 3600 | 150 | 35 | WB4NPD |
| KPON | 1:00 PM Sa. | 3945 | 75 | 6 | WA4AVV |
| 9RN-D | 2100 UTC Dy. | 3940 7280 | 53% | 177 | W9HOT |

CARN-140/27 5th Dist. ARES-66/22 SEKEN-23/1 Silent Keys- K4WN/ex K4ZOR/W4CN, and W4HNF. Lexington Hamfest Aug 12. KNTN will have net meeting at Lex. Hamfest. New OTS appts: KA4AZT K4HRF WB4APC W4RHZ WA4EBN. New NM of KSN, is WB4NPD. KSN has new time, check above. Start making plans for the Louisville Hamfest. Forums for all nets. Traffic: KB4OZ 162, WA4AVV 130, K4DZM 125, WA4WSM 90, WA4IGS 71, WA4EBN 63, W4CDA 56, WB4NPD 47, WD4RNI 46, WA4GAL 45, KA4AZT 39, WD4CDF 36, WA4JTE 34, W4NLN 32, W4BAZ 31, WA4FAF 28, WB4KDP 21, WB4APC 20, WA4YPO 20, K4YZU 19, K4HRF 18, K4AVZ 17, WA4AGH 16, W4RHZ 14, WD4KDG

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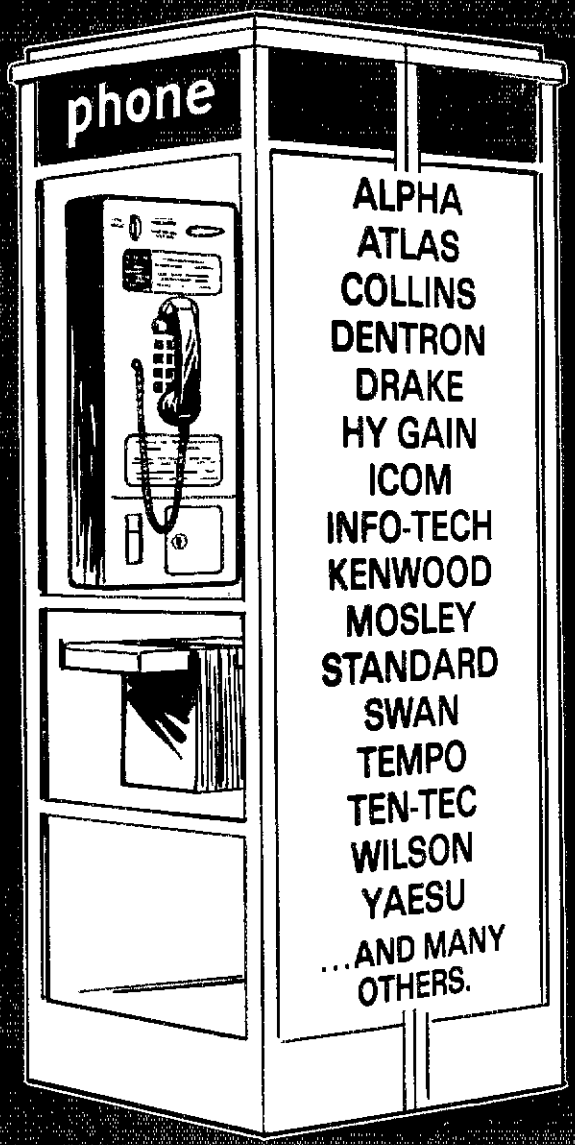


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12,N4CCJ 11, K4AML 11, W4HKT 8, K4HOE 5, WB4RIT 5, WA4SWF 5, WA4UIH 5.

**MICHIGAN:** SCM, Stanley J. Briggs, W8MPD/K8SB — Asst SCMs: WA8DHB W8SOP SEC: WA8EFK. STM: WB8MTD NMs: K8LNE K8KMQ KB8AI WB8YDZ WA8DHB WB8ZNS.

| Net | Freq. | UTC/Day | QNI | QTC | Sess. |
|---|---|---|---|---|---|
| GLETN | 3932 | 0130 Dy | 1104 | 345 | 30 |
| QMN* | 3663 | 2200/ 0200 Dy | 725 | 281 | 58 |
| MACS* | 3953 | 1500 Dy | 725 | 272 | 30 |
| MiTN* | 3953 | 2300 Dy | 457 | 257 | 30 |
| UPN* | 3922 | 2100 Dy | 535 | 91 | 34 |
| MNN* | 3722 | 2130 Dy | 212 | 77 | 25 |
| WSSBN | 3935 | 2300 Dy | 673 | 39 | 30 |
| BR | 3930 | 2130 Dy | 311 | 32 | 23 |
| ARES | 3932 | 2130 Su | 62 | 6 | 4 |
| MEN | 3930 | 1300 Su | 142 | 4 | 4 |
| VHF LOCAL NETS: 15 reports | | | 818 | 34 | 56 |

*NTS Section nets. Weekly traffic training sessions are being conducted the half hour prior to the Michigan Traffic Net (3953 kHz at 6:30 PM Wed) Proper NTS procedures are discussed and question and answer sessions are included. You are invited to participate or at least listen in. K8RV has had to resign as QMN manager because of increased obligations at work. His effort of the last 2 years is appreciated very much. N8ABA will fill in as acting manager until the Sept QMN picnic. Be sure to save the first weekend of October for the Simulated Emergency Test. Register in ARES with your EC. Can you copy W1AW bulletins and relay them on your local net or repeater on a regular basis? If so, I hope you will consider an Official Bulletin Station appointment. W8QG was awarded Life membership in the Central Michigan ARC. Congratulations! Mich-A-Con ARC and the Muskegon Area Amateur Radio Council provided communications for parades in their respective areas. June OO reports from K8JH W8QG K8RCT. OBS reports: N8AG K8NKB W8SOP AF8V AC8Y. I am sorry to report the following Silent Keys in the Mich. Section: WD8OSN W8KGY WA8YFU W8NJP K8GMR. The Mich Novice Net is a great place to get started in cw traffic work...give it a try. Traffic: W8VPW 374, WD8NKA 280, WD8KZX 240, WB8MTD 229, K8KMQ 210, K8DTG 184, W8PDP 168, WD8OSE 150, WB8YRY 136, W8MPD 120, K8RV 118, WA8DHB 105, WA8WZF 103, WD8LRT 101, N8AKY 99, WR8AIR 88, K8ZJU 84, K8LNE 78, WD8EGO 71, KB8EO 71, WB8ZIY 71, W8CUP 64, AF8V 63, W8SOP 59, W8YIQ 54, N8ACL 47, KB8AI 46, W8NOH 46, W8VIZ 46, WB8YDZ 42, K8DYI 36, WB8SYA 33, KB8GC 31, K8GXV 31, W8IHX 30, W8HIN 27, WD8IEW 27, AC8Y 27, WD8ITT 27, W8TBP 26, W0UPL/8 26, WD8ROK 26, WB8DJS 23, K8JED 23, KA8DMT 22, W3GQJ/8 22, WB8QYU 21, WA8FXR 18, WD8MJB 18, WB8VVF 17, WB8SYA 16, WA8VBF 16, WD8MCN 14, W8JXJ 13, WA8EOW 12, WA8GTG 12, W8LCU 11, W8WOJ 11, WB8AFO 10, KA8CPS 10, W8UOO 10, WB8PLO 9, K8UPE 9, KB8BS 8, WD8DUC 8, K8OBZ 7, WB8SDB 7, WD8IXZ 6, WD8NJQ 6, K8DD 5, W8LDS 5, W8JUP 5, WA8PIM 5, N8AOA 4, W8FSZ 4, WB8HSN 4, WB8NCD 4, W8WVL 4, W8FZL 3, WH8ALB 2, WD8EAR 2, AC8F 2, W8HKL 2, K8NKB 2, WD8JFF 1, K8TIY 1, K8XE 1.

**OHIO:** SCM, Harold C. Chapman, WB8JGW — Asst. SCMs: AF8O W8TP. SEC: K8AN. NMs AF8A K8AAZ WD8KBW WB8KWD WB8OMQ WB8YGW.

| Net | QNI | QTC | Sess | Time (Local) | Freq. |
|---|---|---|---|---|---|
| BN | 520 | 238 | 58 | 9:45/10 PM | 3.577 |
| BNR | 88 | 66 | 30 | 6 PM | 3.605 |
| ONN | 57 | 29 | 22 | 6:30 PM | 3.708 |
| OSN | 246 | 110 | 30 | 6:10 PM | 3.577 |
| OSSBN | 2226 | 809 | 90 | 10:30 AM/ 4:15 & 6:45 PM | 3.9725 |
| 06mN | 390 | 41 | 29 | 9 PM | 50.160 |

Field day is over - hope all groups had a very productive & successful venture. The second session of SET '79 is almost upon us. Let's improve on the outstanding statistics of the first session. Get involved! Participate! Volunteer! Assist your EC wherever possible. Make your local law enforcement groups, Red Cross, Salvation Army, etc. aware of the program and its capabilities and get them involved. Utilize all your local newspapers, radio and TV stations to gain publicity where possible. The fall sessions of Novice and upgrading classes will begin soon in most areas of the Section. All instructors: please make your students, especially the Novices, aware of the traffic nets available to them in the Ohio Section. What better place to train operators than on your section nets? The basics can be given in the classroom but the profusive perspiration and handshaking (or voice quivering) goes only with passing your first QTC on an actual net. Trained operators are much more valuable during emergencies than a person attempting to transmit or receive his first formal message. How many metro areas have daily evening traffic nets on 2-meters (or other bands) following the evening sessions of the section nets? I am aware of only one - that one being in the Cleveland area. Such nets can be invaluable in processing traffic to areas outside of local telephone exchanges where there is no hf net participation. Give it a thought - get with your club members and see if you can't come up with a workable solution. There are still many areas of the Section where coverage is poor -these 2-meter nets may be a partial solution, but your actual participation in a Section net is urged if you might be in the following areas: Ashland Bryan Defiance Findlay Warren Wilmington Wooster Xenia Yellow Springs etc. Appointments: EC: WD8IPS/Erie-Huron; OTS: WB8SIQ. Traffic: K8AAZ 465, W8PMJ 314, W8ENI 219, WB8OMQ 182, WB8WTS 161, K8PE 150, WA8GMT 139, K8BYR 122, W8QZK 118, W8MOK 102, WB8MEK 96, WB8KWD 88, N8TM 80, WD8KBW 72, N8CW 67, WB8UBR 64, K8AN 60, W8EMK 59, W8GGX 59, WB8JGW 58, WD8QMP 57, WB8SRC 55, W8TH 48, WB8CJU 45, WA8SSI 45, WD8DTG 43, WB8QHV 43, W8FU 42, WD8LLD 42, W8LZE 42, WD8PEI 42, WB8SIQ 42, K8DL 37, WB8PIY 36, WA8HQH 35, WD8LPP 35, WB8WHF 35, K8PE 33, WD8DIP 32, WB8YTI 31, WB8YGW 30, WB8TRK 28, K3RC 26, W8TP 25. WA8MHO 24, AB8P 23, WD8PUH 23, W8RG 23, KB8FU 22, WD8QZM 22, AF8A 21, K8CKY 19, WB8WNH 19, N8AKS 17, N8JR 17, WD8KFN 17, WA8BOV 16, W8MGA 16, WB8YTD 16, WB8MRL 15, W8WEG 14, W8QCU 12, WA8RQQ 12, K8DHJ 11, WD8JTT 11, WB8OFR 11, AF8O 10, W8DYF 9, K8RT 9, WD8OYK 8, W8ZM 8, WD8PPQ 7, WA8TSX 7, WD8EKI 6, WD8RIH 6, WB8VLR 6, W8DIL 5, WD8MKC 5, WB8SMC 5, W8XT 5, WD8JIL 4, KB8KV 4, WD8OQQ 4, W8IM 3, WB8INY 3, WB8YTQ 3, WB8YUS 3, WD8DOS 2, K8JA 2, WB8QHU 1, WB9RUW 1.

## HUDSON DIVISION

**EASTERN NEW YORK:** SCM, Guy L. Olinger, K2AV —

# ATTENTION:

TO: All Amateurs
FROM: Wilson Systems, Inc.

Inflation . . . gas shortages . . . etc., all leading to higher prices each week, and cutting into the amount that we have to spend on our hobby. And face it, our hobby is what keeps us sane in this runaway inflation period, our escape from the hustle and hectic grind of working to make a living. We know — we see the same price increases at the grocery store, the same increases in the gas prices. Wilson Systems, Inc., is going to do something to help ease the purchase of your new tower and antenna.

As you may know, in January of 1979, Regency Electronics, Inc., purchased Wilson Electronics Corp. What you may not know is that in August, 1979, Jim Wilson purchased back the antennas and towers. There is now a new name to look for — WILSON SYSTEMS, INC. — With the new name and new company comes new ideas, methods, products and prices. Yes, prices. But not what you might expect. Wilson Systems is LOWERING the prices to where you will find it hard to believe. Check them out in the following pages of this issue. You will be surprised and pleased at what you will find.

What are we doing that will enable us to lower the prices? Well, we are Hams, too. We like to pay the lowest price possible and will spend much time assuring ourselves this is accomplished. We feel the same higher demands on our money for the house, food, and bills. And as this demand increases, the amount of money left for our hobby decreases. So when money is spent, we want the best quality for the best price.

There are a number of ways to bring the cost of a product down. By using a cheaper grade of material, buying raw materials in larger quantities to obtain a better discount, by cutting the profit ratio, and by eliminating the middle man. Wilson Systems will not lower the quality of the product. In fact, we have improved the strength and quality of almost every antenna in the line. The newly designed monobanders will stay up under heavy icing conditions when others are falling apart. Wilson Systems is currently purchasing at the lowest price possible from the aluminum companies, so these methods of cost reduction are eliminated. The third method mentioned is one that we have decided to consider as a part of the overall cost reduction plan, yet leaving room for research and development expense, so we may bring you the products you want and at a price you will like.

The last method mentioned is always a risky one. The dealers do not want their profits cut back just as you do not want your pay check cut. If you cut the dealers' profits back, some of them will just push the product that will tend to give them the most profit, rather than the one that will be the best performing for you. A rather drastic form of this method is the one that Wilson Systems will be choosing. You will not be able to find the Amateur products of Wilson Systems in stock at the dealers, nor will they probably recommend them. (After all, as long as they're not handling them and making a profit, why should they promote or even recommend them?) No, you will only be able to enjoy the most product for the least money by dealing with Wilson Systems factory direct. We will be offering you the amateur antennas and towers at prices that are below, in most cases, what the dealers pay for the products of other companies. And to make it even easier, we have a toll-free number for you to place your order. Now isn't this what you've been looking for? The best product for the least money!

Just remember these four points:
1. Highest Quality 2. Lowest Price 3. Toll-Free Order Number

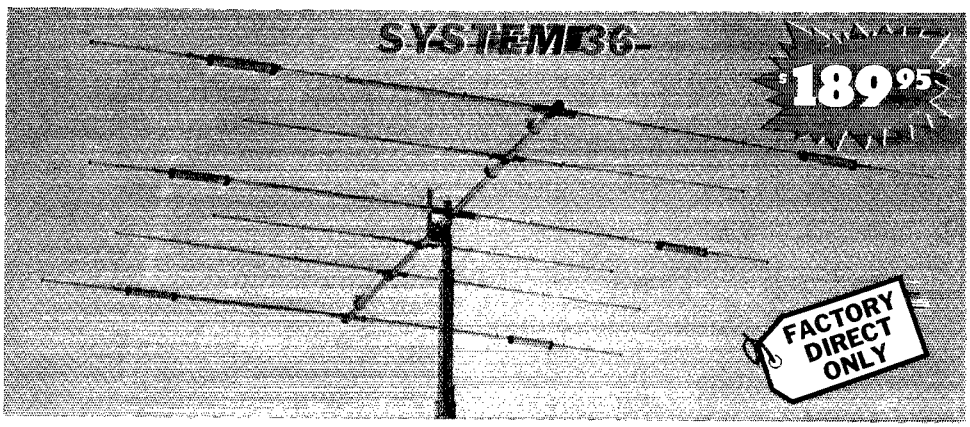
The fourth point? Remember the name . . . WILSON SYSTEMS, INC.

Yours Truly,
Jim Wilson
Wilson Systems, Inc.

**WSI WILSON SYSTEMS, INC.**

4286 S. Polaris Ave., Las Vegas, Nevada 89103
(702) 739-7401 — Toll-Free Order Number 800-634-6898

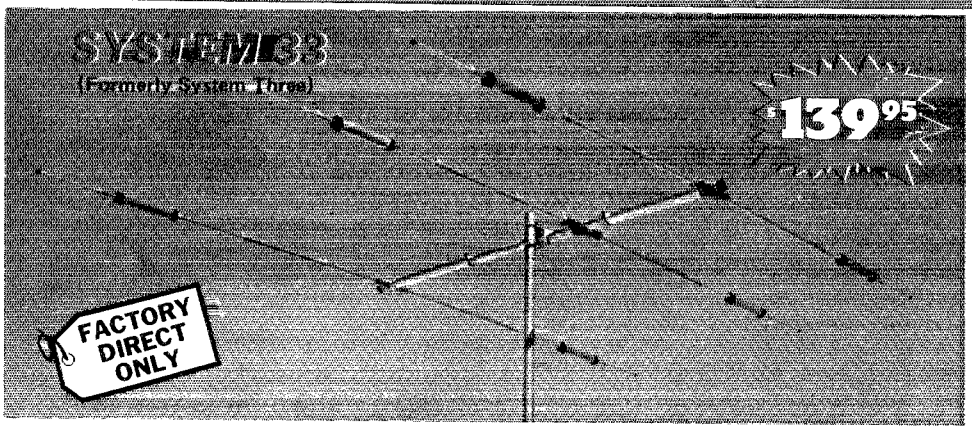
# WILSON SYSTEMS INC. MULTI-BAND ANTENNAS




A trap loaded antenna that performs like a monobander! That's the characteristic of this six element three band beam. Through the use of wide spacing and interlacing of elements, the following is possible: three active elements on 20, three active elements on 15, and four active elements on 10 meters. No need to run separate coax feed lines for each band, as the bandswitching is automatically made via the High-Q Wilson traps. Designed to handle the maximum legal power, the traps are capped at each end to provide a weather-proof seal against rain and dust. The special High-Q traps are the strongest available in the industry today.

**SPECIFICATIONS**

| | | |
|---|---|---|
| Band MHz . . . . . 14-21-28 | Boom (O.D. x Length) . . 2" x 24'2½" | Wind loading @ 80 mph . . 215 lbs. |
| Maximum power input . Legal limit | No. of elements. . . . . 6 | Maximum wind survival . . 100 mph |
| Gain (dBd). . . . . Call Factory | Longest element . . . . . 28'2¼" | Feed method . . . . . Coaxial Balun (supplied) |
| VSWR @ resonance . . . 1.3:1 | Turning radius . . . . . 18'6" | |
| Impedance . . . . . 50 Ω | Maximum mast diameter. 2" | Assembled weight (approx. 53 lbs. |
| F/B ratio . . . . . Call Factory | Surface area . . . . . 8.6 sq. ft. | Shipping weight (approx.) . 62 lbs. |




Capable of handling the Legal Limit, the "SYSTEM 33" is the finest compact tri-bander available to the amateur.

Designed and produced by one of the world's largest antenna manufacturers, the traditional quality of workmanship and materials excells with the "SYSTEM 33".

New boom-to-element mount consists of two 1/8" thick formed aluminum plates that will provide more clamping and holding strength to prevent element misalignment.

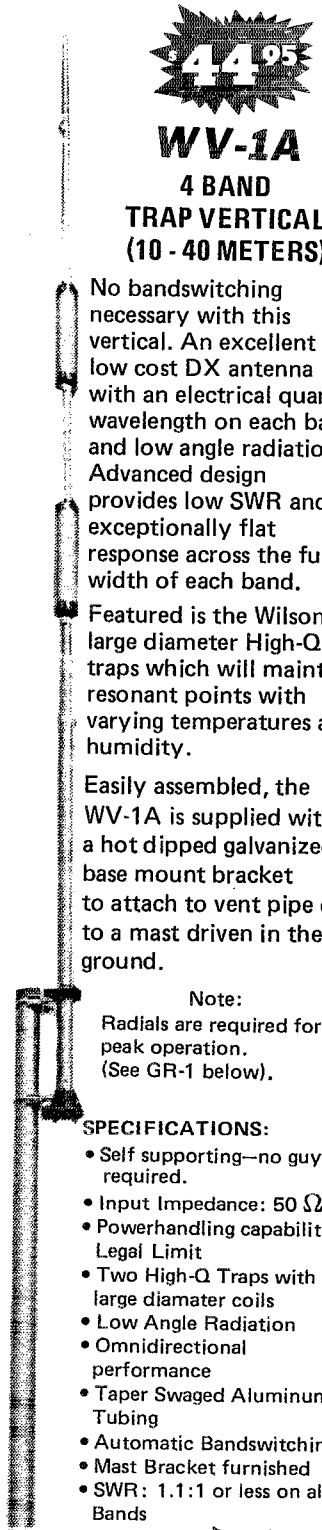
Superior clamping power is obtained with the use of a rugged ¼" thick aluminum plate for boom to mast mounting.

The use of large diameter High-Q Traps in the "SYSTEM 33" makes it a high performing tri-bander and at a very economical price.

A complete step-by-step illustrated instruction manual guides you to easy assembly and the lightweight antenna makes installation of the "SYSTEM 33" quick and simple.

**SPECIFICATIONS**

| | | |
|---|---|---|
| Band MHz . . . . . 14-21-28 | Boom (O.D. x length). . . 2" x 14'4" | Wind loading at 80 mph . . . . 114 lbs. |
| Maximum power input . Legal limit | No. elements . . . . . 3 | Assembled weight (approx.) . 37 lbs. |
| Gain (dbd) . . . . . Call Factory | Longest element . . . . . 27'4" | Shipping weight (approx.) . . . 42 lbs. |
| VSWR at resonance . . . 1.3:1 | Turning radius . . . . . 15'9" | Direct 52 ohm feed—no balun required |
| Impedance . . . . . 50 ohms | Maximum mast diameter. 2" O.D. | maximum wind survival . . . . 100 mph |
| F/B ratio . . . . . Call Factory | Surface area . . . . . 5.7 sq. ft. | |



$44.95

## WV-1A

### 4 BAND TRAP VERTICAL (10 - 40 METERS)

No bandswitching necessary with this vertical. An excellent low cost DX antenna with an electrical quarter wavelength on each band and low angle radiation. Advanced design provides low SWR and exceptionally flat response across the full width of each band.

Featured is the Wilson large diameter High-Q traps which will maintain resonant points with varying temperatures and humidity.

Easily assembled, the WV-1A is supplied with a hot dipped galvanized base mount bracket to attach to vent pipe or to a mast driven in the ground.

Note:
Radials are required for peak operation.
(See GR-1 below).

**SPECIFICATIONS:**

- Self supporting—no guys required.
- Input Impedance: 50 Ω
- Powerhandling capability: Legal Limit
- Two High-Q Traps with large diameter coils
- Low Angle Radiation
- Omnidirectional performance
- Taper Swaged Aluminum Tubing
- Automatic Bandswitching
- Mast Bracket furnished
- SWR: 1.1:1 or less on all Bands

## GR-1

$9.95

The GR-1 is the complete ground radial kit for the WV-1A. It consists of: 150' of 7/14 stranded copper wire and heavy duty egg insulators, instructions. The GR-1 will increase the efficiency of the GR-1 by providing the correct counterpoise.

Prices and specifications subject to change without notice.

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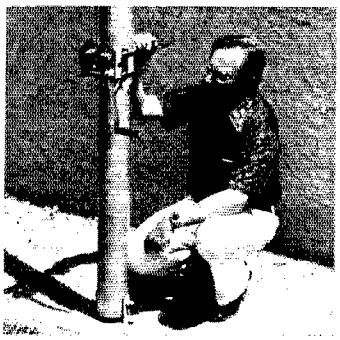
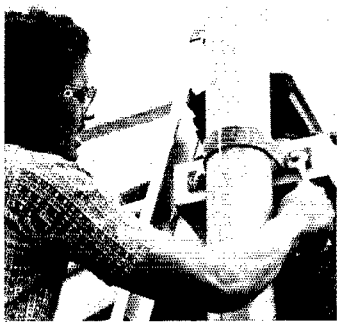
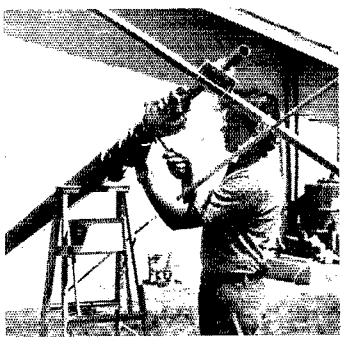
# New, Improved Wilson Towers



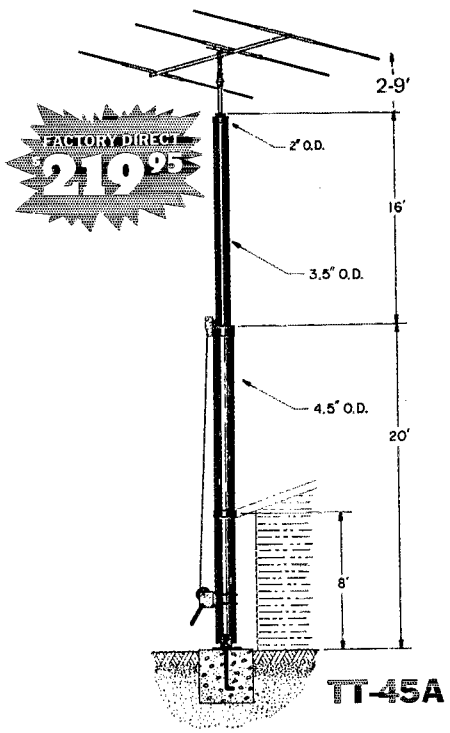
Hinged Base Plate - Concrete Pad, Heavy Duty Winch



Mounting the House Bracket



The Hinged Base Plate allows tower to be tilted over for access to antenna and rotor from the ground.

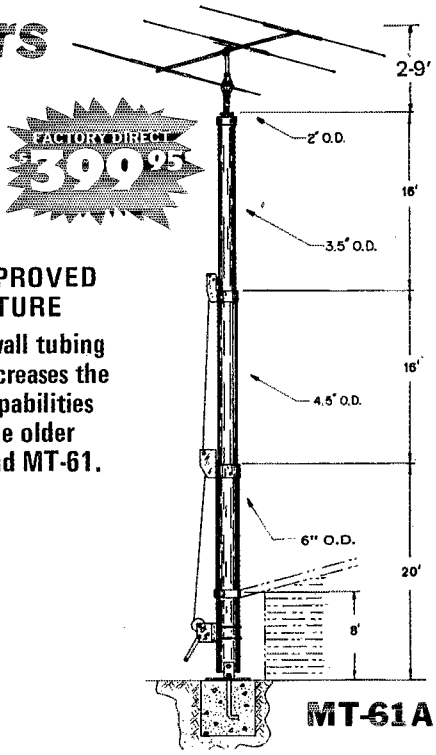



**FEATURES:**
- Maximum Height 45' (will handle 10 sq. ft. at 38') @ 50 mph
- 800 lb. winch
- Totally freestanding with proper base
- Total Weight, 189 lbs.

The TT-45A is a freestanding tower, ideal for installations where guys cannot be used. If the tower is not being supported against the house, the proper base fixture accessory must be selected.

**NEW IMPROVED FEATURE**

**Heavier wall tubing greatly increases the stress capabilities over the older TT-45 and MT-61.**




**FEATURES:**
- Is freestanding with use of proper base
- Maximum Height is 61' (will handle 10 sq. ft. at 53') @ 50 mph
- 1200 lb. brake winch
- 4200 lb. raising cable
- Total Weight, 350 lbs.

Recommended base accessory: RB-61A, FB-61A.

The MT-61A is our largest and tallest freestanding tower. By using the RB-61A rotating base fixture the MT-61A is ideally suited for the SY33 or SY-36. If you plan to mount the tower to your house, caution should be taken to make certain the eave is properly reinforced to handle the tower. If not, one of the base accessory fixtures should be used.

## GENERAL FEATURES

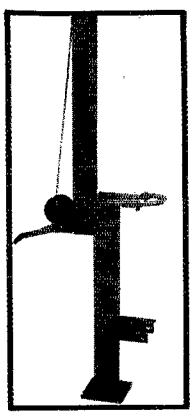
All towers use high strength heavy galvanized steel tubing that conforms to ASTM specifications for years of maintenance-free service. The large diameters provide unexcelled strength. All welding is performed with state-of-the-art equipment. Top sections are 2" O.D. for proper antenna/rotor mounting. A 10' push-up mast is included in the top section of each tower. Hinge-over base plates are standard with each tower. The high loads of today's antennas make Wilson crank-ups a logical choice.

# TILT-OVER BASES FOR TOWERS

## FIXED BASE

The FB Series was designed to provide an economical method of moving the tower away from the house. It will support the tower in a completely free-standing vertical position, while also having the capabilities of tilting the tower over to provide an easy access to the antenna. The rotor mounts at the top of the tower in the conventional manner, and will not rotate the complete tower.

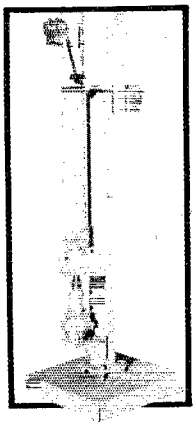
**FB-45A . . . $ 79.95**
**FB-61A . . . 109.95**

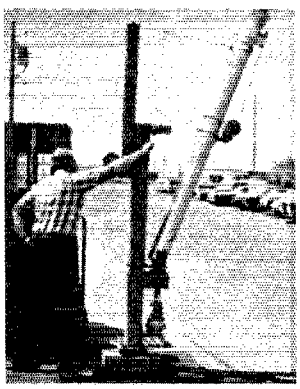


## ROTATING BASE

The RB Series was designed for the Amateur who wants the added convenience of being able to work on the rotor from the ground position. This series of bases will give that ease plus rotate the complete tower and antenna system by the use of a heavy duty thrust bearing at the base of the tower mounting position, while still being able to tilt the tower over when desiring to make changes on the antenna system.

**RB-45A . . . $119.95**
**RB-61A . . . 179.95**





Tilting the tower over is a one-man task with the Wilson bases.
(Shown above is the RB-61A.)

**WEST WILSON SYSTEMS, INC.**

4286 S. Polaris Avenue
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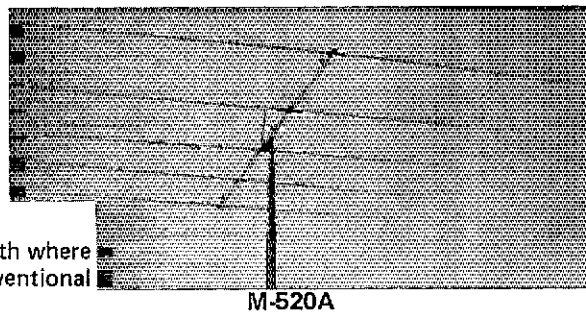
(702) 739-7401
Factory Direct Toll Free 1-800-634-6898

Prices and specifications subject to change without notice.

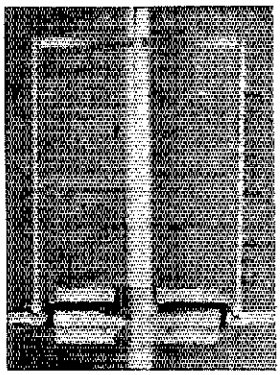
# WILSON MONO-BAND BEAMS

At last, the antennas that you have been waiting for are here! The top quality, optimum spaced, and newest designed monobanders. The Wilson Systems' new Monoband beams are the latest in modern design and incorporate the latest in design principles utilizing some of the strongest materials available. Through the select use of the current production of aluminum and the new boom to element plates, the Wilson Systems' antennas will stay up when others are falling down due to heavy ice loading or strong winds. Note the following features:



M-520A

1. Taper Swaged Elements — The taper swaged elements provide strength where it counts and lowers the wind loading more efficiently than the conventional method of telescoping elements of different sizes.
2. Mounting Plates — Element to Boom — The new formed aluminum plates provide the strongest method of mounting the e ments to the boom that is available in the entire market today. No longer will the elements tilt out of line if a bird should la on one end of the element.
3. Mounting Plates — Boom to Mast — Rugged 1/4" thick aluminum plates are used in combination with sturdy U-bolts a saddles for superior clamping power.
4. Holes — There are no holes drilled in the elements of the Wilson HF Monobanders. The careful attention given to the design made it possible to eliminate this requirement, as the use of holes adds an unnecessary weak point to antenna boom.



Wilson's Beta match offers maximum power transfer.

With the Wilson Beta-match method, it is a "set it and forget it" process. You can now assemble the tenna on the ground, and using the guidelines from the detailed instruction manual, adjust the tuning the Beta-match so that it will remain set when raised to the top of the tower. The Wilson Beta-ma offers the ability to adjust the terminating impedance that is far superior to the other matching meth including the Gamma match and other Beta-matches. As this method of matching requires a balanced li it will be necessary to use a 1:1 balun, or RF choke, for the most efficient use of the HF Monobanders.

The Wilson Monobanders are the perfect answer to the Ham who wants to stack antennas for maxim utilization of space and gain. They offer the most economical method to have more antenna for less m ney with better gain and maximum strength. Order yours today and see why the serious DXers are r ning up that impressive score in contests and number of countries worked.

## SPECIFICATIONS

| Model | Band Mtrs | Gain dBd | F/B Ratio | Bandwidth @ Resonance 2:1 VSWR Limits | VSWR @ Resonance | Impedance | Matching | Elements | Longest Element | Boom O.D. | Boom Length | Turning Radius | Surface Area (Sq.Ft.) | Windload @ 80 mph (Lbs.) | Maximum Mast | Assem Weig (Lb. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M520A | 20 | CALL FACTORY | | 500 KHz | 1.1:1 | 50 Ω | Beta | 5 | 36'6" | 2" | 34'2½" | 25'1" | 8.9 | 227 | 2" | 6 |
| M420A | 20 | | | 500 KHz | 1.1:1 | 50 Ω | Beta | 4 | 36'6" | 2" | 26'0" | 22'6" | 7.6 | 189 | 2" | 5 |
| M515A | 15 | | | 400 KHz | 1.1:1 | 50 Ω | Beta | 5 | 25'3" | 2" | 26'0" | 17'6" | 4.2 | 107 | 2" | 4 |
| M415A | 15 | | | 400 KHz | 1.1:1 | 50 Ω | Beta | 4 | 24'2½" | 2" | 17'0" | 14'11" | 2.1 | 54 | 2" | 2 |
| M510A | 10 | | | 1.5 MHz | 1.1:1 | 50 Ω | Beta | 5 | 18'6" | 2" | 26'0" | 16'0" | 2.8 | 72 | 2" | 3 |
| M410A | 10 | | | 1.5 MHz | 1.1:1 | 50 Ω | Beta | 4 | 18'3" | 2" | 12'11" | 11'3" | 1.4 | 36 | 2" | 3 |

WILSON SYSTEMS, INC. — 4286 S. Polaris
Las Vegas, NV 89103 — (702) 739-7401

## FACTORY DIRECT ORDER BLANK

Toll-Free Order Num
1-800-639-689

WILSON SYSTEMS ANTENNAS

| Qty. | Model | Description | Shipping | Price |
|---|---|---|---|---|
| | SY33 | 3 Ele. Tribander for 10, 15, 20 Mtrs. | UPS | $139.95 |
| | SY36 | 6 Ele. Tribander for 10, 15, 20 Mtrs. | UPS | 189.95 |
| | WV-1A | Trap Vertical for 10, 15, 20, 40 Mtrs. | UPS | 44.95 |
| | GR-1 | Ground Radials for WV-1A | UPS | 9.95 |
| | M-520A | 5 Elements on 20 Mtrs. | TRUCK | 199.95 |
| | M-420A | 4 Elements on 20 Mtrs. | UPS | 139.95 |
| | M-515A | 5 Elements on 15 Mtrs. | UPS | 119.95 |
| | M-415A | 4 Elements on 15 Mtrs. | UPS | 79.95 |
| | M-510A | 5 Elements on 10 Mtrs. | UPS | 84.95 |
| | M-410A | 4 Elements on 10 Mtrs. | UPS | 64.95 |
| | WM-62A | Mobile Antenna: 5/8 λ on 2, ¼ λ on 6 | UPS | 19.95 |
| | | ACCESSORIES | | |
| | HD-73 | Alliance Heavy Duty Rotor | UPS | 109.95 |
| | RC-8C | 8/C Rotor Cable | UPS | .12/ft. |
| | RG-8U | RG-8U Foam-Ultra Flexible Coaxial Cable. 38 strand center conductor, 11 guage | UPS | .21/ft. |

WILSON SYSTEMS TOWERS

| Qty. | Model | Description | Shipping | Pri |
|---|---|---|---|---|
| | TT-45A | Freestanding 45' Tubular Tower | TRUCK | $19 |
| | RB-45A | Rotating Base for TT-45A w/tilt over feature | TRUCK | 11 |
| | FB-45A | Fixed Base for TT-45A w/tilt over feature | TRUCK | 7 |
| | MT-61A | Freestanding 61' Tubular Tower | TRUCK | 39 |
| | RB-61A | Rotating Base for MT-61A w/tilt over feature | TRUCK | 17 |
| | FB-61A | Fixed Base for MT-61A w/tilt over feature | TRUCK | 10 |
| | STB-50 | Thrust Bearing | UPS | 1 |

Note: On Coaxial and Rotor Cable, minimum order is 100 ft. and in 50' multiples.
Prices and specifications subject to change without notice.
Ninety Day Limited Warranty. All Products FOB Las Vegas, Nevada.

Nevada Residents Add Sales Tax

Ship C.O.D. ☐ Check enclosed ☐ Charge to Visa ☐ M/C ☐

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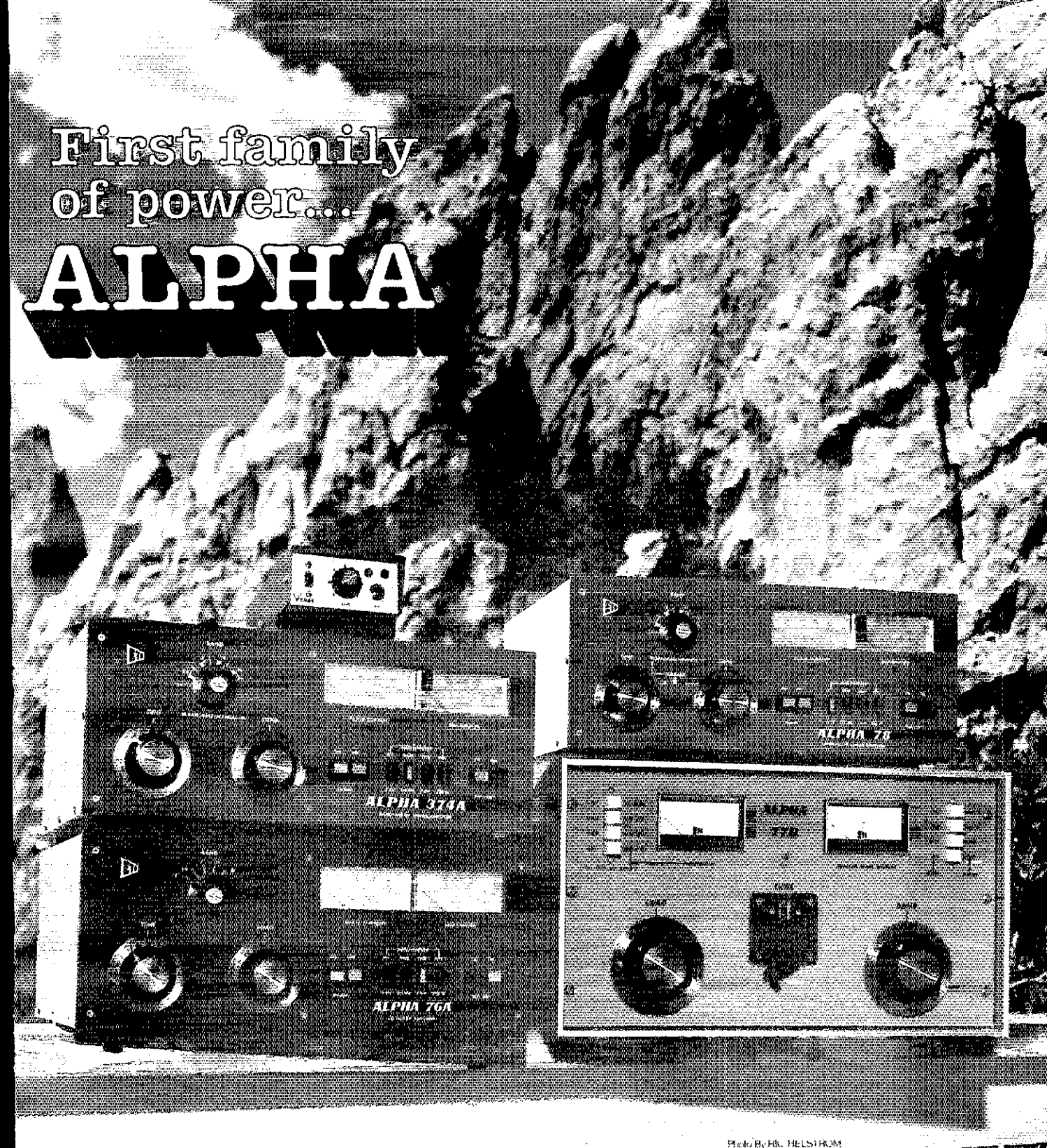


Photo By: BIL HELSTROM

THE VERY FINEST ANSWER TO YOUR NEED for one to two kilowatts of solid state power is superlative *ALPHA* linear amplifier. FIRST in performance, in convenience, in quality and durability.

Brute RF power without time limit, whisper quiet operation, instant no tune up bandchanging, high speed break-in (QSK), the ability to cover any newly assigned band, there's an *ALPHA* perfectly suited to YOUR requirements.

*ALPHA* power in a class by itself. For complete details, contact your *ALPHA* dealer or ETO direct.

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BOX 708, CAÑON CITY, CO 81212 (303) 275-1613

# NEW FROM DSI

## 50 Hz — 500 MHz 8 DIGITS

## 1 Meg INPUT — 1 Hz RESOLUTION — 1 PPM TCXO


- AC—DC Operation
- BNC Inputs 1 Meg Direct 50 Ohms Prescaled
- 8 Large .4" LED Readouts
- Auto Decimal Point & Zero Blanking
- 1 Year Limited Warranty Parts & Labor
- 100% Factory Assembled in U.S.A.

**$149.95**

**MODEL 500 HH**
**50 Hz — 500 MHz**
Without Battery Capability

**MODEL 100 HH**
**50 Hz — 100 MHz**
**$99.95**
Without Battery Capability

**SAVE $5.00**
With Battery Capability
**MODEL 500 HH . . $169.95**
**MODEL 100 HH . . $119.95**
Includes AC-9 Battery Eliminator

The 100 HH and 500 HH hand held frequency counters represent a significant new advancement, utilizing the latest LSI design . . . and because it's a DSI innovation, you know it obsoletes any competitive makes, both in price and performance. No longer do you have to sacrifice accuracy, ultra small readouts and poor resolution to get a calculator size instrument. Both the 100 HH and 500 HH have eight .4 inch LED digits — 1 Hz resolution — direct in only 1 sec. or 10 Hz in .1 sec. — 1 PPM TCXO time base. These counters are perfect for all applications be it mobile, hilltop, marine or bench work. CALL TODAY TOLL FREE: (800—854-2049) Cal. Res. CALL: (800—542-6253) TO ORDER OR RECEIVE MORE INFORMATION ON DSI'S FULL PRODUCT LINE OF FREQUENCY COUNTERS RANGING FROM 10 Hz TO 1.3 GHz.

### FREQUENCY COUNTER CONSUMER DATA COMPARISON CHART

| MANUFACTURER | MODEL | SUG'STD. LIST PRICE | FREQUENCY RANGE | TYPE OF TIME BASE | ACCURACY OVER TEMPERATURE | | SENSITIVITY | | | DIGITS | | PRE-SCALE INPUT RESOLUTION | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 17° - 40°C | 0° - 40°C | 100 Hz - 25 MHz | 50 MHz - 250 MHz | 250 MHz - 450 MHz | No. | SIZE IN INCHES | .1 SEC | 1 SEC |
| DSI INSTRUMENTS | 100 HH | $ 99.95 | 50Hz-100MHz | TCXO | 1 PPM | 2 PPM | 25 MV | NA | NA | 8 | .4 | 100 Hz | 10 Hz |
| DSI INSTRUMENTS | 500 HH | $149.95 | 50Hz-550MHz | TCXO | 1 PPM | 2 PPM | 25 MV | 20 MV | 30 MV | 8 | .4 | 100 Hz | 10 Hz |
| CSC‡ | MAX-550 | $149.95 | 1kHz-550MHz | Non-Compensated | 3 PPM @ 25°C | 8 PPM | 500 MV* | 250 MV | 250 MV | 6 | 1 | NA | 1 kHz |
| OPTOELECTRONICS | OPT-7000 | $139.95 | 10Hz-600MHz | TCXO | 1.8 PPM | 3.4 PPM | NS | NS | NS | 7 | .4 | 1 kHz | 100 Hz |

* 1 KHz - 50 MHz ‡ Continental Specialties Corp.

The specifications and prices included in the above chart are as published in manufacturer's literature and advertisements appearing in early 1979. DSI INSTRUMENTS only assumes responsibility for their own specifications.

**100 HH . . $ 99.95 W/Battery Pack . . . $119.95**
**500 HH . . $149.95 W/Battery Pack . . . $169.95**

Prices and/or specifications subject to change without notice or obligation. These prices include factory installed rechargeable NiCad battery packs.


**DSI INSTRUMENTS, INC.**
7924 Ronson Road, Dept. G
San Diego, California 92111


**T-500 Ant. . . . . $ 7.95**
**AC-9 Battery Eliminator . . . . . $ 7.95**

**TERMS:** MC - VISA - AE - Check - M.O. - COD in U.S. Funds. Please add 10% to a maximum of $10.00 for shipping, handling and insurance. Orders outside of USA & Canada, please add $20.00 addition to cover air shipment. California residents add 6% Sales Tax.

# Make your own fireworks . . .

# with a little help from KLM

**KLM's 2 meter "Long Boomer" delivers the HIGHEST GAIN available ACROSS THE WHOLE BAND, 144-148 MHz.** You get total performance for **SSB** *and* **FM**. . . . and, the unbeatable gain makes for very lively DX, tropo, EME, and meteor scatter.

**Weight and windloading are low** because there's no need for multi-reflectors, extra elements, or trusses (the strong 1½" O.D. boom is self-supporting).

Extra bonus: Simplified hardware means faster, easier assembly— and the "Long Boomer" comes equipped with a 1 KW balun for direct coupling to your 50 ohm feedline. Just build, install, and get on the air. **No tuning or matching** are necessary.

For once, you *can* have the best for less. Just **$79.95** gets you the world's *only* **WHOLE BAND/ALL MODE SUPER-GAIN ANTENNA:**

# KLM's 144-148-13LB

## "THE LONG BOOMER"

FOR COMPLETE SPECIFICATIONS SEE YOUR **KLM** DEALER OR CONTACT:

KLM 17025 LAUREL ROAD MORGAN HILL CALIFORNIA 95037 • (408) 779-7363

arma

# New OMNI/SERIES B Filters The Crowd

**The new OMNI/SERIES B makes today's bands seem less crowded. By offering a new i-f selection that provides up to 16 poles of filtering for superior selectivity. And a new Notch Filter to remove QRM. No other amateur transceiver we know of out-performs it.**

**NEW I-F RESPONSE SELECTION.** OMNI comes equipped with an excellent 8-pole 2.4 kHz crystal ladder i-f filter which is highly satisfactory in normal conditions. But when the going gets rough, the new OMNI/SERIES B, with optional filters installed, provides two additional special purpose i-f responses.

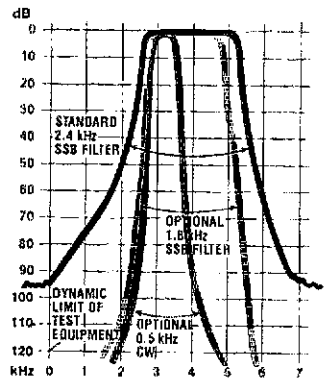
The 1.8 kHz crystal ladder filter transforms an unreadable SSB signal in heavy QRM into one that gets the message through. The 0.5 kHz 8-pole filter provides extremely steep and deep skirts to the CW passband window which effectively blocks out even the very strong adjacent signals.

Both of these filters can be front-panel switched in series with the standard filter to provide up to **16 poles** of filtering for near-ultimate selectivity. In addition, the standard CW active audio filters have three bandwidths (450, 300, and 150 Hz) to give even further attenuation to adjacent signals. In effect, OMNI/SERIES B has six selectivity curves—three for SSB and three for CW. That's true state-of-the-art selectivity.

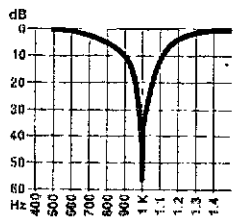
**NEW NOTCH FILTER.** A variable frequency notch filter in OMNI/SERIES B is placed inside the AGC loop to eliminate interfering carriers and CW signals without affecting received signals. Attenuation is more than 8 "S" units (over 50 db) for any frequency between 0.2 kHz and 3.5 kHz.

**OMNI/SERIES B RETAINS ALL THE FEATURES THAT MADE IT FAMOUS.**

**All solid-state; 160-10 meters** plus convertible 10 MHz and AUX band positions; **Broadband design** for band changing without tuneup, without danger;




OMNI/SERIES B I-F RESPONSES WITH STANDARD AND OPTIONAL FILTERS.




NOTCH FILTER PERFORMANCE ADJUSTED TO 1 kHz POINT.

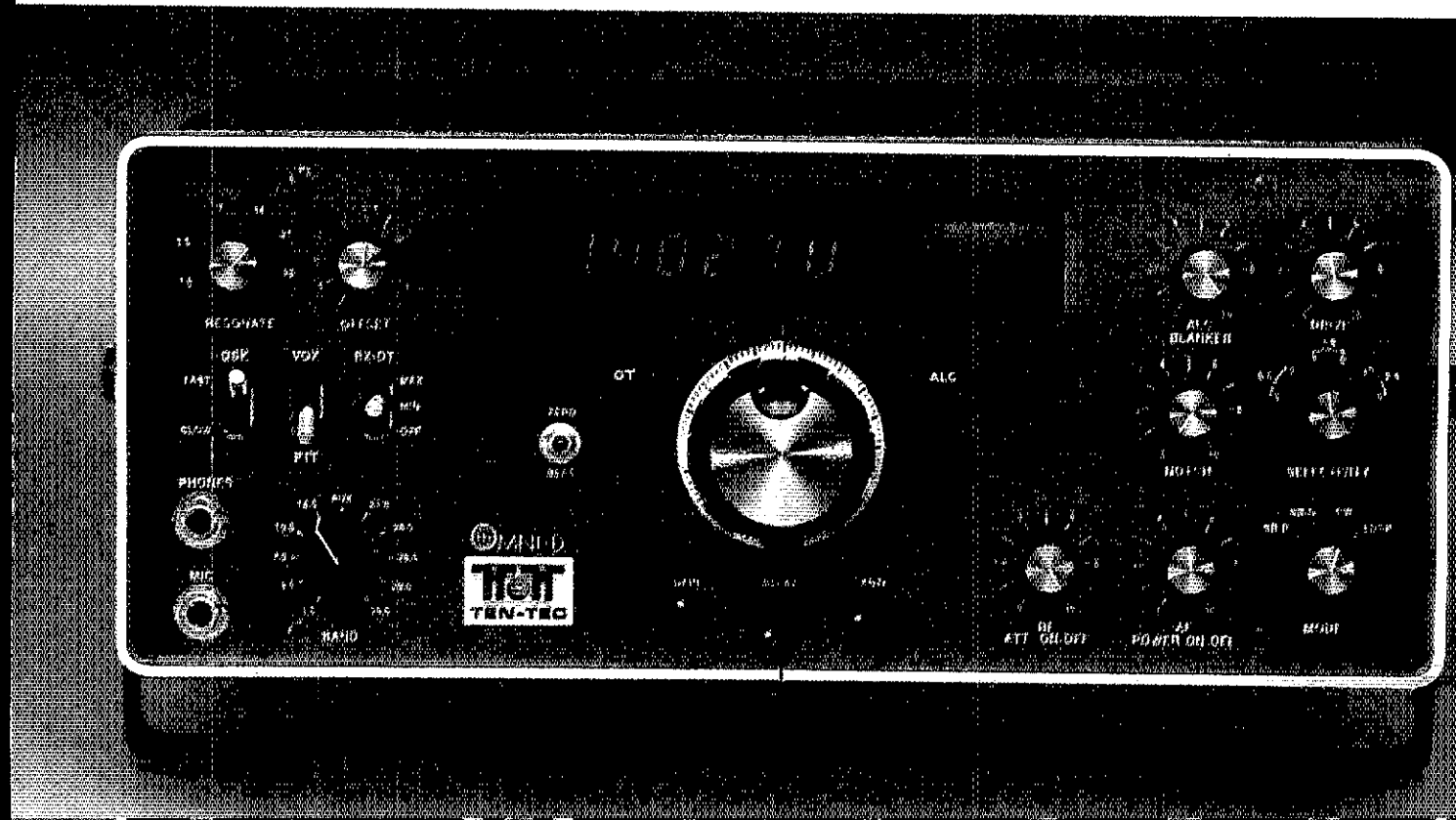
TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862
EXPORT:5715 LINCOLN AVE., CHICAGO, ILL. 60646

**Choice of readouts** —OMNI-A for analog dial or OMNI-D for digital dial; **Built-in VOX and PTT** facilities; **Selectable Break-in,** instant or delayed receiver muting; **Dual-Range Receiver Offset Tuning,** ±5 kHz or ±0.5 kHz; **Wide Overload Capabilities,** dynamic range typically exceeds 90 dB and a PIN diode switched 18 dB attenuator is also included; **Phone Patch Interface Jacks; Adjustable ALC; Adjustable Sidetone; Exceptional Sensitivity; 200 Watts** input to final with full warranty on final transistors for first year, pro-rata for 5 years; **100% Duty Cycle** for RTTY, SSTV or sustained hard usage; **12 VDC Circuitry** for mobile use, external supplies for 117/220 VAC operation; **Front Panel Microphone and Key Jacks; Built-in 25 kHz Calibrator** in analog dial model; **Zero-Beat Switch; "S"/SWR Meter; Dual Speakers; Plug-In Circuit Boards; Functional Styling,** black textured vinyl over aluminum "clamshell" case, complementary nonreflective warm dark metal front panel; **Complete Shielding; Easier-to-use size:** 5¾"h x 14¼"w x 14"d; **Full Options:** Model 645 Keyer $85; Model 243 Remote VFO $139; Model 252MO matching AC power supply $139; Model 248 Noise Blanker $49; Model 217 500 Hz 8-pole Crystal Ladder CW Filter $55; Model 218 1.8 kHz 8-pole Crystal Ladder SSB Filter $55;

**OMNI owners note:** Your OMNI can be converted to a SERIES B model at the factory for just $50 (plus $5 for packing and shipping). The notch filter replaces your present squelch control and provision is made for the two additional optional filters; a partial panel with new nomenclature is provided. Contact us for details.

**Model 545 Series B OMNI-A $949**
**Model 546 Series B OMNI-D $1119**

Experience the uncrowded world of OMNI/SERIES B. See your TEN-TEC dealer or write for full details.



# WHEN QUALITY COUNTS.....

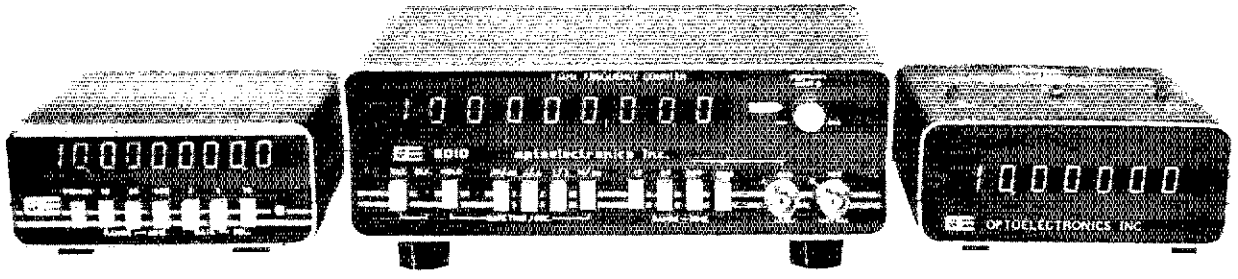
## COUNT ON OPTOELECTRONICS FOR STATE-OF-THE-ART, TOP QUALITY FREQUENCY COUNTERS AT PACE SETTING PRICES.

| | | | |
|---|---|---|---|
| NEW Model K-7000 [Kit] | 7 Digits | 550 MHz | $ 79.95 |
| NEW Model 7010 | 9 Digits | 600 MHz | $145.00 |
| NEW Model 8010 | 9 Digits | 1 GHz | $325.00 |

Note: Model K-7000 is available "KIT FORM" only, other models factory assembled only. Model K-7000 requires #AC-70 Adapter ($4.95) for 115VAC Operation, AC Adapters are included with the other models. See chart below for NI-CAD Battery Pack Option, etc.

## ALL MODELS HAVE MANY STANDARD QUALITY FEATURES INCLUDING:

- ANODIZED ALUMINUM CASES - PROVIDING RF SHIELDING
- 1 MEG AND 50 OHM INPUTS - WITH EXCELLENT SENSITIVITY
- AUTO DECIMAL PLACEMENT AT Hz AND MHz
- AC-DC or NI-CAD BATTERY PORTABLE OPERATION
- FULL YEAR 100% GUARANTEE [PARTS ONLY ON K-7000 KIT]
- NBS TRACEABLE CALIBRATION
- MADE IN U.S.A.
- COMPACT SIZES: 8010 = 3" H x 7½" W x 6½" D
  K-7000/7010 = 1¾" H x 4¼" W x 5¼" D




**7010/7010.1**
**600 MHz**
**9 DIGITS**

**8010/8010.1**
**1 GHz**
**9 DIGITS**

**K-7000 KIT**
**550 MHz**
**$79.95**

| MODEL | $ PRICE | RANGE 10Hz to | LED DIGITS | SENSITIVITY 50 OHM INPUT 25-250 MHz | 50 OHM INPUT 250-450 MHz | 50 OHM INPUT 450 MHz-1GHz | HI-Z INPUT 10Hz - 60 MHz | GATE TIMES | RESOLUTION 12 MHz | RESOLUTION 60 MHz | RESOLUTION MAX FREQ | TCXO TIME BASE 20°-40°C | TCXO TIME BASE FREQ. | EXT CLOCK INPUT | NI-CAD BATT PACK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| K-7000 kit | 79.95 | 550 MHz | 7 | 5-20 mV | 10-30 mV | 20-50 mV to 550 MHz | 1-10 mV | (2).1,1 SEC | 10 Hz | 10 Hz | 100 Hz 550 MHz | 1.8 PPM | 5.24288 MHz | NO | YES OPTION $15. |
| 7010 *7010.1 | 145.00 225.00 | 600 MHz | 9 | 5-20 mV | 10-30 mV | 30-40 mV to 600 MHz | 1-10 mV | (3).1,1,10 SEC | .1Hz | 1 Hz | 10 Hz 600 MHz | 1 PPM 0.1 PPM | 10 MHz | YES OPTION $25. | YES OPTION $15. |
| 8010 *8010.1 | 325.00 405.00 | 1 GHz | 9 | 1-10 mV | 5-20mV | 10-35 mV | 1-10 mV | (8).01-20 SEC | .1 Hz | 1 Hz | 10 Hz 1 GHz | 1 PPM 0.1 PPM | 10 MHz | YES STD | YES OPTION $39. |

*Has precision (0.1PPM) TXCO Time Base

**Enjoy the great looks and ruggedness of the RF shielded metal case. Discover unsurpassed quality throughout for years of trouble free operation. Call or write for additional information or quick delivery of your order.**

**OPTOELECTRONICS, INC.**
**5821 N.E. 14th Avenue, Fort Lauderdale, Florida 33334**

**PHONE ORDERS**
**(305) 771-2050**

master charge
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TERMS: Orders to U.S. and Canada, add 5% for shipping, handling and insurance, to a maximum of $10.00. All other orders add 10%. C.O.D. collection fee $1.00. Orders under $15.00 add extra $1.00 handling. Regular checks must clear before order is shipped. Florida residents add 4% sales tax.

# The evolution of the MLA

When the MLA-2500 was first introduced it was a new concept in high performance amplifiers. Low and sleek yet powerful enough for the military. Some wondered . . . needlessly.

## A promise kept.

The MLA-2500 promised 2000 watts PEP input on SSB. A heavy duty power supply. Two Eimac 8875's. And as thousands of Amateurs across the world have proven, the MLA-2500 delivers!

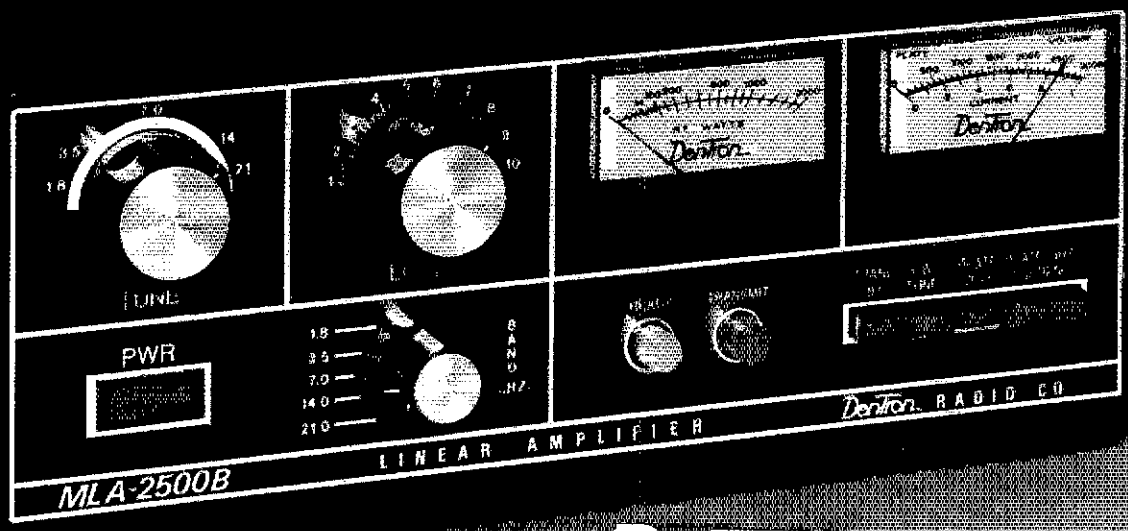
Now DenTron is pleased to bring you **The new MLA-2500 B.** Inherently the same as the original MLA-2500, the B model includes all of the above specifications plus a few refinements. New high-low power switching for consistent efficiency at both the 1KW and 2KW power levels, and 160 - 15 meters.

## Tested and proven.

What better test for an amplifier than the Clipperton DXpedition? Even after 32,000 QSO's, and an accidental dunk in the ocean, the same 3 MLA-2500's are still amplifying other rare DXpeditions around the world – listen for them.

Convinced? Isn't it time you owned the amplifier that powered Clipperton and thousands upon thousands of radio stations throughout the world?

MLA-2500 B **$899.50.**




DenTron Radio Co. Inc.

2100 Enterprise Parkway
Twinsburg, Ohio 44087
(216) 425-3173

# More accuracy
# More range
# Less money


## C-1000

- Includes audio scaler
- Auto zero blanking
- Auto decimal
- 10 MHz proportional oven time base

The C-1000 gives you greater accuracy and wider frequency range than many frequency counters that cost much more. Accuracy to .1 PPM (.00001%) from 0° to 40°C. Full frequency range from 10Hz to 1GHz. Plus sensitivity to 10MV in the 75MHz to 500MHz range. Selectable .1, 1 and 10 second gate times. Standby feature allows oven to remain ready.

**$499.95**

| Guaranteed Specifications | |
|---|---|
| Frequency Range | 10Hz to 1GHz |
| Frequency Accuracy 0° to 40°C | 1 PPM |
| Sensitivity | |
| 60Hz to 75MHz | 20MV |
| 75MHz to 500MHz | 10MV |
| 500MHz to 1GHz | 50MV |
| Number of Digits | 9 |
| Size of Digits | .5 in. |
| Power Requirements | 115VAC or Battery Pack (optional) |

All units are factory calibrated, fully tested and carry a full 5-year limited warranty.

**BEC BRIGHT ELECTRONICS CORPORATION**
P.O. BOX 76972 • ATLANTA, GA. 30328

For information about the C-1000 and other Bright frequency counters, call Toll Free (800) 241-4545. Georgia Exchanges call collect (404) 977-2225.

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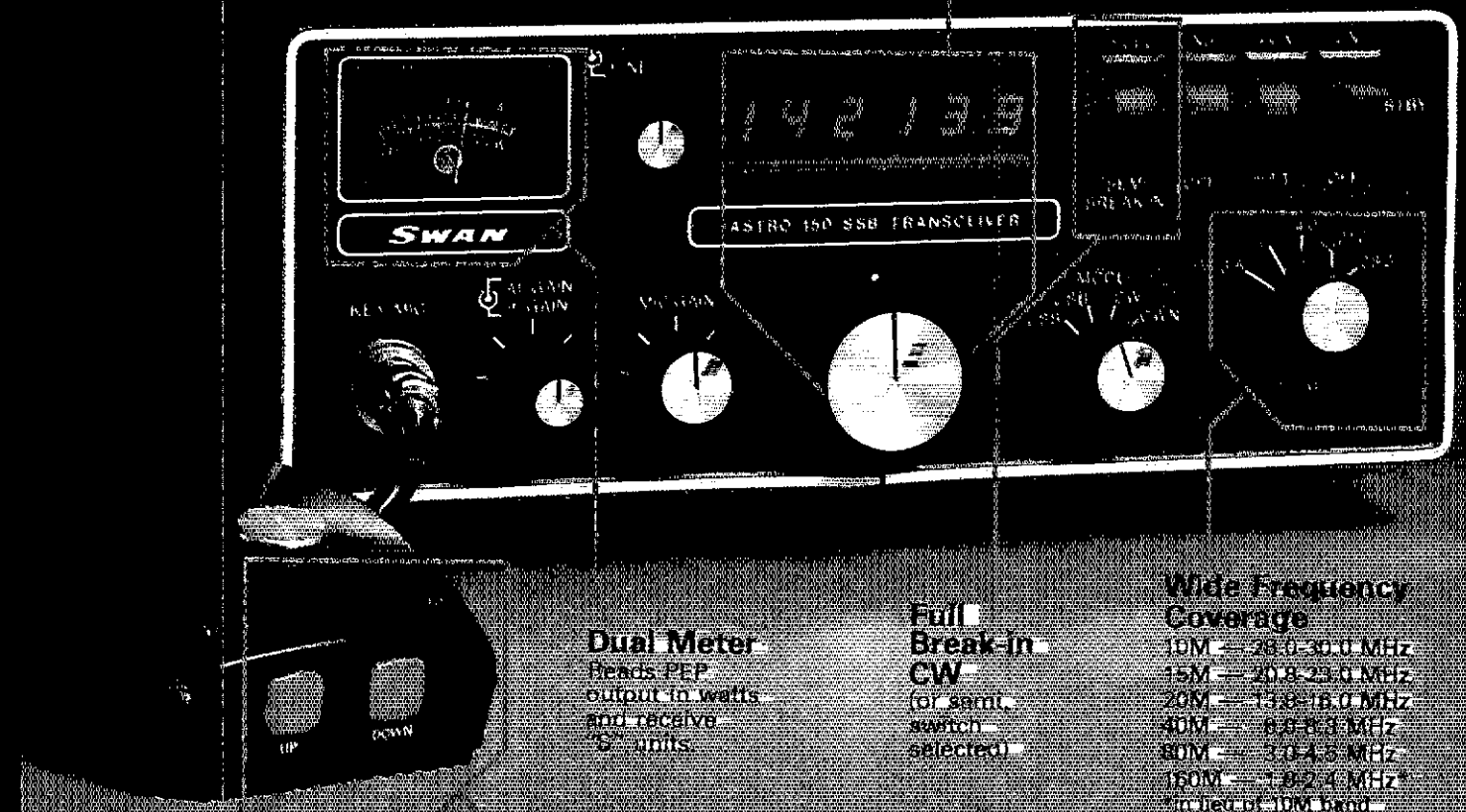
## Swan Astro 150 Exclusive Microprocessor Control w/memory gives you over 100,000 fully synthesized frequencies, and more!

- VRS — Variable Rate Scanning, a dramatic new technique for unprecedented tuning ease and accuracy
- POWER — 235 watts PEP and CW on all bands for that DX punch
- Advanced microcomputer technology developed and manufactured in the U.S.A.
- Price? See your authorized SWAN dealer for a pleasant surprise!




**Dual Meter**
Reads PEP output in watts and receive S-units.

**Full Break-in CW**
(or semi, switch selected)

**Wide Frequency Coverage**
10M — 28.0-30.0 MHz
15M — 20.8-23.0 MHz
20M — 13.8-15.0 MHz
40M — 6.8-8.3 MHz
80M — 3.0-4.5 MHz
160M — 1.8-2.4 MHz*
*in lieu of 10M band on Model Astro 151

**Mike Tuning**
For accurate 100 Hz steps or fixed tune scan.


THE MOST ADVANCED HF SSB TRANSCEIVER AVAILABLE
FULLY SOLID-STATE

# ASTRO 150

SWAN ELECTRONICS

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# Discover the unrivaled ASTRO 102BX with Dual PTO's

## Plus IF Passband Tuning/Full Band Coverage, Speech Processing, 235 Watts PEP All Bands and Much More.

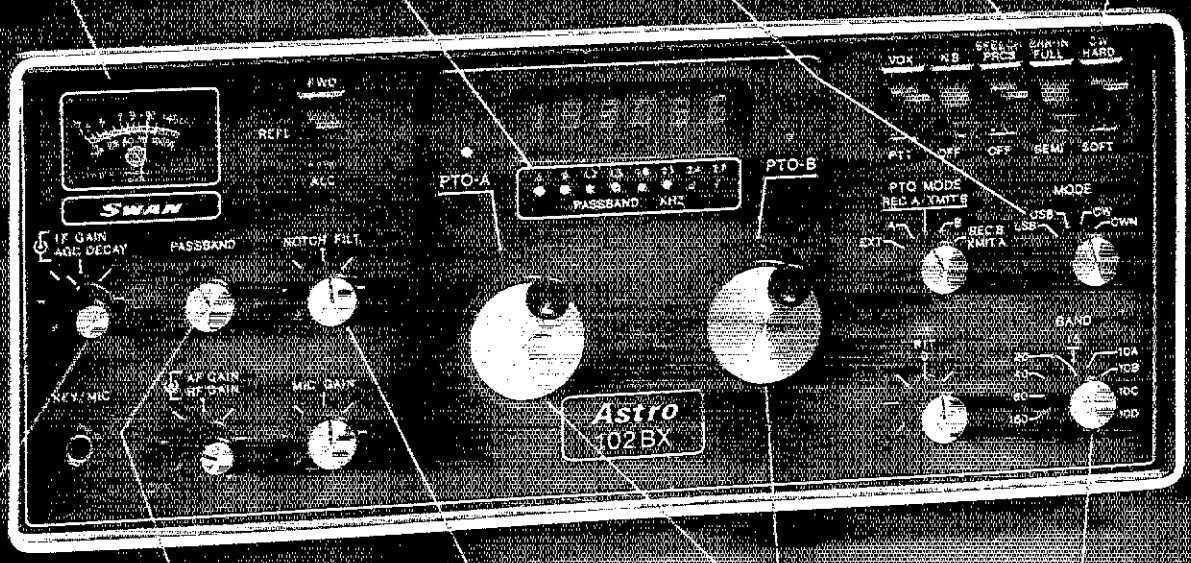
**4-Function Meter**
reads "S" units in receive, and selects forward power, reflected power, or ALC in transmit.

**Visual Display of Passband Tuning**
A series of 8 LED's indicate the equivalent band width and position of the passband from 0.6 to 2.7 KHz as the passband tuning knob is rotated.

**300Hz Crystal CW Filter**
Cascaded with the passband filters and tunable through the passband. Combined with notch filter yields unrivaled CW performance.

**Full or Semi CW Break-in**
A must for the avid CW operator!

**2 Position CW Wave Shaping**
Your choice of soft or hard CW rise and decay time!



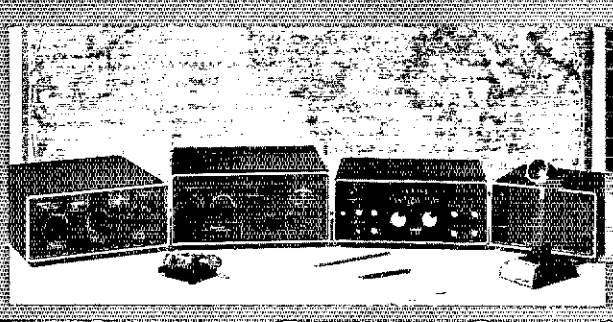

**Variable AGC Decay**
Continuously variable to suit your preference.

**Passband Tuning with 16 Pole Filters**
Two 8 pole crystal filters in cascade provides a 1.4:1 shape factor at -100dB! The ultimate in selectivity.

**Tunable Notch Filter**
Provides the ability to "notch out" QRM. When used in conjunction with the passband tuning, provides the ultimate in removing interference.

**Dual PTO's**
Two independent high stability PTO's provide true split band operation. The digital counter reads the PTO selected, or in split band reads the PTO used for receive, then switches to the transmit frequency selected when the mic is keyed.

**All Band Coverage using PLL and Synthesizer for Band Selection**
Full coverage of 160 meters through all of 10 meters in 9 ranges ... diode matrix programmed for now — or for the future!



The ASTRO 102BX with it's companion PS-1/6 Power Supply, 1500Z Linear Amplifier and ST-2A Antenna Tuner provides a matched and highly efficient 1500 watt PEP or 1000 watt CW complete station to be complemented by a great Swan antenna.

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# ASTRO 102BX

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## INCLUDES PROPORTIONAL OVEN TIME BASE

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- 95% Factory Assembled
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- .2 PPM 10° to 40° C Accuracy
- 9 Digits–.5 Inch LEDs
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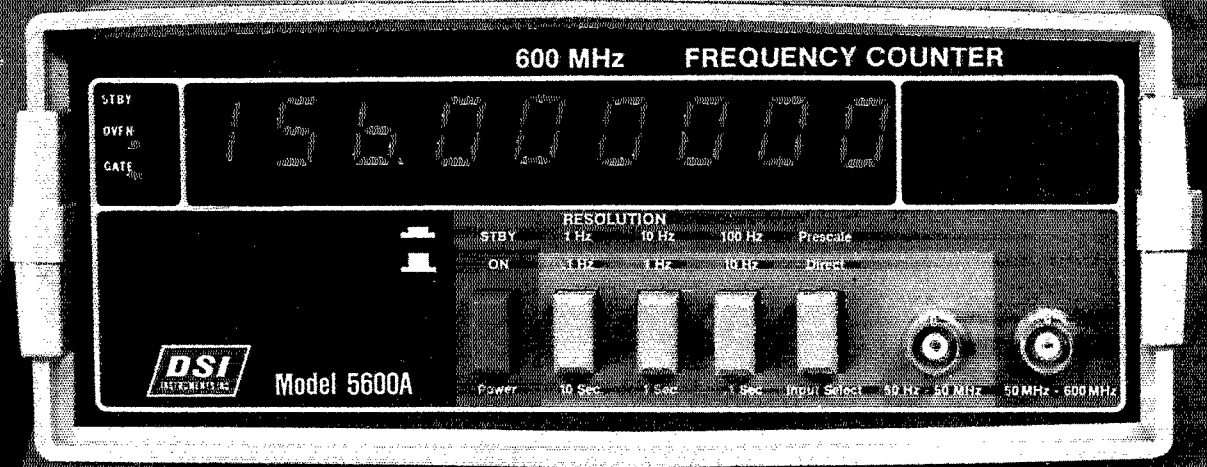


**$149.95**

**MODEL 5600A KIT**

***WHY BUY A 5600A:*** Because 95% of the assembly is completed by DSI and you are only one hour away from solving all those difficult bench problems, from setting the frequency of a audio signal to within 1/10 of a HZ, to checking the frequency of a 486 MHZ mobile radio. Whether you are servicing a VTR, trouble shooting a PLL circuit, the 5600A is the right counter with accuracy that will meet any FCC land mobile, broadcast, or telecommunications requirements. On the bench or in the field the 5600A will do the job you need. The 5600A includes a self contained battery holder providing instant portability or we offer a 10 hour rechargeable battery pack option. Other options include a audio multiplier which allows you to resolve a 1/1000 of a HZ signal and finally a 25db preamplifier with an adjustable attenuator making the 5600A perfect for communications, TV servicing, industrial testing or meeting your QSO on the correct frequency every time.

***FACTS ARE FACTS:*** With the introduction of the 5600A, The sun has set on the competition. This may sound like a bold statement on the part of DSI BUT FACTS ARE FACTS. No counter manufacturer except DSI offers a Full Range 50 HZ to 600 MHZ counter with — 9 Digits — 0.1 HZ resolution — .2 PPM 10° to 40 ° C proportional oven — RF pre-amp — 600 MHZ prescaler — three selectable gate times — oven ready, standby and gate time indicator lights as standard features — For only **$149.95** kit and **$179.95** factory wired. In fact the competition doesn't even come close unless you consider **$200.00** to **$800.00** close. With DSI having the best price to quality features ratio in the industry, no wonder we've become one of the world's largest manufacturers of high quality frequency counter instrumentation.

**FOR INFORMATION — DEALER LOCATION — ORDERS — OEM**

**CALL 800-854-2049 CALIFORNIA RESIDENTS CALL 800-542-6253**

| Model | Price | Frequency Range | Accuracy Over Temperature | Sensitivity @ 100Hz-25MHz | Sensitivity @ 50-250MHz | Sensitivity @ 250-450MHz | Number of Readouts | Size of Readouts | Power Requirements | Size H W D |
|---|---|---|---|---|---|---|---|---|---|---|
| 5600A-K | $149.95 | 50Hz-600MHz | Proportional Oven .2 PPM 10°-40°C | 10MV | 10MV | 50MV | 9 | .5 Inch | *115 VAC or 8.2-14.5 VDC | 3¼" x 9½" x 9" |
| 5600A-W | $179.95 | | | | | | | | | |
| 3550 | 99.95 | 50Hz-550MHz | TCXO 1 PPM 17°-40°C | 25MV | 25MV | 75MV | 8 | .5 Inch | *115 VAC or 8.2-14.5 VDC | 2⅛" x 8" x 5" |
| 500HH | $149.95 | 50Hz-550MHz | TCXO 1 PPM 17°-40°C | 25MV | 20MV | 75MV | 8 | .4 Inch | *115 VAC or 8.2-14.5 VDC or NICAD PAK | 1" x 3½" x 5¾" |

5600A wired factory burned in 1 year limited warranty. 5600A kit 90 day limited warranty
Prices and/or specifications subject to change without notice or obligation.

*With AC-9 Adaptor.

**$99.95**

**MODEL 3550K**

**3550 OWNERS**
You can add the 35P.2 .22 PPM 10° to 40° C proportional oven to your existing 3550

T101 Ant. ..... **$3.95**
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35P.2 ..... **29.95**
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Please add 10% to a maximum of $10.00 for shipping, handling and insurance. Orders outside of USA & Canada, please add $20.00 addition to cover air shipment. California residents add 6% Sales Tax.

5600A Kit ..... **$149.95**
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10 Hr. Bat. Pack ..... **24.95**
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.001Hz Resolution ..... **34.95**
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with Attenuator ..... **59.95**

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# N&G

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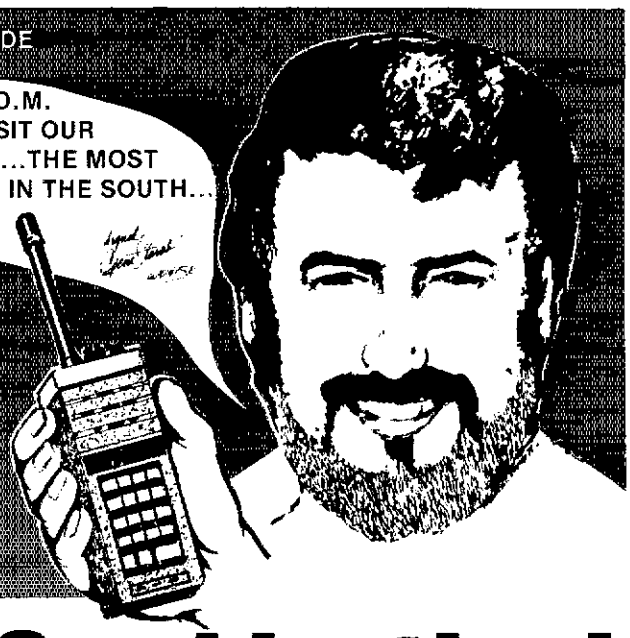

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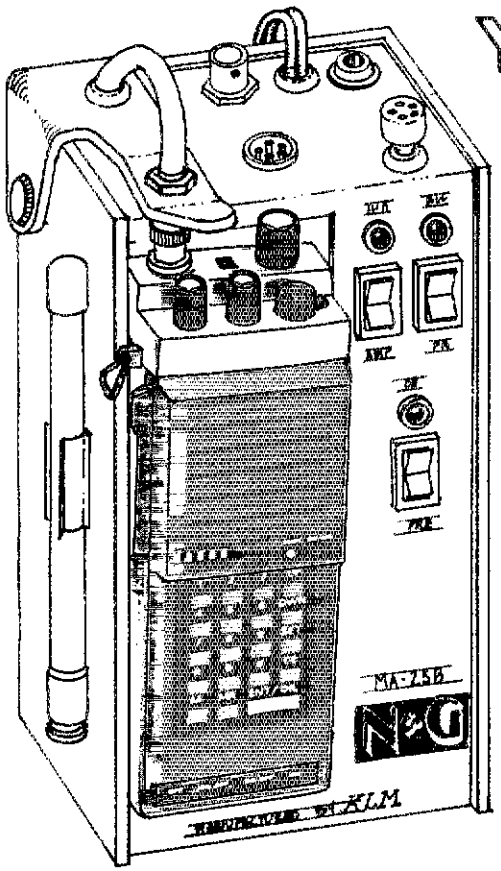
# An Unbeatable Combination!

## YAESU, *KLM*, N&G




Yaesu's hot new **FT-207R** synthesized handie is ready for the road with **KLM's CUSTOM-MATCHED MA-25B MOBILE POWER AMPLIFIER.**

You get the fabulous features of the FT-207R **PLUS** KLM's integrated 25 watt power amplifier, 5 watt audio/PA amplifier, and receive preamp . . . **ALL IN ONE COMPACT PACKAGE — a N&G exclusive!**

KLM/N&G MA-25B Power Amplifier
SPECIFICATIONS

| | |
|---|---|
| Freq. of Operation: 144-148 MHz | Mode: FM |
| Power in: 3 watts | Amps @ 13.5 VDC: 5 |
| Power out: 25 watts | Audio/PA amp: 5 watts |
| Preamp: 2.5 dB N.F., 11 dB gain | @ 8 ohms |

Custom designed and built for N&G by KLM for use only with the Yaesu FT-207R.

## *AVAILABLE ONLY AT N&G*

YAESU FT-207R $399 KLM/N&G MA-25B $279

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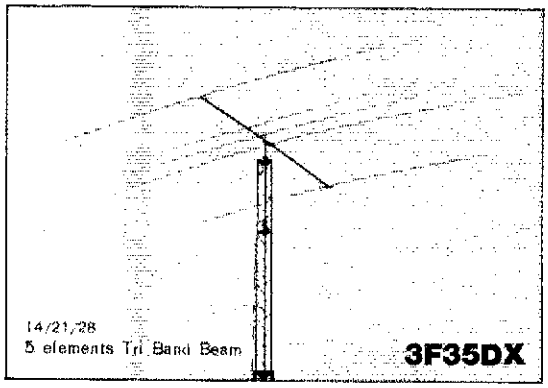
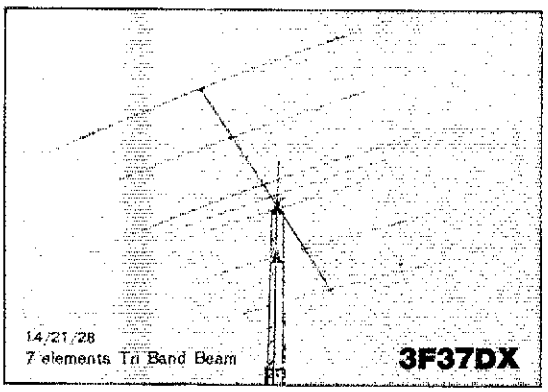
## Multi Band Beam Super DX Series

**These beams employ a hybrid system which is a combination of separate full-size driven elements for each individual band and Hi-Q-trap parasitic elements. These features result in high radiation-efficiency, high power-rating, and excellent VSWR over the entire bandwidth.**



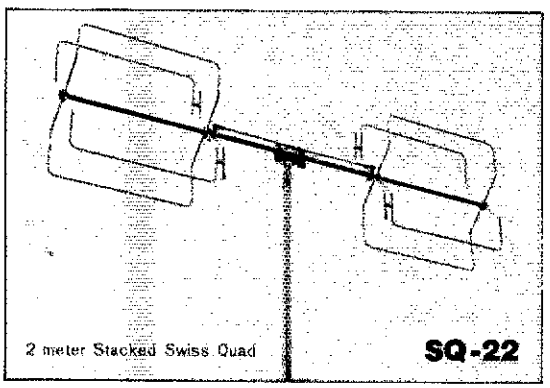
14/21/28
5 elements Tri Band Beam

**3F35DX**



14/21/28
7 elements Tri Band Beam

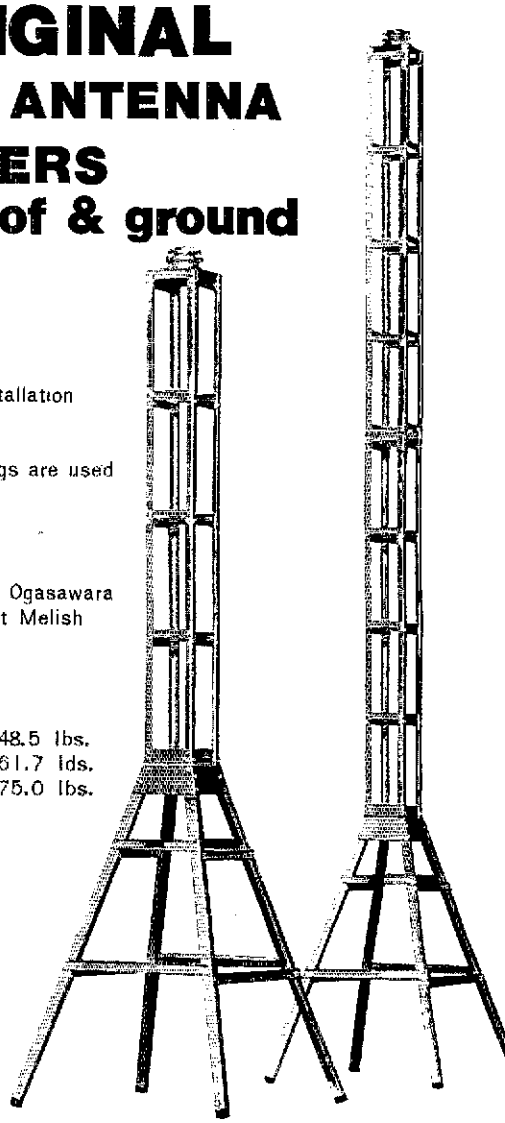
**3F37DX**



2 meter Stacked Swiss Quad

**SQ-22**

# TET ORIGINAL
## MODULAR ANTENNA TOWERS
## Ideal for roof & ground mounts

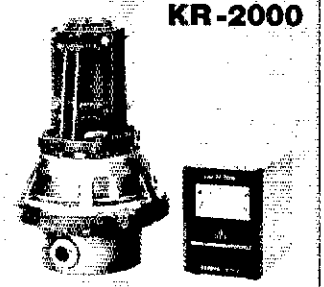


- one man assembly and installation
- Light weight
- High quality aluminum alloy
- High stability (square tubings are used as base section)

Has been used by JD1YAH at Ogasawara island and DX peditionning at Melish Reef (VK9ZR)

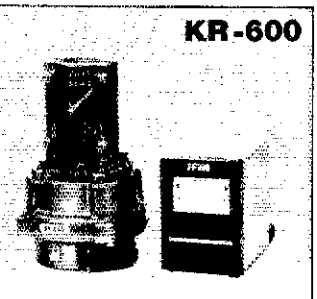
| | | | |
|---|---|---|---|
| Model | TE-35A | 11.6ft. | 48.5 lbs. |
| Model | TE-55B | 18.0ft. | 61.7 lds. |
| Model | TE-75C | 25.0ft. | 75.0 lbs. |

**KR-2000**



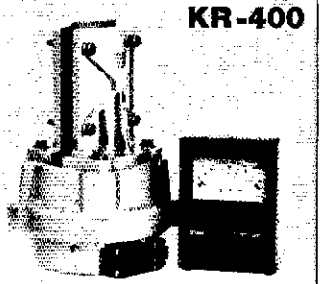
**KR 2000**—Designed for 360° rotation. Brake holds up to 10,000kg/cm (8680lbs/inch) torque.

**KR-600**



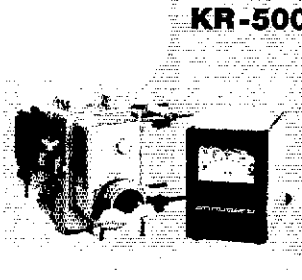
**KR 600**—Designed for360° rotation. Brake holds up to 4000 kg/cm (3470 lbs/inch) torque.

**KR-400**



**KR 400**—Designed for 360° rotation. Rated to support up to 200 kg or 440 lbs. Read out tolerance +5 degree max

**KR-500**



**KR 500**—Designed for 180° rotation. Brake holds up to 2000 kg/cm (1750 lbs/inch) torque.

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SEC: WB2VUK. STM: WA2SPL. ASCM: WB2VUK WB2COY W2IT WB2KDC. NM: W2CS W2WSS KB2JG WB2QOH. Nets: NYPON 5 PM, 3913; ESS (slow) 6 PM, 3590; NYSPTEN 6 PM, 3925; NYS 7 & 10 PM, 3677; CDN (Albany) 6:30 & 10:15 PM, 34/94; HVN (Beacon) 6:45 & 7:30 PM M/F, 37/97; SDN (W. Plains) 6:45 & 9:30 PM S/T/T, 66/06 M/W/F/, 615/015; NET (slow) 8 PM M/W/F, 3732. Note new capital area 2-M local net. Information not firm at this writing. Capital District Net (CDN) 7 days/wk. Field Day messages received in proper form from K2QF WB2ZCM K2AE. Albany ara held exhibit station in Colonie Shopping Center - big success. Congrats to N2EF for QRP DXCC on dipoles (whew). W2BIW reports rig's been brok-a-lot, the QNI's not-a-lot. WB2COY now has NCX-5. WA2CJY stocking up local library with ARRL publications. Congrats upgrades/new tix: Extra: N2AIF KB2CR WA2WOL AK2H; Adv: KB2JQ KB2KW: Gen: KA2BAI KA2DHO WA2MJX, Tech: WA2AKX; Nov: KA2FLB. Some folks still using the old rules for PSHR. Easier rules, but more points needed. Please see me or WA2SPL for help. NY5 certificates to K2s AV DN UF UYK KB2KW N2s EF JK YL W2s ACQ/BIW CS EFU HUM IT IQK ODC WSS YJR WA2s CJY ENM EQW FFX OTC STM SPL WB2s EAG FOM GMN HDU KDC ZCM PSHR: WB2HDU WA2SPL WB2EAG KB2KW. Traffic: (June) WA2SPL 702, WB2HDU 188, WB2EAG 181, W2YJR 139, WB2KDC 96, W2BIW 36, WA2EQW 32, KB2JG 30, KB2KW 26, WA2CJY 18, WB2KHK 18, WA2MZJ 17, K2AV 15, W2EFU 12, AA2Y 11, W2SZ 10, W2IQK 1. (May) KB2JG 47.

**NEW YORK CITY — LONG ISLAND:** SCM, Paul A. Lindgren, WA2UWA — Asst. SCM: Steve Bloom, WB2IDP. STM: WB2BNY. NM: WB2LIG. NM/ASCM: WB2EUF. The following are traffic nets in and around the section.

| Net | Time/Day | Freq. | Mgr. |
|---|---|---|---|
| NLI* | 1900 Dy | 3710 | WB2EUF |
| NLI* | 2200 Dy | 3630 | WB2EUF |
| NLIPN* | 1730 Dy | 3928 | WB2LIG |
| Clearinghouse | 1100 Dy | 3925 | WB2EAG |
| MikeFarad | 1300 M-S | 3925 | WA1LAD |
| NYSPTEN | 1800 Dy | 3925 | W2GLH |
| ESS | 1800 Dy | 3590 | W2WSS |
| BATN | 2100 M-F | 146.40/147.00 | KA2CNN |

Nets marked with an asterisk are NTS section nets. All times are local. Congratulations to K2GCE and WA2UWA who are the first stations to make PSHR under the new rules. WA2DHF has had OVS and OO appointments renewed. He is one of our most consistent and reliable appointees. Big Apple Training net showing excellent growth with QNI 209 and QTC 76. For more information on this net contact KA2CNN. Long time amateur W2JSB passed away on June 29th. Suffolk County Radio Club will hold their flea market Septembe 9th at the Odd Fellows hall Jayne Blvd in Port Jefferson. Rain date will be September 16th. For further information contact WA2SDI. Field Day messages received this year from W2NN/2 W2VL/2 AB2S/2 and WA2LQO/2. Congratulations to WA2HQB who upgraded to General. Suffolk County Radio Club did their usual fine job in the running and organization of the FCC exams at Stony Brook. The Grumman Radio Club received a certificate from the Air Force for their help in the Iranian crisis. This active radio club also helped provide communications for the Boy Scout bikeathon May 6th at Grumman. Communications were provided by WA2OLP WA2TWA N2AOX WB2SIM WA2PFF WB2FMP KA2CWT KA2CWS and WA2PYK. Former NLI traffic whiz N1EE ex WB2OYV, paying short visit back to old haunts. Congratulations to following new Novices KA2s EPZ ERA ERU EQW EPY EQX ESA ERR ESK EQP EPW ERZ ESS EST ESU and EWS. Best wishes to them for a long and successful amateur career and for a quick upgrade. Great South Bay Radio Club has a reference library of radio books for club members. This might be a good idea for other clubs to consider. For more info contact WA2SUB or WB2CO. WA2GZZ upgraded to Technician. WB2YUJ reports that Islip ARES has installed a new tower and 2-meter antenna on the Red Cross building. K2AIU spent some time in the hospital but is now recovering at home. LIMARC provided communications at Massapequa-Mini Marathon. Members participating were WD2AGS W2NL W2LPA KA2CLG KA2CAF WB2GNA WA2BGH WB2TYQ W2NIP and WA2SWB. LIMARC has two nets on W2VL/RPT 146.25/85. The swap and shop net every first and third Wednesday run by N2FP and the Energy net every second and fourth Wednesday run by W2TRP and N2RQ. SET time coming around soon. Time for ECs and MNs to start making your plans. Traffic: K2LIE 137, K2GCE 118, WA2UWA 106, WA2JKG 85, WB2BNY 84, W2MLC 70, W2GKZ 58, WB2BNA 20, W2DBQ 16, WB2IDP 14, K2IZ 10, WA2YUS 7, N1EE/2 5.

**NORTHERN NEW JERSEY:** SCM, Robert Neukomm, WA2MVQ — SEC: WB2VUF. STM: W2XD. NM: AF2L K2VX WA2LHV WB2RMI WA2OPY W2PSU W2UEZ.

| Net | Mgr | Frexxxxxx-xxxxg. | Time/Days | Sess. | QNI | QSP |
|---|---|---|---|---|---|---|
| NJN | AF2L | 3695 | 7 PM Dy | 30 | 548 | 249 |
| NJN | AF2L | 3695 | 10 PM Dy | 30 | 396 | 139 |
| NJPN | K2VX | 3950 | 6 PM Dy<br>9 AM Su | 34 | 628 | 257 |
| UCEN | WB2RMI | 146.085/685 | 7:30 PM<br>7:30 Dy | 30 | 269 | 59 |
| OBTTN | WA2OPY | 147.12/72 | Dy<br>Dy | 30 | 342 | 65 |
| NJSN | W2UEZ | 3735 | 6:30 PM Dy | 29 | 188 | 43 |
| NJVN | WA2LHV | 146.49/49 | 10 PM Dy | 30 | 179 | 69 |
| NJRTTY | W2PSU | 145.7 | 7 PM Dy | | | |

New Net - New Jersey Club Information net meets Sat at 3950 - 10 AM. NM is WB2TOM and he asks that all New Jersey Clubs check-in to coordinate Hamfest activities, exchange of club activities, technical notes or anything of interest to ALL NEW JERSEY CLUBS. W2CO is a Silent Key and will be missed by many of the old-timers. K2RZ in Allendale, after a long struggle with Boro officials, has been granted permission to erect a 50 foot tower. Congratulations. KA2FXA, a new Novice in Wayne, is looking for help getting his station on the air. KA2FKU a new Tech. WB2RMI reports receiving a new tower permit and also has a new TS700A. Reports he worked his first Oscar 8 Mode A. KA2FKU new Tech and N2AAM to General. W2TCA has been appointed NM for NJVN and he reports WR2ADB and WR2ANF are 2 alternate repeaters for NJVN. These 2 repeaters are available for "late" nite traffic handling. It is comforting to know someone is available in case problems occur. NJVN statistics show another advantage of "multiple frequency" option. The members are getting experience in "shifting frequencies" to handle traffic. All NJVN members were active during Field Day, and currently are monitoring the 3 repeaters to assist in the Skylab re-entry activi-

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- **IF shift (passband tuning)**
- **Advanced PLL circuit.**
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**WEIGHT CONTROL** TO PENETRATE QRM. **PULL** TO COMBINE MEMORIES A AND B FOR 1, 2, OR 3 FIFTY CHARACTER MESSAGES.

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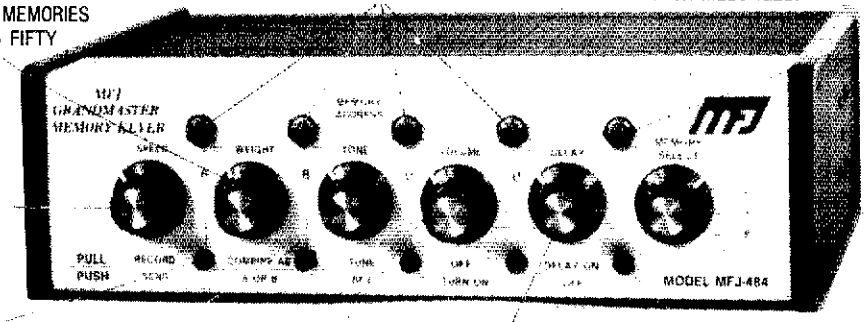


**SPEED CONTROL,** 8 TO 50 WPM. **PULL** TO RECORD.

**MEMORY SELECT:** POSITIONS 1, 2, 3 ARE EACH SPLIT INTO MEMORY SECTIONS A, B, C, D (UP TO TWELVE 25 CHARACTER MESSAGES). SWITCH COMBINES A AND B. **POSITION** K GIVES YOU 100, 75, 50, OR 25 CHARACTERS BY PRESSING BUTTONS A, B, C, OR D.

**LEDs (4)** SHOW WHICH MEMORY IS IN USE AND WHEN IT ENDS.

**TONE CONTROL. PULL** TO TUNE.

**VOLUME CONTROL.** POWER ON-OFF.

**DELAY REPEAT CONTROL** (0 TO 2 MINUTES). **PULL** FOR AUTO REPEAT.

**LED** INDICATES DELAY REPEAT MODE.

**NOW YOU CAN CALL CQ, SEND YOUR QTH, NAME, ETC., ALL AUTOMATICALLY.**

**And only MFJ** offers you the MFJ-484 Grandmaster memory keyer with this much flexability at this price.

**Up to twelve** 25 character messages plus a 100, 75, 50, or 25 character message (4096 bits total).

**A switch combines** 25 character messages for up to three 50 character messages.

**To record,** pull out the speed control, touch a message button and send. **To playback,** push in the speed control, select your message and touch the button. That's all there is to it!

**You can repeat** any message continuously and even leave a pause between repeats (up to 2 minutes). **Example:** Call CQ. Pause. Listen. If no answer, it repeats CQ again. To answer simply start sending. LED indicates Delay Repeat Mode.

**Instantly insert** or make changes in any playing message by simply sending. Continue by touching another button.

**Memory resets** to beginning with button, or by tapping paddle when playing. Touching message button restarts message.

**LEDs show** which 25 character memory is in use and when it ends.

**Built-in memory saver.** Uses 9 volt battery, no drain when power is on. Saves messages in memory when power loss occurs or when transporting keyer. Ultra compact, 8x2x6 inches.

**PLUS A MFJ DELUXE FULL FEATURE KEYER.**

**Iambic operation** with squeeze key. Dot-dash insertion.

**Dot-dash memories,** self-completing dots and dashes, jamproof spacing, instant start (except when recording).

**All controls** are on front panel: speed, weight, tone, volume. Smooth linear speed control, 8 to 50 WPM.

**Weight control** lets you adjust dot-dash-space ratio; makes your signal distinctive to penetrate QRM.

**Tone control.** Room filling volume. Built-in speaker.

**Tune function** keys transmitter for tuning.

**Ultra reliable solid state keying:** grid block, cathode, solid state transmitters (−300 V, 10 ma. max., +300 V, 100 ma. max.). CMOS ICs, MOS memories. Use 110 VAC or 12 to 15 VDC. Automatically switches to external batteries when AC power is lost.

**OPTIONAL SQUEEZE KEY**

for all memory keyers. Dot and dash paddles have fully adjustable tension and spacing for the exact "feel" you like. Heavy base with non-slip rubber feet eliminates "walking". $29.95 plus $2.00 for shipping and handling.

**THIS MFJ-482 FEATURES FOUR 25 OR A 50 AND TWO 25 CHARACTER MESSAGES.**

- **Speed, volume, weight, tone controls**
- **Combine memory switch**
- **Repeat, tune functions**
- **Built-in memory saver**

**$99.95**

Similar to MFJ-484 but with 1024 bits of memory, less delay repeat, single memory operating LED. Weight and tone controls adjustable from rear panel, 6x2x6 inches. 110 VAC or 12 to 15 VDC.

**THIS MFJ-481 GIVES YOU TWO 50 CHARACTER MESSAGES.**

- **Repeat function**
- **Tune function**
- **Built-in memory saver**

**$79.95**

Similar to MFJ-482 but with two 50 character messages, less weight controls. Internal tone control. Volume control is adjustable from rear panel. 5x2x6 inches. 110 VAC or 12 to 15 VDC.

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ty when the final ALERT comes from NAWAS. W5DTR/2 and W2QNL appointed to NJN slots K2WM WA3YGZ/2 and W2QNL qualified for NJN Ne tificates. W2SQ has a new rig with full "breakin" a the accessories. WA2MVQ wishes to thank all st operators who've cooperated so well the past 2 yea making the SCM job a joy and I look forward to se the next two. Traffic: WB2RMI 266, AF2I 174, WB2 162, W2UEZ 157, W2CQB 152, WA2MVQ 132, W2SC N2CR 130, WA2TUH 130, K2VX 114, AG2R 99, WB2R 93, W2XD 84, WA2OVE 61, N2IC 60, WB2KTR/ W2ZEP 44, WB2HSG 38, W2UH 34, K2PH 32, K2WI WA2OWR 30, N3NS 27, WA7DPK/2 22, WB2STI W2TCA 18, WB2KLF 17, N2SU 15, W5DTR/2 13, N2B K2ZFI 6, W2CVW 4, W2CC 2.

## MIDWEST DIVISION

**IOWA:** SCM, Max R. Otto, WØLFF — A tragic tor wrecked the Algona-Manson area June 28th. De next month. FD traffic was received from WBØ KØFXM KØYH AIØQ WBØYNX KØGP WØCS WØGN N WØJV WBØNCR and WØLAC. Congrats to KAØCP Tech., WBØVYG for General KØEVC and WØRWC fo vanced, WBØVHB for Public Service Award, K7YB m to Marshalltown, WBØUPF to Nora Springs and WDI is now KA9EGP in Ill. Public Service Dept: WBØEV Mt. Pleasant Club for canoe race; WØNB and KØKW Steamboat Mississippi Queen; WBØYKJ WBØYWW WDØBBE KØHGR WBØYNA WDI WDØBPR WDØGWN WDØGEM WBØZXA and WBØ for balloon race; WAØDOY WBØWOE WAØUVH WBØBIZ Centenial Parade. Cedar Valley Club W made local paper for 33 schedules in 13 months. Libera, and KØCY and Des Moines Club had good ping center demonstration. WBØSEL has new TH and WAØUYW has GLA-1000 plus TH3-Mk3. Effor WBØTEY and WAØKLD we welcome KAØEHI KA KAØEHH and KAØEPA. KØEVC's efforts responsibl KAØEFU KAØEFV and KAØEPU. WBØZXA's class pr ed three hams in one family, KAØESE KAØESF KAØESG along with KAØESD, KAØEXZ and KA KØBKL flushed the bunny in 41 minutes, and WD4 found the fox in 15 minutes, and WD4MWW foun fox in 15 minutes. Happy Labor Day.

| Net | Freq. | Time(Z)/Days | QNI | QTC |
|---|---|---|---|---|
| Iowa 75M | 3970 | 1730 M-S | 1261 | 535 |
| Iowa 75M | 3970 | 2300 M-S 0300 | 842 | 103 |
| Tall Corn | 3560 | 2330 Dy | 323 | 78 |

Traffic: WØSS 155, WØYLS 109, KØGP 88, KØOF WBØUPF 33, WØLFF 28, KØJGI 25, WBØMCX WBØAVW 13. (May) WBØNSS 35.

**KANSAS:** SCM, Robert M. Summers, KØBXF — WØKL. NMs: WØFT WØOYH WAØSZS WØESF. Time flies, perhaps its FLYS and the tiles comes with Whichever — It is that time of year again when thin become the slowest. Field Day is over and the oper activity seems to do a reverse with other things and or go. It is that time of year again when I wa thank all the gang who really get behind the PU SERVICE end of the ham radio hobby. There have g be greater awards do each of you. My reward is se you as your SCM. I do enjoy it and I hope you all see help me continue. KANSAS net activity for this mor JUNE: KSBN QNI 171, QTC 32; KPN QNI 1110, QTC OKS QNI 340, QTC 81, OKS-SS QNI 80, QTC 16 (May 105, QTC 27). KWN QNI 1024, QTC 412; CSTN QNI QTC 77 for May and June QNI 1238, QTC 70. Tr WBØOBH 208, WØOYH 101, WØFIR 85, WØAM 77, 76, WDØACG 67, WAØLBB 65, WØHI 53, WØCHJ 58, 44, KØXF 40, WØPB 23, KØYTA 20, WØKL 16, WAØFB KØKD 6, WØRBO 5, NØIN 2.

**MISSOURI:** SCM, L. G. Wilson, KØRWL — ASCM Flowers, WØOTF. SEC: WBØFKY. We have a nev manager for the MOSSBN, KØPCK.

| Net | QNI | QTC | Net | QNI |
|---|---|---|---|---|
| MON | 166 | 118 | TNT | 23 |
| MON2 | 117 | 56 | TNT (May) | 72 |
| MOSSBN | 736 | 51 | | |

Another Field Day has come and gone. Reports received from NØES/Ø WBØHBM/Ø WØBRN/Ø WØ WAØUGU/Ø and WØRR/Ø. I operated Field Day WØRR/Ø, the Heart of America Radio Club. With the of our Field Day site the day before we were suppos set up, a last ditch effort was made to find a new One was located and Field Day preparations were set back a few hours. Rain, watered gas for generator and a break-down at the phone st hampered operations on Sat, but Sun was a bea day and we were able to make up for lost time. O station made over 1000 contacts. Most Field operators and members of our families were able to ly "ham" it up when coverage by a local televisior tion arrived. All in all, Field Day 1979 was a success everyone proved they could operate under the adverse conditions. Congratulations to the follo new licensees: Novice KAØs EDZ EEA EEB EEF EEH EEL EEN EEP EES EET EEX EFG EFI EFK EGX EHS EIS EIU EJQ EJU EKF EKW EKX ELB ELF ELJ ENC EOK EOL EOV EOZ AND EPF. Tech: KAØs AUW AVU AWB AWW AXZ AYD AYI and AZQ. General: NØs AYC. Extra: WAØEEU and WBØBMB. Traffic: WØ 371, WØBV 169, WØOUD 86, WØHH 61, WØOTF 57, 42, WBØNIE 41, KØSSN 31, WDØCPS 30, WØVT WDØFZJ 18, KØRWL 12, AGØE 9.

**NEBRASKA:** SCM, Rex P. Greenwell, KØKP — WAØASM. A thanks to Ed O'Donnell, WBØGWR for well done as past SCM. Applications are OPEN League appointments, make your application now needs qualified hams as OO, OTS, OBS, OVS, and stations. Interested? See ARRL publications or dro a note for details. Great service, great fun! Repor dicate NE hams out-did ourselves on Field Day this Clubs, please put your SCM on news mailing lists and storm nets are running strong, see your EC details. Nets: Cornhusker QNI 903 OTC 31; ARES 75 175, OTC 1; Nebr Storm QNI 936, QTC 22; Pawnee QNI 119; Platte Valley QNI 47; QCWA QNI 53; West QNI 487, QTC 43. Traffic: WØHTA 106, KØBRS 80, W 74, WØHOP 30, WAØPCC 22, WØZNI 21, WØVY WAØQEX 19, WBØGWR 15, WØFOB 10, WBØGM WØEUT 8, KØSFA 3, KØFJT 2, WØNIK 2, WØFZ 1, WA 1, WØYFR 1.

## NEW ENGLAND DIVISION

**CONNECTICUT:** SCM, William J. Pace, W1ID — W1SY STM: WB1AIU NMs: WA1LOU K1EIR K WA1ELA WB1CPF.

| Net | Freq. | Time/Days | Sess. | QNI | Q |
|---|---|---|---|---|---|
| CN | 3640 | 1900/2200 Dy | 60 | 255 | 1 |
| CPN | 3965 | 1900 M-S 1000 Su | 30 | 454 | 1 |

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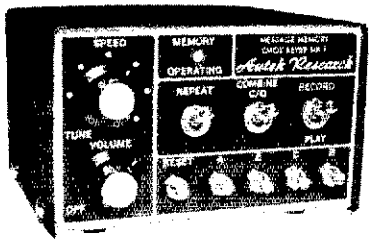
**AUTEK** pioneered the **ACTIVE AUDIO FILTER** way back in 1972. Today, we're still maintaining that engineering leadership. Our **QF-1A** evolved from suggestions from thousands of owners, and years of dedication to making the "ultimate" filter. No gimmicks — just something that really "works" like the ad says. You're in for a treat!

Autek filters gained their reputation by using a costly **INFINITELY VARIABLE** design. Yet, mass-production (we sell only **ONE MODEL** — the best) makes it a tremendous bargain. You're not limited by a few fixed positions. You vary selectivity 100:1, and vary frequency over the entire usable audio range. **PEAK CW** (or voice) with an incredible **20 HZ BANDWIDTH**, but also variable all the way to "flat." Imagine what the **NARROWEST CW FILTER MADE** will do to **QRM!** Reject whistles with the most flexible **NOTCH** you've heard. Wide or narrow. Depth to 70 dB. **LOWPASS** helps you cope with **SSB** hiss and splatter. Skirts exceed 80 dB. Most above features were in the popular QF-1 (See excellent review in March, 1977 **QST**.) The new "A" model is more selective, adds a **HIGHPASS** mode for **SSB**, and a great **AUXILIARY NOTCH** (35 to 60 dB) to give **TWO NOTCHES, NOTCH/PEAK, NOTCH/LOWPASS,** or **NOTCH/HIGHPASS!** If this doesn't convince you, please **ASK ON THE AIR.** Owners are our best salesmen!

Due to cost and panel-space limitations, even the latest rigs only include a fraction of the **QF-1A** features. We recommend you buy the best rig you can afford, spend $3,000 or more, then add a **QF-1A** and listen to the improvement! **WORKS WITH** Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Collins, Heath, S/1, etc., **ANY RIG!**

Hooks up in minutes. Plug into your rigs phone jack, or attach to speaker wires. Plug speaker or phones into **QF-1A** rear-panel jack. That's it! Filter supplies 1 watt to fill a room. No batteries rqd. (+12 VDC hookup possible.) 6½x5x2½". Handsome light/dark grey styling. Get yours today.!

# CMOS PROGRAMMABLE KEYER MAKES CW FUN!



Calls CQ while you relax.
Also remembers name, QTH, contest exchanges.
Record anything you want in seconds!

## Model MK-1 $99.50 ppd. U.S.A.

Our classic **MK-1** should make you wonder why anyone would buy an ordinary keyer, when memory costs so little! Records 4 messages. Just select "record," tap the A, B, C, or D message, and start sending at any speed! Record over old messages as easily. Playback by tapping the same button. Each message holds about 25 characters (letters, numbers). Total 100 characters. Handy repeat switch repeats message forever until reset. Very useful for **CQ's. YOU SIT BACK AND WAIT FOR A CALL!** Another switch combines two messages for 50 characters. "Memory-saver" feature standard.

This "state-of-the-art" keyer pleases beginners and CW "pros" alike. **DOT AND DASH MEMORIES. TRIGGERED CLOCK. IAMBIC. SELF COMPLETING. JAM PROOF. 5 to 50+ WPM. LATEST CMOS FOR LOW CURRENT.** Built-in monitor, speaker. Widely adjustable tone, volume. Perfect weighting at all times. No fiddling with an adjustment that varies with speed. **NEW: DUAL TRANSMITTER OUTPUTS** key **ANY** modern (post 1963) ham rig directly without a battery or relay, including difficult-to-key solid-state rigs. **115VAC** supply built in, or connect 9-14 **VDC** to rear panel. Use with **ANY** paddle. 6x3½x5". Burned-in and tested. Sockets for **IC's.** Full instructions.

**NOW AVAILABLE. 4096 BIT MEMORY EXPANDER (ME-1)** allows 16 messages, 400 chars, & "combine" for longer messages. Plugs into memory socket of **ANY MK-1** ever made. Installs in 10 to 30 mins. Full instructions. Buy your **MK-1** now and easily add memory later if you wish!

**FLASH!** MK-1 used to set new world's CW record. A single operator worked 3992 DXQSO's & 275 band-countries in only 48 hours! Get the choice of champions — AUTEK.

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| PV-50 | $ 9 |
| CN-50 | 29 |
| CN-144 | 39 |
| TX-62 | 79 |
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### B&W Waters
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| Nuvertor 2+6 Conv. | $ 75 |
| 6100 SSB Xmitter | 395 |
| 670 SSB Adaptor | 39 |
| Co-Dax Keyer | 95 |

### Central Electronics
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|---|---|
| 100V Transmitter | 325 |
| MM-2 Scope | 69 |
| 20-A SSB Adaptor | 79 |

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| 22'er FM | $129 |
| 66'er 6M Xcvr | 115 |
| 99'er 6M Xcvr | 59 |
| Interceptor BRCUR | 275 |
| Ant Pre Amp | 22 |
| All Bander | 69 |
| HT-146 | 125 |
| 2 Vess | 259 |
| FM-27-B Xcvr | 325 |

### Collins
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|---|---|
| 75 A4 Receiver | $395 |
| 75S3B Receiver | 695 |
| 75S1 Receiver | 349 |
| KWM-2 Xcvr | 595 |
| 32S1 Xmitter | 349 |
| PM-2 AC Supply | 95 |
| 516 F2 AC Supply | 139 |
| 312B5 Console | 425 |
| 351D2 Mount | 29 |

### Drake
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|---|---|
| 2A Receiver | $149 |
| 2B Receiver | 189 |
| 2AQ SPKR QMULT | 29 |
| R4 Receiver | 289 |
| R4-B Receiver | 349 |
| R4-C Receiver | 399 |
| MS-4 Speaker | 19 |
| 2NT Transmitter | 125 |
| 2NT Transitter | 99 |
| TR-4 | 695 |
| TR-22 2 Meter | 140 |
| T-4X Transmitter | 339 |
| TR-72 2 Meter FM | 225 |
| AC-4 AC Supply | 95 |
| TR-4-C Transceiver | 449 |
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| CPS-1 Supply | |
| SC-2 Conv | |
| SC-4 Conv | |
| SC-1 Calibrator | |
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| 10-0 2 M Ampl | $125 |
| 35-0 401N 110 Out | 130 |
| 470-25 450 MC | 120 |
| P-1416 16 Amp Supply | 95 |

### Eico
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|---|---|
| 720 Transmitter | $ 49 |
| 722 VFO | 39 |
| 730 Modulator | 39 |

### Elmac
| | |
|---|---|
| AF-67 Transmitter | $ 45 |
| PMR-8 Receiver | 79 |

### Genave
| | |
|---|---|
| GTX22M FM | $165 |
| GTX-200 2M FM | 149 |

### Globe/Galaxy
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|---|---|
| VHF 6+2 Transm | $ 39 |
| Chief Transmitter | 39 |
| Galaxy III Xcvr | 159 |
| Galaxy V Xcvr | 189 |
| Galaxy V Mk II | 239 |
| GT-550 Xcvr | 279 |
| GT-500A Xcvr | 329 |
| AC-400 Supply | 79 |
| FM-210-2M FM | 95 |

### Gonset
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|---|---|
| Com II 2M | $ 75 |
| Com II-6M | 69 |
| Com IV 2M | 129 |
| GC-105 2M | 115 |
| G-28 Xcvr | 149 |
| G-50 Xcvr | 149 |

### Hallicrafters
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|---|---|
| S-108 Receiver | $ 99 |
| SX-101 Receiver | 159 |
| HT-32 Transmitter | 179 |
| HT-32B Transmitter | 269 |
| SX-99 Receiver | 79 |
| SX-115 Receiver | 349 |
| HT-37 Transmitter | 159 |
| HT-40 Transmitter | 49 |
| SX-99 Receiver | 99 |
| SX-117 Receiver | 189 |
| SR-150 Xcvr | 259 |
| SR-160 Xcvr | 159 |
| SX-146 Receiver | 175 |
| HT-44 Transmitter | 159 |
| SX-111 Receiver | 149 |
| SX-122 Receiver | 249 |
| S-36 UHF Receiver | 125 |

### Hammarlund
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|---|---|
| HQ-110 A VHF Receiver | $189 |
| HQ-110C Receiver | 119 |
| HQ-110AC Receiver | 149 |
| HQ-145X Receiver | 169 |
| HQ-170C Receiver | 159 |
| HQ-180 Receiver | 379 |
| HQ-215 Receiver | 259 |
| SP-600 Receiver | 179 |
| HX-50 Transmitter | 169 |

### Heathkit
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|---|---|
| SB-300 Receiver | $199 |
| SB-301 Receiver | 229 |
| HR-10-B Receiver | 69 |
| SB-303 Receiver | 269 |
| SB-220 Linear Amp | 449 |
| SB-102 Trivcvr | 379 |
| DX-60B Transmitter | 69 |
| HW-32 Transmitter | 85 |
| HW-100 Transceiver | 249 |
| SB-100 Transceiver | 299 |
| SB-401 Transmitter | 249 |
| SB-101 Transceiver | 349 |
| SB-650 Digital Freq. Display | 149 |
| HW-30 Twoer | 29 |
| Also Sixer | 29 |
| H-10 Monitor | 69 |
| VHF-1 Seneca | 79 |
| HW-12 Transmitter | 75 |
| HP-23 AC Supply | 49 |
| HP-23B AC Supply | 59 |
| HW-202 2M FM Xcvr | 159 |
| SB-620 Spectrum Analyz | 120 |
| SB-102 Xcvr | 369 |
| SB-610 Scope | 95 |
| HA-20 6m Linear | 125 |
| SB-634 Console | 175 |
| SB-604 Spkr | 29.50 |
| SB-644 VFO | 129.50 |
| SB-230 Linear | 359 |
| SB-104 Transceiver | 625 |

### ICOM
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|---|---|
| IC-21 2M FM Xcvr | $299 |
| IC-230 Demo | 369 |
| IC-22A 2M FM Xcvr | 185 |
| IC-30A 432 MCFM | 269 |

### Johnson
| | |
|---|---|
| 1-KW Matchbox/SWR | $195 |
| Courier Linear | 139 |
| Ranger I Transmitter | 85 |
| Ranger II Transmitter | 139 |
| Valiant I Transmitter | 129 |
| Invader 2000 Xmitt | 495 |

### Kenwood
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|---|---|
| T-599 Transmitter | $289 |
| R-599 Receiver | 289 |
| TS-520 Tranc | 625 |
| QR-666 | 259 |
| QR-666 Receiver | 239 |
| TV 502 Transvertor | 179 |

### Knight
| | |
|---|---|
| T-60 Transmitter | $ 39 |
| r 100 Receiver | 59 |
| TR-108 Trancur 2M | 79 |

### Lafayette
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|---|---|
| HA-800 Receiver | $ 89 |
| HP-350 Receiver | 149 |
| HE-45 Transceiver | 49 |

### Midland
| | |
|---|---|
| 509 H.T. | $149 |

### Millen
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|---|---|
| 92200 Transmatch | $149 |
| 90651-A Grid Dipper | 95 |

### National
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|---|---|
| NC-270 Receiver | $119 |
| NC-300 Receiver | 129 |
| NCX-5 Transceiver | 279 |
| NCX-5MK II Transcvr | 299 |
| NC-303 Receiver | 199 |
| AC-500 AC Supply | 69 |
| NCX-500 Transceiver | 199 |
| NCX-3 Transceiver | 169 |
| NC-190 Receiver | 149 |
| NC-105 Receiver | 69 |

### Regency
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| HR-2B 2M FM | $169 |
| HR-220 FM 220 MC | 185 |
| AR-2 2M Amplifier | 85 |
| HR-25 2M FM | 225 |
| HR-6 Meter FM | 189 |

### SBE
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|---|---|
| SB-34 Transceiver | $249 |
| SB-33 Transceiver | 189 |
| SB-144 2M FM | 175 |
| SBZ-LP Linear | 179 |

### Standard
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| SRC-146 HT | $149 |
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| SRC-144 | 395 |
| SRC-851T | 250 |

### Swan
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|---|---|
| 700-CX Xcvr | $459 |
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| 500 CX Xcvr | 389 |
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| 250 C 6M Xcvr | 349 |
| FM 2X2M Xcvr | 169 |
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| 410 VFO | 79 |

### Tempo
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| Tempo one Xcvr | $29 |
| AC One Supply | 7 |
| FMH 2M H.T. | 14 |
| CL 220 Trncvr 220 MC | 17 |
| FMH 2M w/Talkie | 14 |

### Ten Tec
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| PM-3 Trnsvr | $ 4 |
| KR-40 Keyer | 7 |
| RX-10 Receiver | 4 |
| S-30 Signalizer | 2 |
| Triton II | 47 |

### Yaesu
| | |
|---|---|
| FT-401 Xcvr | $49 |
| FRDX 400SD Rec | 32 |
| FT 2 Auto 2M FM | 24 |
| FT-101B Xcvr | 54 |
| FL-2100B Linear | 29 |
| FV-101 VFO | 7 |
| 101E Xcvr Demo | 69 |

### Test Equipment Bargains
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| Boonton "Q" Meter | $295 |
| Tektronix 5140 | 249 |
| Tektronix 545A | 950 |
| 5 3/54A Plug-in wide band preamp | 75 |
| Hickok 695 Generator | 69 |
| Bendix BC221 Freq Meter | 39 |
| Polarad Spectrum Analyzers A84T | 1695 |
| Hewlett Packard 400C | 75 |
| Precision E-400 Signal Generator | 125 |
| Electro Impulse Spectrum Analyzer | 395 |
| Dyna/Sciences Model 330 Digital Multimeter | 195 |
| Hewlett Packard 4905A Ultra Sonic Detector | 550 |
| Hewlett Packard 120A Scope | 250 |
| TS-323/UR Frequency Meter | 175 |
| Hewlett Packard 4910B Open Fault Locator | 650 |
| General Radio 650A | 150 |
| Measurements Mod 80 | 195 |
| Nems Clark 1400 | 495 |
| Ballantine 300H | 175 |
| PACO Scope Mod-S-50 | 75 |
| Singer FM-10C | 3495 |
| Simpson 260 V.O.M. | 49.50 |

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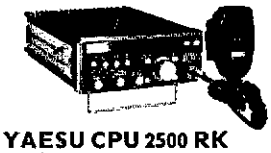

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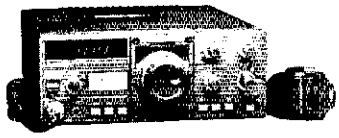

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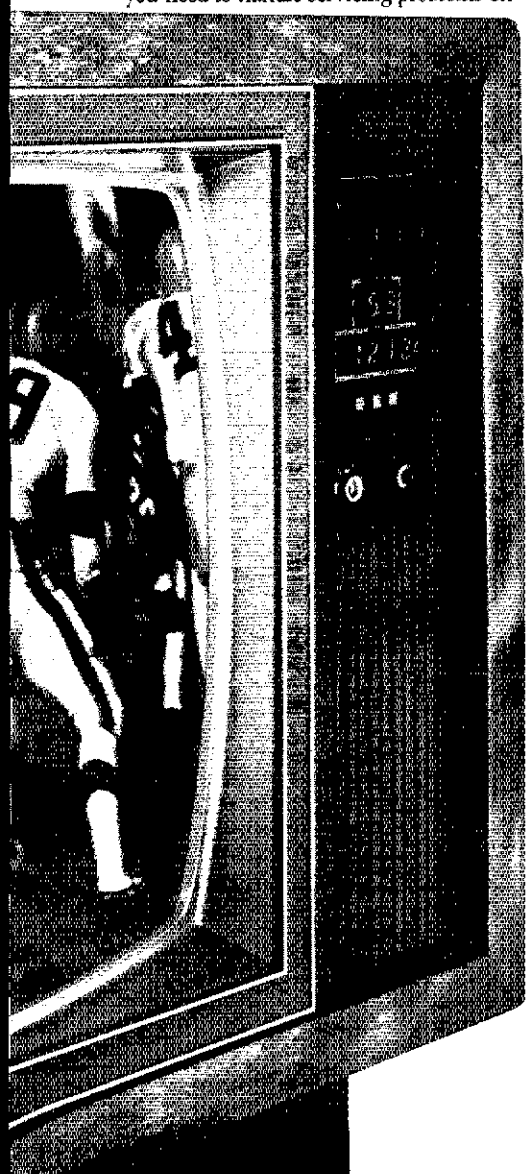

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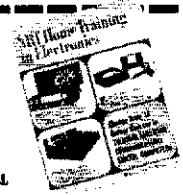

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| NUTMEG | 28/88 | 2130 Dy | 30 | 358 | 76 | |
| WESCON | 78/18 | 2030 Dy | 30 | 599 | 98 | |
| NERTTY | 3620 | 2030 Mon | | | | |

New slate of officers for SARA (Southington). WB1AS pres.; WA1TQO, vice pres.; WB1GIR, treas.; W1EF secy. W1DFS reports on new NE Teleprinter net. dicates W1HHR traffic will probably break 3000 in 197 W1QV attended July Board meeting in Baton Roug W1BDN reports visiting with old time friends in W6-lan WB1FZX indicates complete success in the SAF (Stamford) Field Day effort, at Cove Island. Repor WSTC/WYRS is carrying a locally produced ham-rad program Wed at 7:30 PM. WB1AIE blew a pow transformer on his HW 101. WA1VQP reports a fun nig in the annual CARA fox-hunt. WA1KRX and XYL wi crew WB1DSB were the winners, with W1QK very close second. WA1LOU provides a computer composed a tivities report which was a dandy. The TRS-80 provided very concisely tabulated traffic and PSHR report. W should all go this route! The ham population of CT is creasing very rapidly. Weekly reports from W1ALP e SCM of MA, which are call-book supplements, show hams were licensed in CT for the week of July 6. ST WB1AIU's summer activities will be severely limite following a compound leg fracture in mid-July. The sum mer doldrums have hit us as far as station activities concerned. Only one club bulletin was received, that the Candlewood group, so the news items are necessa ly brief. In the new antenna department, K1TGX h gone all out. He is now sporting a motorized 85 fo tower with mono band beams on 10-15 and 20. K1FR also in Cheshire, has his 50 footer up with a new Teler tri-bander. The ATV activity is increasing in t Naugatuck-Waterbury area with WA1VNX spurring activity in this relatively new mode. Traffic: WA1UA 253, K1DFS 228, K1GF 173, WA1UUA 156, W1OD 12 W1EW 110, W1DFT 107, WB1CPF 99, W1HMJ 88, K1 66, W1BDN 62, WB1DGR 61, WB2PJU/1 52, WA1LOU 3 K1AQE 27, WB1AIE 22, K1EUW 18, W1JTD 8, W1QV WB1DJD 5, WA1SFM 2, W1BDI 2, W1CUH 2, KA1CMX

**EASTERN MASSACHUSETTS:** SCM, Rick Beebe, K1PA — SEC: WA1BLG, STM: WA1TBY, PC reports fro K1FMM, W1ZMO N1ACA WA1GIL W1XA. QO repor from W1NF WA1NAE CBS report from WA1QAA.

| Net | Freq. | Time/Dy | QNI | QTC |
|---|---|---|---|---|
| EMRI | 3.66 | 19/2300 Dy | 457 | 397 |
| EMRIPN | 3.898 | 1730 Dy | 368 | 197 |
| EMRISS | 3.715 | 1915 Dy | 155 | 19 |
| HHTN | 04/64 | 2230 Dy | 413 | 116 |
| NEEPN | 3.945 | 0830 Su | 34 | 10 |
| EM2MN | 90/30 | 2000 MWF | 33 | 26 |
| EM2MN | 145.8 | 2000 TTh | | |

From where I sat Field Day was a smashing success East Mass. I was glad to receive over ten radiogram from active groups around the section. EMRIPN was mess as usual with the contest in full swing b everybody got their message through, thanks aga Speaking of radiograms, there has been a lot of talk a some print on the subject of "funk" messages. Let t record be straight! There is no such thing as a lu message. What most people are referring to a messages that have no apparent value in terms of t text. Lets not forget that all messages have value in t training that they give the relaying stations. This tra ing is important, so I say again there is no such thing "junk" traffic. W1EGE reports that the Mt. Equinox h climb effort went well with a contingent from t Wellesley Club helping out and doing some vhf co testing as well. Wellesley club initiating a "Ham of t Year" award. K1FB had a good article in Middlesex QR Billerica and Chelmsford Clubs organizing a joint fam picnic. Minuteman Repeater Assn. new officers ar K2TJZ, pres.; WB1DQC, vice pres.; WB1GUZ, sec K1GRB, treas.; KA1AL, clerk. K1PAD had a nice visit the Masasoit Club at their new meeting place which great and W1ALP sends his greetings. Officers of th Quannapowitt Radio Assn. W1HL, pres.; KA1RD, vi pres.; WA1HTP, secy.; K1ZUP, treas. Yankee Chapt #112 of OCWA planning meeting at NE Div Conventi in Hartford. Framingham Club considering contributi to DXpeditions. The NE Div Convention will be on Sep 29/30 in Hartford. Hope to see you all there and plea try to attend the traffic or general East Mass meeting Update on the W1JR antenna law suit. Local hams ha setup defense fund at Middlesex Bank, 464 Bosto Road, Billerica 01821. Recent lull in bulletins sent OBSs has now been corrected. The Eastern Mas Emergency Plan is now available to anyone wanting o send note or radiogram to K1PAD. Traffic: (Jun WA1TBY 340, K1BA 166, W1PEX 160, WA1EYY 14 KA1CC 134, WA1YWK 117, K1GN 112, WA1LPM 9 WA1ZAZ 88,WA1YMN 74, W1CE 73, W1FJI 70, K1BS 56, WB1ACA 45, W1GZB 45, W1HL 42, W1DMH 3 WB1EZT 32, W1DMS 26, W1MX 20, WA1IFE 19, WA1ZG 19, N1CW 17, KA1AHD 15, KA1BJY 14, WB1GEX 1 WB1ABM 8, WA1FNM 8, K1BZD 7, WB1EMU 6, W1XA W1AEC 4, W1ALP 1. (May) WA1YMN 74, KA1BMJ 4 W1MX 21, WA1QQV 3.

**Maine:** SCM, Ed Bristow, WA1MUX — AARC ne repeater 14.01/61 on air Lewiston-Auburn area; club als supplying communications at L-A Air Show 7/14 & 1 Reports from Field Day: - ARAS 12 ops, 6 ARES Memb EAWA 15 ops, 1 novice, 3 ARES memb.; SARA 1 op, novice asst. Sess/QTC/QNI: AEN: 4/1/44; SPSN: 4/5/1 QMEN: 13/14/159; PTN: 30/116/208. Novices note: NFN 3720 kHz Dy at 6:15 PM local. PSHR W1RWG WB1BY Check Apr '79 QST for changes in counting & quirements. Traffic: WB1BYR 108, W1RWG 105, N5Y 83, AF1L 57, WA1JZP 51, W1KX 42, N1RP 40, W1HDQ W1CTR 25, WA1YNZ 25, WA1MUX 2, WA1FGM KA1DOJ 4.

**RHODE ISLAND:** SCM, J. Titterington, W1EOF — SE K1DT. STM: N1RI. Back on April 28th, over 60 han helped with Red Cross Disaster Exercise. That is a gre credit to the amateur radio community. The 7Y receiv contest was judged at Fidelity ARC. Winners: Novi Class: AD1P; Experienced: WA1UHT; Best Over A AD1P. New calls: WB1EKH now AG1M and WA1SIT KA1FE. New RI ARES net on 146.52 on Wed at 7:30 P has been having its ups and downs. Check-in, you'll li it. In spite of the good weather activities, the RIE 2-Meter Traffic Net is still doing good business. F June, Sessions 21, QNI 244 and traffic 62. A lot of t credit must go to WA1CSO, Net Mgr. and WA1WW asst. Net Mgr. See you all at the NE Convention at Ha ford, Sept. 29th and 30th. Traffic: WA1YUH 65, WA1CS 29, W1EOF 29, N1RI 11, AE1S 6.

**VERMONT:** SCM, Bob Scott, W1RNA — SEC: W1VS WB1BZR would like to announce he is now KA1FJ. It ha been noted that a few 2-mtr FM stations have strayed o to our 75 mtr nets. Hope they continue and do not let t

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| RX28C W/T | same as above—wired & tested | 129.95 |
| RX50C Kit | 50-60 MHz rcvr w/2 pole 10.7 MHz crystal filter | 64.95 |
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| RX144C Kit | 140-170 MHz rcvr w/2 pole 10.7 MHz crystal filter | 74.95 |
| RX144C W/T | same as above—wired & tested | 131.95 |
| RX220C Kit | 210-240 MHz rcvr w/2 pole 10.7 MHz crystal filter | 74.95 |
| RX220C W/T | same as above—wired & tested | 131.95 |
| RX432C Kit | 432 MHz rcvr w/2 pole 10.7 MHz crystal filter | 84.95 |
| RX432C W/T | same as above—wired & tested | 142.95 |

| | | |
|---|---|---|
| SRX150 Kit | High performance, single board, 144 MHz rcvr w/4 pole crystal filter | 94.95 |
| RXCI | accessory filter for above receiver kits gives 70 dB adjacent channel rejection | 9.95 |
| RI28 Kit | 10 mtr RF front end 10.7 MHz out | 13.50 |
| RI50 Kit | 6 mtr RF front end 10.7 MHz out | 13.50 |
| RI144D Kit | 2 mtr RF front end 10.7 MHz out | 18.50 |
| RI220D Kit | 220 MHz RF front end 10.7 MHz out | 18.50 |
| RF432 Kit | 432 MHz RF front end 10.7 MHz out | 29.50 |
| IF 10.7I Kit | 10.7 MHz II module includes 2 pole crystal filter | 29.50 |
| FM455 Kit | 455 KHz IF stage plus FM detector | 18.50 |
| AS2 Kit | audio and squelch board | 16.00 |

## TRANSMITTERS

| | | |
|---|---|---|
| TX50 Kit | transmitter exciter, 1 watt, 6 mtr | 44.95 |
| TX50 W/T | same as above—wired & tested | 71.95 |
| TX144B Kit | transmitter exciter—1 watt 2 mtrs | 34.95 |
| TX144B W/T | same as above—wired & tested | 65.95 |
| TX220B Kit | transmitter exciter—1watt—220 MHz | 34.95 |

| | | |
|---|---|---|
| TX220B W/T | same as above—wired & tested | 65.95 |
| TX432B Kit | transmitter exciter 432 MHz | 49.95 |
| TX432B W/T | same as above—wired & tested | 87.95 |
| TX150 Kit | 300 milliwatt, 2 mtr transmitter | 24.95 |
| TX150 W/T | same as above—wired & tested | 43.95 |

## POWER AMPLIFIERS

| | | |
|---|---|---|
| PA2501H Kit | 2 mtr power amp—kit 1w in 25w out with solid state switching, case, connectors | 69.95 |
| PA4010H Kit | 2 mtr power amp—10w in 40w out—relay switching | 69.95 |
| PA50/25 Kit | 6 mtr power amp, 1w in, 25w out, less case, connectors & switching | 59.95 |
| PA144/15 Kit | 2 mtr power amp—1w in—15w out—less case, connectors and switching | 49.95 |
| PA144/25 Kit | same as PA144/15 kit but 25w | 59.95 |
| PA220/15 Kit | similar to PA144/15 for 220 MHz | 49.95 |
| PA432/10 Kit | power amp—similar to PA144/15 except 10w and 432 MHz | 59.95 |
| PA9610 W/T | 144 MHz, 100 w, repeater amp. incl. power supply | 549.95 |
| PA9611 W/T | 220 MHz, 90 w, repeater amp. incl. power supply | 549.95 |

| | | |
|---|---|---|
| PA9612 W/T | 432 MHz, 70 w, repeater amp. incl. power supply | 579.95 |

Blue Line — RF power amp, wired & tested, emission—CW-FM-SSB/AM

| Model | Band | Power Input | Power Output | |
|---|---|---|---|---|
| BLC 10/70 | 144 MHz | 10W | 70W | 159.95 |
| BLC 2/70 | 144 MHz | 2W | 70W | 184.95 |
| BLC 10/150 | 144 MHz | 10W | 150W | 269.95 |
| BLC 30/150 | 144 MHz | 30W | 150W | 249.95 |
| BLD 2/60 | 220 MHz | 2W | 60W | 189.95 |
| BLD 10/60 | 220 MHz | 10W | 60W | 169.95 |
| BLD 10/120 | 220 MHz | 10W | 120W | 269.95 |
| BLE 10/40 | 420 MHz | 10W | 40W | 169.95 |
| BLE 2/40 | 420 MHz | 2W | 40W | 219.95 |
| BLE 10/80 | 420 MHz | 10W | 80W | 289.95 |

## POWER SUPPLIES

| | | |
|---|---|---|
| PS15C Kit | 15 amp—12 volt regulated power supply w/case, w/fold-back current limiting and overvoltage protection | 99.95 |
| PS15C W/T | same as above—wired & tested | 134.95 |
| PS25C Kit | 25 amp—12 volt regulated power supply w/case, w/fold-back current limiting and overvoltage protection | 139.95 |
| PS25C W/T | same as above—wired and tested | 169.95 |
| PS25M Kit | same as PS25C with meters | 159.95 |

| | | |
|---|---|---|
| PS25M W/T | same as above—wired and tested | 189.95 |
| O.V.P. | adds over voltage protection to your power supplies, 15 VDC max. | 14.95 |
| PS3A Kit | 12 volt—power supply regulator card with fold-back current limiting | 11.95 |
| PS3012 W/T | new commercial duty 30 amp 12 VD regulated power supply w/case, w/fold-back current limiting and overvoltage protection | 274.95 |

## REPEATERS

| | | |
|---|---|---|
| RPT150 Kit | repeater—6 meter | 599.95 |
| RPT144 Kit | repeater—2 mtr—15w complete (less crystals) | 599.95 |
| RPT220 Kit | repeater—220 MHz—15w complete (less crystals) | 599.95 |
| RPT432 Kit | repeater—10 watt—432 MHz (less crystals) | 649.95 |

| | | |
|---|---|---|
| RPT150 W/T | repeater—6 meter | 899.95 |
| RPT144 W/T | repeater—15 watt—2 mtr | 899.95 |
| RPT220 W/T | repeater—15 watt—220 MHz | 899.95 |
| RPT432 W/T | repeater—10 watt—432 MHz | 949.95 |
| DSC-II | double shielded duplexer cables with PL259 connectors (pr.) | 29.95 |
| DSC-N | same as above with type N connectors (pr.) | 34.95 |

## REPEATER BASE STATIONS

| | | |
|---|---|---|
| RB50 W/T | 50 MHz repeater base station w/autopatch & duplexer | 2,355.00 |
| RB144 W/T | 144 MHz repeater base station w/autopatch & duplexer | 2,085.00 |
| RB220 W/T | 220 MHz repeater base station w/autopatch & duplexer | 2,085.00 |
| RB432 W/T | 432 MHz repeater base station w/autopatch & duplexer | 2,105.00 |

## AUTOPATCHES

| | | |
|---|---|---|
| RA300 W/T | Amateur autopatch w/power supp. | 299.95 |
| RA500W/T | Full duplex, same as above | 895.00 |

## ATV TRANSMITTER

| | | |
|---|---|---|
| TVX10 W/T | UHF fast scan tv transmitter w/power supply | 399.95 |

## OTHER PRODUCTS BY VHF ENGINEERING

| | | |
|---|---|---|
| CD1 Kit | 10 channel receive xtal deck w/diode switching | $ 8.95 |
| CD2 Kit | 10 channel xmit deck w/switch and trimmers | 16.95 |
| CD3 Kit | UHF version of CD1 deck, needed for 432 multi-channel operation | 14.95 |
| CDR2 Kit | carrier operated relay | 23.95 |
| SC3 Kit | 10 channel auto-scan adapter for RX with priority | 21.95 |
| CWID Kit | 159 bit, field programmable, code identifier with built-in squelch tail and ID timers | 42.95 |
| CWID | wired and tested, not programmed | 59.95 |
| CWID | wired and tested, programmed | 64.95 |
| TD3 Kit | 2 tone decoder | 39.95 |
| TD3 W/T | same as above—wired & tested | 64.95 |
| HL144 W/T | 4 pole helical resonator, wired & tested, swept tuned to 144 MHz ban | 34.95 |
| HL220 W/T | same as above tuned to 220 MHz ban | 34.95 |
| HL432 W/T | same as above tuned to 432 MHz ban | 34.95 |

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- Top-mounted controls for instant access

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|---|---|---|
| 3807 | Nicad Battery Pack | $31.95 |
| 1104 | Touch Tone Pad | $44.95 |
| 1106 | AC Battery Charger | $ 9.95 |
| 1107 | Cigarette Lighter Adaptor Cord | $ 9.95 |
| 1108 | Antenna Adaptor Cord | $ 9.95 |
| 1110 | Carrying Case (Leather) | $17.85 |
| 1111 | Carrying Case (Vinyl) | $ 9.95 |
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| | Crystal Certificates | $ 3.95 |

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conditions on that band this time of year discourage them. WR1AEA reports 2 motorist emergency assists for the month. Carrier: 26/413/44; GMN: 28/389/45; VTRFD: 4/72/15; VPN: 4/51/12; VT SSB no report received. As not much input to me for this, I would like to say the handling takes practice, regardless of type. AND, there are many who certainly need practice, in all parts of the art! In emergencies, efficient & correct methods are an absolute must. It should not take too much imagination to know why. Traffic: K1BQB 138; KA1FJ 32.

**WESTERN MASSACHUSETTS:** SCM, Bill Lowe, W1TM — SEC: WA1DNB. STM: W1KK. NM: W1UD WA1MJE. Field Day activity very successful despite the unusual windy/cold weather. FD reports from the following: W1BIM N1CM W1GZ W1JP W1NY. SCM FD report to WA1DNB. These reports via NTS. Nice letter from K1JHC describing emergency drills in Leominster on the 13th. W1UD also reports excellent coordination between Civil Defense and amateurs during this exercise. WB1CGK now very active in NTS. SCM and others enjoyed WMFN picnic at QTH of W1KUL/W1UKR. K1SF reports rare six mtr openings at KH6 land on the 30th. W1KZS also reports confirmed KH6 QSO during this opening. K1BCS indicates W1UV now Silent Key. W1FKN also Silent Key. SCM nominations being solicited for this section. Present SCM will not seek reelection. Traffic: (June) W1UD 236, W1TM 194, K1NWE 144, W1KK 89, WB1CGK 59, K1JHC 49, WA1YYW 38, W1KUE 37, W1BVR 36, W1EFC 35, K1BE 16, W1ETH 15, W1GQP 14, K1IJV 12, WA1OPN 10, W1DOY 6. (May) W1UD 139, K1SSH 189, W1DOY 15.

## NORTHWESTERN DIVISION

**ALASKA:** SCM, Roy Davie, KL7CUK — This month has seen considerable activity with all the Section Nets. Alaska Preparedness Net 21 sessions, 1453 ck ins with 112 msgs. The Alaska Bush Net had 995 ck ins with 114 msgs. The Alaska Snipers Net had 30 sessions with 801 ck ins and 86 msgs. The following stations performed public service to airlift a heart attack victim from Harrison Creek to Fairbanks: W7LNM/KL7 KL7ITG KL7AG KL7EVO and KL7JCY. KL7SHM reports that he is now in Kotzebue and getting set up. The Anchorage Club and the Matanuska Susitna Valley Club were very active on Field Day. The Kodiak Club was also operating from an area overlooking the North Pacific, all clubs had a fine time. The Fairbanks Club provided communications for the Yukon River boat races. Traffic: KL7P 93, KL7O 28, KL7CUK 22, KL7Q 15.

**IDAHO:** SCM, Lem Allen, W7JMH — SEC: WA7UHW: We want to congratulate all clubs and groups which participated in Field Day activities, and a special thanks to those individuals who participated at home or at outpost locations. It all goes together toward a smooth-working emergency communications facility. Groups reporting were: Emmett Amateur Radio Society, at Black Canyon Highway, 5 ARES members: with 4 ops, 3 ARES members; Kootenai Amateur Radio Society, Coer d'Alene Mountain, 22 ops. Class 6A; Canyon Emergency Group, 7 ops; Snake River Chapter ISRA, Minidoka Dam, 8 hams 15 others; Twin Falls Club, Mountain Home Club, and many other groups went out in the field, but no reports as yet. W7MDK/7 operated from 4 mi south of St. Maries. Congrats to new Novice KA7FBG, and new Tech KA7DIT. K7MM has moved to Pullman, Wash. WB7CYI is on from scout camp at McCall.

| NET | Type | Sess. | QNI | QTC |
|---|---|---|---|---|
| FARM | HF | 29 | 1087 | 25 |
| CD | HF | 21 | 475 | 12 |
| IMN | CW | 21 | 67 | 174 |
| TV EMG | VHF | 4126 | 20 | |
| MINI-CASSIA | VHF | 3 | 10 | 1 |

Traffic: W7GHT 175, W7JMH 74, WA7CTS 56, AC7P 50, N7APC 43.

**MONTANA:** SCM, Robert Leo, W7LR — W7IXD got RTTY on agn. IMN QNI 174, QTC 67. W7IDK Havre report: 19/79 rptr on the air; WB7UOI solid state computerized RTTY; WB7CYR tests rptr autopatch; W7IBX builds QRP rig; W7IDK on OSCAR 8. W7LBK spent June spoiling grandkids. W7DB sent 6 OBS bulletins on MTN. WA7OBH says no DX time. Sorry we have two Silent Keys: W7PMC & W7HXC. Please look in recent QSTs to be sure that we have honored all Montana Silent Keys. Let me know of any missed. W7LR attended Glendive hamfest - met great bunch of hams there. Field Day reports: Carbon County group 6 hams & lots of fun; Bozeman group met by river, 17 ops, 1814 points; Butte had 27 ops, about 1850 points. We all enjoyed perfect wx. No other FD reports received - I should have had more. MTN May QNI 801, QTC 109. Lots of 2-meter repeater summer efforts reported. Remember the Oct SET. KB7BJ's Kenwood 120 was the FD workhorse. Lower Yellowstone ARC had 12 ops in FD near Fallon. Traffic: (June) W7LR 11, W7IXD 10, W7NEG 8, KB7BI 5, W7DB 4, W7HAH 2. (May) W7TGU 136.

**OREGON:** SCM, Dale T. Justice, K7WWR — SEC: W7HLF. Section net reports:

| Net | Time(Z)/Days | Freq | QNI | QTC | Sess | Mgr. |
|---|---|---|---|---|---|---|
| AREST | 0000 Z Dy | 3993.5 | 449 | 95 | 30 | W7HLF |
| BSN | 0045 Z Dy | 3908 | 524 | 21 | 30 | WB7PQU |
| JCARES | | 147.06 | 105 | 79 | 9 | W7VSE |
| OSN | 0145 Z Dy | 3585 | 105 | 52 | 30 | WB7OFI |
| PdxAARES | 0230 Z Dy | 147.32 | 820 | 42 | 25 | K7WWR |
| WCN | 0200 Z Dy | 3702 | 269 | 109 | 30 | K7ZIG |
| 1676 | 0200 Z Dy | 146.76 | 721 | 113 | 30 | K7KVV |

Field Day Messages were received from K7AUO/7 WB7AEF/7 AE7O/7 W7SOI/7 WB7QIW/7 W7SAA/7 W7KVV/7 W7KYC/7 W7XI/7. Good weather provided an excellent outing for all stations. WB7DIP reports 26 OBS skeds. TERAC provided communications for the Vancouver Lake Sailing Club annual races. Washington Co. ARES provided assistance for the Transk Mtn. Trials (Enduro). Traffic: (June) W7VSE 586, K7NTS 290, WA7IHS 210, WB7OFI 91, W7HLF 54, W7XI 52, K7QPW 51, K7WWR 47, KA7AUZ 34, K7SGU 24, W7BNS 16, W7LT 11 AG7M 8, W7LNE 6 (May) WB7BCG 81, WB7OIJ 6

**WASHINGTON:** SCM, Bob Klepper, W7IEU — SEC: WA7RWK. STM: W7DZX. NTN: QNI 1319, QTC 61; ESN: 289, QTC 14; WARTS: QNI 2897, QTC 167; NWSSB: QNI 617, QTC 40; WSN: QNI 377, QTC 85; SCARES: QNI 60, QTC 0. Washington State Amateur Radio WEEK will be Sept 9-16, with BEARS sponsored Wash QSO Party on 15th. Walla Walla Hamfest on 22nd and 23rd. Sorry to report the following Silent Keys. W7SKS W7USO W7BVB. New officers for Central Wash ARC are: W7GB, pres.; W6WMG, vice pres.; WB7OYT, secy.; W7PAE, treas. On June 1 the PSHR changed, check page 76 April QST for revised count. WA7ELI reports that amateurs provided communications for over 6000 bike riders in the Diabetes Bikathon. A card from an OO is not a citation, just a friendly reminder from a fellow ham that

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| XV2-2 | 28-30 | 220-222 |
| XV2-3 | 28-30 (26-28) | 222-224 (220-222) |
| XV2-4 | 28-30 | 144-146 |
| XV2-5 | 28-30 | 145-147 |
| XV2-6 | 26-28 | 144-146 |
| XV2-7 | 144-146 | 50-52 |

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| C50-2 | 50-52 | 144-146 |
| C144 | 144-146 | 28-30 |
| C145 | 145-147 | 28-30 |
| C146 | 146-148 | 28-30 |
| C146 | 144-146 | 26-28 |
| C220 | 220-222 | 28-30 |
| C220-2 | 220-222 | 144-146 |
| C110 | Any 2 MHz of Aircraft Band | 26-28 or 28-30 |
| C110-ELT | 121.5 (121.6) | CB Chan 9 (17) |

**UHF KIT ONLY $34.95**

| MODEL | RF RANGE | OUTPUT RANGE |
|---|---|---|
| C432-2 | 432-434 | 28-30 |
| C432-5 | 435-437 | 28-30 |
| C432-4 | 432-436 | 144-148 |
| C432-7 | 427.25 | 61.25 |
| C432-9 | 439.25 | 61.25 |

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| **T50-220** | 6-chan, 220 MHz, 1½W Kit | $49.95 |
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LPA 4-10 UHF PA, 200-500mW in/6-10W out. Kit price only ..... $79.95

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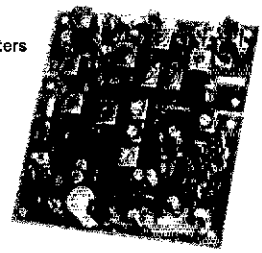

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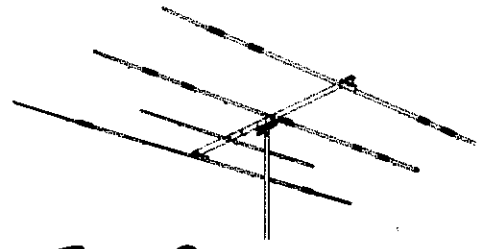

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| TH3MK3 | 3 el. 10-15-20M beam | 229.95 | 179.95 | 18AVT/WB | 80-10M Trap vertical | 99.95 | 79.95 |
| TH3JR | 3 el. 10-15-20M beam | 149.95 | 129.95 | 14AVQ/WB | 40-10M Trap vertical | 69.95 | 57.00 |
| Hy-Quad | 2 el. 10-15-20M Quad | 229.95 | 179.95 | 12AVQ | 20-10M Trap Vertical | 39.95 | 32.95 |
| 205BA | 5 el. "Long John" 20M beam | 289.95 | 229.95 | 14RMQ | Roof Mounting kit (verticals) | 33.95 | 29.95 |
| 155BA | 5 el. "Long John" 15M beam | 169.95 | 139.95 | 5BDQ | 80-10M Trap doublet | 89.95 | 69.95 |
| 105BA | 5 el;"'Long John" 10M beam | 119.95 | 99.95 | 2BDQ | 80-40M Trap doublet | 49.95 | 39.95 |
| 204BA | 4 el. 20M beam | 219.95 | 179.95 | 66B | 6 el. 6M beam | 119.95 | 99.95 |
| 204MK5 | 5 el. conversion kit | 99.95 | 79.95 | 203 | 3 el. 2M beam | 15.95 | |
| 153BA | 3 el. 15M beam | 79.95 | 69.95 | 205 | 5 el. 2M beam | 17.95 | |
| 103BA | 3 el. 10M beam | 54.95 | 44.95 | 208 | 8 el. 2M beam | 25.95 | |
| 402BA | 2 el. 40M beam | 209.95 | 169.95 | 214 | 14 el. 2M beam | 31.95 | |
| BN-86 | Balun for beam antennas | 15.95 | 15.95 | LA-1 | Deluxe lightning arrestor | 59.95 | 49.95 |
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| | | Regular | Special |
|---|---|---|---|
| Classic 33 | 3 el. 10, 15, 20 Mtr. beam | 304.75 | 209.95 |
| Classic 36 | 6 el. 10, 15, 20 Mtr. beam | 392.75 | 269.95 |
| TA-33 | 3 el. 10, 15, 20 Mtr. beam | 264.00 | 189.95 |
| TA-36 | 6 el. 10, 15, 20 Mtr. beam | 392.75 | 269.95 |
| TA-33 Jr. | 3 el. 10, 15, 20 Mtr. beam | 197.00 | 149.95 |
| TA-40KR | 40 Mtr. Add On | 119.95 | 89.95 |

## CUSHCRAFT

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ATB-34 | 4 ele. 10, 15, 20 Mtr. beam | 289.95 | 219.95 | A147-11 | 11 ele. 146-148 Mhz. beam | 36.95 | 30.95 |
| ATV-4 | 10, 15, 20, 40 Mtr. Vertical | 89.95 | 69.95 | A147-22 | 22 ele. Power Pack | 109.95 | 89.95 |
| ATV-5 | 10, 15, 20, 40, 80 Mtr. Vertical | 109.95 | 89.95 | A144-10T | 2 Mtr. "Twist" 10 ele. | 42.95 | 34.95 |
| ARX-2 | 2 Mtr. Ringo Ranger | 39.95 | 32.95 | A144-20T | 2 Mtr. "Twist" 20 ele. | 62.95 | 52.95 |
| AR-6 | 6 Mtr. Ringo | 36.95 | 32.95 | A147-20T | 2 Mtr. beam | 62.95 | 52.95 |
| ARX-220 | 220 Mhz. Ringo Ranger | 39.95 | 32.95 | A430-11 | 432 Mhz. 11 ele. beam | 34.95 | 29.95 |
| ARX-450 | 435 Mhz. Ringo Ranger | 39.95 | 32.95 | A432-20T | 430-436 Mhz. Beam | 59.95 | 49.95 |
| A144-11 | 11 ele. 144-146 Mhz. beam | 36.95 | 30.95 | | | | |

## HUSTLER

| | | | |
|---|---|---|---|
| 3-TBA | 3 ele; 10, 15, 20 Mtr. beam | 259.95 | 189.95 |
| 4-BTV | 10-40 Mtr. Vertical | 99.95 | 79.95 |
| 5-BTV | 10-80 Mtr. Vertical | 134.95 | 99.95 |
| RM-75 | 75 Meter Resonator | 16.95 | 14.50 |
| RM-75S | 75 Meter Super Resonator | 31.95 | 27.50 |
| G6-144B | 2 Mtr. Base Colinear | 79.95 | 59.95 |
| G7-144 | 2 Mtr. Base Colinear | 119.95 | 89.95 |

## WILSON

| | | | |
|---|---|---|---|
| System One | 5 ele. 10, 15, 20, Mtr. Beam | $299.95 | $239.95 |
| System Two | 4 ele. 10, 15, 20 Mtr. Beam | 249.95 | 199.95 |
| System Three | 3 ele. 10, 15, 20 Mtr. Beam | 199.95 | 159.95 |
| WV-1 | 10-40 Mtr. Vertical | 79.95 | 69.95 |

## TAYLOR

| | | | |
|---|---|---|---|
| HQ 10 40AV | 10-40 Mtr. Trap vertical | 59.95 | 49.95 |

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- Split-screen display. Compose and edit messages while receiving.
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- Instant break operation - respond to a direct question *(Still Copy OK? BK)* without sending the transmit buffer. Then resume typing into the buffer where you left off.
- WRU--receive only messages directed to you, acknowledge *Station ready to receive,* then save message on cassette - all automatically. No operator intervention required. Receive messages while away.
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- Instant callsign insertion. Enter other fellow's call just once, then press a single key to send entire ID exchange: W9XYZ Herb De Ron N6EE
- Direct output to your line printer or BAUDOT printer.
- Auto line numbering.
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- Auto left margin labeling.
- Auto carriage return/line feed-selectable carriage width.
- Auto suppress carriage returns and line feeds on receive to compact display.
- Output speed control-like the UT4-set as slow as you like to ensure uniform output rate and realtime editing.
- Four programmable messages of 255 characters each plus one *big* message limited only by RAM available (around 2.5 K on a 16K TRS-80). Save brag tapes, pix, etc. on cassette.
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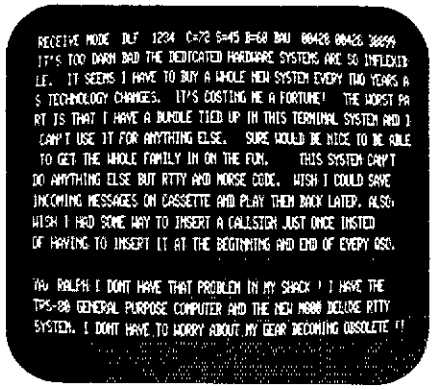


- Four Baudot speeds (60, 66, 75, and 100 WPM) plus ASCII at 110 baud.
- Auto transmitter control-keys PTT line. Fail-safe time-out circuitry for WRU.
- Continuous display of mode, options selected, buffer available no. characters typed, no.characters ahead of buffer, and more.

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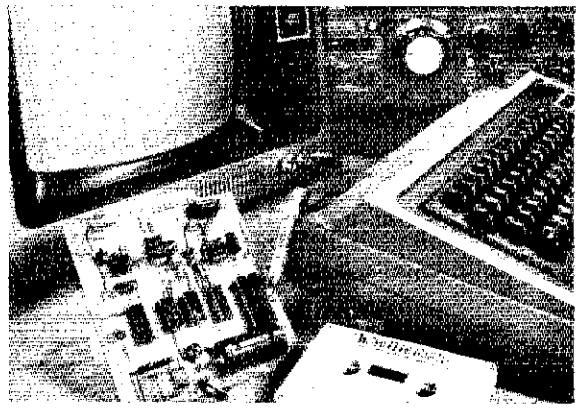

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- **Keyboard buffer - allows typing ahead.**
- **Uses built-in PLL or external TU.**
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something is amiss at your station. K6VSZ and Island City ARES members took part in combined ARES/RACES/DES Skylab exercise. Listen for ARRL bulletins on 147.500 from WB7QJN. W7ERH has new LC 280 and operating in Public Service events. W7JIE still looking for help on Intruder Watch. KL7JEB took short rest from traffic handling but very active in ARES. WA7BDD has new Tempo 2020. WB7QWC was very active in preparation for Skylab reentry. Spokane Dial Twisters had 52 members out for FC. WB7FGC operated 10 meters. New officers for Mt Baker ARC are. WA7YCZ, pres.; WB7AUP, vice pres.; WB7PMS, secy., W7EKM, treas. K7SUR resting at home after trip to hospital. N7AFY and N7AFZ too busy painting during the good wx to do much tfc handling. ARES and HAMS club memberscombined for communications for Maryfest, did a FB job at "Go-Cart" Races handling 6 emergency calls for crashes. KA7AWH was first in NR for Wash Section. Clark Cty ARC(W7AIA) had good time and good results on FD. K7IYN WB7WOW WB7RHT WB7RME KA7AKF N7ASL WB7DHN have upgraded. Novice classes begin Sept. 6 in Marysville. Contact W7IEU. RASC members working hard to get the repeater up on 4000 ft. Lyman Hill, freq is 144.59-145.19. West Seattle ARC responded to need of Public Service by working on a fund raising drive for Channel 9 by answering telephones for pledges. WA7RVA taking over for WB7OUN on WWDX Club's Totem Tabloid. WWDX Club was all battery power for FD, made over 2000 contacts. LCARC Novice station did outstanding job during FD, made almost 250 contacts on 40 and 15. Traffic: W7DZX 380, W7AK 206, W7KZ 171, W7BUN 94, N7AJ 85, WA7BDD 78, K7GXZ 75, W7IEU 58, W7APS 41, WA3WPY 35, W7EBU 32, KL7JEB 30, W7ZEV 24, W7GB 14, W7LG 14, K7AJT 12, W7LUP 10, AF7P 5, W7FJZ 3, WA7OJI 2, W7AIB 1.

## PACIFIC DIVISION

**NEVADA:** SCM, Leonard M. Norman, W7PBV — SEC: K7ZAU. FD was a success in NV with LVRAC, NARA and WADG each reporting many contacts and a good time by all. N7AKX and KB7FBP operated FD at Walter Lake. K7ICS out of hospital and doing FB. The SAROC convention site has been changed to Dunes Hotel and Country Club, Las Vegas, the dates January 10 - 13, 1980 remain the same. K7ZOK has his antenna farm under construction at his new QTH, the Orchid Greenhouse was completed first! Thanks to the many who have supported W7PBV as SCM for past several years. W7JU K7ZOK W7PBV each served as your SCM without missing a Station Activities monthly report. Traffic: N7AKX 163.

**PACIFIC:** SCM, Pat Corrigan, KH6DD — SEC: KH6CKJ. ECs: Guam, KG6JIC; Kauai, KH6JIB; Maui, KH6H; Hawaii, AH6K. I must sadly report KH6AW is Silent Key. Also, W6HFT (ex-KH6CHB) who was a close friend for many years. Kona, on Big Island, showing large ham group and may organize soon. BIARC held meeting there in July. HARC prexy KH6IPQ had visit from her sister. Former SCM, N7HR stopped overnight on way to Tokyo. Watch for him from JA this fall. Congrats to KH6IRT, winner of the Hon. DX Club Spring Sprint. SEC, KH6CKJ, has Pac. Sect. Net on 7290 kHz at 6:30 PM on Su. Everyone is welcome to participate with EC's. KH6ST now Sec. Tfc. Mgr and does hard work running Pac. Tfc. Net, 14110 at 0330 UTC except Sat/Sun at 0001 UTC. KH6GDR up with new tower/beam. Traffic: KH6JJP 6.

**SACRAMENTO VALLEY:** SCM, Norman Wilson, N6JV — SEC: WB6GFJ. ASCM: W6NJU, WA6BYY is new Emergency Coordinator for Nevada County. The new officers for the River City ARCS are: WB6YLK, Act. mgr.; WD6HYQ, pres.; WB6YML, vice pres.; WA6YRL, secy.; Marie Martin, treas.; WD6DFB, cert. mgr.; WA6RPB WB6ROS WB6YRL WD6BWK and KA6ADR comprise the bod. WB6NPC got the Editor's job. Field Day survivors include: GEARS at Bottle Hill, River City near Rancho Murieta, Sierra Foothills at Blue Canyon, and Yuba-Sutter among the bugs and snakes north of Beale AFB. WB6DQP has his Jem quad on 40 ft. of Rohn 25. The Golden Empire Novice Net meets Tues. and Fri. mornings at 7 AM local time on 7110 kHz. The Grant Union and McClellan Novice classes have created over 200 new hams since mid 1976. Congrats to W6RTK and staff. Traffic: W6SX 30, W6DEF 27, W6RSP 25, WB6GFJ 5.

**SAN JOAQUIN VALLEY:** SCM, Charles Mc Connel, W6DPD — SEC: WA6YAB. New officers of the Fresno ARC are WB6YAR, pres.; WA6UOR, vice pres.; WA6LDJ, secy.; K6CZO, treas. SARA now meets the 2nd Tue of each month. CCAC meets the 3rd Wed of the month. Kings County RC sold fireworks to raise money. N6UR is an ARRL Life Member. KA6BTW WD6GVA KA6APQ WB6GIO WD6FHC K6ZLU WD6EPQ WA6LDJ KA6CTF and KA6EKW made General. WB6ZCJ made Advanced. Congrats to all who successfully upgraded with the June FCC visit to Fresno. KA6AQC has both TS120 and TS180. W6EJO has a TS520S. WB6WYA has a TS120. WA6JOV has a FT625RD. WB6ITM has a TS180. K6YK finally got Delaware for WAS on 6 meters. W6LGX has a HW2036A. K6LRJ is on 6 meters. N6AM has a new tower and linear. WA6CPP needs 30 for Worked All Counties. Start planning now for the big Cal. QSO Party in October. Don't forget the Simulated Emergency Test in Oct. The SJV needs more report filed for this activity. Traffic: (June) WB6TTP 29, W6DPD 26, K6PMG 12, WA6WDL 10, WA6YAB 6, WA6JDB 5, N6AM 4, (May) WB6TTP 26, K6RAU 2.

**SANTA CLARA VALLEY:** SCM, Jettie Hull, W6RFF — SEC: WB6IZF. IZF reports new QTH building is progressing FB. W6ASH busy with EC work and with SPECS Net. He and his groups have been busy with several Public Service communication projects. W6KZJ busy with NCN and participated in Field Day. W6CF reports he finally got a 2-meter synthesized rig and will try NCN/VHF. W6AUC keeps the phone nets jumping on hf and vhf. N6XI has new linear on the air and is now an OTS. W6OII also a busy phone net man. WA6HAD sending OBS bulletins in the Novice bands on 80-40-15 and worked his first DJ and HC stations. W6MMG busy with DX and reports new Generals in Belmont are WA6JDL and WD6ERA. MMG's son, WB6HBL, also DX chasing. WB6VWK busy with QO work. WD6EXB spoke to SCCARA on "Antennas and the Law." K6TXR is now member of Radio Club of America. SCCARA will donate set of ARRL manuals to Castro Jr. High. Sept 11 is the date for SCCARA license classes to begin, both beginning and upgrading classes will be given. WA6GBO rcvd both WAC and WAS. New officers of FARS are: WB6OML, pres.; WA6NIL, vice pres.; N6ST, treas.; K6MA, secy. and WA6EAA, rdo officer. New member of LERA ARC is N6BPJ. WA6ANM has a XYL-congrats. San Lorenzo Valley ARC is moving WR6AOK to Ben Lomond

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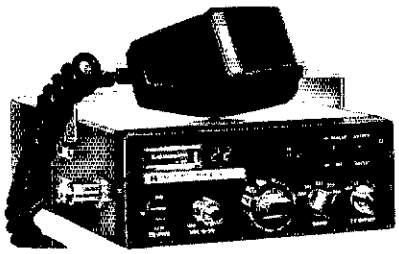

**MIDLAND 13-513** PLL Sythesized "220" Band FM Mobile Transceiver. 13.6 VDC @ 6A. 500 frequencies 220.00 - 225.00 MHz in 10 KHz steps. 500 more with 5 KHz shift-up. No crystals. Simplex or repeater operation with four offsets. Supplied with +1.6MHz and -1.6MHz, two are optional. Output power levels 20, 10 or 2 watts. Electronic switching and automatic VSWR protection. Mulitple FET front end with helical resonator, plus monolithic crystal and ceramic filters. Sensitivity rated at better than .05 uV for 20 db quieting. Selectivity is + or - 15 KHz at 70 db db down. Large-scale LED digital readout. Lighted S/RFO meter. External connections for tone burst, discriminator meter and external speaker. Mic., mt. & cord included. 2-5/8"h x 6-13/16"w x 9-5/8"d. 6.6 lbs.

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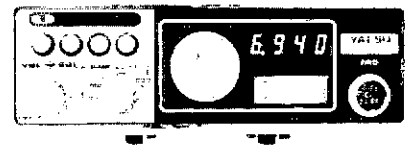

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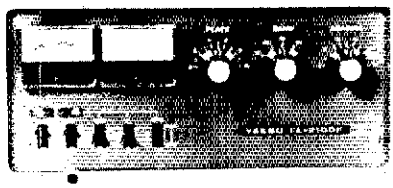

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*The FL-2100F can be legally modified to operate on 10 meters by a properly licensed radio amateur. A parts package containing two bandswitches, all necessary parts and instructions is available for $10.00. **Caution:** The modification is difficult and it should not be attempted by anyone without previous experience in electronic construction or maintainence. **Proof of license required before parts package can be shipped.**

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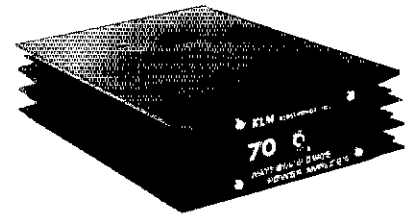

| Model | Band/Mode | Input | Output | Reg. | NOW |
|---|---|---|---|---|---|
| 2 70BL | 2m FM/SSB | 2w | 70w | $169 | $135 |
| 2 140B | 2m FM | 2w | 140w | 229 | 183 |
| 10 40BL | 2m FM/SSB | 10w | 40w | 94 | 75 |
| 2 70BC | 220 FM | 2w | 70w | 169 | 135 |

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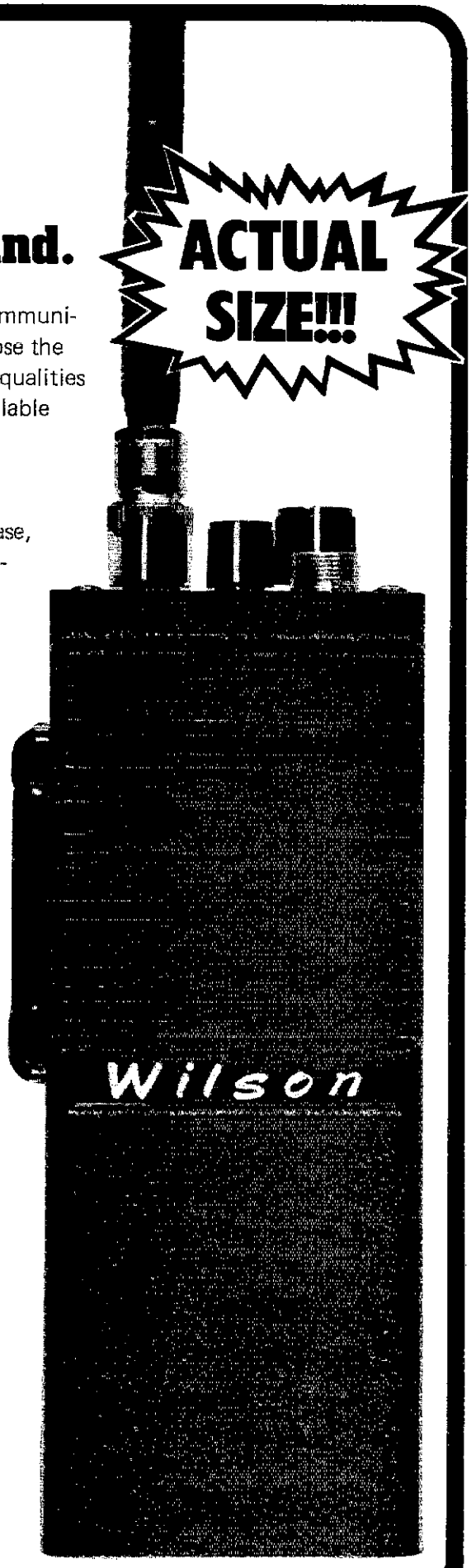


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for better coverage. K6HJU is QRL with an Apple II computer and his operating may suffer! Condolences to W6CEO on the death of his XYL. New PAARA members are KA6FRK W6PPK and KA6EYU. KA6EWX and KA6DZM are now General class. NCN Honor Roll listed SCV's WD6AFR WD6GUA WA6JWK KA6FAZ W6KZJ WA6KRA K6KZ W6LLV WA6NMQ W6RFF W6YBV K6YKG WA6ZFK. NCN meets on 3630 kHz at 7:00 and 8:30 PM and VHF on WR6ADC at 7:30 PM every day of the year, coverage is Northern California and Nevada and NTS Link is with RN6 at 7:45 PM. Info on NCN from secy WB6YUO. RFF aided (?) FARS in their Field Day effort, but complains of the wind and cold. A list of times and places for theory and code classes would be appreciated by your SCM. Traffic: W6YBV 274, W6RFF 53, WA6HAD 41, W6AUC 36, W6KZJ 28, W6ASH 22, W6OII 22, N6XI 12, W6CF 2.

## ROANOKE DIVISION

**NORTH CAROLINA:** SCM, Bill Parris, AA4R — STM: N4UE. SEC: K4GJZ. Mecklenburg ARS and Charlotte ARC active in June VHF Contest. Cary ARC participated in July 4 celebration with demo station. WCARS(Asheville) reports 95 members now. 14 clubs submitted Field Day messages to SCM in June...great participation. K4TPK back active after short stay in hospital. AA4NC is putting up antennas this summer to work DX this Fall; KE4I reports completing 5BWAS along with 254 DXCC on cw; N6DR visited F & EA land this summer. WA4AAV reports Piedmont-Coastal Traffic Net now active on the Raleigh 28/88 repeater, 9 PM each evening. The following NTS Nets are operating daily in NC:

| Net | Time/(Local) | Freq. | Mgr. |
|---|---|---|---|
| THEN | 7:30 PM | 3923 kHz | WB4MMK |
| NCSSBN | 7:30 PM | 3938 kHz | WB4CES |
| JKF | 6:30 PM | 3923 kHz | WA4CUD |
| *CN(E) | 7:00 PM | 3573 kHz | KD4D |
| *CN(L) | 10:00 PM | 3573 kHz | N4UE |
| *CMN | 9:00 AM | 3919 kHz | W4OCX |
| *CNN | 5:30 PM | 3718 kHz | |
| CNCTN | 10:00 PM | 13/73 (Salisbury) | K4VHT |
| P-CTN | 9:00 PM | 28/88 (Raleigh) | WA4AAV |
| M2MEN | 9:00 PM | 34/94 (Charlotte) | WA4OJU |

The nets with the * are joint nets with South Carolina. Thanks to these fine nets and your excellent support, total stations participating in traffic activities has increased 40% over 1978 and traffic count is up 20%. Keep up the good work....see you in Shelby. Traffic: (June) WD4CNQ 154, WD8NYN 142, WD4EPO 124, K4VHT 110, WB4MXG 108, WB4WII 100, AB4S 82, W4FMN 78, K4DHX 76, KB4IZ 74, W4OFO 70, AB4V 68, WA4SRD 66, K4MC 62, AA4R 54, WA4UYS, WD4CFZ 53, N4ZH 50, WD4AIE 48, WB4TOP 46, WA4IHG 45, W4EAT 42, N4UE 42, N4ALE 34, KK4M 33, WB4VQZ 28, W4YZX 28, WB4CES 27, WD4ABZ 24, WA4CUD 21, K4FTB 19, WD4NAO 13, WA4SES 12, W4EHF 11, W4OCZ 10, AA4NC 9, AI4O 8, WA4AKB 5, WB4VHE 2. (May) K4TPK 36, W4OFO 34.

**SOUTH CAROLINA:** SCM, Richard McAbee, W4MTK — Asst SCM: WB4UDK. STM: W4ANK. NMs: WA4SJS KD4D KA4BGX W4OCX. Check-ins/traffic June: SCSSBN 170/176, Anderson 2-M Net 622/18, CNE (May)226/136, 325/146, Carolinas Morning Net (CMN) 269/65, Lancaster Cty. 2-M Net 149/11, CNN 64/14, Dillon Cty ARES 20/7. Congrats to new licensees and all known upgrades: KA4JCW KA4JRB N4AYL KA4HJT K4TDY WD4HGL KN4D WD4KEG WD4BUL. Thnks to all for nice reports & newspaper clippings. Thnks to clubs active in VHF Contest & Field Day. Thnks to Blue Ridge ARS for nice Public Service report. Traffic: (June) N4PQ 202, WD4AWN 183, K4ZN 183, W4ANK 128, W4NTO 98, KD4D 50, W4MTK 48, WA4SJS 47, W4FMZ 45, K4FRX 43, W4FVV 25, WD4DOL 24, WB4UDK 23, AF4E 16, W4OCX 14, W4DRF 12, WA4VYS 11, WB4FEU 11, WD4EDM 10, K4PFC 10, WD4FJP 8, WD4HBX 8, WA4EOD 6, K4VIA 6, N4EE 6, WD4BUM 6, WA4JWS 4, WB8TCT/4 2, N4AKO 2. (May) KD4D 18, WB8TCT/4 13.

**VIRGINIA:** SCM, Rick Genter, K4BKX — ASCM: Buddy Smith, W4YE. STM: W4SQQ. SEC: N4NK. Chief OO: W4HU. Chief OVS: WA4PGI.

| Net | kHz | Time(PM) | Sess. | QTC | QNI | Mgr. |
|---|---|---|---|---|---|---|
| VNTN | 3907 | NOON | 30 | 214 | 293 | N4LE |
| VSBN/E | 3947 | 6:00 | 30 | 306 | 644 | W4JK |
| VSN | 3680 | 6:30 | 30 | 97 | 305 | WA4YIU |
| VN/E | 3680 | 7:00 | 30 | 231 | 469 | WB4FLT |
| VN/L | 3680 | 10:00 | 30 | 161 | 289 | WB4FLT |
| VSBN/L | 3947 | 10:15 | 30 | 214 | 590 | W4JK |

WB4TPT is now KM4X. K4DHB is looking at "mikes" after listening to VNTN. WA4EGW, EC Augusta, finished emergency comm. trailer which was used on Field Day. W4KFC is doing FB and extends thanks for cards, letters and radiograms. The Arlington ARES is now meeting twice a week. WA4NTP is back from OE-land. Many clubs and all ARES districts reported FD activity. VA Beach ARES setting up station in police comm. center. Chesapeake ARES provided communications for Harborfest Regatta. The So. Tidewater ARES net is now on every weekday on 146.37/97. The Southwest ARES has begun their local net. SVEN held 5 emer. sessions and report an increase in QNI and stations with Emer. Pwr. the VA Century Club met at W4UG's, our Vice Dir. Shenandoah Valley ARC helped provide comm. for 100 mile endurance test for both humans and horses. WB4DRC is over half way through graduate program. W4JUJ is now YLCC/700. K4KDJ is off the air until Sept. N3RC just got instrument rating on pilots license. WB4DBK is finishing school in grand style and will continue studies at UVA in the fall. K@JH is retiring from Navy and becoming commercial radioman. Traffic: W4JK 601, WA4CCR 515, WB4PNY 513, N4NK 449, W3BBN 438, K4BKX 204, W4UQ 199, W4SQQ 190, WB4FLT 172, K4KNP 170, KB4N 169, WB4DBK 166, WA4STO 139, WA4LJI 137, K4KDJ 134, K8LGA 133, N5BA 126, WB4MAE 90, K4JM 73, N4RF 73, WA4YIU 68, AA4CK 66, N4LE 62, W3BBQ 60, WA4ONR 58, N4IF 52, AG4D 50, W4SHJ 50, W4OKN 42, WD4GVU 41, KB4QG 40, W4NWM 39, K4EJ 37, K4GR 36, K4DHB 32, N4FM 28, KB4OF 28, W4YVG 27, WD4NEI 23, N4YO 23, WA4FDV 19, WD4FTK 18, KB4OB 18, WA4POZ 18, WB4DQZ 17, WB4RWY 17, K@JH 16, W4WWQ 15, WA4PBH 14, W4YE 14, N4AZI 13, N4BJX 13, WB4FNW 13, K4VWK 13, K4AXF 12, W4CEU 12, W4OOL 12, W4SUS 12, WB4ZKN 12, KJ4J 11, WB4ODZ 11, WD4DRF 11, N4ATT 10, WA4ISA 10, WB4NEE 10, WB4ZNB 10, W4KXE 9, WA4WQG 8, KA4ETG 7, WB4UHC 7, KA4GIQ 7, WA4UYD 7, WD4EUV 6, WB4KIT 6, KM4X 6, AB9I 5, W4PVA 5, N3RC 5, KI4W 5, W4JUJ 4, WA4EQW 3, K4ITV 3, N4OT 3, WB4SHK 3

QUESTION: Who has Advanced Electronics, Alpha, AMECO, Amphenol, Antenna Specialists, Astatic, Atlas, Bencher, Bird, Bomar, B&W, CDE, CES, CSC, Cushcraft, Daiwa, Datong, DGM, Drake, ETO, F9FT, Finco, Ham Key, Henry Hustler, Hygain, JMK, KLM, Kenwood, Larsen, MFJ, Microwave Filter, Morgain, Mosley, Newtronics, NPC, Nye Viking,

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- New device opens up the world of VLF radio.
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  150-550 KHz (VLF, 1750 meter band)
  40-150 KHz (WWVB, Loran)
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- Tunes 1.8 to 54 MHz. Covers ALL amateur bands 160 to 6 meters. ALL shortwave broadcast bands.
- For receivers AND transceivers.
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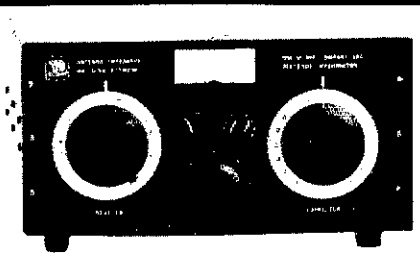


Nye Viking

Model MB II $295
(with Balun) $325

**MB II provides:**

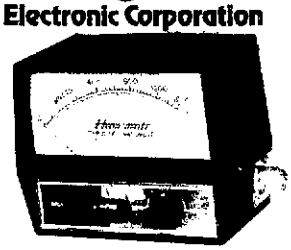
*Constant SWR monitoring. *Precision tuning of final amp. *Harmonic suppression *Receiver input impedance-matching. *Maximum power transfer to antenna. *Continuous frequency coverage 1.6 to 30 MHz. * Precision tuning of any wire ½ wavelength or longer, with SWR of 1:1.

**MB II features:**

*Finest quality, made-in-USA components. *Large, precision, easy-to-read dials with 360° readout. *Optional 3000 watt Balun for twin lead antennas.

# BIRD
## Electronic Corporation

$94 VHF model 4362 (140-180 MHz)
$94 HF model 4360 ( 18- 30 MHz)



The 4360, 4362 HAM-MATE Directional Wattmeters are insertion type instruments for measuring forward or reflected power in 50-ohm coaxial transmission lines. They are direct descendants of the model 43 THRULINE® Wattmeter -- the professional standard of the industry—and will accurately measure RF power flow under any load condition. Each wattmeter is made up of a precisely machined section of 50-ohm line, a rotatable sensing element and meter calibrated in watts, all mounted in a high-impact plastic housing. It is this type of solid construction and the directional THRULINE coupling circuit, without toroids, that account for the superiority of the HAM-MATE Wattmeters.

## the indispensable BIRD 43
## THRULINE WATTMETER

| Power Range | Frequency Bands (MHz) 2-30 | 25-60 | 100-250 | 200-500 | 400-1000 |
|---|---|---|---|---|---|
| 5 watts | — | 5A | 5I | 5D | 5E |
| 10 watts | — | 10A | 10I | 10D | 10E |
| 25 watts | — | 25A | 25I | 25D | 25E |
| 50 watts | 50H | 50A | 50I | 50D | 50E |
| 100 watts | 100H | 100A | 100I | 100D | 100E |
| 250 watts | 250H | 250A | 250I | 250D | 250E |
| 500 watts | 500H | 500A | 500I | 500D | 500E |
| 1000 watts | 1000H | 1000A | 1000I | 1000D | 1000E |
| 2500 watts | 2500H | | | | |
| 5000 watts | 5000H | | | | |

| MODEL 43 | $125.00 |
|---|---|
| Elements (Table 1) 2-30 MHz | 45.00 |
| Elements (Table 1) 25-1000 MHz | 38.00 |
| Carrying case for Model 43 & 6 elements | 27.50 |
| Carrying case for 12 elements | 17.00 |

READ RF WATTS DIRECTLY! (Specify Type N or SO239 connectors) 0.45 — 2300 MHz, 1-10,000 Watts ±5%, low insertion VSWR — 1.05. Unequalled economy and flexibility. Buy only the element(s) covering your present frequency and power needs, add extra ranges later if your requirements expand.

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## Barker & Williamson

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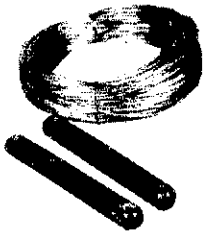
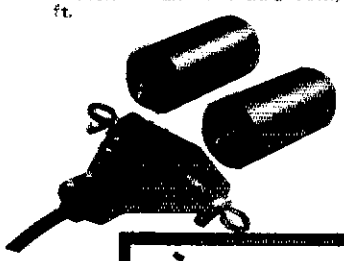
## (80 thru 10 Meters)

**Power rated 2k WPEP, approx. 110 ft. span**

Complete with: wire, traps, end insulators, 50 ft. RG-8/U, PL-259 connector, heavy-duty cast aluminum and steatite center connector. 4-Band (40 thru 10M) 55 ft.





**Pre-assembled:**
**Model 370-11**
**— $59.95**

**Kit (illustrated):**
**Model 370-12 — $49.95**

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**The most portable high performance dipole ever...**

The Model 18TD is unquestionably the most foolproof high performance portable doublet antenna system ever developed. It has proven invaluable in providing reliable communications in vital military and commercial applications throughout the world. Two stainless steel tapes, calibrated in meters, extend from either side of the main housing up to a total distance of 132 feet for 3.5 mc operation. 25 ft. lengths of polypropylene rope attached to each tape permits installation to poles, trees, buildings... whatever is available for forming a doublet antenna system. Integrated in the high impact housing is a frequency to length conversion chart calibrated to meter measurements on the tapes, makes installation foolproof. Feeds with 52 ohm coax. Delivers outstanding performance as a portable or permanent installation. Measures 10x5½x2 inches retracted. Wt., 4.1 lbs.
Order No. 22B Price $94.95

hy-gain

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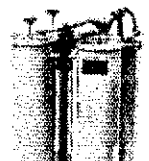

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N4BHI 2, WA4EQW 2, WB4LAB 2, W4PXA 2, W4DM 1, WA4JUO 1, W4KFC 1, WD4KUK 1, K4MLC 1, WA4YJF 1.

**WEST VIRGINIA:** SCM, Karl Thompson, K8KT — SEC: K8QEW. NMs: K8MHR WD8JYM WB8AKO STM: WA8WPW. New Net Managers appointed at WV State J. Mill Convention: WV Phone Net-K8MHR WV Midday Phone Net-WD8JYM CW Net-WB8AKO Novice Net-WD8JYM. Congratulations to all and best wishes for a successful year. West Central West Virginia Repeater Assn. has Monday evening net on 07/67 at 8:00 PM. Successful hamfest held at Cedar Lakes in Aug. Monhamgala will be held on Sun Sept. 2 in Morgantown. Much participation in WV QSO Party this year. Tnx to all who were on the air. FD also popular, with many clubs participating for 1st time. Watch Nov. QST for results.

| Net | Freq | Time (Z) | Ck-In | Tfc. | Sess. |
|---|---|---|---|---|---|
| Hillbily | 14290 | 1700 Su | 182 | 56 | 4 |
| Novice | 3730 | 2215 Dy | 164 | 44 | 29 |
| Phone-MD | 3990 | 1600 Dy | 315 | 19 | 24 |
| Phone | 3990 | 2200 Dy | 672 | 126 | 30 |
| CW | 3567 | 2300 Dy | 150 | 50 | 30 |

Traffic: WD8JYM 72, W8YP 50, W8HZA 45, N8AJC 28, WD8LDY 25, WB8TDA 21, WB8AKO 17, WD8JYN 17, W8CNF 14, K8QEW 9, K8KT 8, WD8DHC 8, K8MHR 7, WD8JGN 6, WB8SAW 5, K8MS 4, WB8BMX 4, WB8MGX 4, WB8UDY 4, K8ZDY 4.

## ROCKY MOUNTAIN DIVISION

**COLORADO:** SCM, Robert W. Poirier, KØDJ — SEC: WØGOW. STM: WBØMCL. NM: KØCNV WBØZOG New Novice in Fraser is KAØDML. ADØA soon to take up residence in W3 land with a job transfer. WØDYK reports scattered six meter openings in June. SSN has curtailed activity for the summer due to QRN. It will begin again early this Fall. OO, WØGW, says he found several operating extremely close to band edges while working DX. You can be cited even if your carrier falls in the band due to your sidebands. Many reports received from clubs taking part in Field Day activities. A letter received by this writter from WA4WME. He took part in the 1978 Clipperton Island DX-pedition and is willing to speak about affair to any interested clubs in Colo. If your group would like to hear his presentation, let me know. Possibly several groups could be brought to a central meeting place for such a presentation. Net tfc. June: Columbine: 30 sessions, QNI 820, QTC 168, informals 190, QNF 1079; CWN: 30 sessions, QNI 171, QTC 207, QNF 1033; Hi-Noon: 29 sessions, QNI 1063, QTC 69, informals 126, QNF 1198; SSN: 30 sessions, QNI 76, QTC 14, QNF 366. Traffic: (June) WØWYX 3326, WAØHJZ 788, WBØMTA 304, WBØIBS 274, WBØHZL 220, WDØAIT 118, WØLAE 118, KØDJ 89, ADØA 61, WBØZQG 60, WØEJD 56, WBØYKH 44, WØMDT 43, WØGO 26, WØLQ 16, WDØDNM 4. (May) WBØMTA 533, KØYFK 504, WBØZQG 174.

**NEW MEXICO:** SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NM: K5KPS WD5AHH. Southwest Net (SWN) meets daily on 3585 kHz, at 2000 local time and handled 132 msgs with 171 stations reporting in. New Mexico Roadrunner Net (NMRRN) meets daily on 3939 kHz at 1800 local and handled 156 msgs with 965 stations reporting in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 103 msgs with 790 checkins. ARTS handled 1818 msgs with 272 checkins. Sorry to note the passing of K5LRY. Nice note from Pecos Valley ARC. QCWA held a nice dinner mtg in ABQ. WA5MIY was a good coordinator for the WBCC Caravan in Las Cruces. Lots of S&R activity for Los Alamos and Albuquerque. Traffic: W5UH 482, W5DAD 384, N5NG 245, N5NG 225, WD5AHH 146, KL7HSF 137, W5JOV 122, K5KPS 69, W5ENI 22, and W5BWV 6.

**UTAH:** SCM, Carl R. Ruthstrom, W7GPN — For the second time in a month, telephone service was interrupted in downtown SLC. The latest was June 8, and affected mainly hospital services. Radio Amateurs furnished emergency communication during this potentially serious situation. Those serving were K7JIZ K7JPV WA7NZE WB7VCI and WA7ZBO. Telephone service was restored in about 6 hours. WA7ADK and WB7QVZ worked CO, ID, WY, and UT during the VHF Party 9-10 June. 24 stations were contacted using cw and ssb on 2-meters. The site was Monte Cristo, elevation about 9000 feet. K7HLR continues code practice sessions on 146.58 MHz at 1930 MDT Dy except Thurs, as well as Sat and Sun at 0930 MDT. ARRL bulletins are sent daily at 1830 MDT. W7BPS has new Narrow Band Voice Modulation system, probably the first and only to date in UT. W7OCX back after a bout with Phlebitis, which hospitalized him for several days. It's good to have him back. WB7UFW and KA7BFQ upgraded to General class. Traffic: K7HLR 195, WA7MEL 33, WB7UFW 10, N7IE 9, N7DF 8, WA7JRC 8, W7OCX 5, W7UTM 3.

**WYOMING:** SCM, Chester C. Stanwaity, W7SDA — Asst. SCM: K7IKO. SEC: WB7EIN. NMs WB7NHR WA7WFC W7LYA. New Novice KA7FPC. New Tech KA7CCT. New Generals KA7CUJ KA7CUK and WB7QMO. WB7UVB now N7BDH. WAØRTO/7 now living in Rawlins. Clubs taking part in Field Day activities were Casper ARC 31 operators 15 visitors, Code Cedar Mountain ARC 9 operators, Sheridan ARC 15 operators 2 visitors, Rock Springs ARC 7 operators, Laramie U of W ARC 9 operators 2 visitors, Cheyenne Shy-Wy ARC and Torrington ARC also participated in Field Day. WB7NHR reports Wyo. Cowboy net held 21 sess, 602 QNI, 18 QTC. Wyo. Jackalope net 496 QNI, 10 QTC. Traffic: W7LYA 285, WA7GYQ 51, WA7SGG 38, K7SLM 6.

## SOUTHEASTERN DIVISION

**ALABAMA:** SCM, William F. Scates, WA4JYU — SEC: K4WYT. STM: WA4JDH. Congrats to KA4BUI for top spot in our division in Novice Round Up. Field Day was a blast state wide. It seemed that all parts of state had much more activity. Hope everyone had as much fun as I had. New Huntsville ARC officers are: WA4VLB, pres. WB4QOS, vice pres.; WD4FVC, secy/treas.; WD4CPF, ass't secy/treas. New officers for Birmingham ARC are: WA4DGI, pres. WB4VSH 1st vice pres.; K4ELV, 2nd vice pres.; WA4TOZ, vice pres.; WB4RZN, secy.; WD4OKY, Treas.; WB4PJU, PR; W4EVD, EC; Board of Directors: W4UCT WA4QIN, WA4GIY, WD4CIQ. Baldwin County has handled another emergency in fine professional form. On May 30, a chemical truck loaded with styrene mononer (a flammable liquid) was leaking fluid. Amateur radio provided emergency communications until a transport truck could be brought up from Mobile. Special thanks go to WB5IWH K4JIE W5TIU K4QP W4MXI KA4ENJ WD4FJZ N4BAS AA4F and WB4BHS. Well done, gentlemen. Traffic: WA4JDH 904, N4MD 536, N4CCT 80, K4AOZ 64, KA4BUI 62, WA4ZPZ 32, W4IBU 30, WA4JYU 29, WB4TVY 29, WB4RCF 22, K4UMD 15, WD4JUH 14, WD4LMJ 7.

KENWOOD

TECH TALK 9D79

# TS-180S DUAL SSB FILTER

**What advantages are provided by the dual SSB filter system in the TS-180S?**

The dual SSB filter system in the TS-180S provides the following advantages:

- Improves receiver signal-to-noise ratio (S/N).
- Improves receiver selectivity.
- Allows greater RF speech-processor compression level.

**Which filters are supplied as standard features?**

The TS-180S operates with these filters:

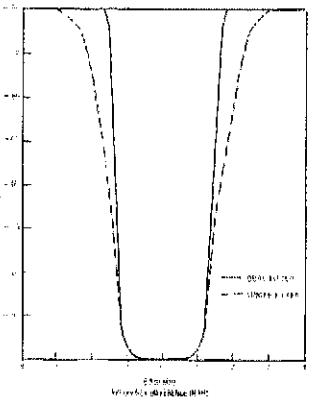
| | |
|---|---|
| YK-88SSB IF SSB Filter #1 | Standard, Built-in |
| YK-88SSB IF SSB Filter #2 (for dual filter system) | Optional |
| YK-88CW 500-Hz CW Filter | Optional |

**How much is selectivity improved by adding the second SSB filter?**

Even with just the one standard SSB filter, the TS-180S is very selective. Passband widths with the single and dual filters, as well as with the CW filter, are shown below:

| RESPONSE | SINGLE SSB FILTER | DUAL SSB FILTER | CW FILTER |
|---|---|---|---|
| -6 dB | 2.4 kHz | 2.2 kHz | 0.5 kHz |
| -60 dB | 4.2 kHz | 3.0 kHz | 1.5 kHz |

The newly developed MCF type filter, including both the YK-88SSB and YK-88CW, has sharp response characteristics. The newer filters are notable in their lack of response "humps" away from the main portion of the passband curve.



**How much does the second SSB filter improve S/N?**

Adding a second crystal SSB filter between the IF amplifier and the detector reduces wideband noise from the IF amplifier by 3 dB, thus giving a certain improvement in overall receiver S/N.

**How does the dual SSB filter system also improve RF speech-processor compression level?**

The following maximum compression levels are available with the TS-180S RF speech processor:

# PC-1 PHONE PATCH

**Is a matching phone patch available for Kenwood equipment?**

After many requests, Trio-Kenwood is introducing the PC-1 phone patch, which may be connected between a transceiver and the telephone-line. (We recommend obtaining a voice connecting arrangement from the telephone company for legal attachment to the telephone line.)

**Does the PC-1 use a hybrid circuit for VOX operation?**

The PC-1 is able to interconnect the transmitter, receiver, and telephone line voice coupler while accommodating a great difference in voice levels to and from the telephone line, and cancelling the audio level from the receiver at the input to the transmitter's VOX circuit.

**Is the PC-1 easy to adjust?**

Three easy adjustments are made after a phone call is established:

- NULL control, with a clear, continuous signal tuned in on the transceiver, for minimum deflection of the PC-1 meter.
- RX GAIN control, to about 0 VU on the PC-1 meter, for hearing the signal clearly through the telephone receiver.
- TX GAIN control, for proper VOX operation while the party on the telephone speaks.

| | SINGLE SSB FILTER | DUAL SSB FILTER |
|---|---|---|
| MAXIMUM COMPRESSION LEVEL | 15 dB | 30 dB |

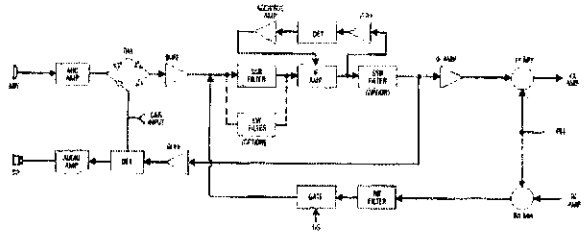
The dual filter system functions in the IF stage, which is common to both the transmitter and receiver. The RF compressor speech processor in the TS-180S is always on, with selectable time constants of SLOW (natural sounding audio) and FAST (more audio punch for the pile-ups). Up to 15 dB of compression in the FAST mode may be achieved without sideband expansion (splatter), using a single filter. With the dual filters, the sideband is filtered again and a high-quality SSB signal of high talk power is obtained, with a maximum compression level of 30 dB without splatter.

**Can both the optional second SSB filter and optional CW filter be used for receiving at the same time?**

Yes.

**Where is the dual SSB filter system located in the TS-180S?**

The dual SSB filter system is in the TS-180S IF unit, and the second filter may be installed easily by the user. The general circuit configuration is shown below.



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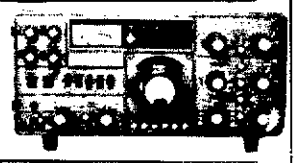

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Synthesized Handi-Talkie. 2 Watts

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We stock the complete YAESU line!

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All Solid State with Digital Frequency Control. 200W P.E.P. Memory.

Best Price Anywhere!

NEW! **TS 120S**

ALL SOLID STATE HF TRANSCEIVER PLUS A FULL LINE OF ACCESSORIES!

**TR 7600**
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10 or 25 Watt FM 2 meter xcvr synthesized with memory. Get our best price!

NEW! **TS 520 SE**

A new version of the FAMOUS STANDARD!

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IN STOCK! Ask about the RM 76 Micro Processor for the 7600/7625.

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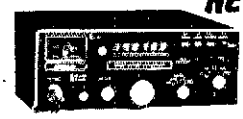

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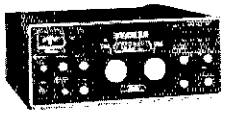

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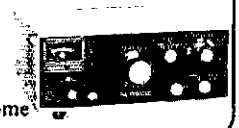
Dual PTO's SYNTHESIZED 1.8–30 MHZ 235 Watts PEP

**SWAN 100 MX P.S. and ANT. TUNER.**

Call or write for quote— ideal for home QTH or mobile!



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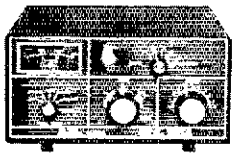

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Fixed or Mobile! 200 WATTS P.E.P.

We have the New Dentron AF-1A Audio Processor, Dentron Antenna Tuners, Antennas and SWR Meters.

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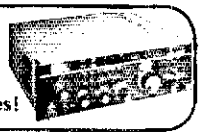
Full 7 line of accessories!



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**Rotor Special ALLIANCE HD-73**

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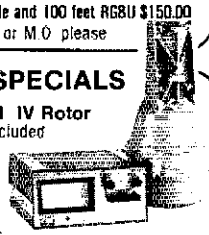

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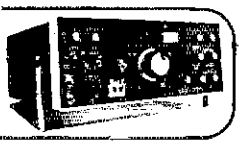

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The fantastic new Avanti 2 meter Mobile Antenna— mounts on your car window glass! Neat and compact installation—

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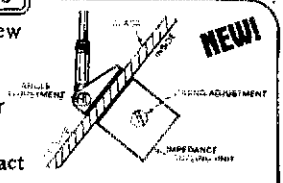

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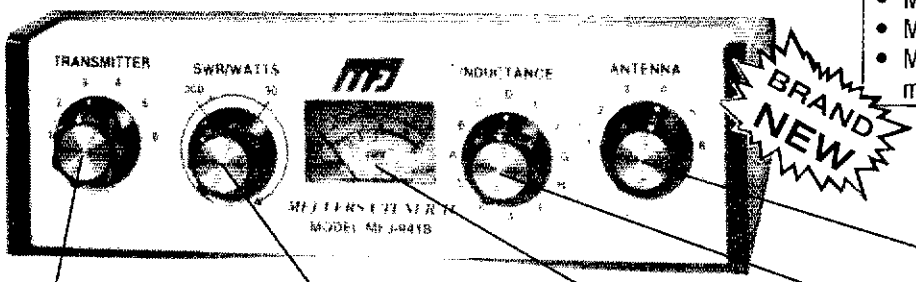
# This NEW MFJ Versa Tuner II . . .

**has SWR and dual range wattmeter, antenna switch, efficient airwound inductor, built in balun. Up to 300 watts RF output. Matches everything from 1.8 thru 30 MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.**

## MFJ LOWER PRICES!

**NEW, IMPROVED MFJ-941B HAS . . .**
- More inductance for wider matching range
- More flexible antenna switch
- More sensitive meter for SWR measurements down to 5 watts output




NEW LOWER PRICE

**$79.95**

**Transmitter matching** capacitor. 208 pf. 1000 volt spacing.

**Sets power range,** 300 and 30 watts. Pull for SWR.

**Meter reads** SWR and RF watts in 2 ranges.

**Efficient airwound inductor** gives more watts out and less losses.

**Antenna matching** capacitor. 208 pf. 1000 volt spacing.

**Only MFJ** gives you this MFJ-941B Versa Tuner II with all these features at this price:

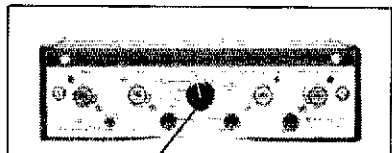
**A SWR and dual range wattmeter** (300 and 30 watts full scale) lets you measure RF power output for simplified tuning.

**An antenna switch** lets you select 2 coax lines direct or thru tuner, random wire/balanced line, and tuner bypass for dummy load.

**A new efficient airwound inductor** (12 positions) gives you less losses than a tapped toroid for more watts out.

**A 1:4 balun** for balanced lines. 1000 volt capacitor spacing. Mounting brackets for mobile installations (not shown).

**With the NEW MFJ Versa Tuner II** you can run your full transceiver power output — up to 300 watts RF power output — and match your transmitter to **any** feedline from 160 thru 10 Meters whether you have coax cable, balanced line, or random wire.



**ANTENNA SWITCH lets you select 2 coax lines direct or thru tuner, wire/balanced line, dummy load.**

**You can tune out the SWR on your dipole,** inverted vee, random wire, vertical, mobile whip, beam, quad, or whatever you have.

**You can even operate all bands** with just one existing antenna. No need to put up separate antennas for each band.

**Increase the usable bandwidth** of your mobile whip by tuning out the SWR **from inside your car.** Works great with all solid state rigs (like the Atlas) and with all tube type rigs.

**It travels well, too.** Its ultra compact size 8x2x6 inches fits easily in a small corner of your suitcase.

**This beautiful little tuner** is housed in a deluxe eggshell white Ten-Tec enclosure with walnut grain sides.

**SO-239 coax connectors** are provided for transmitter input and coax fed antennas. Quality five way binding posts are used for the balanced line inputs (2), random wire input (1), and ground (1).

## NEW 300 WATT MFJ VERSA TUNER II'S: SELECT FEATURES YOU NEED.

**NEW MFJ-945 HAS SWR AND DUAL RANGE WATTMETER.** NEW LOWER PRICE

**$69.95**

Same as MFJ-941B but less 6 position antenna switch.

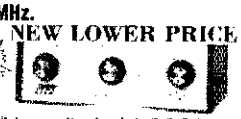
**NEW MFJ-944 HAS 6 POSITION ANTENNA SWITCH ON FRONT PANEL.** NEW LOWER PRICE

**$69.95**

Same as MFJ-941B but less SWR/Wattmeter.

**NEW MFJ-943 MATCHES ALMOST ANYTHING FROM 1.8 THRU 30 MHz.** NEW LOWER PRICE

**$59.95**



Same as MFJ-941B, less SWR/Wattmeter, antenna switch, mounting bracket. 7x2x6 in.

## ULTRA COMPACT 200 WATT VERSA TUNERS FOR ALL YOUR NEEDS.

**MFJ-901 VERSA TUNER MATCHES ANYTHING, 1.8 THRU 30 MHz.** NEW LOWER PRICE

**$49.95**

Efficient 12 position air inductor for more watts out. Matches dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax. 200 watts RF, 1:4 balun, 5x2x6 in.

**MFJ-900 ECONO TUNER MATCHES COAX LINES/RANDOM WIRES.** NEW LOWER PRICE

**$39.95**

Same as MFJ-901 but less balun for balanced lines. Tunes coax lines and random lines.

**MFJ-16010 RANDOM WIRE TUNER FOR LONG WIRES.** NEW LOWER PRICE

**$29.95**

1.8 thru 30 MHz. Up to 200 watts RF output. Matches high and low impedances. 12 position inductor. SO-239 connectors. 2x3x4 inches. Matches 25 to 200 ohms at 1.8 MHz. Does not tune coax lines.

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**CANAL ZONE:** SCM, Alvin Sholk, KZ5AS — KZ5OJ joined K7CA & WA4UAZ to work "HD1A" (multi-multi) from Quito, Ecuador). They made approximately 4000 QSO's and about 6000 K points (6 million). The Pan Canal 10-10 Net has been moved to 2300Z on 28.555 MHz every Sun. KZ5OJ is actively trying to finish 5BDXCC. Still needs only 30 countries on 80M. Also QRV 7005 every nite at about 0030Z. KZ5RO and KZ5OJ are petitioning the DXCC Advisory Committee to let them continue their RBDXCC & DXCC quests. They would like to continue to add to their totals under their HP calls after Oct. 1. This question affects all KZ5's (who are active in DXCC/WAS programs.)

**GEORGIA:** SCM, Eddy Kosobucki, K4JNL — Asst SCM: K4VHC. SEC: K4SWJ. Asst SEC: WB4HXE. STM: WA3NAZ. NMs: K4DMK W4HON K4VHC W4WXA WB4ZOJ.

| Net | Freq. | Time |
|---|---|---|
| GCN | 3995 | 0700 M/S 0800 Su EDT |
| GTN | 7118 | 1815 Dy EDT |
| GSN | 3595 | 1900 & 2200 Dy EDT |
| GSSBN | 3975 | 1930 Dy EDT |
| ARES | 3975 | 1700 Su EDT |

The Hostess City Hamfest sponsored by ARCS and CARS will be held in Savannah on Oct 20th & 21st. WB4RUJ back on air after curing rig troubles. WD4FJR recuperating after heart attack. Good to see old friends and meet new ones at FB Atlanta Hamfestival. Chairman W4BCD and ARC rolled out the red carpet. FB job. FD in section was real active by messages sent to SCM. K4VHC will be NM of RTTY net, plans etc coming shortly. Give him your cooperation please. GSN getting new members daily. Two-meter nets popping up all over the state. Please advise W4GH of times, etc., so he can compile in case of emergencies. Still need Club Bulletins for info for column. K4SWJ getting plans for Oct SET. Local Clubs need to be setting up for SET as time is getting short. After three months as your SCM I want to thank one and all for the fine cooperation I have received . Please write and let me know any improvements that we can make. Traffic: WD4ADV 201, WA3NAZ/4 156, W4WXA 149, WB4ZOJ 139, WA4PUP 136, KB4LA 135, W4PIM 128, W4GH 86, W4HON 45, WA4CBT 44, N4UZ 39, W4CZN 29, WD4LYV 29, K4JNL 26, W4BIA 22, W4ELO 19, WA4ZHC 15, W4CMX 9, W4DGN 7, WB4TEK 4, AA4GA 2, N4BGN 2, WA4PZD 2.

**NORTHERN FLORIDA:** SCM, Frank M Butler, Jr., W4RH — SEC: AA4FG. STM: N4WA, W4RH and YF are on trip to Europe. After all these years as SCM, well deserved I'm sure. New NMs WD4LUG - QFN; WD4HXS - TPTN. Clubs in Pensacola, FWB, Marianna, TLH, Sanford, Jax, Daytona, Brooksville and NPR active in Field Day. Lots more than that I'm sure. N4KE new pres. for NFDXA, AA4ES new prexy for Hernando ARA. Tallahassee club new officers: N4WA WA4RPS KA4DCA and KA4DCF. Congrats to new ham KA4JIE and to upgrades KA4GVH and WD4RAW. QFN certificates to WD4DNC W4KIX WB4GHU and K4FU. Local net activity definitely on the upswing in the section and certificates are being issued. Local 2FM repeater nets are now operating in Pensacola, Fort Walton, Daytona, New Port Richey and Tallahassee. Must be others I'm not yet aware of. Why not join or start one in your area? Don't forget new PSHF system is in effect starting with this months report. Thanks to W4WNY for his help in getting the All Florida Phone Net off the ground. By mutual agreement between Northern and Southern Florida Sections, this net's abbreviation shall be AFPN. Summer conditions, as always, are bad but mercifully traffic is *light*. Late word -Orlando, Gainesville, Fern Park and Orange Park groups also active in Field Day. Traffic: WD4HIF 434, N4WA 182, WA4CRI 181, WB4GHU 153, WD4NYY 145, WD4HXS 131, AA4FG 105, WB4TZR 98, WB4QBB 84, W4JL 75, WA4EYU 65, K4RNS 51, W4KIX 50, W4LDM 50, WB4FJY 48, WD4PDK 38, WB4ADL 37, WD4LUG 33, N4BZH 30, WD4IIO 29, WB4DTS 25, W4MVG 20, WB4VAP 20, KB4B 8, WB4WOO 5.

**SOUTHERN FLORIDA:** SCM, Woodrow Huddleston K4SCI — Asst SCM: W4KGJ. SEC: AA4WJ. New Appointments WA4PFK NM QFNS, WD4ISN NM FAST, WB4KKG EC Broward County. Upgrading reported N4APZ to General. On June 5th Radio Amateurs came to the assistance of Morton Plant Hospital in Clearwater. A communication emergency had resulted from telephone and ICS failure. Amateurs linked important points within the hospital as well as outside. Good publicity resulted with items in Clearwater Sun and St. Petersburg Times. Amateurs involved included W4DPH WB4FVN WA4MJT WA4KKR WA4FYR WB4PEL KA4BBB WB4TPG WB4AIZ and K4TH. Others stood by in the event additional help was needed. Repsonse to the new Public Service Honor Roll rules (April QST p. 76) is excellent with 8 stations qualifying in June, even though traffic and total stations reporting is at a low. Only 3 BPLs: WD4CPL W4MEE and K4TH. We are now using AFPN as abbreviation for All Florida Phone Net (7272 kHz at 12:30 PM daily) rather than CFN as formerly. AFPN is the official combined section-level NTS net of the Northern and Southern Florida Sections, formed by the two SCMs to carry out liaison responsibility to D4RN. TPTN (3940 at 5 PM) is the official "down link," taking traffic from 2nd session of D4RN and distributing throughout Florida. Management of these nets switches between Northern and Southern Florida annually on July 1st. WA4NBE, S.FL, is present manager of AFPN, while WD4HXS N.FL, has TPTN. These fellows are doing an outstanding job under adverse summer band conditions. They deserve your support if you can be on the air during the daytime cycle of the NTS. KI4T sent us a complimentary copy of the *Emergency Communications Guide* put out by South Florida FM Association. It is excellent, brief and concise. The suggested emergency communications kit and check list is especially good. N4XR now licensed as HH2VP expects to operate from Haiti during business trips. His late DX includes VY2 and JD1. K1BCS advises us that K4UE from San Antonio, FL. is vacationing in NH. Traffic: WD4COL 575, W4MEE 536, K4TH 426, K4SCI 313, WA4PFK 267, WB4WYG 191, K4ZK 163, WA4LGT 157, WA4NBE 156, WB4AID 131, WD4ISN 128, WB4FVV 109, W4NFK 102, WA4EIC 88, W4IRA 77, WA4SCK 75, K4EUK 68, W4NTE 68, W4KMN 62, W4DVC 61, WB4PIB 56, W4GPL 53, WA4HXU 49, WB4CDQ 44, N4AUO 37, KA4GDV 36, WA4FKE 35, KA4FZI 26, W4SMI 24, WD4HMC 22, W4KGJ 20, WA4MJT 19, WB4SNX 14, WB4GSV 8, WA4BYT 4, W4TJM 4, N4KB 3, WB4DWU 1, N4XR 1.

## SOUTHWESTERN DIVISION

**ARIZONA:** SCM, Willard L. Haskell, AG7D — I would like to extend my appreciation to the ARCS in AZ that have been sending me copies of their minutes of meetings

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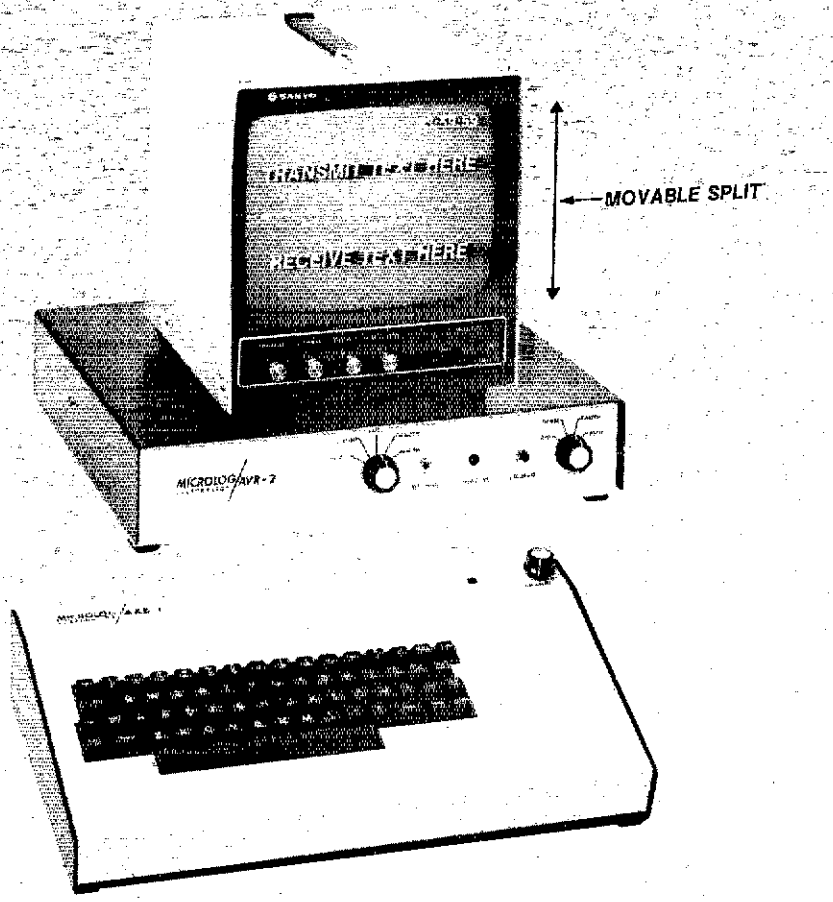


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Hualapai ARC in Kingman goes "all out" in this respect and I must say, that their documented minutes are extremely well accomplished. For those of you who live in close proximity, I would suggest visitation. I intend to do the same after my vacation. W7ENP of Tucson a Silent Key on June 11, 1979. He was well known in all Amateur Circles, especially in his roll as Assistant Director, Southwestern Division. Field Day activity was quite prevalent in AZ during this reporting period. Messages of participation to the SCM were received from Hualapai ARC, K7ZMA; OPRC, N7EH; Cochise ARC WB7NLM; and Scottsdale RC, K7CI. All PR data relative to Field Day activity was forwarded to ARRL for QST publication consideration. (SPECIAL NOTE: WB7RSE, from OPRC reports many new and promising Novices had their first Field Day experience and reflected outstanding performance in their assigned duties.) W7KAX, reports seeing SKYLAB over Kingman. Both Hualapai RC and RACES Pima County maintained communications during SKYLAB watch. New Quagis in the Kingman area have been put in by W7SQM W7KAX and KB7AG giving good 2-meter coverage from their location into Phoenix and St. George UT. Southwestern Division Convention, Oct. 19, 20 & 21. Plan NOW to attend. Net Activity June: A-10-QNI-790, QTC-119; Cactus Net-QNI-1119, QTC-54; SWN-QNI-171, QTC-132. Traffic: K7MC 128, W7EP 103, K7UXB 57, WA7KQE 37, K7NMQ 25, K7JKM 23, WB7NJY 14, WA7NXL 6, N7EH 6, W7YS 1.

**LOS ANGELES:** SCM, Perry Masterson, KD6C — Los Angeles had a nice turn out for Field Day this year. The ATV club reported 30 two way TV contacts with different stations. The Amateur TV is progressing nicely in our section. I am sorry to report that WB6YID, an active OO, suffered a heart attack. We wish him the best and a speedy recovery. While on the subject of OO's, I received several nice reports this month from them. Even some of my close friends reported receiving cards this past month. The traffic group is still doing a nice job. The Salvation Army has asked the Los Angeles section for help in handling traffic from Central America during the war. We are working closely with them to provide what assistance we can legally. W6INH is still building power amplifiers and working on his antennas. W6BWG now has 262 countries confirmed with 274 worked. K6ASK is working closely with the Boy Scouts. How about some new Novices from your troop? The summer months seem to take their toll in hamming. From the few reports received this month, I guess most of our sections amateurs were out of town. The Radio club reports were few this month also. I haven't heard from the United Amateur Radio club, the Lockheed club, The Telephone club and many others for quite some time now. I can use your reports to assess the activity in the section. For months now, I have pleaded with the vhf gang for inputs. I have yet to receive the first report. I know there are many vhf operators in the Los Angeles Section. I guess they don't want their activity reported in QST. I can't let this report go by without commenting on W6IRQ's antenna activity. Traffic: W6INH 190, W6OEQ 96, N6PZ 67, WA6LVO 60, W6BWH 21, K6CL 8, WA6OCM 6.

**ORANGE:** SCM, Roy C. Zukerman, AC6H — A public thanks to KA6EEK who called the phone number engraved on the chassis of a rig he was going to buy and resulted in restoring AC6H's 22$ stolen over a year before. Lots of Field Day activity in the Section with more than 175 operators reported at schoolyards, mountain-tops, and everything in between. Victor Valley Radio Club had a discussion of satellite TV for its June meeting. VVRC members provided communications aid for the Hesperia fire and were given official recognition by San Berdoo County emergency services via WA6WYP. Plans for a major RTTY traffic operation in connection with a Labor Day weekend hiway coffee stop are being coordinated by WB6FAK and SCATS. RATS has a new meeting place in Palm Springs when it resumes meeting in Sept. after a summer hiatus. Former SCM Fried Heyn, WA6WZO has been appointed SEC to succeed AE6N, who resigned due to educational commitments. Traffic: (June) WB6EIG 412, N6ANL 368, W6DXL 161, WB6QBZ 115, K6XI 53, W6NTN 43, KA6A 22, K6WI 15, WA6QCA 13. (May) W6DXL 130, K6XI 54.

**SAN DIEGO:** SCM, Arthur R. Smith, W6INI — STM: N6GW. Asst SEC: N6RD. NM: WA6UAZ. ARES provided 58 operators in June for a four-day Red Flag Alert with a total of 463 man-hours. San Diego Repeater Assn's Otay repeater (146.04/64) and Palomar ARC's Palomar Mtn repeater (146.13/73) provided links between Red Flag patrols and Calif. Dept. of Forestry headquarters. A Red Flag Alert is called when wildland areas are in a high fire-hazard condition. New PSHR rules are now in effect. See April 1979 QST, page 76. Minimum qualifying total is 60 points. Palomar ARC's nightly traffic net handled 46 messages in June. South Bay ARS meets first Thur in Norman Park Center, 270 F St., Chula Vista, at 1930. No. Shores ARC demonstrated use of solar power to run its station at Clairemont July 4th celebration. Equipment was provided by W6THR, assisted by WA6LZA and WA6CDC. Poway ARS has "Distinguished PARS Communicator" award for making nominal number of contacts with PARS members. Voice traffic handlers are advised to see June 1979 QST, page 74, for procedure info. Traffic: (June) WB6PVH 279, K6HAP 143, N6GW 134, W6HUJ 117, N6AT 114, WA6AMK 92, WA6UAZ 71, WB6MLB 68, WA6UFY 16, WB7SUA 14, WA6COE 5. (May) WB6GMM 70.

**SANTA BARBARA:** SCM, D. Paul Gagnon, N6MA — SCN RTTY Net has changed time to 2130 local on 3635 Dv. K6DZT is Mgr. for the section ARES net ot Sun at 1300. WD6DSK spoke on CPR at the Satellite ARC. The Satellite Club now meets only once per month on the first Thurs in Vandenberg. The Santa Maria Swaptest was a success again. The Ventura County ARC was active with a Scout O Rama display, the vhf contest, and Field Day in addition to a spaghetti dinner. N6WR spoke at the Santa Barbara club. New Santa Barbara officers are WB6HOZ, pres.; N6PI WB6SJV WA6IDZ K6QYL WA6KTZ, vice pres.; WA6VNN, secy.; WA6BRW, treas. WB6TRP is a new Official Observer in Oxnard. W6ZRR sent 51 bulletins on vhf and RTTY and K6SZS sends bulletins weekly on WR6ASW and N6ZF/R. N6FB has a new inverted V on 80 to help with the traffic nets. W6KPS is new owner of WR6AHZ. Many groups were active in Field Day this year. W6AB was operated by W2KVA WD6EEN and WB6YZU. N6GC was operated by WA6DKY WA6FOR WA6JVM and N6GC. W7CB and W6OUL got together as did WB6BWZ and KA6BYL. K6MEP had a large group out including K6VMN WA6IJZ AC6I KA6V AA6BB VQ9RL and others. Helping K6MEP during the vhf contest were K6VMN WA6DJS AC6I WB6GNS N6MA WA6UEO WB6TNL WA6IJZ WB6EDA WA6FPX KA6DVA

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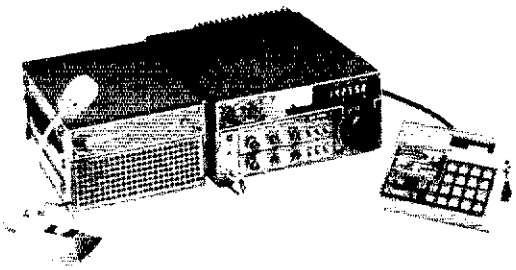

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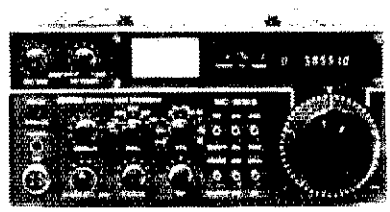

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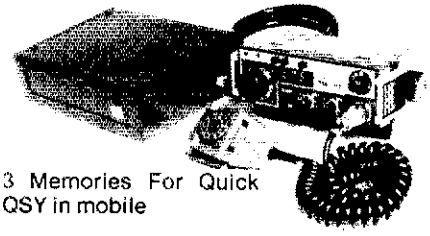

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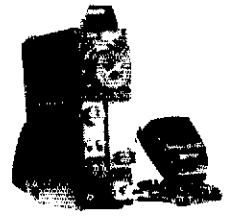

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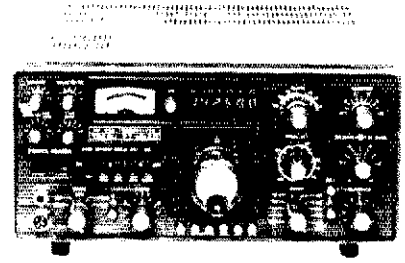

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| ☐ | 50-1 WATT ZENERS, 3.3,8,10,12,15V, etc., double plug, untested, (#1964) | 1.29 | 100 for 1.30 |
| ☐ | 4-ROCKER SWITCHES, DPDT, solder eyelet terminals, (#3302) | 1.29 | 8 for 1.30 |
| ☐ | 60-LONG LEAD DISCS, 100% prime, marked capacitors, (#5899) | 1.29 | 120 for 1.30 |
| ☐ | 6-MINI TRANSFORMERS, asst'd outputs, interstage & audio, 1" sq. (#3295) | 1.29 | 12 for 1.30 |
| ☐ | 1-TV/AUDIO SHIELDED CABLE, 2 cond. 15 ft. w/RCA phone plugs, (#5812) | 1.29 | 2 for 1.30 |
| ☐ | 25-DATA ENTRY KEYCAPS, 3/4" sq. #'s & functions, asst. colors, (#4913) | 1.29 | 50 for 1.30 |
| ☐ | 2-GE 3W AUDIO AMP, type PA-263 IC chip, mono. (#1522) | 1.29 | 4 for 1.30 |
| ☐ | 1-MERCURY TILT SWITCH, N.C. rated 24VDC @ .05A, w/leads, (#5686) | 1.29 | 2 for 1.30 |
| ☐ | 6-POWER TAB TRIACS, 100% prime, 100V, TO-220, (#5888) | 1.29 | 12 for 1.30 |
| ☐ | 6-POWER TAB SCR's, 100% prime, 100V, TO-220, (#5904) | 1.29 | 12 for 1.30 |
| ☐ | 3-WATCH LCD's, 3-1/2 digit, asst. types, size: 1" x 1-1/2" (approx.), (#5066) | 1.29 | 6 for 1.30 |
| ☐ | 10-TV INTERLOCK JACKS, for TV/power mt. ctr, solder tab terms., (#5519) | 1.29 | 20 for 1.30 |
| ☐ | 4-MOS FETS, 3N128, by Fairchild & RCA, TO-18, some duals, (#1686) | 1.29 | 8 for 1.30 |
| ☐ | 4-PHOTO ELECTRIC DARLINGTON TRANSISTORS, 2N5777, (#3276) | 1.29 | 8 for 1.30 |
| ☐ | 6-AC "UTILITY" OUTLETS, for 1 1/4" mt. ctr., solder lugs, (#3582) | 1.29 | 12 for 1.30 |
| ☐ | 15-NE-2 LAMPS, neon red, for 110VAC, less resistor, (#1435) | 1.29 | 30 for 1.30 |
| ☐ | 20-1N4148 SWITCHING DIODES, 4nS, 100V @ 10mA, axial 100%, (#3000) | 1.29 | 40 for 1.30 |
| ☐ | 2-4 AMP SILICON BRIDGE RECTIFIER, 200V, block style, (#5928) | 1.29 | 4 for 1.30 |
| ☐ | 4-VARACTOR DIODES, var. tuner capacitance, 20-50 pf. (#5887) | 1.29 | 8 for 1.30 |
| ☐ | 50-PRECISION RESISTORS, 1/2, 1, & 2 watts, 1%, assorted types, (#363) | 1.29 | 100 for 1.30 |
| ☐ | 60-CERAMIC CAPS, asst'd val. & styles, incl; tubulars, NPO's, etc., (#590) | 1.29 | 120 for 1.30 |
| ☐ | 25-PLASTIC SCR's, incl; 200V, untested, high yield, TO-92, (#3192) | 1.29 | 50 for 1.30 |
| ☐ | 35-MOLDED CAPACITORS, tubular, asst'd volt. to 1 mf. axial leads(#34B642) | 1.29 | 70 for 1.30 |
| ☐ | 100-MICRO ZENER & RECT. KIT, asst'd voltages, only 1/8" sq. U-test, (#1251) | 1.29 | 200 for 1.30 |
| ☐ | 1-LINE CORD, 8 ft. 2 cond, 16 gauge, vinyl molded plug & grommet (#3661) | 1.29 | 2 for 1.30 |
| ☐ | 6-SPDT MICRO SLIDE SWITCH, only 3/7" cube, for PC mount, (#3429) | 1.29 | 12 for 1.30 |
| ☐ | 10-PR.-RCA PLUGS & JACKS, for audio, speakers, etc., (#402) | 1.29 | 20 for 1.30 |
| ☐ | 7-2N3055 HOBBY TRANSISTORS, 100%, TO-3, (#3771) | 1.29 | 14 for 1.30 |
| ☐ | 20-ZENERS, 1 watt 9.1 volts axial leads 100% (#5370A) | 1.29 | 40 for 1.30 |
| ☐ | 40-1N4148, 4 NANO, SWITCHING DIODE, axial leads untested (#5923) | 1.29 | 80 for 1.30 |
| ☐ | 2-RELAYS, BABCOCK 6VDC, SPST, plastic case (#5807) | 1.29 | 4 for 1.30 |
| ☐ | 1-25 AMP BRIDGE RECTIFIER, 50 volts, 100% (#5948) | 1.29 | 2 for 1.30 |
| ☐ | 2-QUADRACS, 10 amp 200 PRV, TO-220 100% (#5915) | 1.29 | 4 for 1.30 |
| ☐ | 15-PNP SWITCHING TRANSISTORS, 2N404, 1305 etc. TO-5 (#5911) | 1.29 | 30 for 1.30 |
| ☐ | 60-MINI RESISTORS, 30-1/2W, 30-1/4 watt, axial, color coded, (#5922) | 1.29 | 120 for 1.30 |
| ☐ | 12-SCRS-TRIAC-QUADRACS, asst. volts. TO-220 case (#2087) | 1.29 | 24 for 1.30 |

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and N6AFI. Remember that the PSHR has a new set of point criteria. Upgrades this month, mostly at the Santa Maria Swapfest included WB6POX KA6ANE WD5HGM WD6GVH KA6CZM to General; WA6MVP W6OJP N6ALH to Advanced, W6ELH WA6FMA WA6HKU to Extra and KA6GKK WD6DSJ to Tech. Congrats. Traffic: (June) N6MA 24, W6POU 13, K6SZS 7, N6FB 4. (May) W6KON 406, N6WP 143, K6YD 92. (April) N6WP 326, K6YD 149.

## WEST GULF DIVISION

**NORTHERN TEXAS:** SCM, Phil Clements, K5PC — Asst. SCM: AE5C. SEC: N5WB. STM: W5VMP NMs: AA5J AE5I The following is a list of our local and section tfc nets: Texas Traffic Net-3961kHz-Dy@2330 Z; Texas C.W. Net (TEX)-3770kHz-Dy@0000 Z/0300 Z. D/FW Metroplex Tfc.Net-146.28/.88-Dy@2330 Z. Big Country 2-mtr Net(Abilene)-146.16/.76-Thurs@2000L FD msgs from the Heart-O-Texas ARC, TI Amateur Club, Key City ARC, Red River Valley ARC, Grayson Co. Mesquite Horned Toads, Denton Co. ARC, North Texas HF Assn and Richardson Wireless Klub. The North Texas Contest Club is looking for new members. The club is for beginning contesters as well as old pros. If interested, contact K5FUV. Congrats to new slate of officers at KC Club: W5OMQ, chair; K5ASZ, secy/treas; AB5F, educ; WA5OLV, Bulletin. New OTS/OO is K9MX. Welcome to N. TX. We need all the tfc men we can get! New OTS/OES is WA5QFD who stays busy just QSPing my tfc! Thanks. New OTS, KA5Q is also new fellow employee/pilot at Dallas. No more /5 at TXK eh?! WD5GFP turning out new Novices at a record rate. KA5FKB KA5FKS and KA5FLC, welcome aboard. W5BCB rpts. new auto-patch on .13/.73 machine at Sulphur Spgs. OO W5ARV leaving for 3 mo. assignment in Mediterranean. BPL this mo. W5TI. PSHR for June: WB5SDD AA5J WA5QFD K5SOR WB5LAT & W5VMP. We need more mo. reports! Please send you news, views, comments, announcements and especially your monthly traffic count to K5PC by the 4th of each month (address on page 8 of this issue QST). This column runs 2 mo. behind, so send your time factor inputs early. It's impossible to fill up our allotted 55 lines each month without more of *your* input. We handle a lot of traffic each month here in N.TX, but a big majority of it never gets tallied at HQ because it is never reported to the SCM. A count of 12 for the month is just as important to report as a count of 500; it all adds up. Lets get proper credit for our hard work and dedication. D/FW Metro Tfc. Net in June had QNI-449 QTC-115/99 in 30 sess. Traffic: W5TI 573, WB5SDD 432, AA5J 173, N5CY 87, AC5Y 73, W5VMP 69, WA5QFD 62, WB5LAT 56, WB5BKM 55, W5CTZ 55, N5BT 54, WA5INJ 49, AE5I 36, WD5HHK 23, WA5EZT 22, K9MX 16, K5SOR 15, K5LHL 13, K5PC 12, KA5Q 10, K5ERJ 6, WB5KTC 6, WD5AAT 4, WA5ZNZ 4, WD5GFP 2, K5HSZ 2.

**OKLAHOMA:** SCM, Leonard Hollar, WA5FSN — Ass't SCM: Ray Miller, W5REC; SEC: WA5MLT. June reports down, both in number of reports and amount of traffic, vacations (I hope). WB5AXH has 9 in Novice class. Hugo talking repeater linking to the south. Also helped with 10,000 meter run for Heart Fund. WB5TTU talking antenna farm (120 acres). Ardmore getting another repeater ready. WB5NKD/NKC suffered storm damage to antennas, kept them off the nets for a few days. W5KFL having rig troubles. WB5KKT moving to new QTH. Early reports show increased interest in new PSHR criteria. We have many more who do not report. KA5FUU new call at El Reno. KA5FNQ & KA5FQC (OM & XYL) new at Weatherford. WA5LFJ Silent Key. A few good reports from Local Area Nets. Can always use more. WB5EAY and K5TEX both in Tulsa Hospitals. All of the above material compiled from SARs and on-the-air reports. Have not made much effort to get out and visit any clubs due to 'Energy Crunch'. Maybe later. Ham Holiday in July. Then West Gulf Convention at Houston and Texoma Hamarama both in October. Hope to see you there. Traffic: K5OWK 641, WB5MVR 384, WB5NKC 346, W5REC 316, K5JGZ 231, WB5NKD 205, W5RB 110, W5BYC 60, WA5FSN 42, WA5OUV 42, W5UYH 31, K5CAY 24, W5VOR 24, W5JJ 23, WB5ELG 19, W5VXU 19, WD5GLO 18, K5MGD 18, WD5ETB 11, WD5IFB 10, KA5DRD 8, WB5OVT 8, W5TC/WB1EMU 8, KB5EK 6, W5HGH 3, W5FKL 2.

**SOUTHERN TEXAS:** SCM, Arthur R. Ross, W5KR — Asst SCM: N5TC Net Mgrs-at-large: N5TC, phone; WA5RKU, cw. New SEC will be AK5N; he has been selected by N5FN. Effective October 1 N5FN will take over as SCM for this section. Your Sept reports, submitted in the first week of October must be sent to him at the address at the bottom of Page 8 in the October QST. My thanks to the Southern Texas bunch for a job well done. May you continue to do as well for N5FN. OES, W5SPD, operated FD with his TS-120S on battery power for 18 hours without recharging; had plenty of reserve power at end of period. OES/OVS, WD5JJS, had big FD with the Brenham ARC. WD5CLI WD5CLE KA5BYJ WD5CLG WD5CLE of Brownsville's CHARRO ran up a claimed total of 3025 pts in class 1E; they used the Heath QRP rig on battery power; Vibroplex with serial Nr 32 used for cw contacts, which KA5BYJ says is still every bit as good as his US Coast Guard bug. EC/OTS, WA5RVT, helped out in National Weather Service hurricane exercise. Sorry for short report, but reports seem to be in summer doldrums. Traffic: W5KLV 551, K5HZR 215, WB5YDD 187, W5SBE 154, WA5VBM 148, N5TC 88, WB5MMI 58, K5RG 50, K5QEW 44, WA5RVT 37, WB5CIT 36, W5BGE 34, W5KR 28, K5DG 9, K5RVF 6, WD5JJS 2, W5SPD 1.

# ANTENNA SYSTEMS/TOWER HARDWARE

**HY-GAIN ANTENNAS**

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| TH5DX | New 5-Element Triband Beam | $195 |
| TH6DXX | 6-Element Triband beam | $225 |
| TH3MK3 | 3-Element Triband beam | $165 |
| TH2MK3 | 2-Element Triband Beam | $109 |
| TH3JR | 3-Element Triband Beam | $119 |
| 205BA | 5-Element 20-mtr "Long John" | $230 |
| 155BA | 5-Element 15-mtr "Long John" | $140 |
| 105BA | 5-Element 10-mtr "Long John" | $89 |
| 203BA | 3-Element 20-mtr beam | $99 |
| 204BA | 4-Element 20-mtr beam | $175 |
| 204MK5 | 204BA to 205BA kit | $79 |
| 153BA | 3-Element 15-mtr beam | $64 |
| 103BA | 3-Element 10-mtr beam | $54 |
| 402BA | 2-Element 40-mtr beam | $175 |
| DB1015A | 3-Element 10-/15-mtr beam | $115 |
| Hy-Quad | 2-Element 10-/15-/20-mtr quad | $199 |
| 64B | 4-Element 6-mtr beam | $39 |
| 66B | 6-Element 6-mtr beam | $89 |
| 18HT | Hy-Tower 80-10 mtr vertical | $255 |
| 18V | 80-10 mtr vertical | $26 |
| 18AVT/WB | 80-10 mtr trap vertical | $75 |
| 14AVQ/WB | 40-10 mtr trap vertical | $55 |
| 12AVQ | 20-/15-/10-mtr trap vertical | $49 |
| RMQ | Roof mount kit for verticals | $29 |
| 203 | 3-Element 2-mtr beam | $14 |
| 205 | 5-Element 2-mtr beam | $18 |
| 208 | 8-Element 2-mtr beam | $23 |
| 214 | 14-Element 2-mtr beam | $26 |
| 2BDQ | 80/40 mtr trap dipole | $44 |
| 5BDQ | 80-10 mtr trap dipole | $79 |
| GPG2 | ⅝ Wave 2-mtr ground plane | $18 |
| J-Pole | 4-Bay 2-mtr stacked J-Pole | $59 |
| LA1 | Heavy duty Lightning Arrestor | $45 |
| LA2 | Coax in-line arrestor | $7 |
| BN86 | kW balun | $12 |

**TIMES WIRE COAX**

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| RG-213/u MIL SPEC RG-8/u replacement | $0.25/ft |
| 1/2" Aluminum jacketed hardline | $0.55/ft |
| Male hardline connector (PL-259) | $8.00 |
| Female hardline connector (SO-239) | $9.00 |
| Male hardline connector (Type N) | $10.00 |

**CUSHCRAFT ANTENNAS**

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|---|---|---|
| A3219 | New 19-element 2-mtr 'Boomer' | $69 |
| ATB34 | 4-Element triband beam | $209 |
| A21-4 | 4-Element 15-mtr beam | $79 |
| A28-4 | 4-Element 10-mtr beam | $69 |
| A50-5 | 5-Element 6-mtr beam | $49 |
| A50-6 | 6-Element 6-mtr beam | $69 |
| A50-10 | 10-Element 6-mtr beam | $95 |
| ATV4 | 40-10 mtr vertical | $67 |
| ATV5 | 80-10 mtr vertical | $85 |
| ARX2 | 2-mtr 'Ringo-Ranger' | $30 |
| ARX-450 | 450 MHz 'Ringo Ranger' | $30 |
| A147-11 | 11-Element 146-148 MHz beam | $29 |
| A147-22 | 22-Element 'Power-Pack' | $86 |
| A144-10T | 10-Element 2-mtr Twist | $33 |
| A144-20T | 20-Element 2-mtr Twist | $50 |
| DX120 | 20-Element 2-mtr EME building block | $40 |
| DXK140 | Stacking kit for pair DX120 | $5 |
| LAC1 | Coax lightning arrestor M/F | $5 |
| LAC2 | Coax lightning arrestor F/F | $5 |

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| FK2548 | 48-ft 25G foldover tower | $545 |
| FK2558 | 58-ft 25G foldover tower | $600 |
| FK2568 | 68-ft 25G foldover tower | $655 |
| FK4548 | 48-ft 45G foldover tower | $765 |
| FK4558 | 58-ft 45G foldover tower | $840 |
| FK4568 | 68-ft 45G foldover tower | $915 |

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| 5/32" — 7 × 7 Aircraft cable(2700 lb) | $8/100 ft |
| 3/16 CCM cable clamps (3/16" or 5/32" cable) | $0.30 |
| 1/4 CCM cable clamps(1/4" cable) | $0.40 |
| 1/4 TH Thimble (fits all sizes) | $0.25 |
| 3/8 EE (3/8" Eye and eye turnbuckle) | $5.50 |
| 3/8 EJ (3/8" Eye and jaw turnbuckle) | $6.00 |
| 1/2 EE (1/2" Eye and eye turnbuckle) | $7.50 |
| 1/2 EJ (1/2" Eye and jaw turnbuckle) | $8.00 |
| 3/16" Preformed guy deadend | $1.45 |
| 1/4" Preformed guy deadend | $1.65 |
| 6"-dia 4-ft long earth screw anchor | $10.50 |
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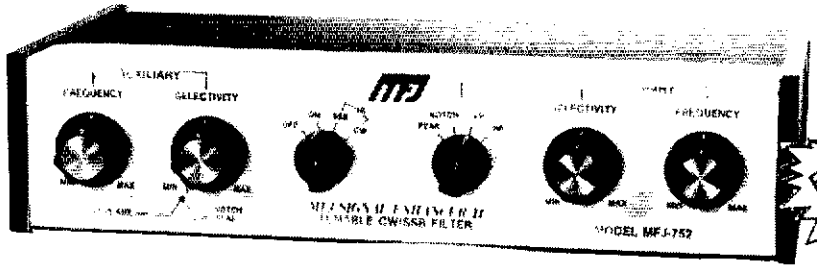


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**The MFJ-752 Signal Enhancer** is a dual tunable SSB/CW active filter system that gives you signal processing performance and flexibility that others can't match.

**For example,** you can select the optimum Primary Filter mode for an SSB signal, zero in with the frequency control and adjust the bandwidth for best response. Then with the Auxiliary Filter notch out an interfering heterodyne . . . or peak the desired signal.

**For CW,** peak both Primary and Auxiliary Filters for narrow bandwidth to give skirt selectivity that others can't touch. Or use Auxiliary Filter to notch out a nearby QSO.

**The Primary Filter** lets you peak, notch, low-pass, or highpass signals with double tuned filter for extra steep skirts. The **Auxiliary Filter** lets you notch a signal to 70 db. Or peak one with a bandwidth down to 40 Hz.

**Tune both Primary and Auxiliary Filters** from 300 to 3000 Hz. Vary the bandwidth from 40 Hz to almost flat. Notch depth to 70 db.

**MFJ has solved problems** that plague other tunable filters to give you a constant output as a bandwidth is varied. And a linear frequency control. And a notch filter that is tighter and smoother for a more effective notch.

**Works with any rig.** Plugs into phone jack. 2 watts for speaker. Inputs for 2 rigs.

**Switchable noise limiter** for impulse noise; trough clipper removes background noise.

**Simulated stereo feature for CW** lets ears and brain reject QRM. Yet off frequency calls can be heard.

**Speaker and phone jacks.** Speaker is disabled by phones. OFF bypasses filter. 110 VAC or 9 to 18 VDC, 300 ma. 10x2x6 inches.

**Every single unit is tested** for performance and inspected for quality. Solid American construction, quality components.

**The MFJ-752 carries a full one year** unconc tional guarantee.

**Order from MFJ and try it — no obligation.** not delighted, return it within 30 days for a r fund (less shipping).

**To order,** simply call us toll free 800-647-180 and charge it on your VISA or Master Charge mail us a check or money order for $79.95 pl $3.00 for shipping/handling.

**Don't wait any longer** to use Ham Radio's mo versatile filter. Order your MFJ Dual Tunab SSB/CW Filter at no obligation, today.

**MFJ ENTERPRISES, INC**
**P. O. BOX 494**
**MISSISSIPPI STATE, MS 39762**
**CALL TOLL FREE .... 800-647-180**
**For technical information, order/repair status, Miss., outside continental USA, call 601-323-586**

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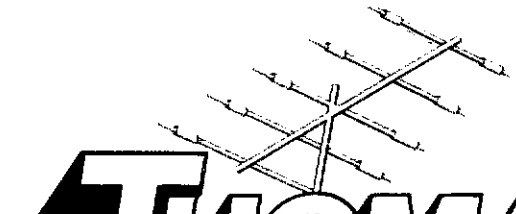

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*SUB-DEALER DIVISION DEPT. 12*

*95 Kitts Lane, Newington, Conn. 06111*

**1-800-243-7765 or Conn. Res. 203-667-0811**

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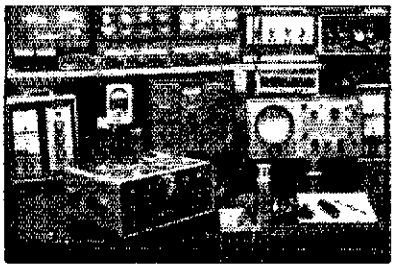

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| RV4-C VFO | 89.00 |
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| T4-X With Drake Desk Mic. | 359.00 |
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**KENWOOD**

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| TR-7200 FM XCVR | 189.00 |

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| SB-36 Transceiver | 449.00 |

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| VHF One Plus | 299.00 |
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| 210X W/NB & DMK & Mobile Mount | 679.00 |

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# Stalking the Ultimate DX.

**BOOMER SCORES AGAIN**
W1FC/1 claims record score during June VHF-QSO Party

Now you can really enjoy the challenge of working that tough to work 2-meter DX. The all new Boomer 3.2-λ yagi gives exceptional forward gain. A high efficiency balanced feed system, with integral balun, gives a clear, precise pattern. The trigon reflector reinforces Boomers' very high front to back ratio. Boomer has that right combination of features which will give you long path DX capability or allow you to participate in tropo, sporadic E, meteor scatter and EME activities.

The Boomer is designed to last with a large diameter round boom for more strength with less wind load. It has a reversible truss support, high strength aluminum mounting plates and all stainless steel hardware.

When you install Boomer, you'll appreciate our typical attention to detail. You can throw away the hack saw and hand drill. Boomer has a detailed instruction manual, precisely cut elements, plus machined and finished components which need only pliers and screwdriver to assemble.

When you are ready to move up to even higher gain, we have complete stacking kits with everything necessary to assemble two, four and larger yagi arrays.

Stalk down to your local dealer (anywhere in the world) for full details on Boomer.

**A-3219 BOOMER**
**UPS SHIPPABLE**

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**The Antenna Company**
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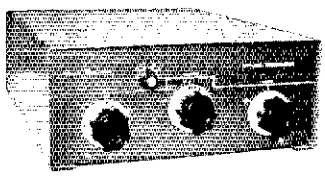
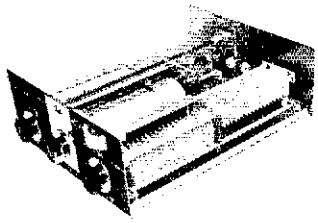
# NEW — FROM MURCH ELECTRONICS — THE ULTIMATE TRANSMATCH

NEW — The UT-160 & UT-160B



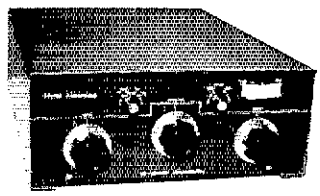
UT-160, less balun & meter $194.50 + shipping
UT-160B, with balun, no meter $212.75 + shipping



Internal construction
Of UT-160 models

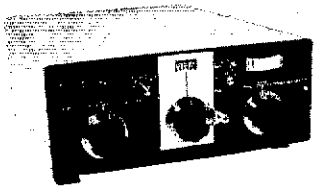
- UT-160, UT-160B, UT-160M & UT-160MB models:
- Ceramic inductor tapped every turn each band
- All B models for use with balanced lines, heavy duty 3 core balun
- All M models have relative output meter
  12"Wx15½"Dx5"H, 13 lbs. shipping wt.

NEW — The UT-160M & UT-160MB



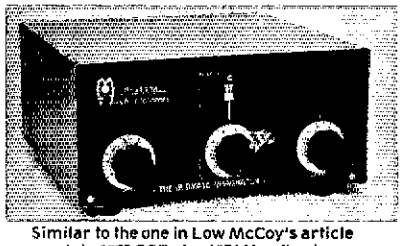
UT-160 M with meter, no balun $212.75 + shipping
UT-160MB with meter, balun $230.50 + shipping

NEW — The UT-2000B



- Continuous coverage 160-10 meters
- Rotary inductor with turns counter
- Relative power output meter
- Three core balun
  12"Wx15½"Dx5"H, 13 lbs. shipping wt.
  $242.50 + shipping

MODEL UT-2000A
ULTIMATE TRANSMATCH



Similar to the one in Low McCoy's article
July 1970 QST also 1976 Handbook

- Use with any coax or end fed random wire antenna, ideal for apartment dwellers
- 80-10 continuous, including MARS
- Rotary inductor with turns counter for precise and rapid tuning
  12"Wx12"Dx5½" H, 12 lbs. shipping wt.
  $139.95 + shipping

MODEL 68A
MULTIBAND ANTENNA 10-80 M

- Field proven 4 years
- Sealed center insulator, 102 ft. wire, 30 feet heavy duty twin lead
- Coax fitting to connect twin lead to 52 ohm transmission line (68 feet or more, not included)
- Ready to use. Great on all bands when used with the Ultimate 1 ransmatch
- 2000 w P.E.P.
  $44.50 p.p.

**SEE YOUR DEALER OR ORDER DIRECT**

- Use these Transmatches with any antenna — dipoles, random wires, verticals, whips, beams
- Function switch — in, out, dummy load (not supplied), ground (switch not on UT-2000A)
- Provides SWR of 1 to 1 to the transmitter
- Full legal power on all bands 160 to 10 meters (UT-2000A 80 to 10)
- Outputs for coax, random wire, balanced line
- 4000 volt capacitors, heavy duty construction throughout
- Use with any watt meter, SWR bridge
- Changing frequency by a few kilocycles normally requires only a slight adjustment

**NEW!**
SEND FOR OUR LITERATURE
ON MODEL UT-2000 A-LS
WITH METER.

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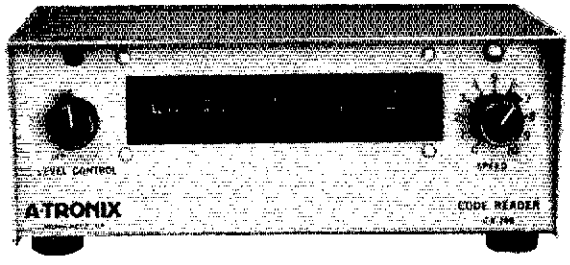
16 POSITION DISPLAY
CODE READING WAS NEVER EASIER

# THE WORD READER

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# A-TRONIX

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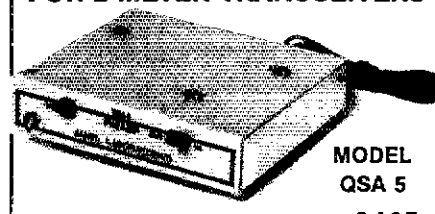
# PREAMP

FOR 2 METER TRANSCEIVERS



MODEL QSA 5

ONLY $41.95

The QSA 5 preamp is a high performance, low noise preamp for improving the receiving sensitivity of 2 Meter transceivers. This preamp features easy installation with no modification to the transceiver required. Can be used with virtually all 2 Meter transceivers and on all modes—FM, SSB, CW or AM. Relays in the QSA 5 automatically bypass the preamp when transmit power is sensed. Available with BNC or SO-239 connectors.

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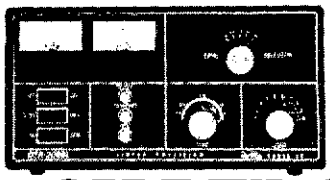

## DENTRON DTR-2000L

($1199.50 LIST)

The DTR-2000L runs comfortably at maximum legal power. The Mirage MP-1 assures you that it's all going to your antenna!

Buy your DENTRON DTR-2000L and a MIRAGE MP-1 from CLEGG for only $1119.00 total. Save over $200! Have the biggest signal the law allows!

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**MIRAGE MP-1**
Reads both Peak and Average Power and VSWR ($119.95 LIST)

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Greenfield Industrial Park East
Lancaster, PA 17601
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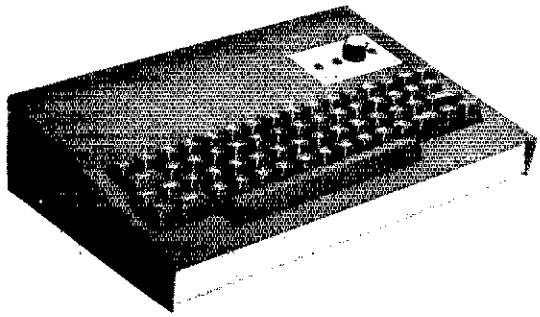
# MKB-2000 KEYBOARD

NEW!



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* Complete set of alphanumeric, punctuation, and special function keys
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* RTTY with "Brag Tape" cassette interface, AFSK modulator, ASCII, and memory expansion options available
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# It's for 2-meters.
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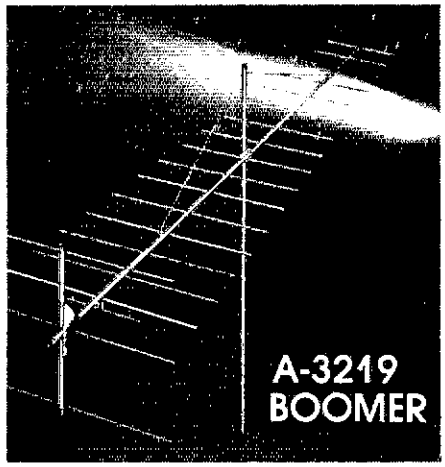
# It's the Boomer.

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THE ANTENNA COMPANY

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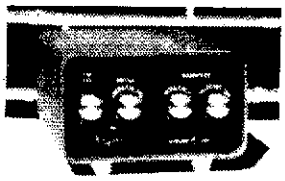
**ERC PROMISES UP TO THE MINUTE STATE-OF-THE-ART DESIGN AND PERFORMANCE WE'VE DONE IT FOR 1979**

FOUR SIMULTANEOUS FILTERS IN ONE FOR UNPARALLELED QRM FREE RECEPTION (SSB & CW)
*PLUS A SPECIAL PATENTED CW PROCESSOR*



SL-56
AUDIO ACTIVE FILTER
(3.5 + 5.5 + 7.5 INCHES)

THE BRAND NEW SL-56 AUDIO ACTIVE FILTER SUPERCEDES OUR SL-55 IN BOTH CONCEPT AND PERFORMANCE. CONSOLIDATION OF MANY COMPONENTS HAS ALLOWED US TO MAKE 16 OPERATIONAL AMPLIFIERS (COMPARED TO 6 IN THE SL-55) INTO A FILTER GUARANTEED TO OUT PERFORM ANY OTHER AT A COST ONLY SLIGHTLY HIGHER THAN THE SL-55. THE FEATURES OF THE SL-56 ARE SO ADVANCED FROM ITS PREDECESSOR THAT CALLING IT THE SL-55A IS NOT JUSTIFIED. UNLIKE OTHER FILTERS THAT SIMPLY OFFER A CHOICE OF ONE OR TWO FILTER TYPES AT A TIME (NOTCH, BANDPASS, ETC.) SL-56 PROVIDES WHAT IS REALLY NEEDED --- THE SIMULTANEOUS ACTION OF A 6 POLE 200 Hz FIXED HIGHPASS FILTER AND A 6 POLE 1600 Hz FIXED LOWPASS FILTER WITH A 60 dB NOTCH WHICH IS TUNABLE OVER THE 200-1600 Hz RANGE. THIS 3 FILTER COMBINATION IS UNBEATABLE FOR THE ULTIMATE IN QRM FREE SSB RECEPTION. ADJACENT CHANNEL QRM IS ELIMINATED ON THE HIGH AND LOW SIDES AT THE SAME TIME AND DOES NOT INTRODUCE ANY HOLLOWNESS TO THE DESIRED SIGNAL. ON CW THE SL-56 IS A DREAM. THE LOWPASS, HIGHPASS AND NOTCH FILTERS ARE ENGAGED ALONG WITH THE TUNABLE BANDPASS FILTER (400-1600 Hz) PROVIDING THE NEEDED ACTION OF 4 SIMULTANEOUS FILTER TYPES. THE BANDPASS MAY BE MADE AS NARROW AS 14 Hz (3dB). ADDITIONALLY, A SPECIAL PATENTED CIRCUIT FOLLOWS THE FILTER SECTIONS WHICH ALLOWS ONLY THE PEAKED SIGNAL TO "GATE ITSELF" THROUGH TO THE SPEAKER OR HEADPHONES (4-2000 OHMS). RECEIVER NOISE, RING AND OTHER SIGNALS ARE REJECTED. THIS IS NOT A REGENERATOR, BUT A MODERN NEW CONCEPT IN CW RECEPTION. THE SL-56 CONNECTS IN SERIES WITH THE RECEIVER SPEAKER OUTPUT AND DRIVES ANY SPEAKER OR HEADPHONES WITH ONE WATT OF AUDIO POWER. REQUIRES 115 VAC. EASILY CONVERTED TO 12 VDC OPERATION. COLLINS GRAY CABINET AND WRINKLE GRAY PANEL.

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**$75.00 POSTPAID IN THE USA AND CANADA.** VIRGINIA RESIDENTS ADD 4% SALES TAX.

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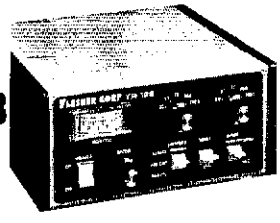


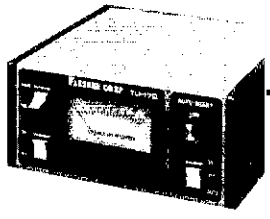
**TR-128**
NEW FROM FLESHER

***RTTY REGENERATIVE BAUD RATE CONVERTER**

**TTL compatible connections for direct hook-up to the TU-170, also adaptable to other units.**

- Five standard baud rates
- Stable crystal-controlled oscillator
- 128 Character storage capacity with storage status meter to show buffer fill
- Continuously variable character rate

**WIRED $239.95 Kit $179.95**



**TU-170**
TERMINAL UNIT

**Connect to your receiver speaker, transmitter microphone jack, and teletype machine and you're on the air. Ideal for HF and VHF auto start operation.**

- Autostat with threshold control and solid state relay
- Stable audio frequency shift oscillator produces phase coherent sine wave tones
- TTL compatible inputs and outputs for auxilliary equipment
- High level output for scope tuning

**WIRED $234.95 KIT $159.95**

***Flesher products . . . the critics choice!***

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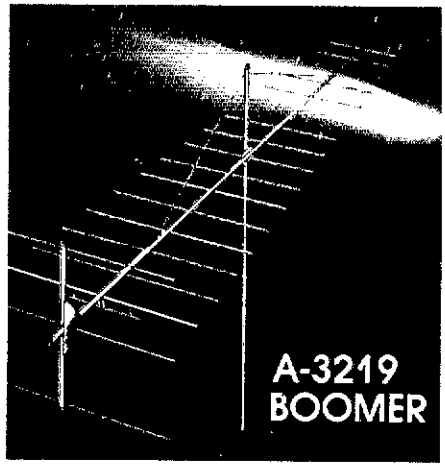
**P.O. Box 976Q Topeka, Ks. 66601 913/234-0198**
**Add $3.00 for postage and handling.**

# It's New.
# It's for 2-meters.
# It's the Best.
# It's the Boomer.

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THE ANTENNA COMPANY

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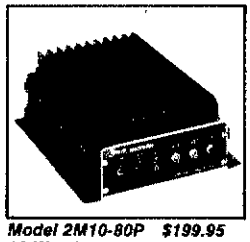
# Lunar's Linearized® Power Amps Save Energy.

To be "Linear," an amplifier output signal must be an exact reproduction of the input signal, with only the power level changed.

We are the originators of the Linearized process. Our amplifiers exhibit this in transmit operation by the very small amount of side-splatter produced when compared to most other amps.



***Model 2M10-80P $199.95***
***10 Watt in, 80 W out.***

*You use 2 to 3 times less energy for the same power output with a Lunar power amplifier, because our amps are 2 to 3 times more efficient.*

Another innovation is our pre-amp capability which improves signal reception on those circuits where signals are weak or dead.

*Thus the station transmitting to you requires less energy, because his signal is strengthened at your receiver with Lunar's pre-amp capability. Again, this saves energy.*

To paraphrase the August '78 QST review of our preamps.. "no other commercially available preamplifiers can match or beat (the Lunar)."

*Don't waste your money or energy with high priced inefficient amplifiers. Get a Lunar power amp with pre-amp capability. They're really efficient.*

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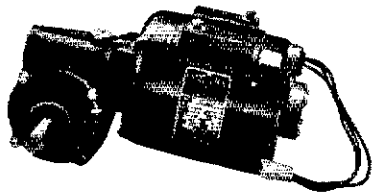

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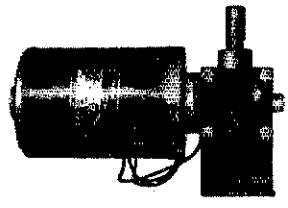

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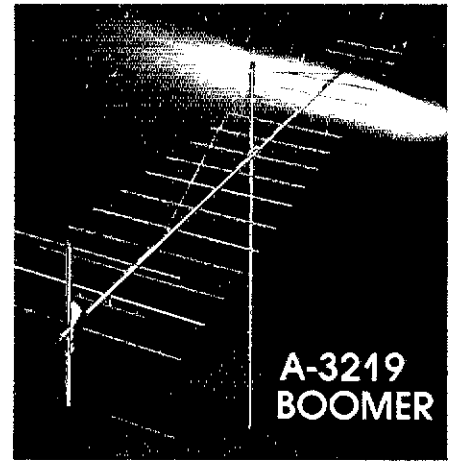


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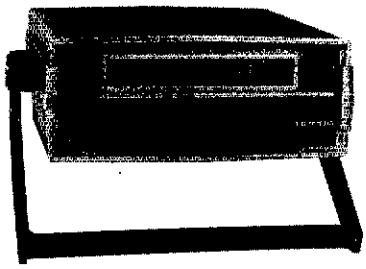

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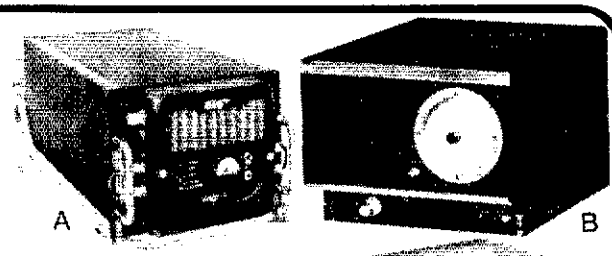


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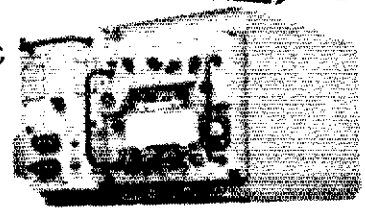


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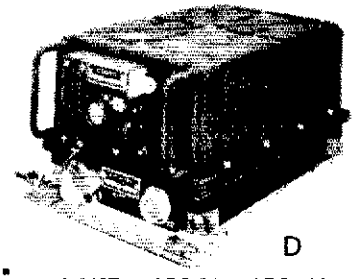


A-618T or ARC-94 or ARC-102.
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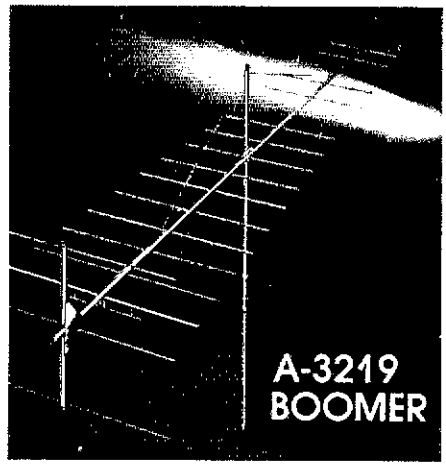


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You'll think you're in Ham Heaven when you see the **GIGANTIC FLEA MARKET.** Buy, sell or trade —there will be plenty of bargains, all under one roof. (Spaces are $3.00 per day, tables furnished).

Another big feature of this year's event will be the **FCC EXAMS.** So hit the books now and come prepared.*

It's all indoors—come rain or shine—**Exhibits, New Equipment Dealers, Seminars, Hourly Awards** including an **APPLE II, 16K MICRO COMPUTER.** Plus ladies activities and the traditional southern hospitality party Saturday night.

To make your visit a pleasure, there will be special **motel accommodations** at the **Holiday Inn** near Overton Square as well as **On-Site Trailer Hook-Ups.**

Admission is only $3.00 for adults, children 14 and younger **FREE.** Exhibitor booths are still available.

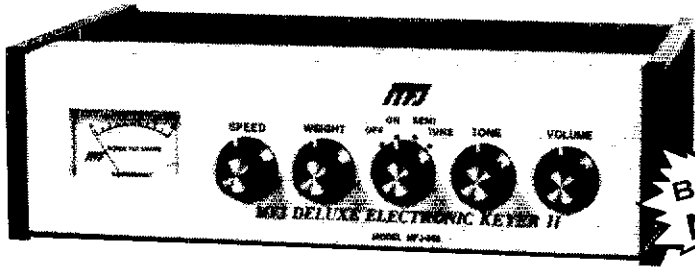
For detailed brochure with map, program guide, and motel reservation form, write to **MEMPHIS HAMFEST,** P.O. Box 3845, Memphis, TN 38103.

**MEMPHIS HAMFEST**

*All applicants for the FCC Exams must appear by 8:00 AM Saturday with a copy of current license, on the campus of CBC College across from the Fairgrounds.

# NEW MFJ Deluxe Keyer has Speed Readout

**Socket for external Curtis memory, random code generator, keyboard. Uses Curtis 8044 IC. Gives you dot-dash memories, weight, speed, volume, tone controls, speaker. Sends iambic, automatic, semi-automatic, manual. Reliable solid state keying, RF proof.**




BRAND NEW

***Speed Readout Meter lets you read to 50 WPM. Socket for Curtis memory, random code generator, keyboard.***

**$79.95**

**The new MFJ-408 Deluxe Electronic Keyer II** is based on the proven Curtis 8044 IC keyer chip. **Speed readout meter** lets you read sending speed to 50 WPM. **Socket** (optional cable with plug, $3.00) lets you use external Curtis memory, random code generator, keyboard (available from Curtis Electro Devices).

**Sends iambic, automatic, semi-automatic, manual.** Use squeeze, single lever or straight key.

**Iambic operation** with squeeze key. Dot-dash insertion. **Semi-automatic "bug" operation** provides automatic dots and manual dashes.

**Dot-dash memory,** self-completing dots and dashes, jam-proof spacing, instant start. **RF proof.**

**Ultra-reliable solid-state keying:** grid block, cathode, solid state transmitters (-300 V, 10 ma. max, +300 V, 100 ma. max).

**All controls** are on front panel: speed, weight, tone volume, function switch. Smooth linear speed control. 8 to 50 WPM.

**Weight control** adjusts dot-dash space ratio; makes your signal distinctive to penetrate QRM.

**Tone control.** Room filling volume. Built-in speaker. Ideal for classroom teaching.

**Function switch** selects off, on, semi-automatic/manual, tune. Tune keys transmitter for tuning.

**Completely portable.** Operates up to a year on 4 C-cells. 2.5 mm phone jack for external power (6 to 9 VDC). Optional AC adapter $7.95.

**Eggshell white,** walnut sides. 8x2x6 inches.

**Stereo phone jack** for key, phono jack outputs. **OPTIONAL BENCHER IAMBIC PADDLE.** Dot and dash paddles have fully adjustable tension and spacing. Heavy base with non-slip rubber feet eliminates "walking." $39.95.

**Order from MFJ and try it — no obligation.** If not delighted, return it within 30 days for refund (less shipping). One year unconditional guarantee.

**Order today.** Call toll free 800-647-1800. Charge VISA, MC or mail check, money order for $79.95 plus $3.00 shipping for MFJ-408 keyer and/or $39.95 plus $3.00 shipping for Bencher paddle.

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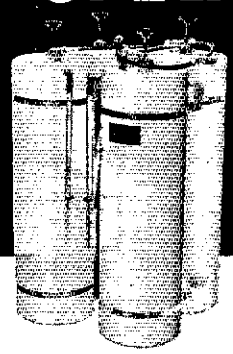

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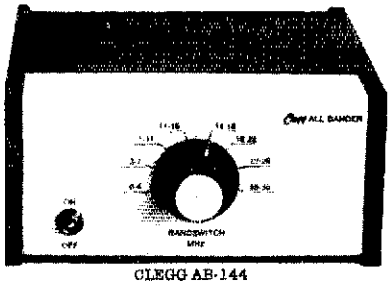

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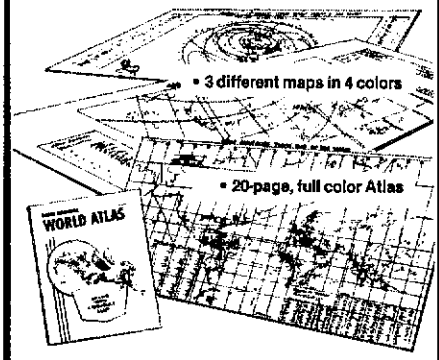


Here's an offer you can't refuse! You receive three, information-packed, Amateur Callbook maps, folded, plus the World Atlas for only $3.75 plus $1.50 shipping and handling. If purchased separately, total value of map/atlas offer would be $6.25, plus shipping. You save $2.50 and get these invaluable radio amateur aids!

1. **Prefix Map of the World,** folded. World-wide prefixes. Shows 40-zone map on one side, 90-zone map on the other. Size 40" x 28"
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Pegasus on blue field, red lettering. 3" wide x 3" high. Great on jackets and caps. Sorry, no call letters.

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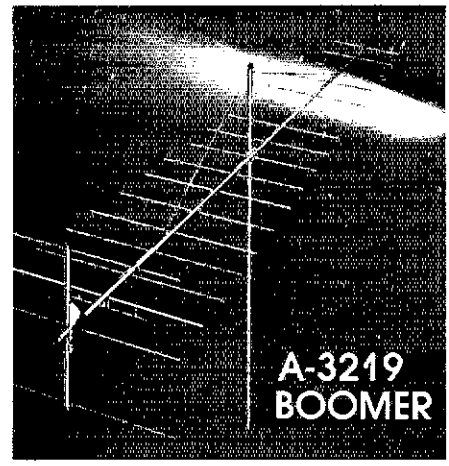


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# Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 70 cents per word. A special rate of 25 cents per word applies to hamfest and convention announcements, to individuals seeking to dispose of or acquire personal equipment, and to other advertising which, in our opinion, obviously qualifies for the individual rate.

(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 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 21 through September 20 will appear in November *QST*.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

### Clubs/Hamfests

OCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. Any currently licensed Amateur who was first licensed 25 or more years ago is eligible for membership. Members receive a membership call book and quarterly news. Write Q.C.W.A. Inc. 1409 Cooper Dr., Irving TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

SUPERFEST 1979 Peoria Illinois. Now two fantastic days — September 15th and 16th. Manufacturers (R.L. Drake, etc.), forums and excellent programs for the ladies. Great smorgasbord Saturday night. Advance tickets $2. Exhibitors and advance tickets write: Peoria Hamfest, 5808 N. Andover Ct., Peoria, IL 61614

MUSEUM for radio historians and collectors now open. Free admission. Old time amateur (W2AN) and commercial station exhibits. 1925 store and telegraph displays, 15,000 items. Write for details. Antique Wireless Assn., Holcomb, NY 14469.

ELMIRA, New York International Hamfest — September 22, 1979. Tech talks, free flea market, great food, contests — even more prizes than last year! For more info, contact WA2FJM, John Breese, 340 West Avenue, Horseheads, New York, 14845.

THE Greater Delaware Valley Hamfest, Cherry Hill, NJ, October 28, 1979 at the Camden Catholic High School, Rt. 38 and Cuthbert Rd., 8 A.M. to 5 P.M. Reserved indoor flea market $4/table, commercial displays, outdoor flea market, and seminars. Admission $3. Talk-in 22/82 and 52/52. Set-up late Saturday night and RV parking. Write GDV Hamfest, 15 East Camden Avenue, Moorestown, NJ 08057. 609-234-3926.

CINCINNATI Hamfest: 43rd Annual — Sunday September 16, 1979 at Strickers Grove on State Route 128, one mile west of Ross (Venice) Ohio. Exhibits, prizes, food and refreshments available, Fleamarket (radio related products only), music, good fellowship, hidden transmitter hunt and sensational air show. Admission and registration $4. For further information: Lillian Abbott-K8CKI, 1424 Main Street, Cincinnati, OH 45210.

FALL Classic Radio Exchange: September 30! S.a.s.e. for Newsletter: K8SJ, 2386 Queenston, Cleveland, OH 44118.

ARRL Roanoke Division Convention & Hamfest. Fourth Annual Tidewater hamfest-computer show-flea market will be held in the Norfolk, VA. Cultural and Convention Center SCOPE October 20 & 21, 1979. Open at 9:00 AM. ARRL meetings, DX, Traffic forums, plus a cw contest are scheduled. FCC exams are planned for amateur upgrading Saturday 9-12 AM. A special feature will be a dinner cruise and banquet on the Spirit of Norfolk Cruiseship Saturday Night. Advance registrations $2.50 (s.a.s.e.), $3.50 at the door. Flea market tailgate spaces $3 day. Cruise and banquet $16 person, $30 couple. Tickets and information — TRC P. O. Box 7101, Portsmouth, VA 23707.

FINDLAY Hamfest: Don't miss this Superfest! We're second only to Dayton in Ohio. We've got one of the largest Swap & Shops you'll ever see. Admission tickets still only $1.50 in advance and $2 at the park. Awards include the new Kenwood TS-120S. See you at Riverside Park in Findlay, Ohio just 45 miles south of Toledo on Sunday, Sept. 9th. For advance tickets and further info send s.a.s.e. to Clark Foltz, W8UN, 122 W. Hobart Ave. Findlay, OH 45840.

THE SANGAMON Valley Radio Club of Springfield, IL holds its Fourth Annual Hamfest on Sunday, Sept. 23rd — Sangamon County Fairgrounds, New Berlin, sixteen miles west of Springfield. Indoor dislpay and covered pavilion. Randy Rowe NØTG talks on Navassa DXpedition! Exhibits, kids activities and food available. Overnight camping. Awards include: Atlas RX110/TX110, power supply. Tickets: $1.50 advance, $2 gate. Information: John WA9KRL, S.V.R.C., 1025 South Sixth, Springfield, IL 62703.

CERTIFICATE for proven two-way radio contacts with amateurs in all ten USA areas. Award suitable to frame and proven achievements added on request. S.a.s.e. brings TAD data sheet from W6LS, 2814 Empire, Burbank, CA 91504.

BLOSSOMLAND Fall Swap Shop, October 7th, Berrien County Youth Fair Grounds, Berrien Springs, Michigan. Large convenient facilities and refreshments. Tables restricted to radio and electronic items. Advance ticket donation $1.50. Tables $2. Write Charles White, 1940 Union Ave., Benton Harbor, MI 49022. Make checks payable to Blosomland ARA.

BEST show in Amateur Radio available for club annual banqets — color movies and slides of the Clipperton Island DXpedition, live narrative, two hours, over 60 shows in 19 states. Call 817-634-1053, WA4WME/5.

HAMFAIR '79 sponsored by LIMARC, Sunday Oct. 14 at the Islip Speedway, Route 111 (Islip Ave.) 1 block south of Southern State Pkwy Exit 43 or come south from the LIE Exit 56. Open from 9 A.M. til 4 P.M. Free parking, room for 3000 cars. Over 300 sellers at the last show. Loads of prizes with special catagorie such as furthest distance. Several contests planned, you need no preparation. This ARRL Hamfest admission is $1.50 and $3 per seller's space. Seller's space permits one person to enter. All hams must pay admission, others are free. Info call Hank Wener, WB2ALW nites at 516-484-4322 or Sid Grossman, N2AOI, nites at 516-681-2194.

BARCFEST '79, on Sept. 23, 1979, at the Boulder, Colorado National Guard Armory is the largest hamfest in the Colorado Rockies. Talk in 146.10/.70 and .52/.52. For further info contact Mark Call, NØMC, 4297 Redwood Ct., Boulder, CO 80301: Phone 303-442-2616.

HAMFEST Chattanooga will be held Oct. 27th & 28th, awards include Ten-Tec 540 Transceiver and Tempo S-1. Send $1 for preregistration ticket with info. Come and visit with us in the Choo-Choo city. Hamfest: P. O. Box 95, Chattanooga, TN 37401.

ICOM-701 International User's Club is now operational. S.a.s.e. for details N8RT. Rob Pohorence 9600 Kickapoo Pass, Streetsboro, OH 44240.

LIMA, OH — Northwest Ohio Amateur Radio Club Annual Hamfest October 14 — Doors open 7 A.M. Dealer tables available — talk-in 52/52, 07/67 Allen County Fairgrounds — Rte. 309E — 1 mile off I-75. For Info. Write N.O.A.R.C. P. O. Box 211, Lima, OH 45802.

THE 1st Annual Hostess City Hamfest will be held in Savannah, GA October 20-21 at the National Guard Armory on Eisenhower Drive. Admission will be $2.50 in advance, $3.50 at the gate. Talk-in will be on 37/97, 10/70, 28/88 and 63/03. For additional information and advance tickets write Hostess City Hamfest Committee, P. O. Box 1237, Pooler, GA 31322.

HAMFAIR '79 sponsored by LIMARC, Sunday Oct. 14 at the Islip Speedway, Route 111 (Islip Ave.) 1 block south of Southern State Pkwy Exit 43 or come south from the LIE Exit 56. Open from 9 A.M. til 4 P.M. Info: call Hank Wner, WB2ALW nites at 516-484-4322 or Sid Grossman, N2AOI, nites at 516-681-2194. See Hamfest Calendar for info.

**QSL Cards/Rubber Stamps/Engraving**

TRAVEL-PAK QSL Kit — Converts Post Cards, Photos to QSLs. Stamp brings circular. Samco, Box 203, Wynantskill NY 12198.

DELUXE QSLs, Samples 25c. Petty, W2HAZ, P. O. Box 5237, Trenton NJ 08638.

DON'T buy QSL cards until you see my free samples. Fast service, economical prices. Little Print Shop, Box 9848, Austin TX 78766.

$2.70 per 100 (1000 order). 30 original two-color styles, 125 cards minimum. We ship 2-weeks after your check clears or you may have your money back! Satisfaction guaranteed. Send 30c stamps for catalog. VP5QED Press: Box 1523-Boca Raton, FL 33432.

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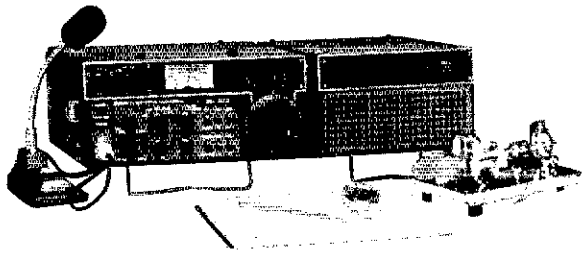

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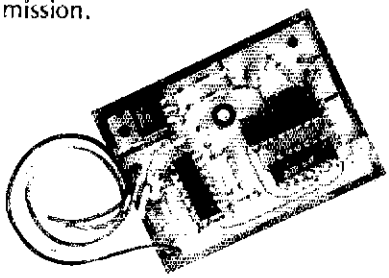

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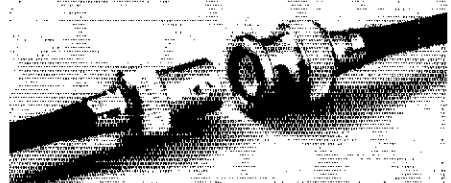

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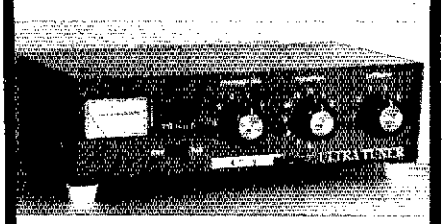

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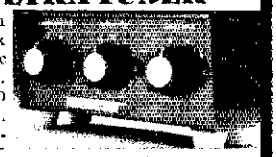

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KENWOOD TS-520S five months old, new condition, $550. Phone Hamp, WB6PMG, 408-624-1171 after 6 P.M. PDT.

DREAM amateur transmitter. Collins 208U-3 3kw pep linear amplifier complete with 310V-1 rf exciter, 618Z-4 rf translator, 798T-1 if translator (Collins URG series) widely used military and commercial services. Continuous coverage 2-30 MHz in 100 Hz steps. Six second automatic retune. Ssb, am, cw, RTTY. Just completely checked Collins service facility. Offers invited, W6ITH, 2151 Camino Pablo, Moraga, CA 94556. 415-376-5082.

SELL: Complete station — Hallicrafters HT-37 transmitter, Hethkit HR-10B receiver, Sigma RF-2000 meter, Johnson TR-switch, many extras. All in excellent condition. $250 or best offer. Pickup only! NYC-LI area. Scott (WB2UBK) 516-543-7887.

QST Collector looking for ARRL 1914 and 1915 List of Member Stations and map, QST March — September 1916. Ed Kalin, K1RT, 75 Tumblebrook Lane, West Hartford, CT 06117. 203-233-9915.

ETO amps, KLM amps and antennas — Big Discounts! KDK 2016A $330. Bearcat 250 $259. Write for other hot specials! Ben Franklin Electronics, 115-1/2 N. Main, Hillsboro, KS 67063.

WANTED: Heath HA-14 linear, any condition. Jim, WA5ZVB, 611 Woodvale, Lafayette, LA 70503. 318-984-3711.

TEN-TEC, Wilson, Cushcraft, Hy-Gain, Anteco, Weatheralert, KLM, Nye-Viking, Vibroplex, Bencher, MFJ, B&W, DB Products, and many others. Call or write for quote Mon-Sat, 10 AM till 8 PM. 10-5 PM Wed & Sat. Sidewalk Sale last Saturday of each month. J-T Electronics Supply, Inc., 14 Jupiter Place no. 117, Plano, TX 75074, 214-424-0515.

WANTED: Cushman plug in modules for Cushman Service Monitors, also will consider taking over payments on service monitor you cannot pay for. Cushman or IFR only; WB8IJX, Fred Slaughter, 5844 Grisell Rd., Oregon, OH 43618.

FOR SALE: 8 room — 2-1/2 baths — colonial, excellent condition all carpeted, gas heat, corner hill in beautiful Glen Cove, Long Island — 3rd floor radio room complete — 40 ft. tower, concrete base — 2 element 3 band quad. Zoned for two families. Phone after 6 P.M. — 516-671-4997. Bert Shapiro.

SALE: 75A4 no. 1473 $385; Regency HR2B $149; Swan Mark 1; Swan 350C $249; write for list. WØEWN, 612 Hillcrest, Scottsbluff, NE 69361.

WANTED: International Crystal Model FM-2400CH frequency meter. Also Drake RV-4 VFO and vhf marine radios. State condition and price in first letter. WB8IJX, Fred Slaughter, 5844 Grisell Rd., Oregon, OH 43618.

WANTED: Collins mechanical filter No. F-455J-05 for 75A4. Will pay $100 W1ELR 802-295-3210 collect.

WANTED: 1920s battery radios, horn speakers and catalogs. W6THU, 1545 Raymond, Glendale, CA 91201: 213-242-8961.

FAST professional ham repair service New York City area. Amateur Extra; FCC Commercial license. Fully equipped shop. Reasonable. Rich Tashner N2EO 212-352-1214.

DRAKE T4XC, R4C, AC-4, MS-4. Also 3-1000Z, 4-1000A, socket, chimneys, vacuum variables. John, K5SB, 417 W. 1st Street, Sonora, TX 76950. 915-387-3831. 8-5 P.M.

SALE: Collins, Late round emblem KWM2A, 312B-5 VFO console, Spectronics digital display DD1C, 516F-2 powr supply, SM-3 desk microphone, dummy load DL1, DX Engineering rf speech processor — with all manuals, like new, excellent condition $3500, or best offer, cash sale only. No trades. Will not separate. Will prepay shipment. WB5RNC, P. O. Box 5566, Corpus Christi, TX 78405. 512-883-8511 days only.

SHURE Microphones — have 100 brand new 4 wire high impedance handheld mics, fraction original cost, only $12.95 postpaid. Bruce Burkhardt, WA3MAS, Box 1, Royal Oak, MD 21662. 301-745-2826.

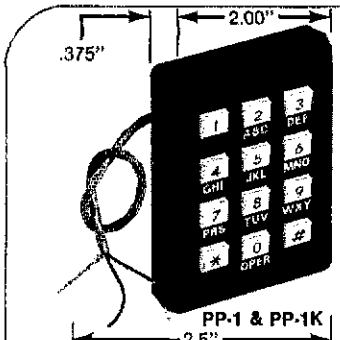
WANTED — Old microphones — Pre 1940, for my microphone museum. Also mic related items. Write Bob Paquette, 443 N. 31 St., Milwaukee WI 53208.

SONY TC-270 Tape Rec Stereo 7" Reel-Reel List 1973 ($395.) $225. W6RQZ, 1330 Curtis, Berkeley CA 94702.

SELL: Mint Hammarlund 180AX Communication Receiver, has place for Eleven Crystals S-200 Speaker, instructions, used only 30 hours, $320. — UPS included. Tad Moyseowicz 253 Palm Lane, Cocoa Beach FL 32931. 305-784-0524 evenings.

TEMPO-One/AC-One $299, DC-1A $75, Hustler elbow style mast and 75/40/20 resonators $40. TS-520S recent and mint $600; no shipping. Want: SB-200, please state age and condition of finals. Contact Chuck, KBAXL at 203-666-0657 3:30 P.M.-1A.M. Tu-Fri only.

6 METERS-Tempo 100AL10 linear amplifier. Perfect for Kenwood or Yaesu. As new, $275. Wilson 4 element beam $40. Call Joe WB2JKJ, after 9 P.M. 212-479-2912.

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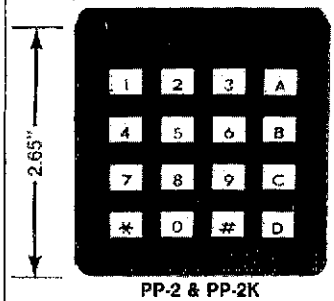


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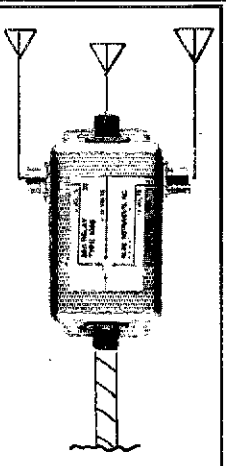

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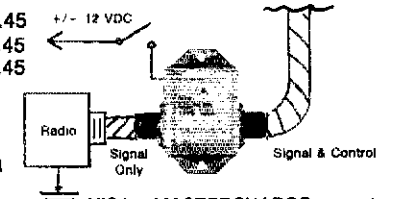


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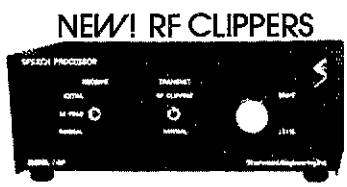

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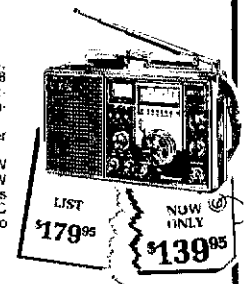

RF-2200 8 BAND AM/FM, SW freqs from 3.9 to 28 MHz ... Double super heterodyne ... Precise calibrated tuning to 10 kHz ... Double-check xtal marker at 500 kHz and 125 kHz ... RF gain control for AM/SW BFO switch for SSB & SW Plus many more features such as ext. jacks for AC ant., & spkr. ... Big radio features at low price.
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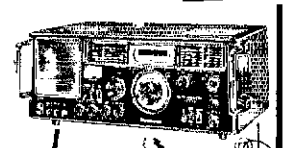

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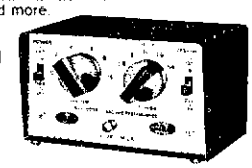

MODEL PLF-2 ... Improves weak signals as well as image and spurious rejection of most receivers. Direct switching to rec. or preamp. Includes pwr. supp. 117 VAC wired & tested. ppd $49.95.

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For 11,13,16,19,15, 31, & 49 meters. An inexpensive horizontal dipole with 8 pre-tuned weatherproof trap assemblies that are the key to the SWL-7's amazing broadband coverage. Complete kit w/instr.

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HEATH SB104 updated, ssb cw filter, SB604 $500 I ship. WB8MYX 6660 West Lane Ave. Ludington, MI 49431.

KENWOOD TS-520S $550. ICOM IC-22S $175. Heath HM-102 $25. Heath DX-60B $50. Heath HD-15 $25. Dentron Jr. Monitor $50. Wilson WR-500 RoTor $85. Wilson DB-43 Beam $100. WB5RGC, 330 Emerson Dr., Hattiesburg, MS 39401. 601-544-1773.

KENWOOD TS-520S w/digital display DG-5 MC-50 mic., two months old, $840, best offer. WBØMPJ 913-782-0567 evenings.

6 FM Motrac U41LHT-1470, extender, 4 channel scan, excellent $399. Mint SB-220, quiet fan, $599. HT46-SX146 complete $299. Local prefered. W3RW, Bob, Leola, PA 17540. 717-656-9770

SELL: Heath HD-1410 Keyer $30. ERC SL-56 Audio Filter $50 DJ8GO/W2, 914-473-4453.

FOR SALE: Heathkit 2M HW-2036-A, P.S. and encoder $225. Heathkit SB-303 receiver with all filters $250. Tristao MM-35 mast $225. AE7W, Jim Grafty, 8412 SW 9th Ave., Portland OR 97219. 503-244-0867.

SELL — Hallicrafters HT-32B, $225. SX-115 $325. Package deal with spkr and T/R relay. $525. Meisner EX $30. Wanted — Drake FS-4. WB2CLL 201-534-9642.

WANTED: Ten-Tec 405 linear - no pwr. Dick Myers, Browning Rd., Hyde Park, NY 12538.

KENWOOD TS-820. Mint. WD4EPR, Brian, 5749 Montpelier, Memphis, TN 38134. 901-382-3655.

WANTED — two relays, 3 pole double throw, 12 VDC 110 ohms, 11 pin plug in type with plastic cover. 323D10-12-CDE1077. WB4QBS, Charles W. Richardson, P. O. Box 111, Shephardsville, KY 40165.

RAK-7 — Is there anyone within driving distance that would like to buy for a reasonable figure this low frequency reciever with power supply to match? W1RF, Box 88, Sturbridge, MA 01566. Phone 617-347-3166.

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SALE: Drake station: T4XC-R4C, MS4, AC4. All in good condition w/manuals Drake 2B rcvr., $1000 certified check, will ship, you pay charges. Prefer pick up. Bert Lockard, WA3YTB, 302-227-9239, Box 1356 Sea Air, Rehoboth, DE 19971.

JOHNSON KW Matchbox w/SWR, Flawless condx. W/manual $160 firm. Ed, W4GW, Box 6255, Charlottesville VA 22906. 804-296-7409.

SELL Heath SB-104A with matching power supply, speaker, cw filter & noise blanker, $600. Excellent condition. W6OWD 415-728-7136.

SALE: As a unit — Century 21 no. 574 digital xcvr, 277 tuner, 670 keyer, 276 calibrator, Telex C1320 headphones, new condition, $375. Leaving amateur radio. Cliff Sears P. O. Box 1415, N. Myrtle Beach, SC 29582. 803-272-8290.

SELL: Heathkit SB-620 spectrum analyzer $120. IM-5218 VTVM with rf probe and solid state tube replacement $80. DJ8GO/W2, 914-473-4453.

HEATHKIT SB-220 linear 80-10M, hardly used, $525. W2GVK 516-499-7958.

MVD-1000 Morse video display. Brand new. $300. Steve WD4JWV 904-769-7733.

SWAN 500CX, ac supply, Shure 444 mic., QF-1 audio filter, AV-1 10-80 meter vertical, TVI filter, watt/SWR meter, cables. FB condx. WA2BIJ/9, Jim, 812-332-0641. $550 takes complete station.

ESTATE sale of Silent Key: Kenwood TS-520S with cw filter, SP-520 speaker and dust covers, $650. Kenwood VFO-520S with dust cover, $100. Atlas 210X with noise blanker and mobile mounting tray, $500. Heathkit SB-200 amp with 10 meters, $475. Cushcraft ATB-34 beam, Tri-Ex T-237 tower, Ham III rotor, and approx. 75 ft. coax and rotor cable, $525. Pick-up only on tower package. Will ship all other items in factory boxes. You pay U.P.S. Prices firm. Equipment is mint, no scratches, Purchased new less than year ago. Will deliver LA. or Hemet Area. WB6WQA, 213-379-5151 after 5 P.M.

QUITTING: HW-8, $85; Heath IO-4510 dual trace, solid state oscilloscope, $450; HP-97 card programmable, printing calculator, $485; GenRad 1602B uhf admittance meter, 20 MHz to 1.5 GHz, with all accessories, also, four GR-874 to N-type adaptors and HP precision attenuator set, NBS traceable, containing four N-type attenuators of 3, 6, 10 and 20 dB, HP-908A precision 50 ohm load, as package only, $185; HP-355C 0-12dB, 1dB step attenuator, DC-1GHz, $90; 2 new MRF 449A transistors, $8 each. All in A-1 condition and with manuals. Tancig, WB9YIF, Box 397, Sidney, IL 61877.

KENWOOD TR-2200A, $150; Telco 125 amplifier, $50; Swan WMM-200 meter, $25; Yaesu FT-101EE, fan, $600. WDØCTI, 918 Neosho, Emporia, KS 66801.

SELL: SB-200 amplifier with ten meter circuit. Only 20 hrs on new tubes. $300. Set of QST 1932 thru 1978 — $25. Dr. Crosby, W1QP, 617-432-1157.

WANTED: Collins filters for 75A-4. Ed Schmults, 68 Pheasant Ln., Greenwich, CT. 06830. 203-661-3167.

WANTED: Someone to make fifteen PCBs from

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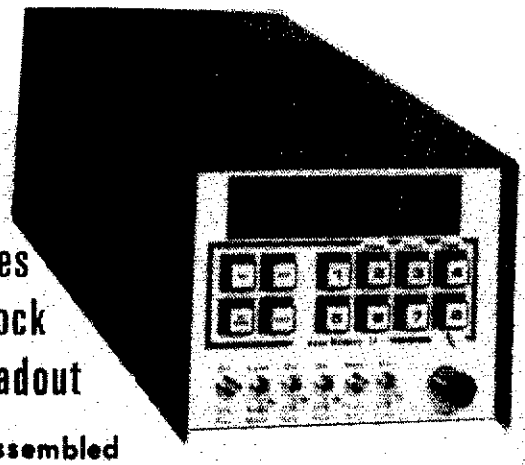

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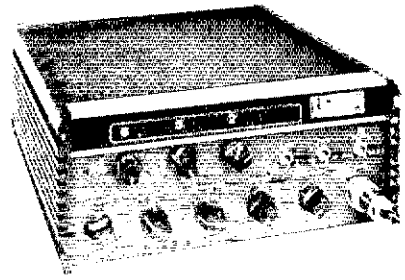

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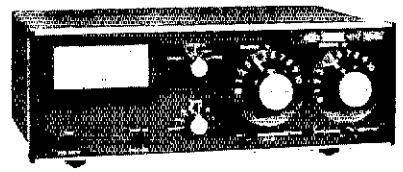

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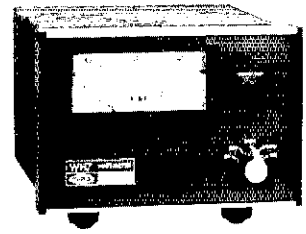

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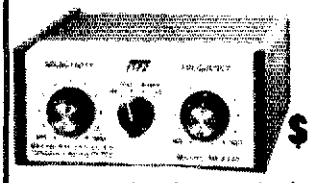

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**High Performance Assured. Ask the ham who owns one!**

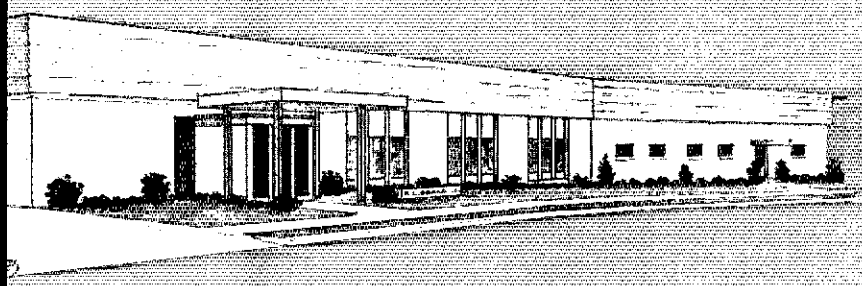
**Towers:**
ALUMA TOWERS. Nest to 23 feet. Hinged base. Easy to Tilt. Non-corrosive aluminum. Minimum freight rate. Many towers unguyed, 30' to 100'. Excellent wind loading. Priced from $192.00, less discount. Also two other makes of towers to choose from.

Send 30c cash or stamps, for literature and prices, or call 1-813/988-4213, day or night.

**Skylane Products**
W4YM 406 Bon Aire Ave. Temple Terrace, FL 33617

*Known throughout the world for quality...*

# DRAKE Equipment for Radio Communications



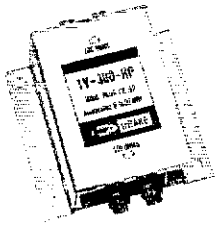
**R. L. DRAKE COMPANY**
540 Richard Street, Miamisburg, Ohio 45342
Phone (513) 866-2421 • Telex 288-017

*Specifications, availability and prices subject to change without notice or obligation*

# Drake TVI Filters

## High Pass Filters for TV Sets

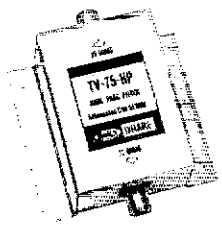
provide more than 40 dB attenuation at 52 MHz and lower. Protect the TV set from amateur transmitters 6-160 meters.



Model No. 1603

**Drake TV-300-HP**

For 300 ohm twin lead. New terminals for easy installation.



Model No. 1610

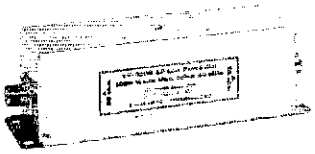
**Drake TV-75-HP**

For 75 ohm TV coaxial cable; TV type "F" connectors installed.

## Low Pass Filters for Transmitters

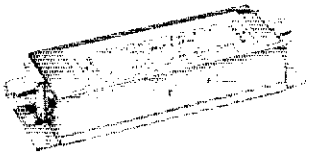
have four pi sections for sharp cut off above the hf amateur bands and to attenuate transmitter harmonics falling in any TV channel and fm band. 52 ohm. SO-239 connectors built in.

Model No. 1608 **Drake TV-3300-LP**



1000 watts max. below 30 MHz. Attenuation better than 80 dB abo 41 MHz. Helps TV i-f interference, as well as harmonic interference.

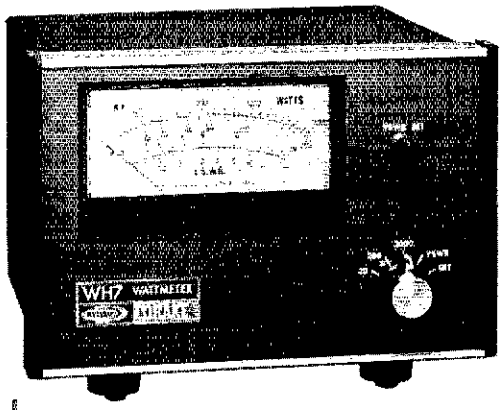
Model No. 1605 **Drake TV-42-LP**



is a four section filter designed with 43.2 MHz cut-off and extremely high attenuation in all TV channels for transmitters operating at 30 MHz and lower. Rated 100 watts input.

***Drake TVI Filters help you keep peace with your neighbors***

Model
1514




# Drake WH-7 Directional RF Wattmeter

## 1.8-30 MHz

Drake directional, through line wattmeters, using printed circuits, toroids, and state of the art techniques, permit versatile performance and laboratory accuracy, yet at a lower cost.

Removable coupler provides remote metering, and allows convenient positioning of coaxial cable.

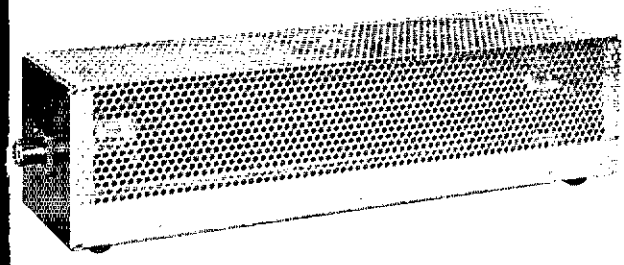
WH-7 wattmeter makes possible quick, accurate adjustments of antenna resonance and impedance match, when placed between transmitter and matching network.

Drake WH-7: Designed for user convenience and high accuracy. This instrument includes three calibrated scales for rf power to satisfy applications from QRP to high power (0-20, 0-200 and 0-2000 watts full scale) A fourth calibrated scale provides direct reading VSWR information, and is switch selected from front panel. The WH-7 is styled to match the 7-line.

### Specifications

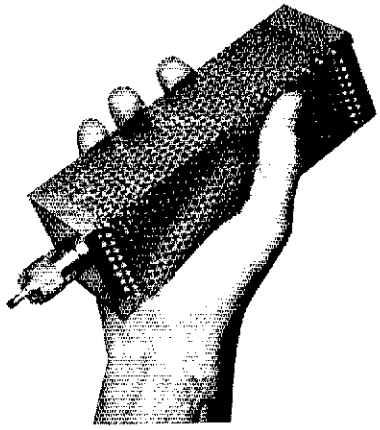
| | |
|---|---|
| **Frequency Coverage** | 1.8-30 MHz |
| **Line Impedance** | 50 ohm resistive |
| **Power Capability** | 2000 W continuous |
| **Jacks, Removable Coupler** | Two S0239 input and output connectors |
| **Semiconductors** | Two power meter rectifiers |
| **Accuracy** | ± (5% of reading + 1% of full scale) |
| **VSWR Insertion** | Insertion of wattmeter in line changes VSWR no more than 1.05:1 |
| **Shipping Weight** | 3 lbs (1.4 kg) |
| **Dimensions** | 5.3"H x 6.9"W x 7.5"D (13.5 x 17.5 x 19 cm) |

# Drake "Dry" Dummy Loads—no oil required



## Model 1551 Drake DL-1000

- **1000 watts** for 30 seconds, with derating curve to 5 minutes. Designed to accept Drake FA-7 cooling fan for extended high power operation.
- **VSWR of 1.5:1 max.** 0-30 MHz.
- Provided with SO-239 coax connector, and rubber feet for desk or bench use.
- **Size** 14" x 3.6" (35.6 x 9.1 cm). Wt. 2 lbs (910 g)



## Model 1550 Drake DL-300

- **300 watts** for 30 seconds, with derating curve to 5 minutes.
- **Built-in PL-259** coax connector for direct connection to rear of transceiver or transmitter-no jumper coax necessary.
- **VSWR of 1.1:1 max.** 0-30 MHz 1.5 max. 30-160 MHz.
- Ideal as bench test device for amateur or commercial hf and vhf gear.
- **Small size** fits conveniently in any field service tool box. 6.7" x 2.08" (17.0 x 5.3 cm). Wt. 11 oz (310 g)

*A remarkable engineering breakthrough...*

# DRAKE TR-7

**0-30 MHz**

**continuous coverage reception—no gaps—no range crystals required †**

**160-10 Meters**

**Amateur Band transmission, including capability for MARS, Embassy, Government, and future band expansions***

**The Drake TR-7 System significantly advances the technology of worldwide radio communications and unfolds an entirely new state of the art.**


Models shown are Drake TR-7/DR-7 with RV-7 and MS-7

**Designed and manufactured in U.S.A.**

In 1963 Drake led the way by producing the first commercially available amateur transceiver that employed the now widely copied 9 MHz i-f frequency. Even today, many major competitive transceivers are still being introduced using i-f's in this range.

Now, Drake leads the way again by developing the first commercially available amateur transceiver that uses a 48 MHz i-f, through the technique of "Up-Conversion." This system greatly improves image and general coverage performance, and will be copied in the years to come. With Drake, you can join the new state of the art today!

# solid state continuous coverage synthesized hf system Model 1337

DRAKE®

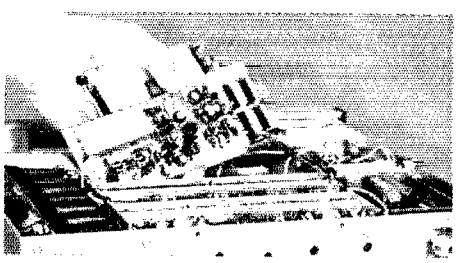
*The design philosophy behind the new Drake "7 system" has created a most sophisticated system concept, extending from engineering to the visual appearance of the system and each of its parts.*

*The TR-7 System is the result of one of the most extensive engineering and development programs in the history of the R. L. Drake Company, and provides the user with many innovative design features.*

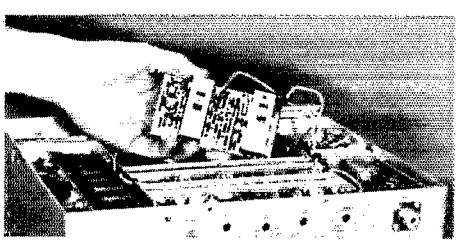
*With the excellent design of its front panel and controls, the system is simple and straightforward to operate–makes state of the art performance a pleasure.*

**Broadband, Solid State Design**—100% solid state throughout. All circuits are broadbanded so there is no need for preselection tuning or transmitter adjustments of any kind.

**Synthesized/PTO Frequency Control**—A Drake exclusive: Special high performance synthesizer, combined with the famous Drake PTO, provides smooth, linear tuning with 1 kHz dial and 100 Hz digital readout. 500 kHz up/down range switching is pushbutton controlled.

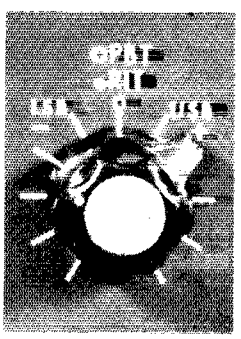


† **Continuous, Wide Range Frequency Coverage**—The TR-7/DR-7 provides reception from 1.5 thru 30 MHz—continuously, and **zero** thru **30 MHz** continuously with the optional Aux-7 Range Program Board. No gaps or range crystals required. The highly advanced Drake Synthesizer makes this possible, and is an industry first. The TR-7/DR-7 provides transmit coverage for all Amateur Bands 160 thru 10 meters. With the optional Aux-7 Range Program Board, diode-programmable out-of-band transmit coverage is available for MARS, Embassy, Government, and future band expansions in the range 1.8 thru 30 MHz.* The Aux-7 Board also provides 0 thru 1.5 MHz receive coverage and crystal-controlled fixed channel operation for Government, Amateur, or semi-commercial applications anywhere in the hf range. The TR-7 w/o DR-7 provides coverage of the Amateur Bands 160 thru 15 meters and the 28.5-29.0 MHz range of 10 meters. The Aux-7 Range Program Board is also useable in the standard TR-7 for extra range coverage as noted.



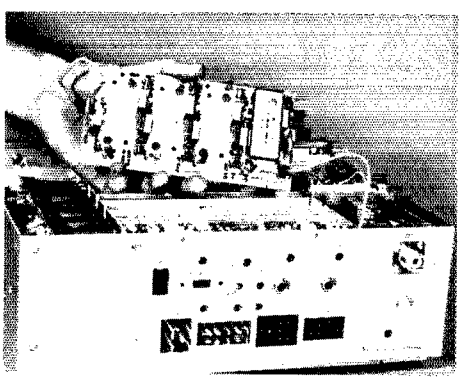
**State of the Art Receiver Design**—The Drake TR-7 introduces another industry first for amateur transceivers: "Up-Conversion," in combination with a special high level double balanced mixer for superior strong signal handling, spurious and image response performance. The first i-f of 48.05 MHz places images well outside the receiver passband, and provides for true general coverage operation without i-f gaps.

**True Passband Tuning**—The TR-7 employs the famous Drake Full Passband Tuning instead of the limited range "i-f shift" found in some other units. The Drake System tunes from the top edge of one sideband, through center, to the bottom edge of the other sideband. In fact, the range is even wider to accommodate RTTY. Full passband tuning greatly improves receiving performance in heavy QRM.



**Unique Independent Receive Selectivity**—Optional receiving selectivity filters can be installed internally and pushbutton-selected from the front panel. These may be selected independently of transmit mode and provide optimum response for various conditions of ssb, cw, RTTY, and a-m. You may also transmit cw while receiving ssb, or vice versa, or even transmit one sideband while receiving the other. The standard filter is 2.3 kHz for ssb. You may choose from optional 300 Hz, 500 Hz, a special 1.8 kHz for crowded ssb, or 6 kHz filter for a-m. Any three may be installed in addition to the ssb filter.

**Effective Noise Blanker**—This accessory is custom engineered to provide true impulse-type noise blanking performance.



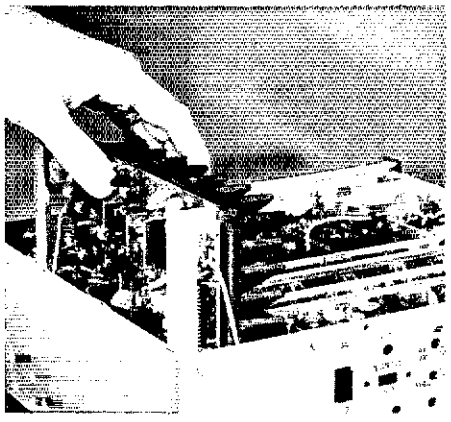
**Special High Power Solid State PA**—A Drake custom-designed diagonal heat sink provides for an internally mounted power amplifier with nothing mounted outboard subject to physical damage. The unique air ducting effect of this amplifier allows an optional rear-mounted fan to provide continuous duty on SSTV/RTTY. Continuous ssb/cw

(TR-7 features continued on next page)

*Note: Out-of-band transmitter coverage for MARS, Government, etc. is available only in ranges authorized by the FCC, Military, or other government agency for a specific service. Proof of license for that service must be submitted to the R. L. Drake Company, including the 500 kHz range to be covered. Upon approval, and at the discretion of the R. L. Drake Company, a special range IC will be supplied for use with the Aux-7 Range Program Board. Prices quoted from the factory. See operator's manual for details. (Not available for services requiring type acceptance.)

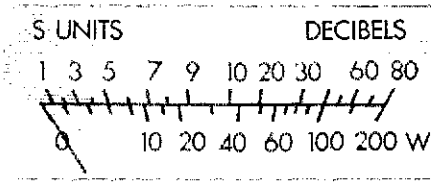
(Continued from preceding page)

# DRAKE TR-7 solid state continuous coverage synthesized hf system

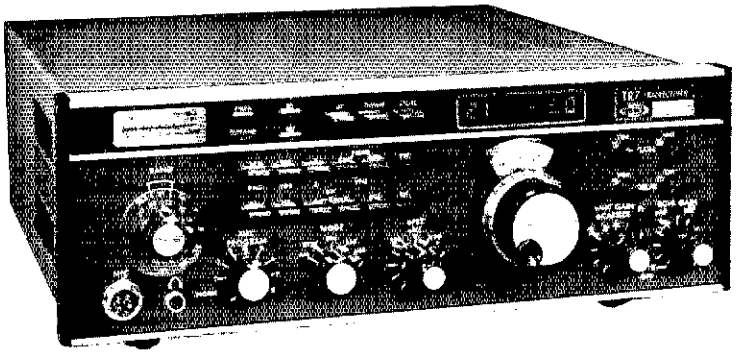


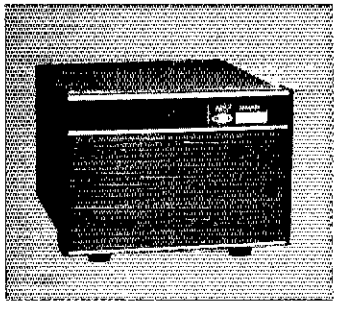
operation is available without the fan, due to the excellent heat sink design. The optional Drake PS-7 Ac Supply is rugged, rated for continuous duty, and will easily handle power requirements. The System is rated 250 watts input—in any of its modes. Fully VSWR protected.

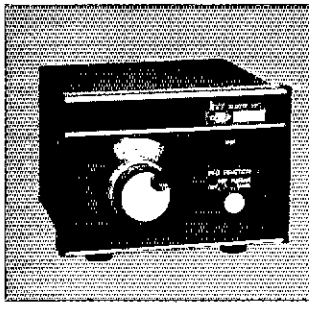
**TR-7 Internal Test Facilities**—As well as the standard "S" meter function, the TR-7 metering includes a built-in rf Wattmeter/VSWR Bridge. Also, the DR-7 digital counter reads frequencies to 150 MHz for test purposes. Access to the counter is from the rear panel.




**Receiver Incremental Tuning (RIT)**—Complete RIT Flexibility is provided for both the TR-7 and RV-7 remote VFO for maximum convenience. The RV-7 also includes a special "spot" function for easy zero beating.







**Model 1337** Drake TR-7 Transceiver

**Model 1530** Drake DR-7 General Coverage/ Digital Readout Board

**Model 1336** Drake TR-7/DR-7 General Coverage Digital R/O Transceiver

**Model 1338** Drake RV-7 Remote VFO

**Model 1502** Drake PS-7 120/240V Ac Supply includes special wide range voltage and frequency capability. Operates from any nominal line voltage (90-132 V/ 180-264 V; 50-60 Hz) ideal for overseas

**Model 1536** Drake Aux-7 Range Program Board†

**Model 1531** Drake MS-7 Matching Speaker

**Model 1537** Drake NB-7 Noise Blanker

**Model 1529** Drake FA-7 Fan

**Model 7021** Drake SL-300 Cw Filter, 300 Hz

**Model 7022** Drake SL-500 Cw Filter, 500 Hz

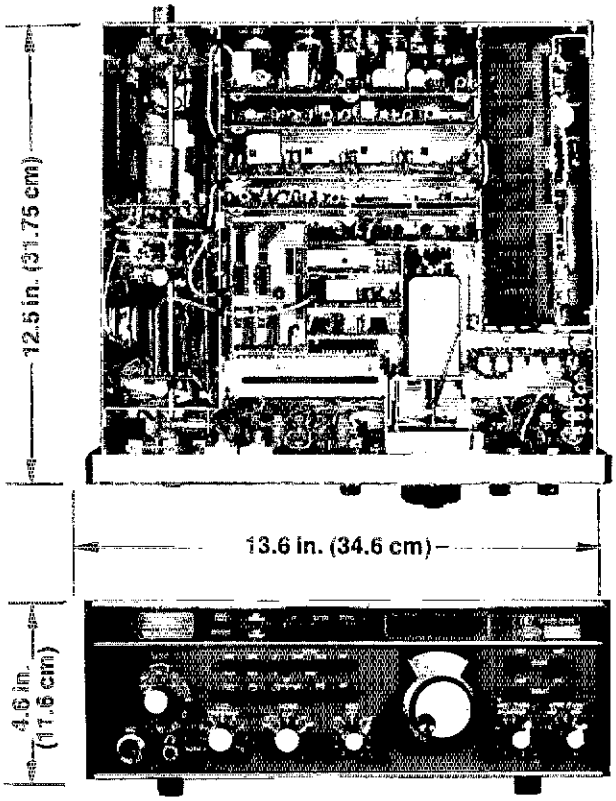
**Model 7023** Drake SL-1800 Ssb/RTTY Filter, 1.8 kHz

**Model 7024** Drake SL-6000 A-m Filter, 6.0 kHz

**Model 1335** Drake MMK-7 Mobile Mounting Kit

**Model 7037** Drake TR-7 Service Kit/Extender Board Set

**Model 385-0004** Drake TR-7 Service/Schematic Book



# DRAKE TR-7 SPECIFICATIONS

## GENERAL

**Frequency Coverage**
*(with DR-7 Digital R/O Gen. Cov. Board)*

**Receive**
*Without Aux-7* ... 1.5 to 30 MHz, continuous, no gaps
*With Aux-7*† ..... Same, plus 0 to 1.5 MHz at reduced performance in this range

**Transmit**
*Without Aux-7* ... 1.8-2.0, 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, 28.0-30.0 MHz
*With Aux-7*† ..... Above ranges, plus any eight 500 kHz segments from 1.8 to 30 MHz

**Frequency Coverage**
*(without DR-7 Digital R/O Gen. Cov. Board)*

**Receive/Transmit** (Transmit above 1.8 MHz only)
*Without Aux-7* ... 1.5-2.0, 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, 28.5-29.0 MHz, plus Receive only on 2.5-3.0 MHz and 5.0-5.5 MHz
*With Aux-7*† ..... Above ranges, plus any eight 500 kHz segments from 0 to 30 MHz, (0 to 1.8 MHz Receive only)

**Modes of Operation** ... Usb, Lsb, Cw, RTTY, A-m equiv. (A-3H)

**Frequency Stability** ... Total drift is less than 100 Hz after warm up. Total frequency change is less than 100 Hz over the 11-16 V-dc input supply range.

**Frequency Readout Accuracy**
*Analog* ..... Better than ± 1 kHz when calibrated at the nearest marker point
*Digital* ..... 15 ppm ± 100 Hz

**External Counter Mode**
*Maximum Input Frequency* ... 150 MHz
*Input Level Range* ... 50 mV to 2 V, rms

**Power Supply Requirements** .... 11-16 V-dc (13.6 V-dc nominal), 3A receive, 25A transmit

**Dimensions**
*Depth* ..... 12.5 in. (31.75 cm), excluding knobs and connectors.
*Width* ..... 13.6 in. (34.6 cm)
*Height* ..... 4.6 in. (11.6 cm), excluding feet
*Weight* ..... 17.1 lb. (7.75 kg)

## RECEIVER

*(1.8-30 MHz, reduced specs 0-1.8 MHz)*

**Sensitivity**
*Ssb, Cw* ..... Less than 0.5 μV for 10 dB (S+N)÷N
*A-m (30% Mod.)* ..... Less than 2.0 μV for 10 dB (S+N)÷N

**Selectivity** ..... 2.3 kHz at −6 dB and 4.1 kHz at −60 dB (1.8:1 shape factor)

**Ultimate Selectivity** ... Greater than 100 dB

**Agc** ..... Less than 4 dB output variation for 100 dB input signal change, referenced to agc threshold

**Intermodulation** ..... Intercept Point, +20 dBm
Two-tone Dynamic Range, 99 dB
*(at tone spacings of 50 kHz and greater)*

**I-f Frequency** ..... First I-f ..... 48.05 MHz
Second I-f ..... 5.645 MHz

**Image and I-f Rejection** Greater than 80 dB

**Spurious Response** ... Greater than 60 dB down

**Internally Generated Spurious** ..... Less than 1 μV equivalent, except 3 μV equivalent from 5 to 6 MHz. (Reduced specs on internal osc frequencies)

**Audio Output** ..... 2.0 watts @ less than 10% THD (4 ohm load)

## TRANSMITTER

**Power Input (Nominal)**
*Ssb* ..... 250 watts PEP
*Cw* ..... 250 watts
*A-m equiv.* ..... 80 watts (carrier), plus upper sideband

**Load Impedance** ..... 50 ohms, nominal

**Spurious Output** ..... Greater than 50 dB down

**Harmonic Output** ..... Greater than 45 dB down

**Intermodulation Distortion** ..... 30 dB below PEP (24 dB below one of two tones)

**Undesired Sideband Suppression** ..... Greater than 60 dB @ 1 kHz

**Duty Cycle**
*Ssb, Cw* ..... 100%
*Tune, SSTV, RTTY, A-m* w/o 1529 FA-7 Fan: 33%, 5 min. transmit, max.
with 1529 FA-7 Fan: 100%

**Wattmeter Accuracy** ... ±5% @ 100 watts (50 ohm load)

**Carrier Suppression** ... Greater than 50 dB

**Microphone Input** ..... High impedance

**VSWR Turndown (Nominal)** (Percent rf power turndown)

| | |
|---|---|
| @ 1:1 | 0% |
| @ 2:1 | 10% |
| @ 3:1 | 25% |
| @ 4:1 | 50% |
| @ 5:1 and above | 90% |

† Aux-7 must be used with either Model 1546 RRM-7 Range Receive Module, or Model 1547 RTM-7 Range Transceive Module. Use one module per 500 kHz range. Modules plug directly into Aux-7.

**R. L. DRAKE COMPANY**


540 Richard St., Miamisburg, Ohio 45342
Phone: (513) 866-2421 • Telex: 288-017

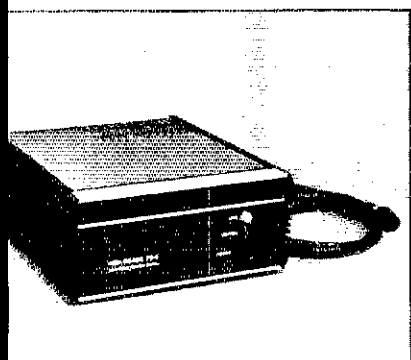
September 1979

# DRAKE® UV-3 uhf-vhf fr

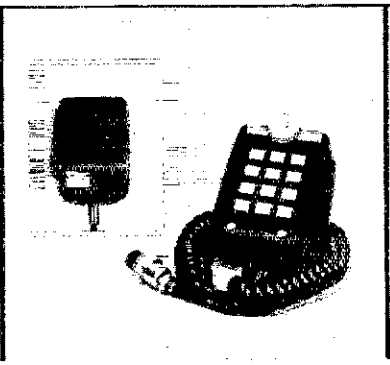

Optional Drake 1525 Encoding M

Designed and manufactured in U.S.A.

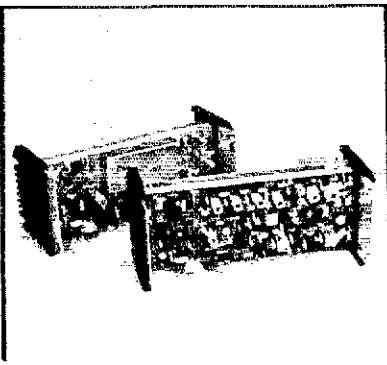
- Fully synthesized on each band, 5 kHz steps, digital read-out.
- Fm coverage on complete 144, 220 and 440 Amateur Bands, depending on model purchased. Completely band-switched from front panel.
- Four extra diode programmable fixed channels, with offsets, available for each band, in addition to the synthesizer.
- Diode programmable non-standard offsets available for each band.
- Separate SO-239 Antenna Connector for each band.
- Outstanding receiver front-end performance. Ideal for use in metropolitan areas where many repeaters are in use.
- Squelch.
- Hi-lo power, with lo-power adjustable.
- Priority scan feature:
  —scan a programmed fixed channel from any synthesizer frequency.
  —scan any synthesizer frequency from a programmed fixed channel.
  —scan a specific programmed fixed channel from another programmed fixed channel.
- Plug-in modular construction.
- Remote operation. Removable control head will operate radio in trunk compartment from driver seat. (remote kit optional)
- No frequency mixing in transmitte Transmitter frequency derived dire from VCO frequency. Provides extremely low spurious output.
- Companion ac power supply (PS-3
- Operate mobile or fixed station. (1 supply required)
- Small, compact, rugged construct utilizing aluminum extrusion sides and panel.
- Transmit audio custom tailored for maximum communications "punc
- Choice of one, two, or three band coverage in a single transceiver. B models may be purchased, with fa installed add-on modules added la



PS-3 Ac Power Supply



1525EM Encoding Microphone



220 and 440 Add-on Modules

UMK-3 Remote Trunk-Mour

# 3-band system

## Fully synthesized on each band

144 220 440 MHz

## DRAKE UV-3 SPECIFICATIONS

### GENERAL

**Frequency Coverage:** 144 ..... 144-148 MHz*
220 ..... 220-225 MHz
440 ..... 440-450 MHz

**Mode:** Fm (5 kHz deviation)

**Supply Voltage:** 11.5-15.0 V dc negative ground

**Supply Current:** Receive ..... 0.9 A Standby
Transmit ..... 6 A High Power
1.3 A Low Power

**Dimensions:** Length (single unit) ..... 9" (22.86 cm)
(two unit) ..... 11.5" (29.2 cm)
(three unit) ..... 14" (35.56 cm)
Width ..... 8.1" (20.6 cm)
Height ..... 3.5" (8.9 cm)

**Weight:** (One unit) ..... 7 lbs. (3.17 kg)
(Two unit) ..... 7.3 lbs. (3.31 kg)
(Three Unit) ..... 7.6 lbs. (3.45 kg)

**Operating Temperature:** 0°C to 60°C

*Band overlap allows tuning of most Mars frequencies

### FREQUENCY SYNTHESIZER

**Type:** Directly programmable, digital phase locked loop, 5 kHz steps

**Reference:** 5 MHz crystal oscillator

**Frequency Accuracy:** ±.0005% over a temperature range of 0°C to 60°C with a supply voltage variation of 11.5 to 15 V dc

### RECEIVER

**Type:** Double conversion, 1st i-f @ 10.7 MHz, 2nd i-f @ 455 kHz, 6 pole crystal filter @ 10.7 MHz and 8 pole ceramic filter at 455 kHz

**Selectivity:** 12 kHz @ −3 dB

**Sensitivity:** 146-148 MHz, 222-225 MHz, 442-447 MHz — Typically less than .35 μV for 12 dB SINAD
144-148 MHz, 220-225 MHz, 440-450 MHz — .5 μV (max.) for 12 dB SINAD

**Adjacent Channel Rejection:** 144 ..... greater than 80 dB min. @ ± 30 kHz
220, 440 ..... greater than 70 dB min. @ ± 30 kHz
144, 220, 440 .. greater than 60 dB min. @ ± 15 kHz

**Intermodulation Attenuation: (EIA RS-204-A)** 144 ..... 80 dB (referenced to 12 dB SINAD)
220 ..... 75 dB (referenced to 12 dB SINAD)
440 ..... 65 dB (referenced to 12 dB SINAD)

**Image Rejection:** 144 ..... 80 dB
220 ..... 60 dB
440 ..... 50 dB

**I-f Rejection:** Greater than 95 dB

**Audio Output:** 2.5 watts @ less than 10% THD, 2 watts @ less than 5% THD

**Squelch Sensitivity:** Less than 0.2 μV

**Meter:** Indicates relative signal level

### TRANSMITTER

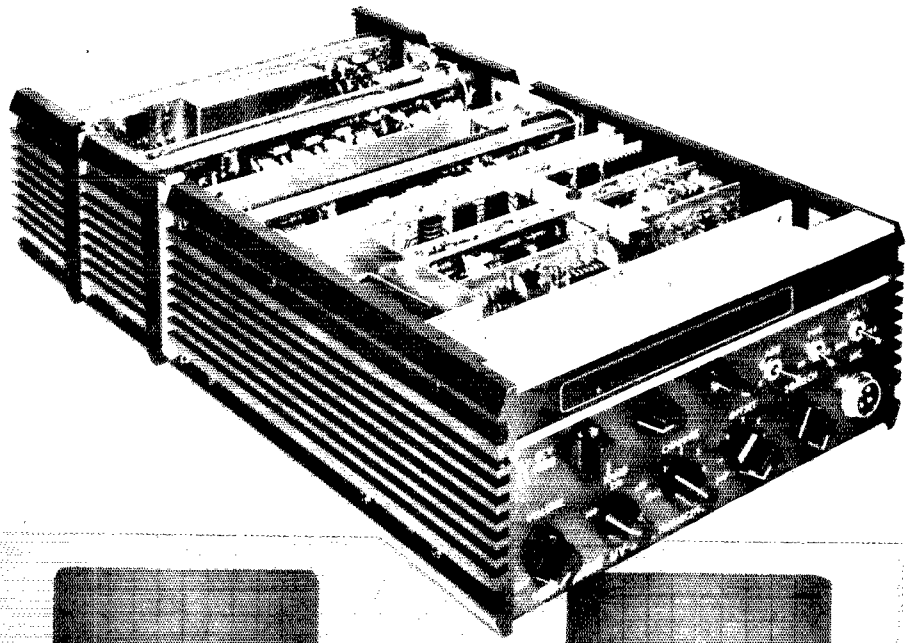
**Power Output (13.8 V dc):** High Power: 144 ..... 25 watts nom. (144-148 MHz)
220 ..... 10 watts min. (220-225 MHz)
440 ..... 10 watts min. (440-450 MHz)
Low Power: Approx. 10% of high power (adjustable)

**Harmonic and Out of Band Spurious:** 144, 220 ..... −60 dB (min.) referenced to carrier
440 ..... −40 DB (min.) referenced to carrier

**Spurious in Band:** −75 dB (min.) referenced to carrier

**Modulation:** Direct fm, pre-set to ±5 kHz deviation

**Hum and Noise:** Greater than 40 dB below maximum deviation



**Model 1346** Drake UV-3 (144-220-440)
**Model 1344** Drake UV-3 (144-440)
**Model 1340** Drake UV-3 (144)

*(Models above include factory installed modules for bands as listed, standard dynamic mike, and mobile mounting bracket.)*

Add-on modules expand band coverage of models which may have been purchased in a single band or two band configuration. Prices include factory installation which is necessary to meet FCC receiver certification requirements.

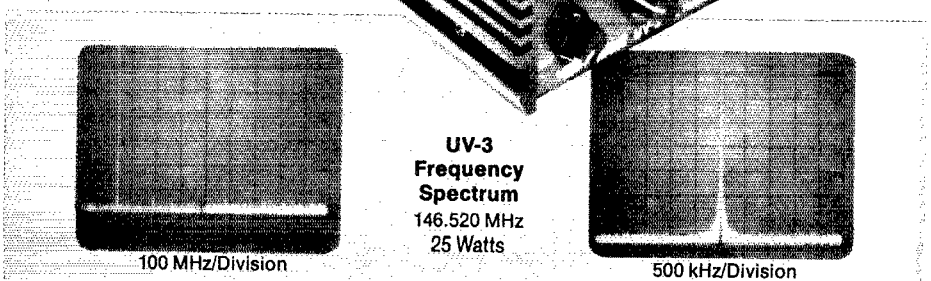
220 Add-on Module
440 Add-on Module
144 Add-on Module

**Model 1504** Drake PS-3 AC Power Supply

**Model 1525** Drake 1525EM Encoding Mike (see next page)

**Model 1330** Drake UMK-3 Remote Trunk-Mount Kit

**Model 385-0002** Drake UV-3 Service/Schematic Book



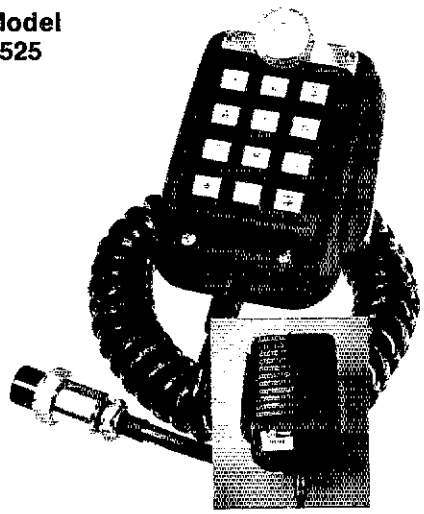

**UV-3 Frequency Spectrum**
146.520 MHz
25 Watts

# DRAKE® MICROPHONES

## Drake 1525EM Push Button Encoding Mike

- Microphone and auto-patch encoder in single convenient package with coil cord and connector. Fully wired and ready for use.
- High accuracy IC tone generator, no frequency adjustments.
- High reliability Digitran® keyboard.
- Power for tone encoder obtained from transceiver through microphone cable. No battery required. Low current drain.
- Low output impedance allows use with almost all transceivers.
- Four pin microphone plug: directly connects to Drake UV-3 without any modification in transceiver. Compatible with all previous Drake and other 2 meter units with minor modifications.
- Tone level adjustable

**Model 1525**



## Drake 7077 Dynamic Desk Microphone

- **Audio and level characteristics** custom designed to matc the transmit audio requirements of the Drake TR-7.
- **Features both VOX and PTT** operation without modifica tion.
- **High Impedance**
- Includes coil cord and plug wired for direct installation to th Drake TR-7.
- Style and color provide a beautiful match to the Drak 7-Line.
- Size 4.3"W x 5.8"D x 9.3"H (10.9 x 14.7 x 23.6 cm). Wt. 1 lb. 7 o (650 g).

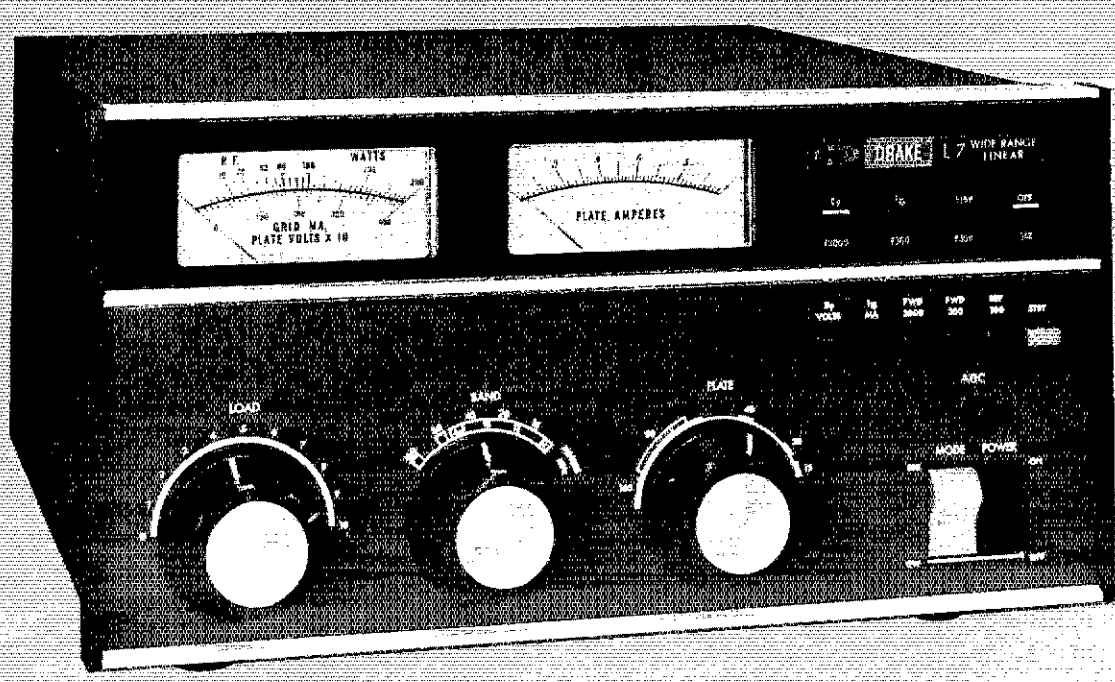
**R. L. DRAKE COMPANY**

DRAKE®

540 Richard St., Miamisburg, Ohio 45342
Phone: (513) 866-2421 • Telex: 288-017

# Drake L-7 Continuous Duty 160-10* Meters 2kW Linear Amplifier

Model 1528




**Temperature controlled design for "key-down" operation over a wide frequency range. Newly engineered for coverage of any new or expanded hf amateur bands within FCC amplifier rules. Also features wide frequency coverage for MARS, and other services authorized for this type of amplifier.**

2 kW PEP, 1 kW cw, RTTY, SSTV operation—all modes. full rated input, continuous duty cycle.

160-10* meter amateur band coverage, plus expanded ranges for any future hf band expansions or additions within FCC rules. These ranges also include increased coverage for MARS, embassy, government, or other such services.

The Drake L-7 utilizes a pair of Eimac 3-500 Z triodes for rugged use, and lower replacement cost compared to equivalent ceramic types. Tubes are included.

Accurate built-in rf wattmeter, with forward/reverse readings, is switch selected. Calibrated 300/3000 watt scales.

Temperature controlled two speed fan is a high volume low noise type and offers optimum cooling.

Adjustable exciter agc feedback circuitry permits drive power to be automatically controlled at proper levels to prevent peak clipping and cw overdrive. Front panel control.

By-pass switching is included for straight through, low power operation without having to turn off amplifier.

Bandpass tuned input circuitry for low distortion and 50 ohm input impedance.

Amplifier is comprised of two units—rf deck for desk top and separate power supply.

Operates from 120/240 V ac, 50/60 Hz primary line voltage.

### DRAKE L-7 SPECIFICATIONS

**Frequency Coverage***: Ham bands 160 through 15 meters. Non-amateur frequencies between 6.5 and 21.5 MHz may be covered with some modification of the input circuit.

**Plate Power Input:** 2000 Watts PEP on SSB and 1000 Watts DC on CW, AM, RTTY, and SSTV.

**Drive Power Requirements:** 100 Watts PEP on SSB and 75 Watts on CW, AM, RTTY, and SSTV.

**Input Impedance:** 50 Ohms. (Bandpass tuned input)

**Output Impedance:** Adjustable pi-network matches 50 Ohm line with SWR not to exceed 2:1.

**Intermodulation Distortion Products:** In excess of −33 dB.

**Wattmeter Accuracy:** 300 Watts forward and reflected, ± (5% of reading + 3 Watts). 3000 Watts forward, ± (5% of reading + 30 Watts).

**Power Requirements:** 240 Volts 50-60 Hertz 15 Amperes, or 120 Volts 50-60 Hertz 30 Amperes.

**Tube Complement:** Two of 3-500Z or 8802/3-500Z or 8163 or 3-400Z.

**Dimensions: Amplifier** 13.69"W x 6.75"H x 14.25"D (34.8 x 17.1 x 36.2 cm). **Power Supply** 6.75"W x 7.88"H x 11"D (17 x 20 x 28 cm).

**Weight: Amplifier** 27 lbs (12.25 kg). **Power Supply** 42.5 lbs (19.3 kg).

*Export model includes coverage of the 10-meter Ham Band.

# Drake R-7 Synthesized, General Coverage Receiver

Model 1240

**Full general coverage recepti 0-30 MHz, with no gaps or range crystals required.**

Continuous tuning all the way from vlf thru hf. Superb state-of-the-art performance on a-m, ssb, RTTY, and cw —and it transceives with the Drake TR-7.

**100% solid state broadband design,** fully synthesized with a permeability tuned oscillator (PTO) for smooth, continuous tuning.

**Covers the complete range 0 to 30 MHz** with no gaps in frequency coverage. Both digital and analog frequency readout.

**Special front-end circuitry** employing a high level double balanced mixer and 48 MHz "up-converted" 1st i-f for superior general coverage, image rejection and strong signal handling performance.

**Complete front-end bandpass filters** are included that operate from hf thru vlf. External vlf preselectors are not required.

**10 dB pushbutton-controlled broadband preamp** can be activated on all ranges above 1.5 MHz. Low noise design.

**Various optional selectivity filters** for cw, RTTY and a-m are switch-selected from the front panel. Ssb filter standard.

**Special new low distortion "synchro-phase" a-m detector** provides superior international shortwave broadcast reception. This new technique permits 3 kHz a-m sideband response with the use of a 4 kHz filter for better interference rejection.

**Tunable i-f notch filter** effectively reduces heterodyne interference from nearby stations.

**The famous Drake full electronic passband tuning system** is employed, permitting the passband position to be adjusted for any selectivity filter. This is a grea aid in interference rejection.

**Three agc time constants** plus "Off" are switch-selected from the front panel.

**Complete transceive/separate functions** when use with the Drake TR-7 transceiver are included, along with separate R-7 R.I.T. control.

**Special multi-function antenna selector/50 ohm splitter** is switch-selected from the front panel, and provides simultaneous dual receive with the TR-7. This makes possible the reception of two different frequencies at the same time. Main and alternate antennas and vhf/uhf converters may also be selecte with this switching network.

**The digital readout** of the R-7 may be used as a 150 MHz counter, and is switched from the front panel. Access thru rear panel connector.

**The built-in power supply** operates from 100, 120, 20 240 V-ac, 50/60 Hz, or nominal 13.8 V-dc.

**The R-7 includes a built-in speaker,** or an external Drake MS-7 speaker may be used.

**Built-in 25 kHz calibrator** for calibration of analog d

**Low level audio output** for tape recorder.

**Up to eight crystal controlled fixed channels** can b selected. (With Drake Aux-7 installed.)

**Optional Drake NB-7A Noise Blanker** available. Pro vides true impulse type noise blanking performance

## Optional accessories available

Model 1531 Drake MS-7 Speaker
Model 7021 Drake SL-300 Cw Filter, 300 Hz
Model 7022 Drake SL-500 Cw Filter, 500 Hz
Model 7023 Drake SL-1800 Ssb/RTTY Filter, 1800 Hz
Model 7024 Drake SL-6000 A-m Filter, 6.0 kHz
Model 7026 Drake SL-4000 A-m Filter, 4.0 kHz
Model 1532 Drake NB-7A Noise Blanker
Model 1536 Drake Aux-7 Range Program/Fixed-Frequency Board

## DRAKE R-7 SPECIFICATIONS

**Frequency Coverage, continuous tuning (With Drake DR-7** Digital R/O, General Coverage Board)
**0 to 30 MHz continuous** (With or without Aux-7 board) (No gaps in frequency coverage)

**Frequency Coverage, continuous tuning (Without DR-7** Board installed)

| | | |
|---|---|---|
| 0.01 to 0.5 MHz<br>0.5 to 1.0 MHz<br>1.0 to 1.5 MHz<br>1.5 to 2.0 MHz<br>2.5 to 3.0 MHz<br>3.5 to 4.0 MHz | Without Aux-7 Board | 5.0 to 5.5 MHz<br>7.0 to 7.5 MHz<br>14.0 to 14.5 MHz<br>21.0 to 21.5 MHz<br>28.5 to 29.0 MHz |

**Plus any eight additional 500 kHz segments** between 0 and 30 MHz when programmed into Aux-7 Board.

**Crystal Controlled Fixed Frequencies:** Up to eight crystal-controlled fixed frequencies within the 0-30 MHz range with Aux-7 Accessory Board. Proper 500 kHz range for desired fixed frequency is also programmed into Aux-7.

**Frequency Stability:** Less than 100 Hz drift after temperature stabilization including ±10% line voltage variation.

**Digital Readout Accuracy:** (DR-7 installed) 15 PPM ± 100 Hz

**Analog Dial Accuracy:** Better than ±1 kHz when calibrated to nearest calibrator marker.

**Modes of Operation:** Ssb, cw, RTTY, SSTV, a-m.

**Sensitivity (ssb):** 1.8-30 MHz Less than .20μV for 10dB S+N/N with preamp on (typically .15μV) (Noise floor typically −134 dBm) Less than .50μV for 10 dB S+N/N without preamp (typically .30μV) (Noise floor typically −128dBm). .01-1.5MHz Less than 1.0μV for 10 dB S+N/N

**Sensitivity (a-m):** 1.8-30MHz Less than 1.2μV for 10dB S+N/N @ 30% modulation, preamp on. Less than 2.0μV for 10 dB S+N/N @ 30% modulation, preamp off. .01-1.5 MHz Less than 4.0μV for 10 dB S+N/N @ 30% modulation.

**Selectivity** (2.3 kHz filter supplied): 2.3 kHz at −6 dB, 4.2 kHz at −60 dB (1.8:1) shape factor. Optional 300 Hz, 500 Hz, 1800 Hz and 4 kHz filters are available as follows:

**Ultimate Selectivity:** Greater than 100 dB

**Accessory Crystal Filters**

SL-300 cw filter: 300 Hz @ 6 dB, 700 Hz @ 60 dB
SL-500 cw, RTTY Filter: 500 Hz @ 6 dB, 1100 Hz @ 60 dB
SL-1800 ssb/RTTY Filter: 1800 Hz @ 6 dB, 3600 Hz @ 60 dB
SL-4000 a-m Filter: 4 kHz @ 6 dB, 8 kHz @ 60 dB
SL-6000 a-m Filter: 6 kHz @ 6 dB, 12 kHz @ 60 dB

**Strong Signal Handling**

| | |
|---|---|
| Two-tone dynamic range: 99 dB * | 1.8-30 MHz |
| Third order intercept point: +20 dBm | preamp off |
| Two-tone dynamic range: 95 dB * | 1.8-30 MHz |
| Third order intercept point: +10 dBm | preamp on |

Blocking: >145 dB above noise floor

**(At tone spacings of 50 kHz and greater)*

**I-f and Image Rejection:** Greater than 80 dB (48.05 MHz 1st i-f) (5.645 MHz 2nd i-f) (50 kHz 3rd i-f)

**Agc Performance;** Less than 4 dB audio output variation for 100 dB input signal change above agc threshold. Agc threshold is typical .8μV with preamp off and .25μV with preamp on.

**Attack time:** 1 millisecond. Three selectable release times: Slow—2 seconds; Med—400 m sec; Fast—75 m sec. Also, "Off" position is provided.

**Antenna Input Impedance:** Nominal 50 ohms

**Audio Output:** 2.5 watts with less than 10% T.H.D. into nominal 4 ohm load.

**Power Requirements:** 100/120/200/240 V-ac ±10%, 50/60 Hz, 60 watts or 11.0 to 16.0 V-dc (13.8 V-dc nominal), 3 amps

**External Counter Mode (DR-7 installed):** Readout: to 100 Hz. Accuracy: 15 PPM ±100 Hz. Maximum input frequency: 150 MHz. Input level range: 50 mV to 2 V rms.

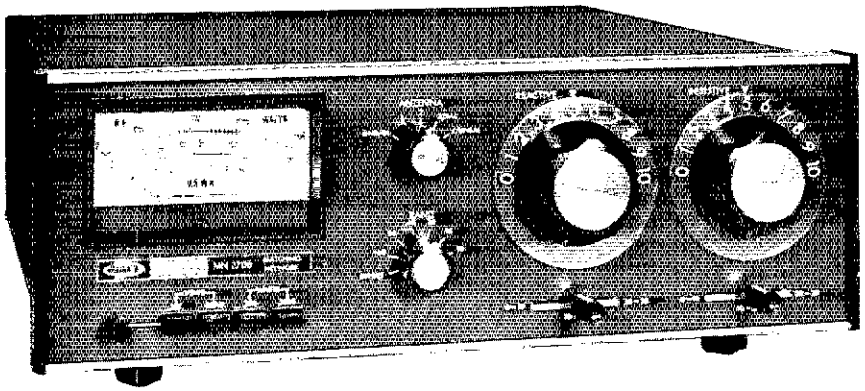
**Dimensions/Weight:**

Depth— 13.0 in (33.0 cm) excluding knobs and connectors.
Width— 13.6 in (34.6 cm)
Height— 4.6 in (11.6 cm) excluding feet
Weight— 18.4 lbs (8.34 kg)

40 RICHARD STREET, MIAMISBURG, OHIO 45342 • TELEPHONE (513) 866-2421 • TELEX 288-017

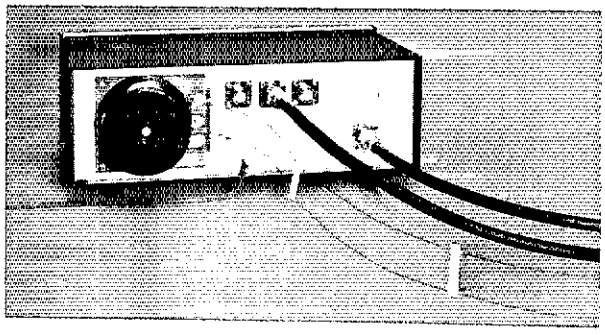
# DRAKE® MATCHING NETWORKS

## *Precision instruments providing* rf radiation control and measurement *for your communication system*

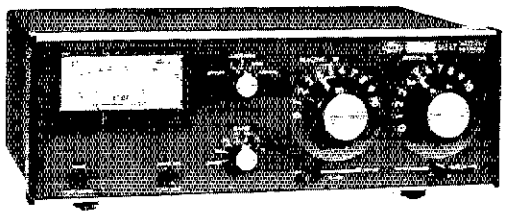


## Drake MN-2700 2kW Matching Network

**Model 1539**



**Drake B-1000 Balun** Model 1510 installed on Matching Network.



## Drake MN-7 Matching Network Model 1538

Same features and specifications as the Drake MN-2700, but rated at 250 watts continuous. Same width and height, but only 8.5" (21.6 cm) in depth, and weighs 10 lbs. (4.55 kg). Meter reads 0-300 watts forward power or VSWR.

**The Drake MN-2700 manages rf radiation in the areas of impedance match to the antenna, rf power measurement, VSWR measurement, reduction of harmonic radiation, and antenna selection.**

### DRAKE MN-2700 FEATURES

**160 thru 10 Meters Frequency Coverage**—With out-of-band cove age for MARS, future band expansions and other applications.

**Antenna Choice**—Matches antennas fed with coax, balanced lin or random wire. (For balanced line use optional Drake B-1000 Balu which mounts on rear panel of MN-2700.)

**Antenna By-pass Switching**—Unique design allows unit to b switch-by-passed regardless of which antenna is in use, wheth coax or wire type. No need to manually disconnect feedlines. Swit also selects various antennas.

**Extra Harmonic Reduction to help fight TVI**—Drake Matching Ne works employ special "pi-network" low-pass filter type circuitry f maximum harmonic rejection. This feature alone makes the MI 2700 a worthwhile investment; it is a Drake exclusive.

**Built-in Metering**—Accurate rf wattmeter/VSWR bridge is pushbu ton controlled from front panel.

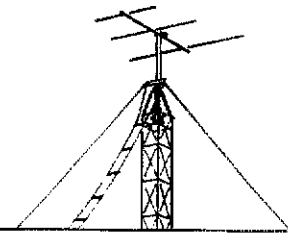
**Power Capability**—2000 watts PEP, 1000 watts average. Continuou Duty.

**Dimensions**—13.09"W x 4.53"H x 13"D including connectors (33.26 11.5 x 33 cm); **Weight** 11 lbs. (5 kg).

### DRAKE MN-2700 SPECIFICATIONS

• **Frequency Coverage:** 1.8 to 30 MHz. Band Switch marked for 160, 80, 40, 20, 15, and 10 meter amateur bands; however, frequency coverage between amateur bands is possible by using the nearest band positions with a small reduction in matching capability. • **Input Impedance:** 50 ohms (resistive). • **Load Impedance:** 50 ohm coaxial with VSWR of 5:1 or less at any phase angle (3:1 on 10 meters). 75 ohm coaxial at a lower VSWR can be used. • **Balanced Feedlines:** With the Drake B-1000 accessory balun, which mounts on rear panel, tunes feed point impedances of 40 to 1000 ohms, or 5:1 VSWR referenced to 200 ohms (3:1 on 10 meters). • **Long-Wire Antennas** Feed point impedances up to 5:1 VSWR referenced to 50 ohms. Also, 5:1 referenced to 200 ohms with the Drake B-1000 accessory balun (3:1 on 10 meters) • **Meter:** Reads VSWR or forward power, 0-200 watts or 0-2000 watts. • **Wattmeter Accuracy:** ±5% of reading ±1% of full scale. • **Insertion Loss:** 0.5 dB or less on each band after tuning. • **Front Panel Controls:** Provide for the adjustment of resistive and reactive tuning, antenna switching, band switching, VSWR calibration, and selection of watts or VSWR functions of the meter. • **Rear Panel Connectors:** The rear panel has four type SO-239 connectors (one for input and 3 for outputs), three screw terminal connections (for long-wire and open-wire feeder systems), and a ground post.

# *really a "secret weapon" for 160 meter enthusiasts!*



## The Drake MN-2700 and MN-7 Matching Networks have a truly unique antenna feed switching design

Both matching networks will completely change the mode of a balanced-line fed 135 foot doublet to a special configuration that provides very effective 160 meter performance. And best of all, it's done with the simple flip of a switch on the front panel.

Consider a typical all-band antenna set-up—a 135 foot doublet, center-fed with 60 to 70 feet of balanced line at a height of 45 to 60 feet. The Drake MN-2700/B-1000 or MN-7/B-1000 will match this as a true balanced system on 80 thru 10 meters. (Fig. 1)

But what about 160 meters? Many amateurs recommend tying the feeders together and using the antenna as a vertical with a "top-hat." In fact, we suggest this ourselves in our manual.

However, the use of this, or any vertical, assumes you have a good ground or radial system for efficient operation. If you do not have enough room or do not wish to install such a radial system, performance may suffer. And if you do have radials, you still have to change the feeder connections each time you operate 160 meters.

On the other hand, when you use the MN-2700/B1000 or MN-7/B-1000 simply leave the feeders in the balanced connection as you would for 80 thru 10, and move the special antenna selector switch to Position No. 4. This automatically converts half of the antenna and feedline to an inverted "L", fed through a 4:1 impedance transformer, with the other half operating as a counterpoise. (Fig. 2)

This system offers the convenience of "stay in your chair" operation, while providing an effective means of operating 160 meters with a relatively small antenna.

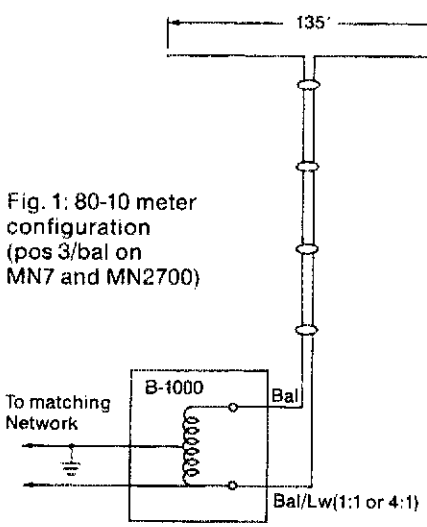



Fig. 1: 80-10 meter configuration (pos 3/bal on MN7 and MN2700)

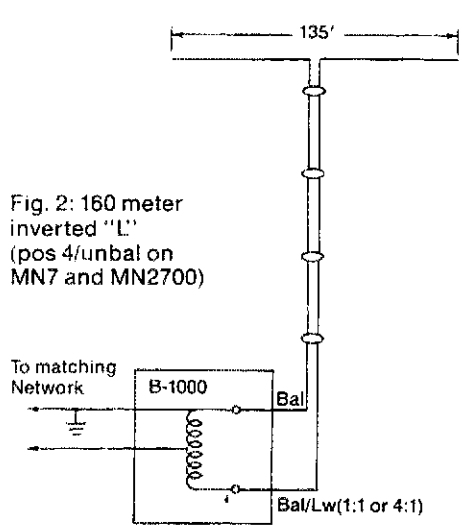



Fig. 2: 160 meter inverted "L" (pos 4/unbal on MN7 and MN2700)

schematic of fifteen ICs. Shanks, 7 Lake Circle Dr., Vicksburg, MS 39180.

ICOM 701, purchased in Japan in 1978, with p.s., mike and relay box. $850 FOB. Dave Bell, 5700 Hill Oak Dr., Los Angeles, CA 90068. 213-467-0832.

DRAKE R4A, T4X, MS4 — $650 or best offer. W2HRX, 225 West 86th St., NYC 10024. 212-580-9964.

SELL: HW-101, HP-23, HS-1661, HDP-21A, HD-1410, excellent condition, $525. W4STX, Box 5021, Clearwater, FL 33518.

WANTED: Cw mobile transceiver, 10 thru 20 meters. WA2KIR 296 Wisteria Dr. Bricktown, NJ 08723. 201-920-1978.

WANTED: HW/SB-100,101. Any condition. A. Bush, 2139 Charles, Stevensville, MI 49127.

HEATH Computer — H8 w/24K memory. H9 CRT terminal, cassette recorder, BASIC software & program trainer. $950. Phone 216-669-3698. Jack Bly, AI8P, 5914 Apple Creek Rd., Smithville, OH 44677.

WANTED — Someone to build heavy duty RF amplifier. Must be professional work. Write Thomas Nickle, 5th Prev. Med. Unit, APO San Francisco 96301.

PROVEN 2M DX antennas for sale. 8 16 element F9FTs, 4 way power dividers, phasing lines. $250 for each set of 4. WA1JXN/7, 1114 Margaret, Missoula, MT 59801.

ALL mint — SSTV Robot 400 $595, switchable 9" monitor TV $100. Superscope C-105 professional cassette recorder $125. FL-2100B with extra new set 572Bs $350. MFJ electronic keyer $30. Swan WM-3000 PEP watt/SWR $50. Evenings. WB9UBD 219-583-5803.

TELREX TB5EM tribander used one year in good condition. Asking $275. Will ship freight collect. Bought Telrex Duobander. Also, two Bird slugs for ht 100W and 1000W. $50 for both. WA2DXJ 201-635-5980.

COLLINS 51J4 with manual $175. K7GFL, 1885 Parkside Dr., Hanford, CA 93230.

HW-8 with crystal calibrator. Great condition. $125. postpaid. KA8BGB, 906-942-7388.

10M ssb conversion. Tram XL-5, 28.500-28.890 continuous tuning VXO, Telex mike, mint $150; homebrew Transmatch, 500 watts, with roller inductor & turns counter, works FB but needs new front panel, $50. KB4LX, 1-804-596-7461.

SWAN 500 transceiver, 117XC power supply, speaker, one owner, excellent signal reports, $350. Contact WA3LVU 412-286-9575.

SB-303/cw filter SB401, excellent condition $550. WAØNLK 319-886-6800.

KW Linear parts. 811As, cabinet, chassis, all difficult parts plus spares, $175. W1OLP, 318 Fisher, Walpole, MA 02081.

COLLINS 51S-1F receiver, round emblem $1,000 WA4GNY.

SELLING: Heathkit SB-303, SB-401 with crystal pack, SB-600, DX-60B, HW-16, HG-10B VFO, T-R switch, 12 VDC supply, MFJ cw filter. All excellent. You ship. Highest offer over $760 takes all, will consider separate. WB1HBH. 203-673-0787.

FOR SALE: Radio Shack SW receiver DX-100. Complete Gtd condx., less than 6 mos. old. N1AK, 47 Elm St., Rutland, VT 05701. Price: $125.

TEN-TEC Model 247 antenna tuner $50. Like new. W4MGG, 2941 Kedron, Winston-Salem, NC 27106.

HP120AR, scope $50, Adcom dc-dc power supply $45, BC221 with book $50, s.a.s.e. list. K5BCQ, 10605 Double Spur, Austin, TX 78759.

QST May 1917 to Dec. 1930. Wireless Age — Oct. 1918 to May 1921. Radio News May 1915 to Sept. 1921. WA8DSH 313-364-9244.

EZ Way tower — RBX 50G/wander ground post, best offer over $600. WA3FII, 131 Scottsdale Dr., Coraopolis, PA 15108. 412-457-7597.

FOR SALE: HW-101 in very good condition with cw filter HP-23B power supply and all manuals. $350 or best offer. Also, IC-215 with nicads, charger, antenna all crystals, autopatch mic and all manuals. Best offer over $150. WB1FVL 603-284-7726.

HW-32A and HP-23C ac p.s., good condx. 607-733-7823 $110. L. Ward.

KENWOOD TS-520S, cw filter, mint, $575. 516-623-5207 Irv, WB2KPL, 14 Oakfield Ave., Freeport, NY 11520.

FOR SALE: 432 MHz repeater with power amp, base, mobile units. $350 or trade for 2 Motorola mobile units Sam Killen 804-842-3623.

CENTURY 21, MFJ 720 cw filter, CMOS iambic keye with Nye paddles. $250 for all. UPS ppd. in 48 states Frank Aldrich, M.D., 813 Rees Court, Longmont CO 80501.

COLLINS: 75S3C — $850, 32S3 — $695, 312B4 — $225 516F2 — $150. All round and mint, 32S1 — $325, 312B3 — $35, mint. R. Schaaf, Box 301, DePere, WI 54115 1-414-532-6643.

ALUMA Towers now with steel or aluminum crank-ups and stack sections. Will take anything in on trade tha doesn't eat! What have you? Or cash discount. Robert D McClaran Sales, P. O. Box 2513, Vero Beach, FL 32960 305-723-4793.

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Patent No. D219106 — For dipoles, beams, inverted "V", and quads

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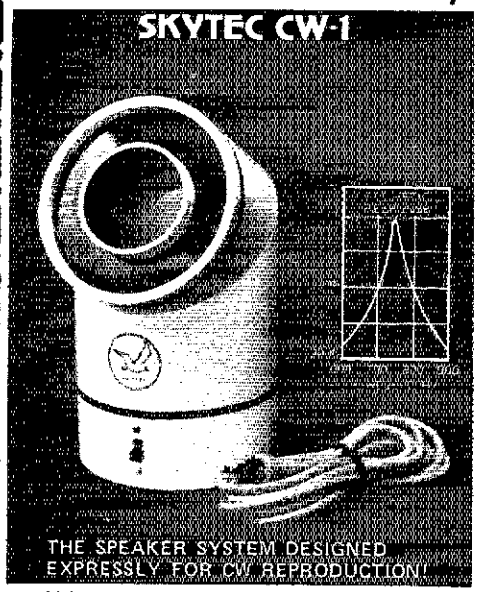


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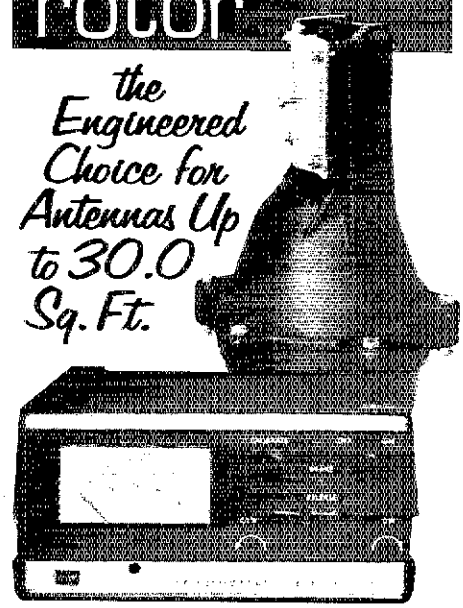

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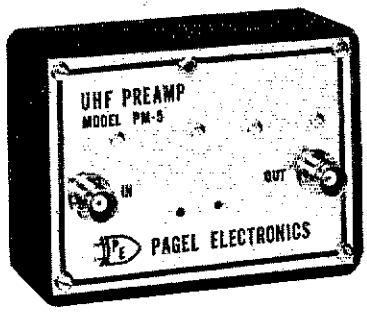


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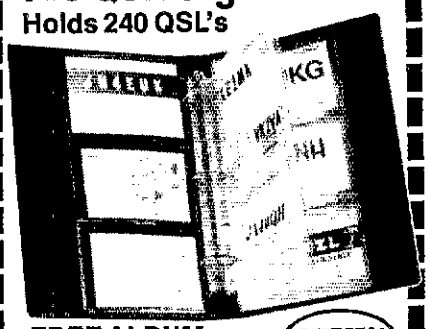

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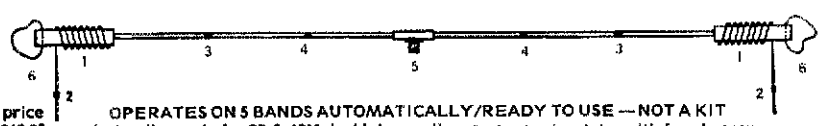


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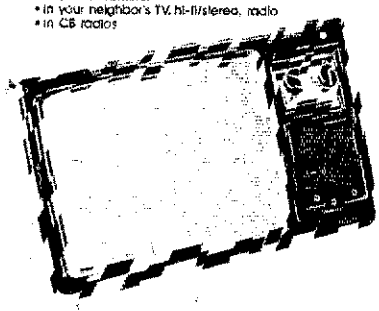

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- For dipoles, yagis, inverted vees & doublets
- Replaces center insulator
- Puts power in antenna
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- Small, lightweight and weatherproof
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- For full legal power and more
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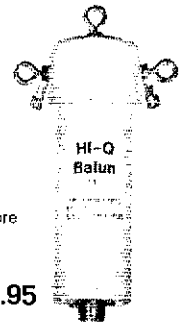


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## HI-Q ANTENNA CENTER INSULATOR

Small, rugged, lightweight, weatherproof
Replaces center insulator
Handles full legal power and more
**$4.95** With SO 239 connector

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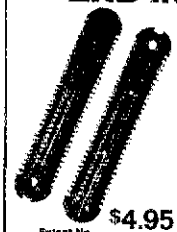

Rugged, lightweight injection molded of top quality material with high dielectric qualities and excellent weatherability. End insulators are constructed in a spiral threading fashion to permit winding of loading coils or partial winding for tuned traps.

May be used for
- Guy wire strain insulators
- End or center insulators for antennas
- Construction of antenna loading coils or multiband traps

Patent No. 4,091,350

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# DIPOLES

| MODEL | BANDS | LENGTH | PRICE WITH HI-Q BALUN | WITH HI-Q CENTER INSULATOR |
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| D-80 | 80-75 | 130 | $26.95 | $24.95 |
| D-40 | 40-15 | 66 | 22.95 | 21.95 |
| D-20 | 20 | 33 | 20.95 | 19.95 |
| D-15 | 15 | 27 | 20.95 | 19.95 |
| D-10 | 10 | 16 | 20.95 | 18.95 |
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| S-80 | 80/75 | | $11.95/pr | |
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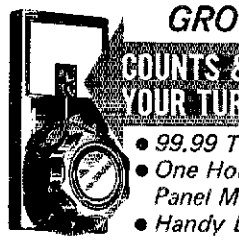

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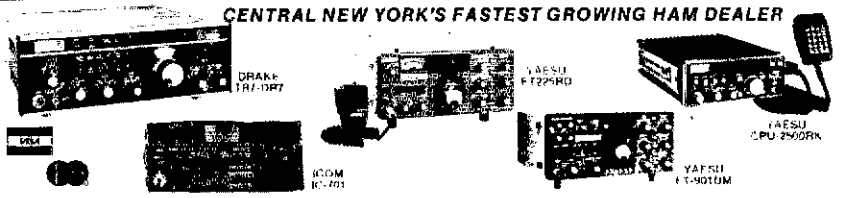


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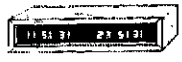

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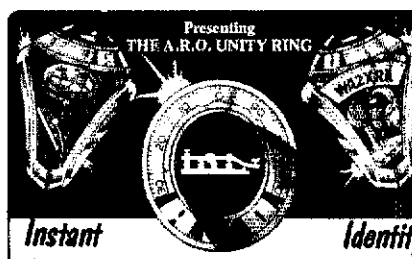

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FIBERGLASS Vaulting Poles. Perfect quad spreaders or vhf/uhf booms. S.a.s.e. for info. K5WSE, Box 1032, Cedar Park, TX 78613. 512-259-2164.

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QUALITY stainless, threaded, washer, hardware fasteners! Guying accessories! Insulators! List 20c! Walt W8BLR. Engineer. 29716 Briarbank, Southfield, Mich. 48034.

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FOR SALE: Hal ST-6000 w' scope, used only a few months, and in perfect cond. _will ship. WBØWJD, 517-568-3784 — Waukon, IA

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GEM QUAD pickup only $50. Heath SB610 monitor scope mint $100. Heath SB630 station console. Very good $75. Original deluxe Vibroplex Chrome. Like new $40. W1WXV, 37 Conch Rd., Narragansett, RI 02882, 1-401-783-3722.

30 AMP power supply, continuous duty. 13.8 VDC (115 VAC input). Five year limited warranty. Hammertone metal case. $124.95. Other models from $44.95. Add shipping; COD accepted. S.a.s.e. for info. JRS Electronics, (WA8OGS), P. O. Box 1893-B, Cincinnati, OH 45201.

DRAKE Station — TR4C transceiver, AC-4 power supply, MS-4 speaker, 7075 desk mike. Mint condition. Recent factory alignment. $500. firm. No trades. Pick-up only. Will not ship. Bill, AE6T, 6934 Enfield Ave., Reseda, CA 91335. Phone 213-342-7650.

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USED Gear Special 30 day warranty Heath HW104 $499, Alda 103 $399, Yaesu FT301 w/supply $649, Yaesu FT-7 $399, Heath HW-12+ HP23 $149, Drake SSR-1 $249, Drake 4-line speaker $19, Collins 75S-1, 32-S1 AC supply & speaker $749. Swan 100 MX Demo $699, Yaesu FL2100F Linear (Demo) $449 one year warranty on new gear! Ham-Bone Radio 3206 Erie Blvd. East, Syracuse NY 13214 315-446-2266.

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PRETUNED - COMPLETELY ASSEMBLED - ONLY ONE NEAT SMALL ANTENNA FOR UP TO 6 BANDS! EXCELLENT FOR CONGESTED HOUSING AREAS - APARTMENTS LIGHT - STRONG - ALMOST INVISIBLE!

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RG58U is OK for 500 watts CW - 1000 watts SSB - RG8U is $22.00 extra P.P. for any antenna.
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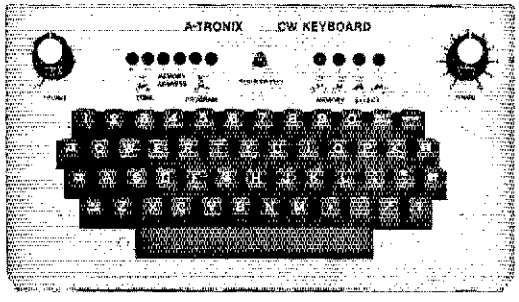


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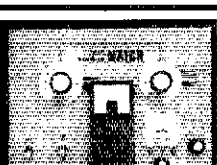

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A complete line of QUALITY 50 thru 450 MHz TRANSMITTER AND RECEIVER KITS. Only two boards for a complete receiver. 4 pole crystal filter is standard. Use with our CHANNELIZER or your crystals. Priced from $69.95. Matching transmitter strips. Easy construction, clean spectrum, TWO WATTS output, unsurpassed audio quality and built in TONE PAD INTERFACE. Priced from $29.95.

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FOR SALE: SB-303 rcvr $225, SB-401 xmtr $225, Murch Transmatch $100, Knight TR-108 xcvr and VFO $60. All mint. You pick up — W2LG 212-454-7945.

WANTED: 1650kz crystal lattice filter for Hallicrafters SR-150 etc. Part no. 049-000216. State price and condition. F.R. Claus W3QM, 310 McKinnedy Rd., Wexford, PA 15090.

1/2" HARDLINE — 39c/ft. Sept. special for in stock 1050' thru 1250' rolls. 500, with jacket. Solid copper center conductor. 500' to 1000' rolls, 45c/ft. Freight collect. Connectors available. Info — s.a.s.e. JRS Electronics, (WA8OGS), P. O. Box 1893-B, Cincinnati, OH 45201.

WANTED — Ext. VFO for Tempo One W6NPN 859 San Pascual Ave., Los Angeles CA 90042.

HEATH Station, SB303, SB401 mint condition. WB2WWI, 609-451-7709.

SPECIAL Sale of old QST send want list to Beardsley 119 Wythburn Rd., South Portland, ME 04106.

MUST SELL: entire rig. Like new. TS-520, VFO-520, phone patch, external speaker, SB-200 amplifier. Will take best offer. Call or write — KA7ABG P. O. Box 161, Midvale, UT 84047 — 1-801-486-9729.

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SELL ATB-34 tri-band beam never used in original carton $165. TMC GPR90 receiver good condition $145. Ham M III rotator with 100 ft of cable, never used $75. W6OWD 415-728-7136.

CLEANING Shop: Ten Tec Triton 4 loaded, w/AC $500. Drake R-4B full xtals, $330. Hal MKB-1 Morse keyboard, $125. Homebrew SSTV monitor, $55. Dentron 160XV transverter w/outboard Dentron tuner, $120. Yaesu monitor scope, $165. Heathkit HW-7 modified to HW-8 w/ac and cw filter, $100. Heathkit SB-644 remote VFO, $90. Icom IC-230, $165. Heathkit SB-220 amplifier w/wattmeter, $525. Genave GTX-1T w/all accy's, needs if xtal, $175 Swan noise blanker, $15. All gear mint. Steve Kirschner 516-487-2744.

VHF Amplifier kits, SSB-FM, 75 watt, solid state, $99.95 post paid. Communication Concepts, Inc. 2648 North Aragon Ave., Kettering, Ohio 45440.

HP495A microwave amplifier 10GHz $255, HP430C microwave power meter $60, HP415B standing wave indicator $40, HP200J audio oscillator $40, Tektronix 531A/CA dual trace $245, Vird termaline 8890 2500W $55, Sorenson Nobatron DCR40-60A p.s. $225, DCR40-40A p.s. $175, Collins 32V transmitter $100, HP signal generator 65 MHz $130, PRD504 heterodyne FM UHF $175. Send s.a.s.e. for others. Want Kenwood TV-502 and 6M linear. Newman, 63A Youngs Hill, Halesite, NY 11752 516-271-0369 evenings.

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HENRY-2K amplifier floor model. Pair 3-400Z's excellent condition. $650 negotiable. Heathkit HM-102 calibrated SWR/watt meter, $35. Jim at W4AQL, 404-894-6496.

SELL: Drake R4B receiver, excellent, extra crystals, recent factory alignment, $325. W1GEN 203-653-3905.

FOUR 250th P.P. Parallel 2kW linear. 6 ft. cabinet, 10KVA pole pig, $199. 250th P.P. linear w/p.s. $90. Mite TTY with extras $299. Heath GR900 Color TV $299. Heath AA100 & AJ41 Tuner & Amp $75. Tektronics 531 Scope w/plug-ins $349. R.C.A. Scope mod. WO 60C $25. 6HY. 2A choke $15. 4700VCT 750VA xfmr $22. 300W mod. XFMR $15.00 K1PPF, 203-974-1856.

HEATH SB-401 and SB-303 for sale. Very good condition, little used, includes mic. $450. Also Heath IB1103 counter, $200. David Salant — Sprout Brook Road, RD 3. Peekskill, New York, 10566.

ICOM IC-245 2M ssb-cw-fm, xcvr, excellent, $475; KLM 2m solid-state linear amp, 160W output, hardly used, $190; call Jeff, W1OH, 401-246-0150.

HEATHKIT HW12A and HW22A transceivers with power supplies, mike. Both mint. $100 each. Hammarlund SP600JX17 receiver in cabinet. Mint. $250. W4EPK, 2639 Avenel Ave., Roanoke, VA 24015. 703-343-4198.

UHF Amplifier kits, fm-ssb-atv, 420-450 MHz 100 watt, solid state, $94.60 post paid. Communication Concepts, Inc. 2648 North Aragon Ave., Kettering, OH 45420.

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ICOM 230, Yaesu FP-4 supply, CushCraft vertical beam, $275, I ship. WD4HFO, 510 Wells Ave., Fulton, KY 42041.

SELL: ATV equipment (no antenna), test gear, 50' tower, TH3JR, 10-20 vertical, 18v. Write, WA3VJS, 437 Crescent Road, Wyncote, PA 19095.

2 METER Wilson 1402 HT, nicads, charger, more. $165. WA2YZC 914-968-2729.

KENWOOD TS-820 w/digital readout, dc power supply, MC-50 Mic., $825. Heathkit HW2036 2-meter w/mag-mount ant., $225. Heathkit HR1680 receiver, $165. Swan 140 40-meter ssb w/dc power supply, $80. Swan WM2000 watt-meter, $45. Heathkit SWR Bridge, $7. Drake TV-3300-L.P. Filter, $12. 1979 U.S. Callbook $6. B&W T-R Switch, $3. All in excellent condition. KA8CKM 313-979-1011.

HW-8, HWA-7-1 p.s. $100. Al Schulz WB9DQA, 608-271-7831 evenings.

KENWOOD TS-820S with cw filter, perfect, $750.; R-820 receiver, mint, $750. Original cartons. W8RH, 3451 Ridge Ave., Dayton, OH 45414.

YAESU FT-301D, cw filter, mike, original carton, $675; Hallicrafters Super Defiant receiver, $75.; Pickering KB-1 keyboard, $115. See August 1970 QST, page 47. May trade. W8RH 513-277-0409.

TUBES. Selected and matched tube sets (driver and finals) for: Yaesu FT-101, FL-101, $19; FT101ZD, FT901, Kenwood, Heath, Drake $17. For dentron GLA $31. Amperex 4CX250B $33, 572 $31. All ppd USA. SST, Ltd. 423 Cornelia St., Bronton, NJ 07005.

SALE: SWAN 350-C transceiver, 520 watts, 117XC power supply & speaker. Used very little. Like new condition. Brand new set (14) tubes, plus complete spares. Complete $395 + shipping. Brand new Swan VOX $35. Plane, 42 Pennsylvania Ave., Niantic, CT 06357.

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DX LIFE Stainless small quantities and U-bolts, send s.a.s.e. for current list. Stainless kits for: 14 AVQ/WB $14.95, 18AVT/WB $15.95, TH5DX $27.95, TH3MKIII, 204BA, 155BA, 105BA $26.95, (TH6DXX $37.95 send copy of parts list) 205BA $39.95. DX Life Stainless Co., 7 Alta Place, Yonkers, NY 10710.

QST — 1915 to date — single copies year — see previous ads or call for quote — W3ZD 215-675-4539.

RTTY Gear — printer, T.V., reperfs, dist., etc. $175 takes all only. Local. Call for list. K3BW, 215-777-3361.

FOR SALE: Hallicrafters linear amplifier HT-33B mint condx. $500. E-Z Way Tower (crank-up/tilt-over) with ground post and thrust bearing, mint condx. $400. Located in Palatine, Illinois, call 213-820-5113 CA for info. R. Carstens.

HEATH HW-2036 2mtr. F.M. sythesized transceiver with micoder mike and matching ac supply. Factory allgned, perfect operating condition. Asking $185. Tempo FMH 2 mtr. handie talkie — 2 watts crystals, 52-52, 94-94, 34-94, 10-70, 13-73, 19-79, 2 battery packs, charger, rubber duck ant. Perfect operating condition. Asking $175 complete. Paul K1YOU 413-538-7978 evenings.

FOR SALE: Drake L4 (converted to L4B, 3-500Z finals) T4XB-R4B (all crystalled up) MS4, MN-2000 excellent condition like new, will not separate. $1500 firm. W1CKA, Paul 203-582-4885.

MINT TR7/DR7, PS-7 power supply. MS-7 spkr, RV-7 remote VFO, FA-7 fan, SL-500 filter, SL-1800 filter, SL-6000 filter. 7077 desk mike, service manual, service kit. Free shipping continental USA. $1750 firm. Charles Ziegler, W8RN, 23 Public Square, Medina, OH 44256 or call 216-722-4521.

SELL: Collins KWM-2 (wing) with (round) power supply. M-2 has Waters rejection tuning. Recently calibrated and in excellent condition. $900. Norm, 15 Dera Street, Greenville, SC 29615. 1-803-242-0473.

ICOM 230 owners. Six cheap and easy modifications; 10 kHz steps, automatic offset, variable output, variable dialight, new repeater subband, low power receive. Illustrated, beginner tested. Kit style directions. $3 to David Thompson, K7OMT, 11740 N.W. West Rd., Portland, OR 97229.

FREE Rohn tower. 100 foot 25G tower to person who removes it. Presently installed with 3 sets of 3 guys and 2 beams. Write your qualifications for project. I will call you to discuss. W1FDH — 64 Hitchcock Lane, Avon CT 06001.

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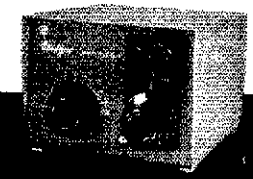

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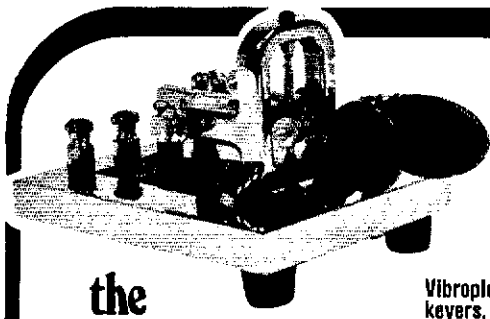

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| Part Number | MHz | db/ 100 ft. | db/ 100 m |
|---|---|---|---|
| 9888 42¢/ft | 50 | 1.2 | 3.9 |
| | 100 | 1.8 | 5.9 |
| | 200 | 2.6 | 8.5 |
| | 300 | 3.3 | 10.8 |
| | 400 | 3.8 | 12.5 |
| 8214 26¢/ft | 50 | 1.2 | 3.9 |
| | 100 | 1.8 | 5.9 |
| | 200 | 2.6 | 8.5 |
| | 300 | 3.3 | 10.8 |
| | 400 | 3.8 | 12.5 |
| 8237 23¢/ft | 100 | 2.0 | 6.6 |
| | 200 | 3.0 | 9.8 |
| | 400 | 4.7 | 15.4 |
| | 900 | 7.8 | 25.6 |
| 8267 27¢/ft | 100 | 2.0 | 6.6 |
| | 200 | 3.0 | 9.8 |
| | 400 | 4.7 | 15.4 |
| | 900 | 7.8 | 25.6 |

8448 17¢/ft
No. of Cond. — 8
AWG (in mm) — 6-22, (7x30), [.76]; 2-18, (16x30), [1.19]

9405 28¢/ft
No. of Cond. — 8
AWG (in mm) — 2-16, (26x30), [1.52]; 6-18, (16x30), [1.17]

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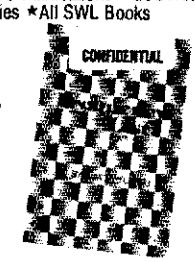


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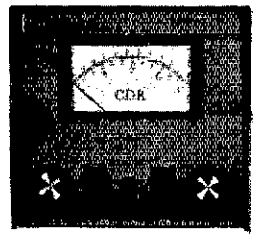

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YAESU FT-301D transceiver w/cw filter, FP-301 p.s., FV-301 VFO and FC-301 ant. tuner. Incl. mic. and dust covers. Mint in orig. boxes. $899. Bob, WA6CNT, 415-522-2304.

ELECTRONIC Backyard sale. September 2 & 3. Radio-TV Lab, George, WA9IEZ, 5631 Irving, Chicago, IL 60634.

FOR SALE: Hallicrafters HT-33B linear $360. Jon Kohn, N3AJB, 717-532-3175.

FOR SALE: HT-41 linear amplifier A-1, condition, covers 10 meters thru 80 meters, call 203-435-9331 after 6 P.M. WA1BAL.

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ATLAS 350 XL, excellent condition, p.s., ext. VFO, D. Display, $1800 new, asking $1100. AD3U, 301-336-8044.

HEATH HR-1680 80-10M rcr. Clean, recently aligned, manual. $250 money order and I'll ship. WB4EHS, P. O. Box 8383, Ft. Lauderdale, FL 33310.

DRAKE 2-NT (mint) with five Novice xtals — $100; Hallicrafters SX-111 — $125; Hammarlund HQ-129-X — $50; Johnson 250 watt Matchbox $50; Hufco 250 MHz frequency counter (factory wired) $75; Vibroplex Deluxe (chrome) with case — $50; Pace high-band four channel acidc scanner with .52 .76 .91 .97 xtals — $50. W9ODL, 319 Oxford, Springfield, IL 62704.

FOR SALE: Dentron GLA-1000 kW amplifier with original warranty; can't use because of TVI $290. Also selling Dentron SWR bridge — relative power output meter $25. WA2YYJ evenings 212-897-5260.

CLEANING out ham shack, several tube receivers, send s.a.s.e. for two page list, W9VZR 4627 N. Bartlett, Milwaukee, WI 53211.

SALE: Ten-Tec Triton II with 262 power supply mint condition $475, no shipping. W2UPY, Andrew Ostrochovsky, 70 Rea Ave., Ext., Hawthorne NJ 07506. Call 201-742-8918 before noon.

SELL Heath SB-102 with HP-23B in SB-600 speaker cabinet. New tubes, no mods, exc. condition, performs to specs. $410. Will ship F.O.B. UPS. Ronald Ottman, 454 Del Norte Ave., Corning, CA 96021. Ph. 916-824-2539.

HQ180A, very good, manual, UPS. $275. Tom Overcamp, Rte. 2, Box 98, Seneca, SC 29678. 803-882-7906.

YAESU FT-301S. Excellent, with manual, VOX, WWV crystal. Best offer over $400. W3EP/9, 1601 Matlock Rd., Bloomington, IN 47401. 812-336-7786.

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DRAKE R4C receiver, T4XC transmitter, MS-4 speaker, AC-4 power supply, noise blanker, 500 cycle cw filter, extra crystals for 10 meters, Electro-voice dynamic microphone 619. All are mint condition. List over $1750. Sell for $1250. Shipping depends upon location. Original box, manuals. AE5V, 318-323-3478.

HAMMARLUND HQ-110 $100. Eico 723 transmitter w/VF-1, $25. HW-7 $40. Manuals. Will ship. WA2VOP, 1045 Walnut Ave., Bohemia, NY 11716. 516-589-3422.

NEW Yaesu FT301 analog transceiver $500. Yaesu FC301 antenna tuner $100. Yaesu FT301 mobil mount $15. Atlas 210X transceiver, noise blanker $550. AG1L, ex-WB1DXE, Marv. Tel. 401-295-9741.

SIGNAL/ONE CX-11, personal demonstrator, immaculate, warranty $3595. CX-7B, mint, warranty $1495. Payne Radio, K4ID, 615-384-2224 anytime.

COLLINS 75S-3A (14 frequency ranges), 10 extra SWL and marine crystals, 200 Hz cw filter; 32S-3; 516F-2; 312B-4; SM-1 mike; cables, manuals, dust covers, $1,900. FRG-7 $225. Gene Simon, W2KOY. 850 Richmond Road, East Meadow, NY 11554.

YAESU FT-221 2 meter ssb/fm, $430. N6OE, 213-794-7323.

TS-700A, just back from factory w/sub-band, perfect SP-70, MC-50, all $485. Offers. KDK-2015R, new $299. WD4NCF. 502-465-8763.

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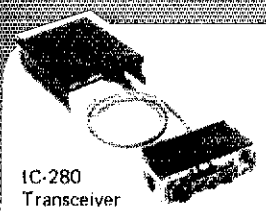

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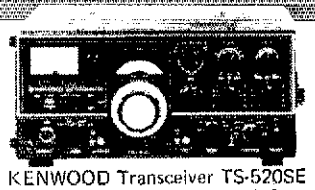

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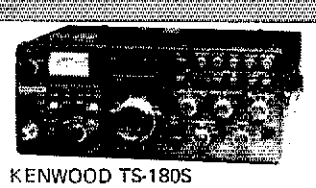

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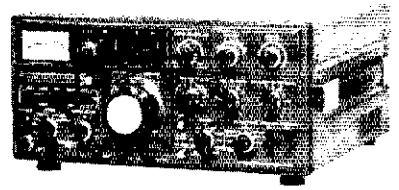

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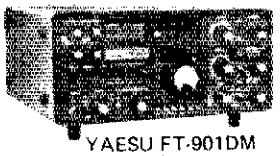

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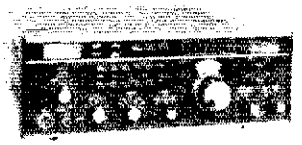

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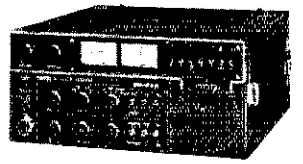

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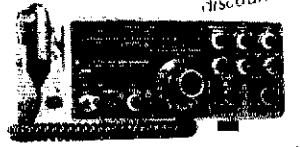

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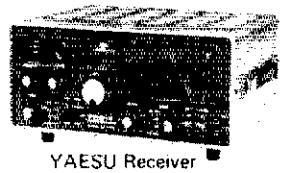

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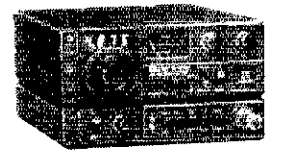

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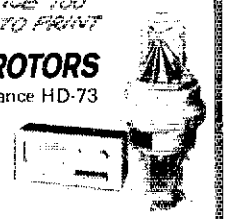

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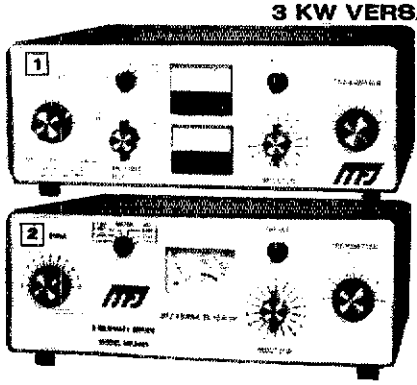


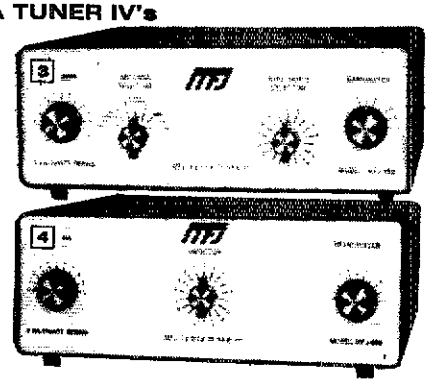


1.5 KW VERSA TUNER III's


## NEW MFJ KW VERSA TUNERS HAVE THESE FEATURES IN COMMON

**These 6 new MFJ KW Versa Tuners** let you run up to 3 KW or 1.5 KW PEP (depending on the model) and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire. Gives maximum power transfer. Harmonic attenuation reduces TVI, out of band emissions.

**All metal, low profile cabinet** gives RFI protection, rigid construction, sleek styling. Black. Rich anodized aluminum front panel. 5x14x14 inches. Flip down stand tilts tuner for easy viewing.

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## 3 KW VERSA TUNER IV's

### [1] MFJ-984 3 KW VERSA TUNER IV

**$299.95** ***EXCLUSIVE RF AMMETER insures maximum power to antenna at minimum SWR. Built-in dummy load.***

**This is MFJ's best 3 KW Versa Tuner IV.** The MFJ-984 Deluxe 3 KW Versa Tuner IV gives you a combination of quality, performance, and features that others can't touch at this price.

**An exclusive 10 amp RF ammeter** insures maximum power to antenna at minimum SWR. A separate meter gives SWR, forward, reflected power in 2 ranges (2000 and 200 watts).

**Versatile antenna switch** lets you select 2 coax lines thru tuner and 1 thru or direct, or random wire, balanced line or dummy load.

**A 200 watt 50 ohm dummy load** lets you tune your exciter off air for peak performance. Efficient, encapsulated 4:1 ferrite balun.

### [2] MFJ-981 3 KW VERSA TUNER IV

**$199.95** ***Accurate meter gives SWR, forward and reflected power in 2 ranges: 2000 and 200 watts. 4:1 ferrite balun.***

**The MFJ-981 3 KW Versa Tuner IV** is one of MFJ's most popular Versa Tuners. An accurate meter gives you SWR, forward and reflected power in 2 ranges: 2000 and 200 watts. Encapsulated 4:1 ferrite balun.

### [3] MFJ-982 3 KW VERSA TUNER IV

**$199.95** ***Antenna switch lets you select 1 coax thru tuner and 2 coax thru tuner or direct, or random wire and balanced line.***

**The MFJ-982 3 KW Versa Tuner IV** gives you a versatile 7 position antenna switch that lets you select 1 coax thru tuner and 2 coax thru tuner or direct, or random wire and balanced line. Encapsulated 4:1 balun.

**If you already have a SWR/wattmeter,** the MFJ-982 is for you.

### [4] MFJ-980 3 KW VERSA TUNER IV

**$169.95** ***Heavy duty encapsulated 4:1 ferrite balun for balanced lines.***

**The MFJ-980 is MFJ's lowest priced** 3 KW Versa Tuner IV but has the same matching capabilities as the other 3 KW Versa Tuner IV's.

**Features an efficient, encapsulated 4:1 ferrite balun** for balanced lines.

## 1.5 KW VERSA TUNER III's

### [5] MFJ-962 1.5 KW VERSA TUNER III

**$169.95** ***SWR, dual range forward and reflected power meter, 6 position antenna switch, encapsulated 4:1 ferrite balun.***

**The MFJ-962 1.5 KW Versa Tuner III** is an exceptional value.

**An accurate meter** gives SWR, forward and reflected power in 2 ranges (2000 and 200 watts).

**A versatile six position antenna switch** lets you select 2 coax lines thru tuner or direct, or random wire and balanced line. Encapsulated 4:1 balun.

**Black front panel** has reverse lettering.

### [6] MFJ-961 1.5 KW Versa Tuner III

**$149.95** ***6 position antenna switch lets you select 2 coax lines thru tuner or direct, or random wire and balanced line.***

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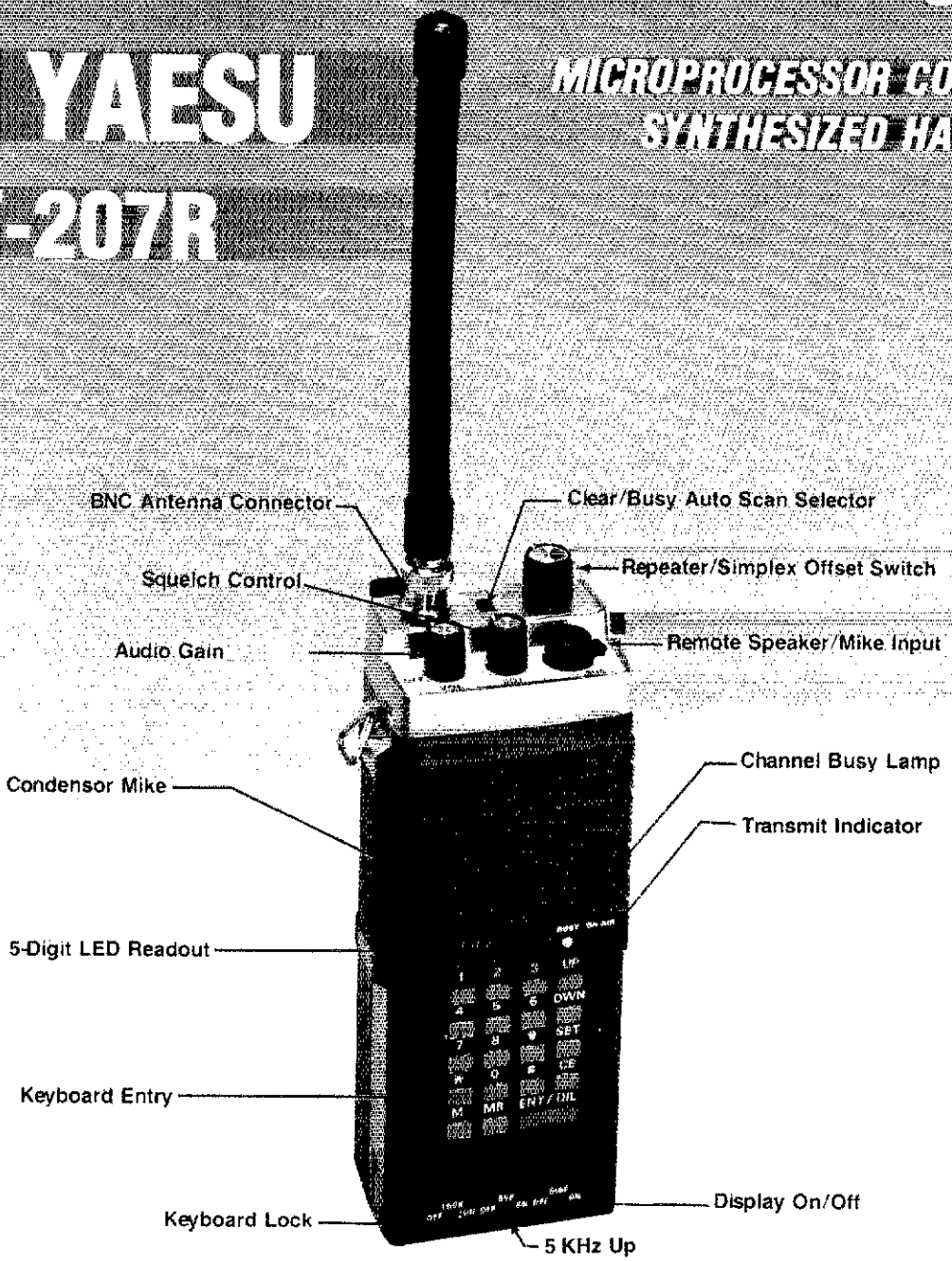


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