QST

amateur radio

June 1972
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OFFICIAL JOURNAL OF THE ARRL

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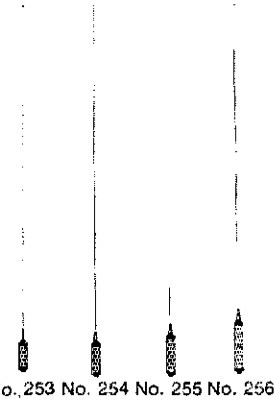


HY-GAIN ELECTRONICS CORPORATION

P. O. Box 5407-HF Lincoln, Nebraska 68505

New FPM-300, a low-priced, versatile, compact SSB/CW transceiver with latest high performance FET and integrated circuits plus extended coverage.

This new radio, with built-in AC-DC power supply, is compactly designed with modular construction techniques for effective and reliable service in fixed, portable and mobile use for amateur, Civil Defense, CAP, MARS, RACES and other utility HF Communications Services.

The new transceiver has premium type glass epoxy printed circuit board construction for greater reliability, routine maintenance and features the latest state-of-the-art solid state devices throughout. The All-American made radio, priced at only $595, is also equipped with a unique integrated circuit speech compressor design for extended "talk power" plus many other built-in features—all good reasons why you should be talking with a Hallicrafters.

For additional data see your Hallicrafters distributor or write or phone:

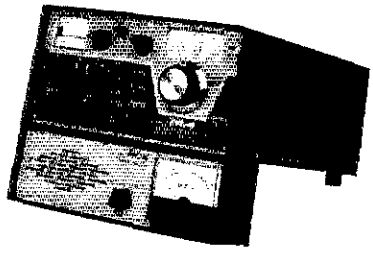
The Hallicrafters Co., 600 Hicks Road, Rolling Meadows, Ill., 60008 U.S.A.
Phone: 312/259-9600

You should be talking with a Hallicrafters.

Only an **MC-4** can "top" a **Drake TR-4**

the optimum Sideband Transceiver

(Sometimes even the MC-4 ends up on the bottom . . .)



Adding an MC-4 Mobile Console, with its excellent wattmeter and built-in speaker, is the only way to improve a Drake TR-4.

BUILT-IN TR-4 FEATURES

- **Full Frequency Coverage** on all amateur bands 10 through 80 meters. No additional crystals required.
- **300 Watts PEP input on SSB.**
- **Shifted-Carrier CW** 260 watts input
- **Upper and Lower Sideband** all bands.
- **Controlled-Carrier Screen Modulator** for AM
- **VOX or PTT**
- **Output Impedance Adjustable** with pi-net.
- **Two Special 9 MHz Crystal Filters** for sideband selection.
- **1 kHz Dial Accuracy.**
- **100 kHz Crystal Calibrator**
- **Price $599.95 Amateur Net**

ACCESSORIES

MC-4 Mobile Console (shown in photos above.	$ 69.00
MMK-3 Mobile Mounting Kit . .	$ 6.95
AC-4 115/230 VAC 50/60 Hz Power Supply	$ 99.95
DC-4 12 VDC Solid State Power Supply	$125.00
34PNB Noise Blanker	$100.00

TR-4 SPECIFICATIONS: • **Frequency Coverage:** Full coverage on all amateur bands 10 thru 80 meters, in seven 600 kHz ranges: 3.5 to 4.1 MHz, 7.0 to 7.6 MHz, 13.9 to 14.5 MHz, 21 to 21.6 MHz, 28 to 28.6 MHz, 28.5 to 29.1 MHz, 29.1 to 29.7 MHz. • **Solid State VFO:** Has linear permeability tuning. Tunes 4.9 to 5.5 MHz for all ranges. • **Dial Calibration:** 10 kHz divisions on main tuning dial and 1 kHz divisions on the tuning knob skirt. • **Frequency Stability:** High stability solid state VFO tunes same range on all bands. Drift is less than 100 cycles after warm-up, and less than 100 cycles for plus or minus 10% line voltage change. • **Modes of Operation:** SSB Upper and Lower Sideband, CW and AM. • **Misc:** 20 tubes including voltage regulator; two transistors; 8 diodes; 100 kHz crystal calibrator built in; Dimensions: 5¼" high, 10¾" wide, 14⅛" deep. Weight: 16 lbs. . . **TRANSMITTER:** • **Single Sideband:** 300 watts P.E.P. input power, VOX or PTT. Two special 9 MHz crystal filters provide upper or lower sideband selection on any band, without the necessity of shifting oscillators. • **CW:** Power input 260 watts. Carrier is shifted approximately 1000 cycles into one sideband, and mixer and driver are keyed. Grid block keying is free from chirps and clicks. Automatic transmit/receive switching when key is operated. CW sidetone oscillator for monitoring. • **AM:** Controlled carrier AM screen modulator is built-in. 260 watts P.E.P. input. Low carrier power increases 6 times to 50 watts output at maximum modulation. This system is compatible with SSB linears. VOX or PTT. Diode detector used for receiving on this mode. Product Detector can be used by switching manually . . . **RECEIVER:** • **Sensitivity:** Less than ½ microvolt for 10 dB S/N • **I. F. Selectivity:** 2.1 kHz at 6 dB, 3.6 kHz at 60 dB. • **Antenna Input:** Nominal 50 ohms. • **Audio Response:** 400 to 2500 cycles at 6 dB. • **Audio Output Power:** 2 watts. • **Impedance:** 4 ohms.

MC-4 SPECIFICATIONS: • ***Frequency Coverage:*** *1.8-54 MHz* • ***Line Impedance:*** 50 Ohm resistive • **Accuracy:** ± (5% of reading +3 watts) • **Power Capability:** 300 watts forward or reflected • **Controls:** Front panel 2-position switch selects forward or reflected power • **Speaker:** 3" × 5" oval, 2.98 ounce ceramic mag.

R. L. DRAKE COMPANY
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QST

JUNE 1972

VOLUME LVI NUMBER 6

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OUR COVER WA1MRF "takes out the garbage" with a life-sized high-*Q* filter. It also cooks hot dogs! See page 48.

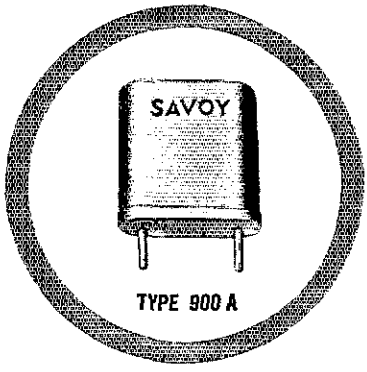
—CONTENTS—

after warm-up, and less than 100 cycles for plus or minus 10% line

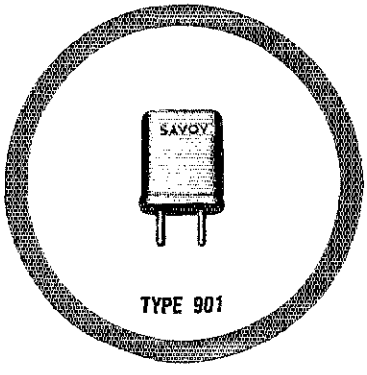
Savoy

High Accuracy Crystals

For over 30 years



TYPE 900 A



TYPE 901

Crystals shown are actual size.

Either type, for transmitter or receiver.

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Postpaid in U.S.A.

Specify crystal type, equipment make and model, desired frequency, transmit or receive.

For amateur two meter FM use in Regency, Varitronics, Standard Drake, Tempo, Swan, Galaxy, Trio, Sonar, Clegg, Linear SBE.

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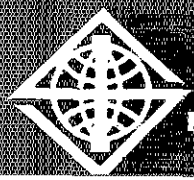

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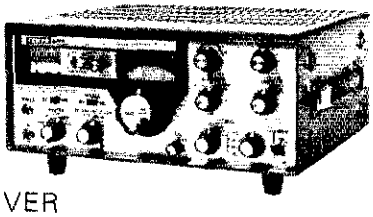
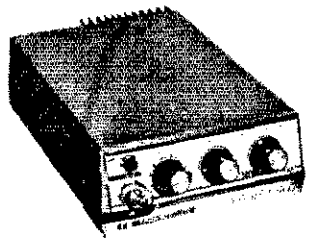
TEMPO "ONE"



SSB TRANSCEIVER

. . . . . represents the culminating achievement of many years of experience in the amateur radio field. Modern design, superb performance, high styling, sturdy construction, outstanding reliability, exceptional value.

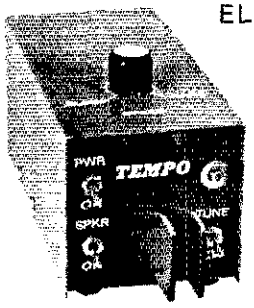
Tempo "ONE" Transceiver	$319.00
AC/ONE Power Supply (117/230 Volt 50/60 cycle	$ 99.00
DC/1-A Power supply (12 volts DC)	$110.00



TEMPO/fma

the top of the Tempo VHF line. This transceiver offers all of the famous Tempo quality and performance at 25 watts of power output. The unit also features a low power position for 10 watts output to conserve battery power. Here is a true value in VHF FM; Tempo presents high power operation for only $349.00.

TEMPO DKT ELECTRONIC KEYER



The Tempo DKT keyer is the latest in electronic keyer design. Using integrated circuit techniques it provides the unique features of dot memory and single dot injection which, with a specially designed twin lever key assembly, affords effortless sending and perfect character formation regardless of speed.

Price: $89.00.

TEMPO FMP

Truly mobile, the Tempo fmp-3 watt portable gives amateurs 3 watts, or a battery saving ½ watt, FM talk power anyplace at anytime. With a leather carrying case included, this little transceiver will operate in the field, in a car, or at home with an accessory AC power supply. The battery pack is of course included. Price:$225.00.

TEMPO LW 1500 DUMMY LOAD WATTMETER

The Tempo LW1500 load-wattmeter offers typical Tempo price-performance value. Designed for amateur or commercial use, the LW1500 is completely portable. An internal "D" cell battery powers the overheating warning light so no AC connections are necessary. The built-in handle and light weight make the load convenient for desk, bench, auto or field testing.

Price: $119.00.

Other Tempo products:

FMV450 - 10 watt UHF transceiver
FMV - 10 watt 2 meter transceiver
RBF-1 Wattmeter & SWR Bridge
VHF & UHF Solid State Amplifiers

Henry Radio

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Section Communications Managers of the ARRL

Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in *QST*. ARRL Field Organization station appointments are available in areas shown to qualified League members. General or Conditional Class licensees or higher may be appointed ORS, OVS, OPS, OO and OBS. Technicians may be appointed OVS, OBS or V.H.F. PAM. Novices may be appointed OVS. SCMs desire application leadership posts of SEC, EC, RM and PAM where vacancies exist

ATLANTIC DIVISION

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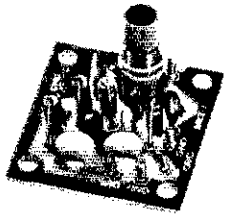
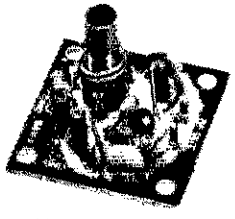


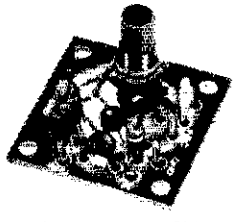
1. MXX-1 TRANSISTOR RF MIXER

A single tuned circuit intended for signal conversion in the 3 to 170 MHz range. Harmonics of the OX oscillator are used for injection in the 60 to 170 MHz range. Lo Kit 3 to 20 MHz, Hi Kit 20 to 170 MHz (Specify when ordering).....**$3.50**



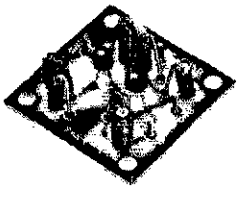
2. SAX-1 TRANSISTOR RF AMP

A small signal amplifier to drive MXX-1 mixer. Single tuned input and link output. Lo Kit 3 to 20 MHz, Hi Kit 20 to 170 MHz (Specify when ordering).....**$3.50**



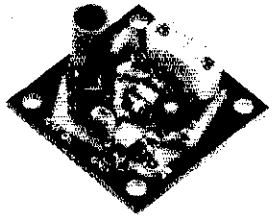
3. PAX-1 TRANSISTOR RF POWER AMP

A single tuned output amplifier designed to follow the OX oscillator. Outputs up to 200 mw, depending on the frequency and voltage. Amplifier can be amplitude modulated. Frequency 3,000 to 30,000 KHz.....**$3.75**



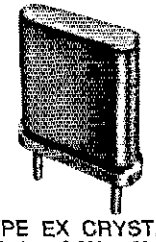
4. BAX-1 BROADBAND AMP

General purpose unit which may be used as a tuned or untuned amplifier in RF and audio applications 20 Hz to 150 MHz. Provides 6 to 30 db gain. Ideal for SWL, Experimenter or Amateur **$3.75**



5. OX OSCILLATOR

Crystal controlled transistor type. Lo Kit 3,000 to 19,999 KHz, Hi Kit 20,000 to 60,000 KHz. (Specify when ordering).....**$2.95**



6. TYPE EX CRYSTAL

Available from 3,000 to 60,000 KHz. Supplied only in HC 6/U holder. Calibration is ± .02% when operated in International OX circuit or its equivalent. (Specify frequency) **$3.95**

for the COMMERCIAL user...

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International Crystals are available from 70 KHz to 160 MHz in a wide variety of holders. Crystals for use in military equipment can be supplied to meet specifications MIL-C-3098E.

CRYSTAL TYPES:

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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 worth-while 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.

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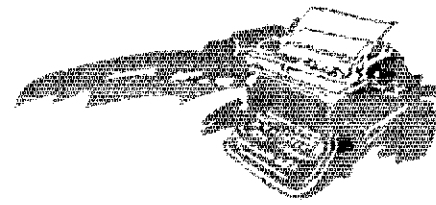
"It Seems to Us..."



FM CHANNEL COORDINATION

THE RAPID GROWTH of channelized fm communications and fm repeaters was described in a July 1969 *QST* editorial. Fueled by low-cost U.S.-made and imported transceivers, and an abundance of commercial surplus rigs as well as a spurt of home-brewing, a spiraling pattern of more stations and more repeaters continues. And it is mostly to the good. Many local cross-town QSOs that once cluttered the hf bands now take place on vhf. For the first time, high-quality, noise-free communication is consistently possible from a mobile station.

But any rapidly growing field has its problems, and repeaters are no exception. Most "machines" are run by a few technically skilled individuals, or club groups, who try to operate in accordance with FCC regulations and observe good practices generally, and who in their planning attempt to hold interference to other activities to a minimum. Sad to say, a few repeaters have been put on the air willy-nilly with little thought given to QRM created for other stations using the same channel. In some metropolitan areas, particularly on 2 meters, conditions have come near chaos.

Recognizing the growing pains of fm and repeaters, the ARRL Board of Directors has taken a number of steps the past several years, hopefully to help bring order to these situations. During 1968 the ARRL Vhf Repeater Advisory Committee – a group of prominent and knowledgeable fm-ers – was formed to aid the Board on policy matters. The committee did much of the analysis of FCC's proposed rules for repeaters, and the ground work for the League's filing in this docket (18803), where we argued strongly for considerably more freedom and flexibility in repeater activity. Later the Board requested the VRAC to develop suggested standards for fm and repeater operation, a project which is still being developed. Also, proposed frequency subdivision plans have been formulated for the 220 and 420-MHz bands. These proposed "gentlemen's agreements" are presented elsewhere in this issue.

If maximum usage is to be obtained from the channels available, a common frequency-assignment plan for each band *must* be agreed upon, and the planning *must* be done on a regional basis. Recognizing the difficulties of repeater frequency coordination, ARRL Directors at the 1972 annual meeting requested VRAC to study ways of bringing the various frequency-planning efforts together (Minute 75). While some fm-ers have asked the FCC to step in and assign repeater channels, ARRL has always taken the opposite view – holding that we amateurs are a highly skilled fraternity able to work out problems on our own. A minimum of regulation so as to provide a maximum growth potential is a basic tenet of League policy. And FCC has offered us the opportunity: amateur division chief W4BW has said that he would prefer amateurs to do the coordination job, through a nationwide effort, rather than have FCC prescribe exact frequencies.

ARRL strongly supports the many organizations (see story by W5NSQ in the May issue) working to achieve standard separations for repeater input and output channels, to coordinate the geographical distribution of channel assignments to hold interference to a minimum, and to provide a forum where repeater owners can meet and discuss their difficulties. Whenever possible, representatives from Headquarters and the VRAC attend regional meetings. *QST* regularly reports fm meetings in the hope that such publicity will aid in getting all repeater groups in an area together.

Work on band plans, frequency coordination and standards for repeater operation continues. The Board, the VRAC, and the Hq. staff can provide aid and assistance in the effort to improve fm and repeater operation. But, as always, the task must be undertaken by individual amateurs of good will. Local clubs, state-wide organizations, and area groups will be successful only with the help and support of all fm-ers. Through such efforts amateurs can again demonstrate that they solve their own problems – without outside interference or additional Government regulation.

Right now we have two big jobs ahead of us. One is to generate band plans, frequency coordination and standards for repeater operation. This is a cooperative effort amongst us amateurs, through voluntary regional groups, with the aid and assistance of the VRAC and Hq. staff. Because of the rapid growth of repeaters, helter-skelter across the nation without enough planning and coordination, for some time there will

(Continued on page 26)

League Lines . . .

There must be something about CB which brings out the lawbreaker instinct. A news story reports that hundreds of U.S. military and civilian personnel in Germany are operating CB in open defiance of German and American law, and threaten to jam communications unless they get licenses to operate legally. And these are the kinds of people for which EIA is requesting FCC to provide more frequencies, taken from ham bands!

In its presentation to the House appropriations subcommittee earlier this year, FCC spoke of the "widespread rules violations, abuse of operating privileges, and defiance of our regulatory authority" in the Citizens Radio Service, and plans special mobile teams for additional monitoring and enforcement. Three cheers!

Reminder: The second of two yearly meetings of the ARRL Board of Directors will be held in mid-July. Let your director-representative (address page 8) know of any ideas, comment, complaints or bouquets you may have on the status of amateur radio and the conduct of League affairs. Expressions from affiliated clubs are particularly helpful, when they represent a concensus after open group discussion.

Clubs: Are your activities being reported suitably in the local press? If you've mislaid your copy of the ARRL Publicity Handbook, write for another. Hq. will help with special p.r. opportunities, too, but give us as much advance notice as you can if you're planning to set up a station at a state fair, or placing a display in your library (say for Amateur Radio Week, June 18-24) or writing a story for your company's house organ.

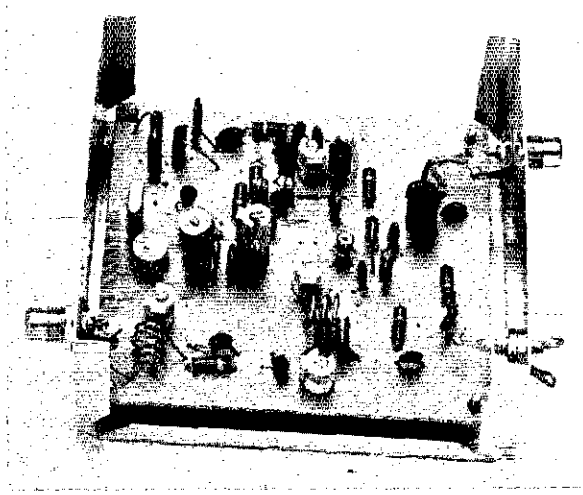
FCC amateur exams, at least in the higher levels, contain more and more orientation to solid-state theory and circuits. We've had complaints that our License Manual doesn't cover the area adequately; yet FCC staff claims its sample questions (repeated in the Manual) are definitely sufficient as an indication of scope. K2AMN found one simple answer -- purchase of the "Let's Talk Transistors" series reprint from Hq. for $1, which enabled him to sail through the Advanced exam. And see the quiz elsewhere in this issue for another approach.

Where, in one weekend, can you combine the good fellowship of a hamfest, the underlying motive of preparation for public service, the fresh air and fun of a picnic, the teamwork of cooperative effort, and the excitement of an operating contest? In ARRL Field Day, that's where. CU there.

This issue carries an interesting description of reception by two amateurs of Apollo lunar signals. Another of our fraternity was involved in a different way in the recent Apollo 16 flight -- the voice of mission control in Houston was, for much of the time, that of astronaut Tony England, W5RAP.

NOTICE

To meet the current and anticipated financial needs of your League, the Board of Directors has set new annual dues rates effective July 1, 1972 – **$7.50 in the U.S., $8.50 in Canada, $9 elsewhere.** Remittances received by the Secretary on or before June 30 will be applied at the present rates ($6.50 Canada and U.S., $7 elsewhere) and any number of years may be paid in advance at the old rates. Family membership and blind member dues rate remains the same – $2 yearly, without receipt of *QST*. New rates for Life Membership will be $150 U.S., $170 Canada, $180 elsewhere. On an eight-quarterly-payment basis, the new amounts will be $18.75 U.S., $21.25 Canada, and $22.50 elsewhere. Again, the old rates will be accepted if remittance is received by June 30: $130 Canada and U.S., $150 elsewhere. The instalment payment plan will be honored at the old rates ($16.25 Canada and U.S., $17.50 elsewhere) if the first payment is received by June 30 and the remainder is paid on schedule. **Last call!**



The 220-MHz converter is mounted in a box made from sheet aluminum. A phono jack at the lower left is the input connection. Another jack at the upper right is the output to the receiver. The i-f output coil shown here is for use with a low-band receiver. Changes necessary to work into a 2-meter receiver are explained in the parts list and text.

450 Cubic Centimeters of New Front End for Your Fm Receiver

A Compact Converter for 220-MHz

BY THOMAS McMULLEN,* WISL

WITH THE RECENT increase in repeater planning and, in some cases, activity on 220 MHz, there is a need for receiving systems on that frequency. Many past designs for 220-MHz converters have suffered from bulkiness in size, and complexity of circuits, that has made them unattractive for most mobile installations. The converter described here is small enough to be mounted in or near most mobile receivers.

One decision that must be made when designing a converter is what frequency to use as an i-f. For fm use the field is narrowed somewhat by the availability of surplus equipment. Much of this equipment is in the "low-band" range of 30 to 50 MHz, or in the "high-band" range of 148 to 170 MHz. It has been common practice to convert these rigs to work in the amateur 6- or 2-meter bands. Therefore, a most useful converter design would be one that could be adapted to use either of these bands as an i-f. This converter can be constructed for either i-f with only small differences in the components needed.

Circuit Considerations

One of the important features of this converter is the crystal oscillator and the multiplier stage that follows it. As shown in Fig. 1, Q3 is the oscillator and quadrupler. By using a crystal frequency of 19.25 MHz, and tuning the collector circuit to 77 MHz, the transistor stage provides the injection voltage to the mixer for an i-f of 147 MHz, or high-band. For a low-band i-f, only one more stage is needed – a frequency doubler. With a crystal frequency of 21.5 MHz, the output of Q3 is 86 MHz. Q4 doubles this to 172 MHz, which is the injection frequency for an i-f of 52 MHz. The foregoing figures assume an input or signal frequency of 224 MHz. Crystal frequencies for other input or output frequencies can be calculated as follows:

For a low-band i-f, $f_O = \frac{f_S - f_I}{8}$

For a high-band i-f, $f_O = \frac{f_S - f_I}{4}$

Where f_O is the crystal frequency, f_S is the signal frequency to be received, and f_I is the i-f. If the receiver to be used has several channels, an extra one can be set up for use with the converter. Where the choice of channels is limited, the one with least likelihood of feedthrough interference should be used. The severity of such interference will depend on the sensitivity of the receiver, shielding, grounding of the chassis, and the strength of the repeater signal.

Fm receiving equipment for 220 MHz has been notable by its absence. Here is a converter that will work into a 144-MHz receiver. By making a few changes in the circuit, the converter output frequency can be changed to 50 MHz. The circuit-board layout is such that construction for either i-f is not difficult.

* Assistant Technical Editor, *QST*.

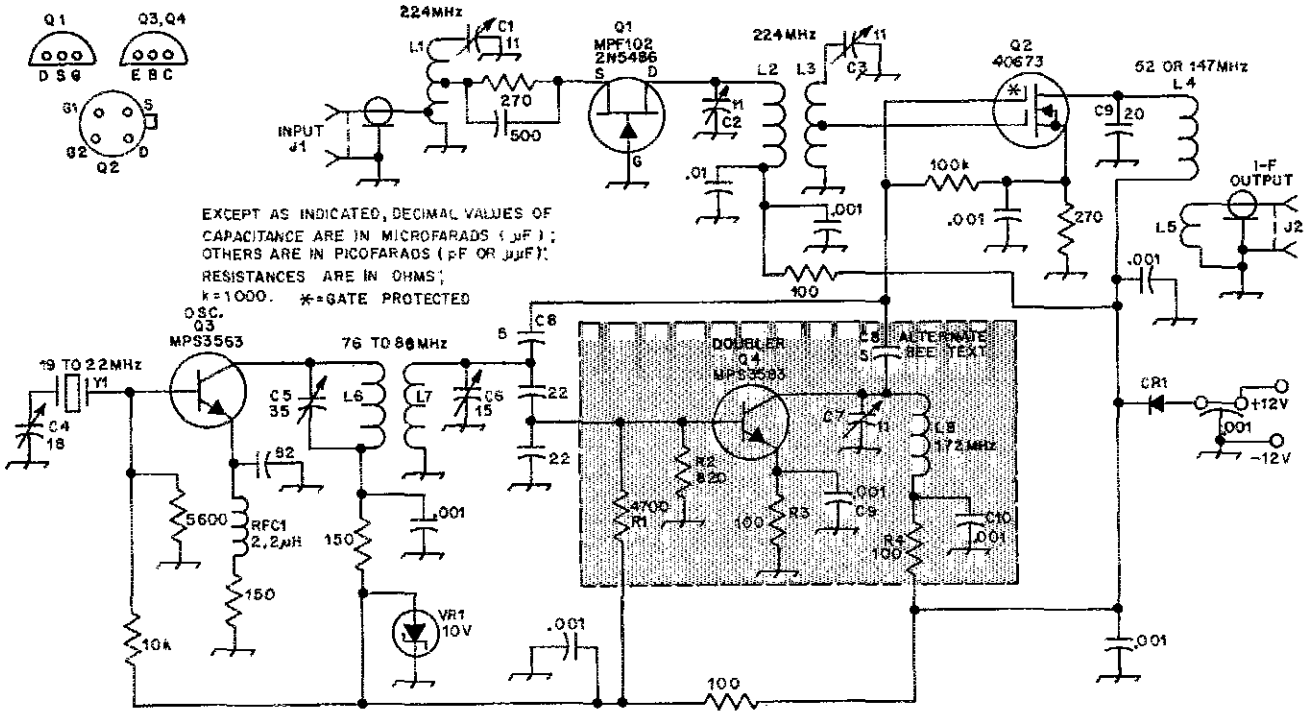
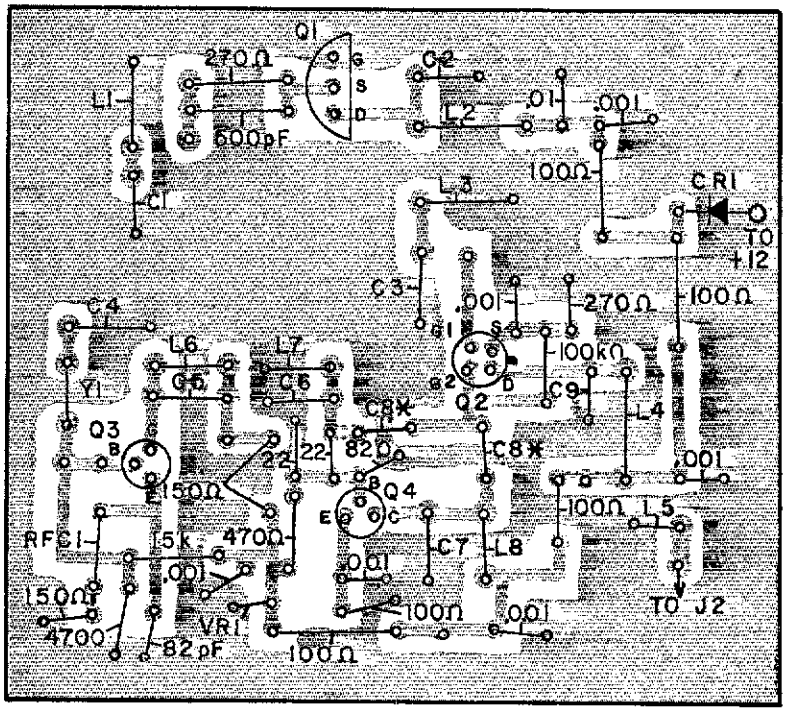


Fig. 1 — Schematic diagram of the 220-MHz converter. The components shown in the shaded area are the frequency-doubler circuit and can be omitted if the converter is built for use with a 2-meter receiver. Note that the connection point for C8 is also changed for a high-band i-f.

C1, C2, C3, C7 — 1.7- to 11-pF miniature variable (E. F. Johnson 187-0106-105).
C4 — 5.5- to 18-pF ceramic trimmer (Erie 538-002A-5.5-18 or equiv.).
C5 — 9- to 35-pF ceramic trimmer (Erie 538-002D-9-35 or equiv.).
C6 — 1.9- to 15.7-pF miniature variable (E.F. Johnson 187-0109-105).
C8 — 5-pF ceramic (see text).
C9 — For 52 MHz, 20 pF ceramic; for 146 MHz, 10 pF ceramic.
CR1 — Silicon diode, 50 PRV, 200 mA or greater.
J1, J2 — Coaxial connector, phono or other type.
L1 — 4 turns No. 20 tinned wire, 1/4-in. ID × 3/8-in. long, tapped 1-1/2 and 2-1/4 turns from ground end.
L2 — 4 turns No. 18 enam. wire, 1/4-in. ID × 1/2-in. long.
L3 — 3 turns No. 20 tinned wire, 1/4-in. ID × 3/8-in. long, tap 1-1/2 turns from ground end.
L4 — For 52 MHz, 9 turns No. 20 enam. wire, 1/4-in. ID × 5/8-in. long; for 146 MHz, 5 turns No. 20 enam. wire, 1/4-in. ID × 3/8-in. long.
L5 — For 52 MHz, 3 turns No. 20 enam. wire, 1/4-in. ID, closewound; for 146 MHz, 2 turns No. 20 enam. wire, 1/4-in. ID, closewound.
L6 — 6 turns No. 20 enam. wire, 1/4-in. ID × 1/2-in. long.
L7 — 7 turns No. 20 enam. wire, 1/4-in. ID × 1/2-in. long.
L8 — 5 turns No. 18 enam. wire, 3/16-in. ID × 3/8-in. long.
RFC1 — 2.2 μH choke, (J. W. Miller 70F225AI).
Y1 — Crystal, 19- to 22-MHz fundamental (International Crystal type CS or equiv.). The etched board layout will accept either 0.486 or 0.275 pin spacing.



* CONNECT C8 ACCORDING TO TEXT

Fig. 2 — Scale drawing of the pc-board pattern for the 220-MHz converter. Foil side shown.

A 40673 dual-gate MOSFET is used for the mixer, with the gate 2 connection tapped on the input-frequency coil. Gate 1 obtains injection voltage via a 5-pF capacitor from the output of the oscillator multiplier chain. The i-f output circuit is connected to the drain of the MOSFET. This circuit is fixed-tuned for simplicity's sake. It can be peaked for maximum output by squeezing or stretching the coil.

The rf amplifier uses an MPF102 or 2N5486 JFET in a grounded-gate configuration. The latter device will give slightly better performance. A word of advice when using these transistors in such a circuit: The gate must be connected to ground with the *shortest* possible lead length. A stubborn case of self-oscillation in the converter described here was cured by leaning the 2N5486 over so that the gate lead was just long enough to reach through the board and connect to the ground foil.

Construction

The converter is built on a piece of glass-epoxy board, 8.8-cm wide by 9.9-cm long. In inches, that works out to be just under 3-7/16 × 4. An aluminum box, 9-cm wide, 10-cm long, and 5-cm high was constructed as a housing. If the converter is to be installed inside a receiver, the box may not be necessary. However, care should be taken to assure that the converter is not mounted close to circuits that would couple unwanted signals into it. Such circuits might be the oscillator, multiplier, or rf amplifier stages of the i-f receiver.

Metal stand-off posts at each corner of the board serve to mount the converter and provide a good ground to the chassis. Phono connectors are used for input and output. The 12-volt dc supply is connected to a feedthrough capacitor on the wall of the box. A silicon diode in the supply lead offers protection against damage caused by reversing the polarity, although in most mobile installations this should not be a problem.

The circuit board has been designed to include parts placement for either high- or low-band i-f. For an output at 147 MHz, the injection coupling capacitor, C8, is connected from the top of L7 to gate 1 of the 40673. For a 52-MHz i-f, Q4 is added to the board, along with its associated resistors, capacitors, and L8. When the doubler is used, C8 must be connected in the alternative position (from the top of L8 to gate 1) to provide injection voltage.

All of the coils are wound with wire large enough to be self-supporting. Vibration should not be a problem, but a few drops of coil dope can be applied to each winding for further stiffening.

(Continued on page 35)

Jerry Sevick's article in July 1971 QST *can be considered a classic in Amateur Radio. Jerry provided some basic rules for ground-radial systems used with vertical antennas. In this article W2FMI takes us one step further – a 3-element vertical beam, mounted at ground level, that holds its own with tower-mounted Yagis.*

The W2FMI 20-Meter Vertical Beam

BY JERRY SEVICK,* W2FMI

HOME-BUILT EQUIPMENT is still to be found in some ham shacks, although probably not on such a grand scale as before the days of ssb. Commercial rigs and kits are well designed and reasonably priced, so they are widely used. Significantly, the actual power difference between low- and high-power commercial rigs is only about 10 dB. Therefore, the noticeable differences in signals are mainly the result of the antennas used by the amateurs. The antenna system – and possibly some test equipment – seems to be the last stronghold of the do-it-yourself artist.

Yet most effort in antenna design and construction is directed toward Yagis and quads, and the towers needed to support them. If one is not fortunate enough to have a tower, then he has to resort to a dipole or (even worse) a vertical. The vertical rates high aesthetically but, as many have said, *radiates poorly in all directions*. It has long been known that the earth is unkind to vertical radiation, especially at the low angles necessary for reliable DX operation.[1] But earlier work[2] by the author has shown that a vertical antenna can be an efficient radiator if earth losses are minimized. This gave promise of a vertical beam competing with horizontal beam antennas at elevated heights. That investigation on a vertical antenna was actually an extension of the work on a-m broadcast-antenna ground systems[3] as applied to sky-wave transmission.

This paper presents the first results from a three-element, 20-meter, parasitic array. On-the-air checks, over a three-month period, have been most exciting and gratifying. Reports from a hundred observations in Europe and Africa strongly indicate that this beam is competitive with a Yagi or a quad on a 50- to 60-foot tower.

Antenna and Image Plane Description

Over the years, many amateurs have tried phased vertical antennas. This is probably a carry-over from broadcast-antenna work, where they are widely used. But in general, phased arrays are difficult to work with.[4] The design of the required networks can be quite formidable since currents have to be controlled in both magnitude and phase, and input impedances may vary with the direction of transmission. Therefore, the parasitic Yagi array was chosen for investigation since it is a simpler system, and because considerable information is available for comparison.

The specific antenna investigated was a symmetric, three-element, parasitic array (actually one-half of a Yagi array) with spacing between

* Technical Relations Mgr., Bell Laboratories, 600 Mountain Rd., Murray Hill, NJ 07974.

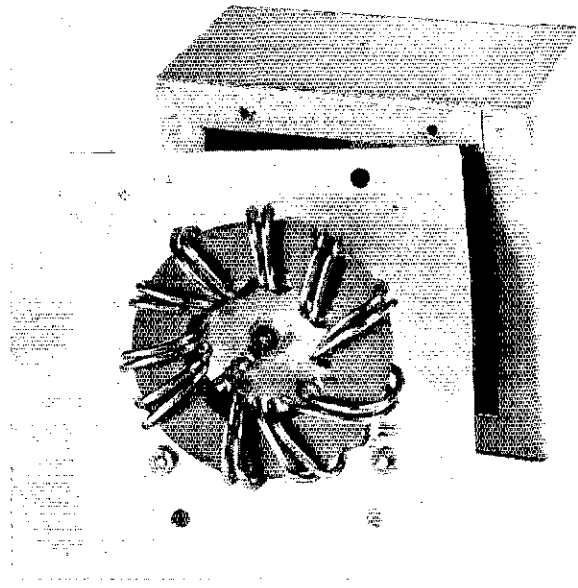
1 Feldman, "The Optical Behavior of the Ground for Short Radio Waves," *Proceedings of the IRE*, Vol. 21, No. 6, June 1933.

2 Sevick, "The Ground-Image Vertical Antenna," *QST*, July 1971.

3 Brown, Lewis, and Epstein, "Ground Systems as a Factor in Antenna Efficiency," *Proceedings of the IRE*, Vol. 25, No. 6, June 1937.

4 King, *The Theory of Linear Antennas*, Harvard University Press, Cambridge, Mass., 1956, p. 622.

Shown here is the three-element switched array. This system is mounted in the center of the back yard and is approximately 2 wavelengths from the wooded area shown above as well as the author's house. The northeast direction, which was mostly used for the data in this paper, is through the wooded area.



Matching network for three-element array. The enclosure is a standard aluminum meter box. The edges of the box are sealed with tape to minimize moisture seepage.

elements of 0.2 wavelength (12-1/2 feet on 20 meters). This spacing results in a good compromise between gain and input impedance. Closer spacing would reduce the input impedance, and hence the efficiency, because of the inherent earth losses with vertical antennas. This vertical symmetrical Yagi allows for electrical beam switching (changing a director into a reflector by switching in a loading coil at the base) while maintaining a constant input impedance at the driven element. The dimensions of the three-element antenna, when used as a fixed or a switched array, are shown in Table I. A switched array is also shown in the photograph. The elements are constructed using 1/16-inch-wall aluminum tubing and consist of three telescoping sections with one-inch OD tubing used for the bottom portions. This results in a self-supporting structure. Actually, many choices are available, including No. 14 or 12 wire taped to bamboo poles.

The three-element array with the full image plane, described later, presents an input impedance of 15 ohms. This is close to the theoretical value expected over an ideal image plane (infinite in conductivity and extent). Matching is accomplished with the step-down transformer[5,6] shown in the photograph and in Fig. 1. This transformer is also shown connected to the driven element. One of the parasitic elements is shown in a photograph, with the switching network and the indicating meter of the field-strength detector which was placed two wavelengths away. Having the indicating meter close by proved invaluable in tuning the array.

Fig. 2 shows the geometry of the image plane used in the measurements and on-the-air checks reported in the next section. The inner square has a diagonal of 4/10 wavelength (25 feet) and was constructed from four sections which were first laid out on a form of 1 × 2-inch boards in the basement. The outer wires of these sections are No. 14 wire and the inner wires are No. 18. All cross-connected wires were wire-wrapped and soldered. The pattern was chosen to give an easy path for the surface currents of a five-element array (parasitic elements at the four corners). The outer radials were all 0.4 wavelength long and also of No. 18 wire. Twenty-five wires emanated from each corner and nine from the sides.

At first glance, the image plane shown in Fig. 2 appears formidable and overdesigned. But considerable reduction in performance was noted with the removal of the outer radials. Obviously one cannot get something for nothing and the trade-off for a tower appears in the image plane. Much work still remains to be done in this area. For those with considerable real estate and wire, an image plane with an extended sector[7] could prove very interesting. From the author's first work[2] as well as Wilson's, a 10- or 20-degree sector, 2 to 10 wavelengths long, bears investigation.

5 Ruthroff, "Some Broad-Band Transformers," *Proceedings of the IRE*, Vol. 47, August 1959, pp. 1337-1342.

6 Core — 2-1/2-inch OD Q1 material; supplier — Indiana General Corporation, Electronics Division, Keasby, NJ.

7 Wilson, "Measurements of Low-Angle Radiation from a Monopole," *J. Res. Nat. Bur. Stand.*, Vol. 65D, pp. 641-645 (Nov.-Dec. 1961).

8 See footnote 2.

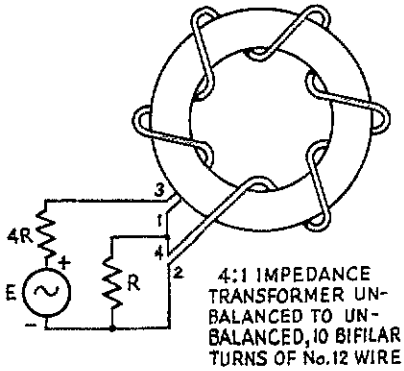
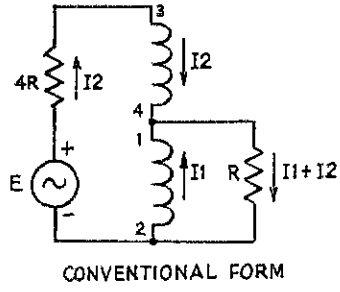
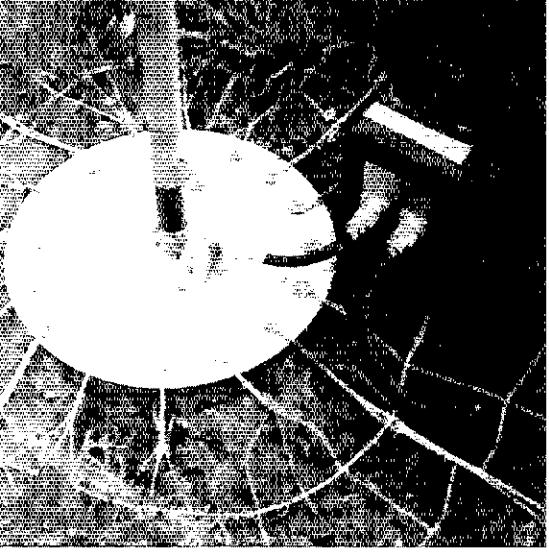


Fig. 1 — Schematic of the step-down transformer.





Base hardware of the driven element and the matching transformer.

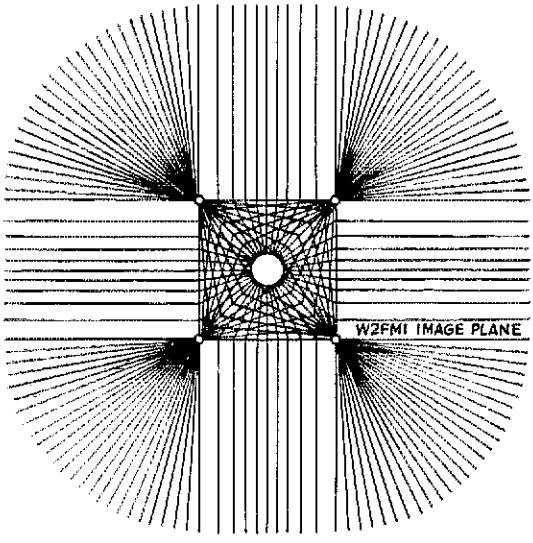


Fig. 2 — Geometry of the image plane used in this investigation. The pattern was chosen to approximate lines of current flow.

Measurements

As was stated earlier, the input impedance of the three-element array is 15 ohms. This value was obtained with all radials as shown in Fig. 2 and the director and driven elements adjusted for maximum forward gain, and the reflector for minimum signal in the reverse direction. This overall system adjustment also yielded the lowest standing-wave-ratio. A plot of the horizontal radiation pattern is shown in Fig. 3. These data are the average values taken at approximately 22.5-degree intervals. The measurements were made at approximately 5 degrees in elevation and 2 wavelengths in distance. Even though this distance does not assure ideal, far-zone measurements, the pattern is not far from what is expected. The beamwidth of 84 degrees is larger than the 50 to 55 degrees obtained with a horizontal Yagi, but, in the latter case, very little radiation is expected off the ends (the 90-degree direction). The front-to-back measurement yielded a value of 19 dB. This was confirmed many times on the air. The standing-wave-ratio is shown in Fig. 4. As was expected, the lowest SWR was obtained at 14.30 MHz.

The gain over a single 1/4-wave vertical was measured and found to be 5.2 dB. This again is an expected value and should not be confused with the 7- to 10-dB figures quoted on horizontal beams. In the latter case, the gain (which is a function of elevation) is also affected by an increase in the energy in the lower lobes because of the vertical directivity of the beam. It should be noted that this vertical directivity does not lower the lobe angles.

Measurements were also taken with the outer radials gradually removed one by one, until just the inner square remained. The most noticeable effect was the reduction of the front-to-back ratio from 19 to 7 dB. This is particularly harmful on the East Coast when one is trying to work Europe and Africa. The forward gain also gradually lowered by about 2 dB.

On-the-Air Checks

Obviously the most accurate comparison between this vertical beam and a horizontal one at 50 to 60 feet can be made only when the two antennas are close by and compared over a considerable length of time. Lacking this ideal situation, it was felt that a good indication could be obtained on the air if comparative evaluations, at the same approximate time, would be reported by the amateurs contacted. In this way variations in S meters and transmission conditions would be

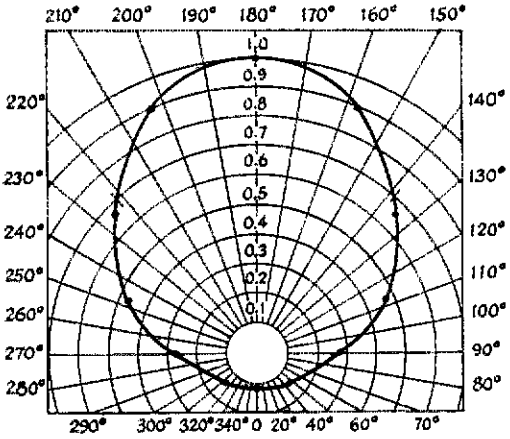


Fig. 3 — Horizontal directivity pattern of 3-element parasitic image-plane vertical array. Spacing = 0.2λ between elements; beamwidth = 84 degrees.

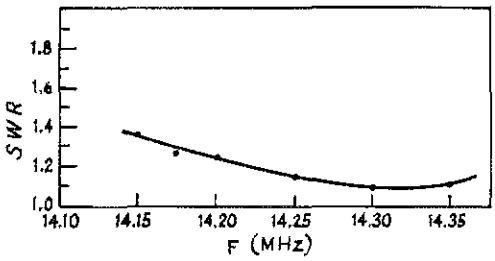


Fig. 4 — SWR vs. frequency for the 3-element parasitic image-plane vertical array.

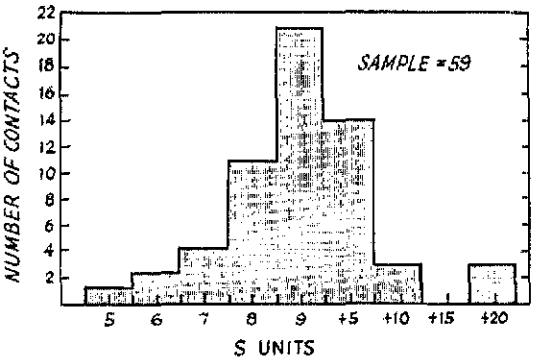


Fig. 5 — Distribution of signal reports from European and African contacts in interval October 8 to November 15, 1971.

minimized. Fifty-nine amateurs were contacted in Europe and Africa over a five-week period. In all cases the signal reports were above average and comparable to the strongest on the band. In no case was there a state-side signal reported which was stronger than from the W2FMI vertical beam. The distribution of signal reports is shown in Fig. 5. Fig. 6, which is a picture of one page in the log, showns some of the comments.

Mr. G. D. Wall, ZE2KV, located at Rhodesia, Africa, also made comparisons on 69 state-side signals over several hours of operation. Only three signals registered S8, one S unit stronger than W2FMI. The interesting result of these data is that the vertical beam gives a fairly good signal into Africa even though this direction is 90 degrees, or 2 S units, off the center of the radiation pattern.

And finally, a comparison was made with WA2BVU/4X operating portable out of Jerusalem. While in contact, a breaking station offered to make a direct comparison since he was using about the same power with a Yagi at 60 feet and was located only 60 miles away from my QTH. The difference amounted to about one S unit in favor of the elevated Yagi. This result again is very interesting considering Jerusalem is at about the half-power point in the W2FMI antenna pattern (3

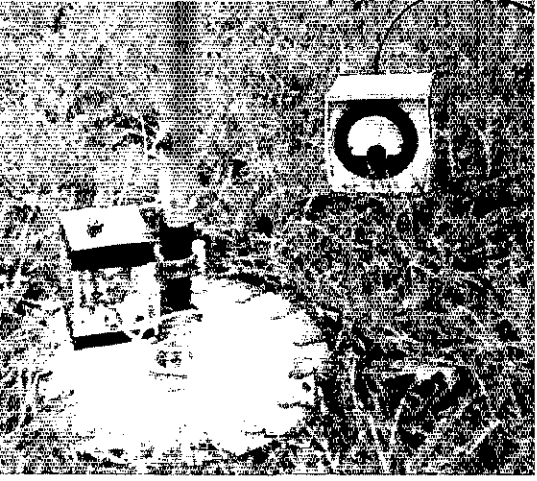
TABLE I

Dimensions of 20-Meter Parasitic 3-Element Array

1) Fixed Array	
Director	15 ft 8 in.
Driven Element	16 ft
Reflector	17 ft 7 in.
Spacing Between Elements	12-1/2 ft
2) Switched Array	
Director and Reflector	15 ft
Driven Element	16 ft
Spacing Between Elements	12-1/2 ft
Loading Coil	2 ft No. 12 wire wound 3 turns with 3 in. dia. Length adjusted for max. F/B ratio

DATE TIME (GMT)	STATION CALLED	CALLED BY	HIS FREQ. OR BAND	HIS SIGNAL RST	MY SIGNAL RST	FREQ. MHZ	EMISSION TYPE	POWER INPUT WATTS (DC)	TIME OF ENDING QSO	OTHER DATA NAME	QSL'd S	QSL'd R
11-3-71 1940	CQ	DGØND	14	59+5	59+10	14	A3	1KW	1800	Mike, terrific signal, one of strongest		
1800	X	IT9ZZW	"	57	59+5	"	"	"	1820	very good signal		
1820	X	DK5KI	"	57	59	"	"	"	1830	very nice signal		
1830	X	DL6TV	"	59	59	"	"	"	1850	really strong, not many 59 on my TR4		
1850	X	ZE2KV	"	58	58	"	"	"	1910	Jerry extremely fine signal		
1910	X	DL2OW	"	57	57-8	"	"	"	1940	Hans loudest on band		
1940	GB3MEX	X	"	58	59	"	"	"	1945	— changed rig —		
1945	CQ	DA1TZ	"	59	59+	"	"	250	1955	Ron - above average signal		
1955	X	W8MFU	"	59	59+40	"	"	"	2105	Jack - first working on 10 meters		
2105	X	W6MBV	"	57	58	"	"	"	2115	John		
2115	X	WA9ZCP	"	59	59	"	"	"	2130	E.J.		
2130	X	EA3RR	"	57	59	"	"	"	2145	very strong signal		
11-6-71 1930	CQ	WØCK	"	59+15	59	"	"	1KW	1930	Don		
1950	I3EZE	X	"	58	59	"	"	"	1735	first on pick-up, very fine sig		
1735	X	I4APG	"	58	59+5	"	"	"	1747	above average signal. Paolo		
1747	X	I1ZNG	"	58-9	59+5	"	"	"	1757	Nicky booming into Italy		
1800	DJ7II	X	"	57-8	59+5	"	"	"	1815	only one other heard on mine, other S6		
1815	X	ON8UU	"	59		"	"	"		15 - loud + S3		

Fig. 6 — Picture of one of pages of the log during the run of 59 contacts with European and African amateurs.



Base of one of the parasitic elements showing the relay enclosure, loading coil, and the indicator meter of the field-strength detector, which was located 2 wavelengths away.

dB down) and hence consistent with all the other reports.

On a more subjective note, it can be said that this vertical beam has been an exciting performer. A CQ on 20 meters generally raises a DX reply. In many cases several stations respond making it embarrassing to one not used to such attention. A three-element Yagi at 40 feet used by W2FMI (then K3RXG) when operating out of Bethlehem, Pennsylvania, never came up to this luxury.

Conclusion

From this work, as well as the previous one,[9] it is quite apparent that a good ground system is required for efficient operation of vertical antennas. Even though the vertical antenna has been around for a long time, much remains to be done on image-plane antenna configurations.

It is hoped that others will help in supplementing and extending this work since little has been done on the vertical antenna over the last three decades in skywave transmission investigations. It is quite evident that the payoffs could be large, particularly on the 40- and 80-meter bands, where antenna gain is difficult to obtain.

Another observation should be noted relative to this study. Although the experimental results obtained at this location were completely consistent with theoretical expectations, they were obtained over a relatively short interval of time and should be verified by others. It may be difficult for some to believe that three, short, thin aluminum poles on the ground could compete favorably with beams at 50 and 60 feet. But if this investigation turns out to influence antenna structures of the future, then our fraternity could very well take on a look more in tune with the new ecological views.

Finally, I would like to acknowledge the many amateurs who contributed important data and encouragement to this work. In particular, I would like to thank Mr. Gerard D. Wall, ZE2KV, for his reports.

[9]See footnote 2.

50 Years Ago this month

June 1922

. . . The great power-factor controversy of the first ARRL National Convention breathed its last in June 1922 *QST*. The lead article, by Prof. F. C. Blake of Ohio State, analyzed it dispassionately, with rather more mathematics than was usual in the *QST* of those days. The verdict: Both contenders were right, but one was looking at the circuit from the inside while the other's viewpoint was from outside.

. . . In an early instance of amateurs stepping to the fore in a communications emergency, 9ZL set up a temporary station (spark!) when communication lines were wiped out by a storm in the Fox River Valley, Wisconsin. The equipment was installed in a manufacturing plant which generated its own power, the power lines being out too, and communication was established with Manitowoc. Some 250 urgent messages were handled. Other amateurs, including 9DHG at Oshkosh, similarly without power, set up spark-coil stations and participated in emergency traffic handling.

. . . Technical highlight of the issue is a symposium on electrolytic rectifiers edited by S. Kruse. Collecting the observations of many "slop-jar" users and putting them into perspective, the sound dope in the article benefited numberless readers, the present writer among them.

25 years ago in QST

June 1947

. . . The editorial this month introduces a topic that in coming years was to dominate amateur operating – TVI. A threat unparallelled, as it turned out, since the early days of BCI, it was at that time foreign to the experience of all amateurs outside metropolitan New York – and even there there were comparatively few TV receivers in operation. No doubt the thunderclouds were dismissed by most readers as not being a menace to *them*, but this happy condition was not to last. The answers, as the editorial said, were yet to be found – providing effective ones *could* be found.

. . . In one of his many significant contributions to amateur technology, O. G. Villard, Jr., W6QYT, described a method of suppressing overmodulation in a-m phone. Properly applied, it made overmodulation impossible by the ingenious scheme of turning the excessive modulation swings into out-of-phase rf peaks, a form of reduced-carrier modulation that automatically came into operation when the swings exceeded a preset level.

. . . J. C. Geist, W2STZ, is the author of an article on a 2-meter fm transmitter whose frequency deviation can be varied to meet the needs of the superregen receivers then widely used.

. . . Removal of restrictions on the 2-meter band that had prohibited operation between 146.5 and 148 MHz in certain parts of the country, because of military use, is reported in "Happenings of the Month." – *W1DF*

More on Instant Voice Interruption

BY H. ROMMEL HILDRETH,* WØIP

THE CONVENTIONAL VOX control system performs two functions. It enables and disables the transmitter and receiver alternately and switches the antenna between the receiver and the transmitter. As the voice strikes the microphone, a trace of audio signal is amplified and rectified. This dc pulse is used to close a relay. In turn, other relays may be closed and many circuits are completed. An electronic delay function maintains the relays in a closed state until the voice has stopped for a suitable length of time.

The author's VOX system uses the voice-generated dc pulse to forward bias a transistor. In turn, this transistor controls other electronic circuitry which performs all the above functions without the use of relays. Electronic switching is much faster than activating relays. The switching transistors must be connected to points in the circuit to assure that recovery time is very fast. The electronic switching eliminates noise from chattering relays, and reduces other troubles, such as relay sticking and arcing. Additionally, the operator is permitted to hear between syllables or dots and dashes. Each syllable spoken into the microphone creates a dc pulse which is adjusted to encompass the entire syllable. Toward the end of the syllable, as the voice intensity diminishes, a dead space occurs. During this short period the transmitter is disabled and the receiver is activated. These short hearing periods occur at the rate of about three hundred per minute so a considerable amount of the total operating time is devoted to listening.

There are countless times when it is desirable to ask the other fellow to wait a moment, or to ask him to repeat something that was missed. The procedure of speaking and then saying "over" is not the natural way of carrying on a conversation. In fact it was never experienced until Marconi invented the "wireless!" Although this electronic switching system falls short of landline telephony, at least, the operator knows when others are on frequency. There is no longer a chance of doubling or unnecessary calling.

Muting Control

A few words about transistors may be helpful. As used here, they merely open and close circuits. When a transistor is fully conductive (saturated) its resistance is very low. When it is nonconductive, the resistance is quite high and for most purposes the circuit is open. FETs resemble a vacuum tube triode: When a negative *voltage* is applied to the gate, the device becomes nonconductive. The conventional type of transistor becomes conductive when a small *current* is made to flow between the base and emitter (forward bias).

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The basic circuit diagram appeared in an earlier issue of *QST*.[1] The center terminal of the muting jack in the 75S-3 is connected to the ungrounded end of a resistor in the bias system. This point, which is at -23 volts, is also connected to the grid of the first mixer. The mixer is cut off until the resistor is shorted to ground. The standby switch and the muting jack terminals are connected in parallel across this same resistor.

Q1 is connected across the standby switch. When Q1 conducts, it shorts the resistor and activates the receiver. The battery-resistor combination in the base-emitter circuit serves to forward bias the transistor into full conduction. If the base-emitter connection is shorted to ground the current through the battery resistor increases giving a greater voltage drop. Since the voltage drop opposes the cell voltage, the resultant voltage between the base and emitter of Q1 is less than before and the transistor becomes nonconductive, thus muting the receiver.

Q2 is forward biased by a dc pulse furnished by the VOX rectifier. This pulse is adjusted in amplitude by the VOX sensitivity control. The pulse duration is regulated by the VOX hold control. The threshold voltage at which switching takes place is regulated by a potentiometer connected to the base of Q2.

The shape of the dc pulse is important. Fast attack is needed to assure no noticeable loss in the first part of a syllable. With a given voice intensity at the microphone the amplitude of the pulse will be governed by the VOX gain. If the amplitude is too low, the beginning of a syllable will be chopped. If the amplitude is too high, the hold time will be lengthened unnecessarily, cutting into the dead spaces between syllables so that the operator could miss breaking signals. It is possible to transmit so that there is no evidence that change-over switching takes place with each syllable.

Exciter Enabling and Disabling

When an exciter is turned on, the tubes warm up and the relays close, provided the PTT jack contains a shorted phono plug. Voltage is being delivered to all circuits. The oscillators are functioning and there output combines to form a carrier. The 6146As are idling normally at about 50 mA. The latter causes "hash" in the receiver, and the carrier, even though suppressed, forms a strong signal at the receiver. Both of these noise sources must be silenced for normal receiving.

Two types of electronic switches are used to control the noise sources. The first switch applies cutoff bias to the first mixer, and the second one

[1] Hildreth, "IVI," *QST*, Oct., 1968.

opens the screen-voltage line to the 6146s. Both of these switches are controlled by the receiver muting voltage so that there is instant enabling and disabling of the transmitter and receiver.

Cutoff Bias At The First Mixer

Two separate (but identical) switches control the grids of the twin-triode mixer. With the two types of switching shown in the diagram, there is no adverse interaction with any of the original circuitry. Note that each switch is completely isolated from the other and there is a ten-megohm impedance presented to the muting voltage of the receiver. The final-amplifier screen switch is isolated completely from the receiver muting line.

V4 in the 32S-3 has a 470,000-ohm resistor in each grid circuit. A 22.5-volt battery is connected across the resistor to place cutoff bias on each grid. In series with the battery is an FET which opens the battery circuit when the receiver muting voltage appears at the FET gate. Thus, as the receiver is muted, the minus 23 volts turns on V4 by removing the cutoff bias. The second grid of V4 has a similar control switch.

Screen-Circuit Control of the 6146s

A high-voltage transistor is placed in the screen line of the final amplifier. When the transistor is forward biased by the base-emitter battery, the normal 22-mA current flows in each screen circuit. When the base of Q3 is grounded through one section of a twin triode, the forward-biasing voltage is reduced sufficiently to interrupt the screen voltage. The increased current through the

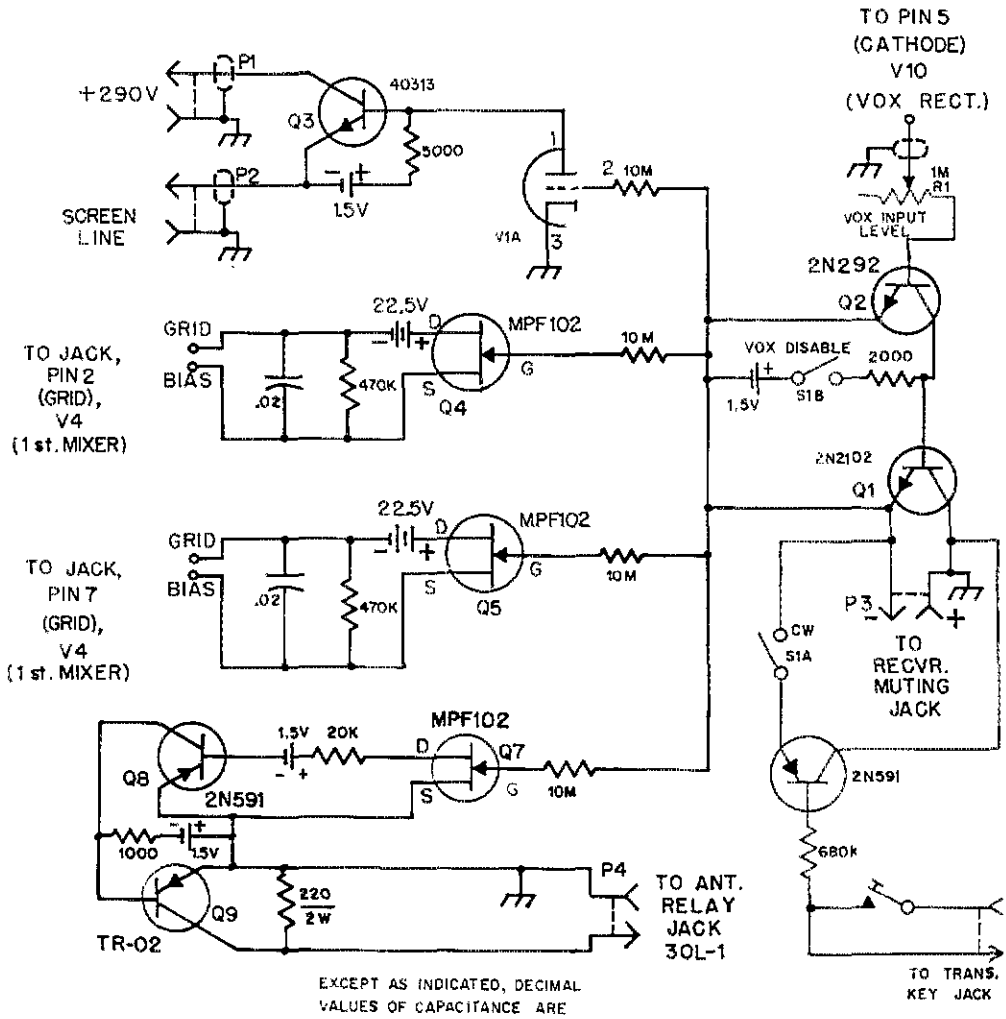

Fig. 1 — Revised circuit diagram for the "IVI" control. R1 should be adjusted to assure proper activation of Q1. S1 is a dpdt slide switch.

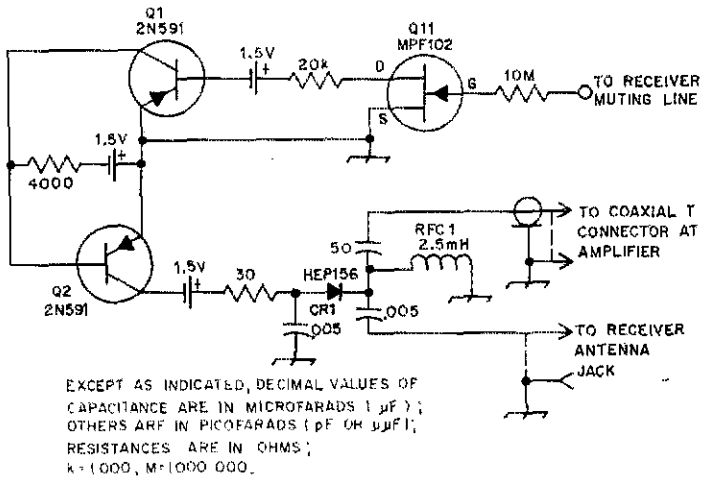

Fig. 2 — Circuit diagram for antenna switching between the receiver and transmitter. The battery connected in series with the 30-ohm resistor and Q2 should be checked periodically to assure proper operation of the switching device. A weak or dead battery could allow full transmitter output power to reach the receiver antenna terminals. The components should be mounted as close to the T connector as possible.

battery resistor causes a voltage drop just as in the case of Q1 and Q2. One may wonder why the vacuum tube? Cutoff switching is required between ground and the base; the small leakage of solid-state devices fails to control Q3. Also note that the three terminals of the conducting transistor are all at plus 290 volts.

Linear-Amplifier Control

Q7, Q8 and Q9 operate to control the Collins 30L-1 bias. Since the amplifier relay is activated during transmitting and receiving periods, there are 200 watts of needless heat dissipation from the idling current. A 220-ohm resistor plugged into the antenna relay jack raises the grid bias to cutoff. The linearity must be restored, however, for proper ssb operation. This resistor must be shorted by a transistor which is controlled along with the other electronic switches. Q8 is connected between the FET and the power transistor for reversal; the FET is cut off by the muting voltage, while Q8 becomes nonconductive and Q9 conducts.

Antenna Switching

The diode method of antenna switching shown in Fig. 2 is not original with the author. A T connector is used at the antenna jack to pick up rf for receiving. Two capacitors pass the incoming signal to the receiver. The line between the capacitors connects to ground through an rf choke which completes a dc forward-biasing pathway for the diode current. When the FET is not conducting, a dc of about 7 mA flows through the diode to ground. In this state the diode passes transmitter rf appearing at the connector to the ground capacitor and thereby protects the receiver.

The device was tested by substituting a 0.5-watt, 50-ohm resistor in place of the receiver. When the diode was forward biased, the loading resistor remained cold even with a transmitter power of 960 watts. The rf voltage across the resistor reached 5. With no forward-biasing current the loading resistor cracked open from heat instantly with only 100 watts of transmitter input power. The diode is rated for 200 PRV at 1 ampere.

The leads between the coaxial T connector and the diode circuit should be kept short. Loading the exciter without the T circuit produces slightly different loading values than when the T circuit is connected. Receiving tests were made by quickly shifting the receiver lead from the diode switch to a direct antenna connection. No difference in signal strength could be observed. Caution: The battery voltage supplying the diode must be reasonably normal. The 7-mA drain is low and not critical but if the battery fails, harm could come to the receiver. All other batteries in the device may fail without harmful results.

Cw Switching

For fast cw break-in, a slightly different muting system is used. This operation was presented in an earlier article.[2] Instead of switching with the VOX circuit (which handles slow cw fairly well), a separate transistor is switched into the Q1 position and the battery voltage to Q1 is turned off. A pnp transistor is forward biased with the negative voltage supplied by the 32S-3 key jack terminals. A dpst switch connects the collector of this additional transistor to the collector of Q1. The emitter is connected to the Q1 emitter. The cw transistor is connected permanently to the key jack and keyer. With the key open, the transistor is conducting; with the key closed the key voltage is shorted out, and the receiver is muted instantly. The receiver muting voltage controls the electronic switches for the transmitter as already described.

Agc

The Collins 75S-3 agc has a slow-release time of about two seconds duration. Even when switched to the fast position, the recovery time is too slow for break-in service. Disabling the agc by the off switch is satisfactory for cw work because usually the operator is in communication only with one

(Continued on page 37)

[2] Hildreth, "Transistor Keyer-Muter for the Collins S-Line," *QST*, Dec., 1964.

Antenna Impedance by Direct SWR Measurement

BY MICHAEL J. TOIA,* W3TQM/4

DURING YEARS of experimenting with amateur antennas, it has often been my dream to have a black box that would indicate directly the resistance and reactance of the antenna feed point. Of course, such boxes have existed for a long time. But their price puts them out of the reach of many amateurs.

After many un- or semi-successful attempts to build such a device were made, an idea presented itself. Its development into a useful tool is given below.

The Device Postulated

Consider a transmission line terminated in some mismatched load, as shown in Fig. 1A. Since the line is mismatched, there will be a pattern of voltage maxima and minima along the line, repeating each electrical half wavelength, as shown at B. If we could measure the voltages along the line and plot them as in Fig. 1B, we could divide the maximum voltage by the minimum to obtain the voltage standing wave ratio, or VSWR, or merely SWR. This ratio will always be greater than (or equal to) one.

The question is, how may the voltage be measured at points along a coaxial transmission line? We may try cutting a small hole in the line and inserting a voltmeter probe, as in Fig. 1C. With enough holes, spaced every inch or so, we can make the measurement. This technique is actually used at microwave frequencies, but the row of holes is enlarged to form a slot running the length of the line, as in Fig. 1D. Rigid coaxial line about one wavelength long is used to make the measurement. However, working with rigid coaxial lines 80 or 160 meters in length is a bit awkward. Cutting a slot in the same length of flexible line, such as RG-8/U, is somewhat impractical, as the line refuses to stay together. Another method of inserting a voltmeter into the line must be used.

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Construction

As an approach to the slotted-line technique, several coaxial lines with lengths in ratio of 2:1 were prepared. By rearranging these lines in various sequences, a voltmeter may be inserted into the total line at any multiple of the shortest length, as will be shown shortly. Initial measurements indicated that readings every .025 wavelength are necessary. The shortest wavelength of interest to the writer was ten meters (28 MHz). Thus the shortest line section prepared had a length of 7.03 inches, including connectors. This length is obtained from the following formula:

$$Length\ (feet) = \frac{984}{Frequency\ (MHz)} \times Length\ (wavelengths) \times Velocity\ Factor$$

For the shortest section,

$$Length\ (inches) = (\frac{984}{28} \times .025 \times .66) \times 12$$

The cables were prepared with RG-58C/U, which has a velocity factor of 0.66. Each section was prepared with two male BNC cable connectors and one UG-914/U adapter included in the section length. The adapters are necessary to link the sections in series for use.

Table 1 lists all sections required, assigns each a number, gives the physical lengths, and lists the electrical lengths of each section at the various frequencies that are likely to be encountered in amateur measurements. Nine sections permit measurement at all frequencies from 1.8 to 29.7 MHz.

Operation

Using the line sections to obtain antenna-impedance measurements is not difficult. Draw up

TABLE 1

Section No.	Length	Electrical length, wavelengths					
		28 MHz	21 MHz	14 MHz	7 MHz	3.5 MHz	1.8 MHz
1	7"	.025	.019	.012	.006		
2	1' 2-1/16"	.050	.038	.025	.012	.006	
3	2' 4-1/8"	0.100	.075	.050	.025	.012	.006
4	4' 8-1/4"	0.200	0.150	0.100	.050	.025	.012
5	9' 4-1/2"	0.400	0.300	0.200	0.100	.050	.025
6	18' 9"	0.800	0.600	0.400	0.200	0.100	.050
7	37' 6"			0.800	0.400	0.200	0.100
8	75'				0.800	0.400	0.200
9	150'					0.800	0.400

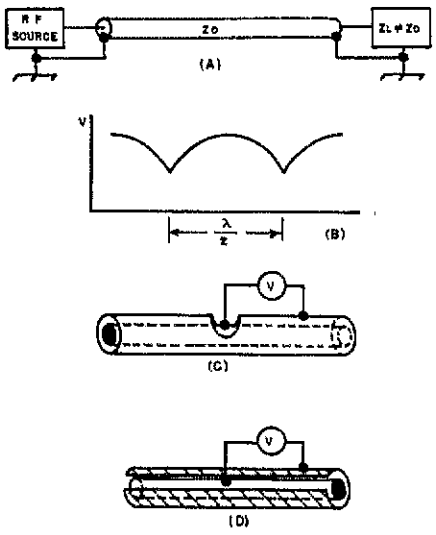


Fig. 1 — The principle of measuring SWR in a coaxial transmission line.

a sheet of paper in the format of Table II. Connect the lines as shown in Fig. 2A using section lengths of .025λ, .050λ, .100λ, .200λ, and .400λ. Connect all sections shorter than .025λ between the source (transmitter) and the line. Apply a signal from a low-power (five- to fifty-watt) transmitter to the source end of the line. Remove the UG-914/U adapter at the load (antenna) end of the line and insert an rf voltmeter by using a UG-274/U T adapter. (Details of a suitable voltmeter circuit are given later.) Read the relative rf voltage and enter this reading into Table II at .000λ. An absolute voltage measurement is unnecessary, as we are interested only in voltage *ratios*. The voltmeter sensitivity may be adjusted for about half-scale deflection at this reading.

Move the voltmeter and T to each point marked with an X on Fig. 2A, read the relative voltages, and enter these readings into Table II. This will complete the entries at .000λ, .400λ, .425λ, and .475λ. (These figures refer to the line length from the load end of the line to the voltmeter.)

Rearrange the line as in Fig. 2B and take voltage measurements at .025λ, .075λ, .175λ, and .375λ. Enter these readings into Table II. Continue through the configurations of Fig. 2 until the column of Table II is filled to the .475λ entry. It is not necessary to extend Table II beyond this point, as the voltage standing-wave pattern repeats itself each half wavelength along the line.

If all voltage readings are identical, *stop here* — and congratulations! Your antenna will give an SWR of 1.00 at fifty ohms! If you are not so fortunate, set up the line and voltmeter in the configuration that gave the lowest voltage reading. Find the minimum voltage *and position* by moving the line sections shorter than .025λ from the source end of the line to the vicinity of the voltmeter. Use these sections as "trimmers" of the load-to-voltmeter length, and record as accurately as possible the minimum voltmeter reading obtainable, as well as the position at which it occurs. Enter these figures into Table II as MIN and POSITION entries, respectively. At the higher frequencies, one UG-914/U and one UG-491A/U may be used as a short line section for the trimming operation.

Note that the total length of line between the source and the antenna is the same for every measurement. The various sections are simply interchanged; no sections are added to or removed from the total line length once measurement has begun. This is necessary to keep the transmitter load constant.

The electrical length of feed line between the antenna and the load end of the measuring line must be entered into Table II as the FEEDER entry. If the impedances of the antenna feed line and the measuring line sections are different, *disregard this instruction* and enter ".000" as the FEEDER entry.

Calculations Simplified

From Table II, the SWR is calculated by dividing the MAX entry by the MIN entry. All remaining calculations are done graphically on a sheet of paper designed specifically for this purpose. It is called a Smith chart and is shown in Fig. 3. A description of the Smith chart and its

TABLE II — Data Sheet Format

Antenna-to-Voltmeter Length (Wavelengths)	*Voltage*		
	Load A	*Load B*	*Load C*
.000	53	50	40
.025	53	48	41
.050	53	50	43
.075	53	54	41
0.100	54	50	45
0.125	55	52	43
0.150	54	51	45
0.175	52	50	39
0.200	54	48	39
0.225	54	43	37
0.250	54	38	41
0.275	54	33	38
0.300	54	32	36
0.325	54	29	31
0.350	53	32	36
0.375	53	32	36
0.400	53	37	38
0.425	54	41	40
0.450	53	47	41
0.475	53	50	41
MAX	55	54	45
MIN	52	29	31
SWR	1.06	1.86	1.45
POSITION	0.175	0.325	0.325
FEEDER	.000	.000	.000
TOTAL	0.175	0.325	0.325
R/Z_o	1.03	1.23	1.18
X/Z_o	0.05	0.65	0.38
CAP/IND	CAP	IND	IND
R	51.5	61.5	59
X	2.5	32.5	19

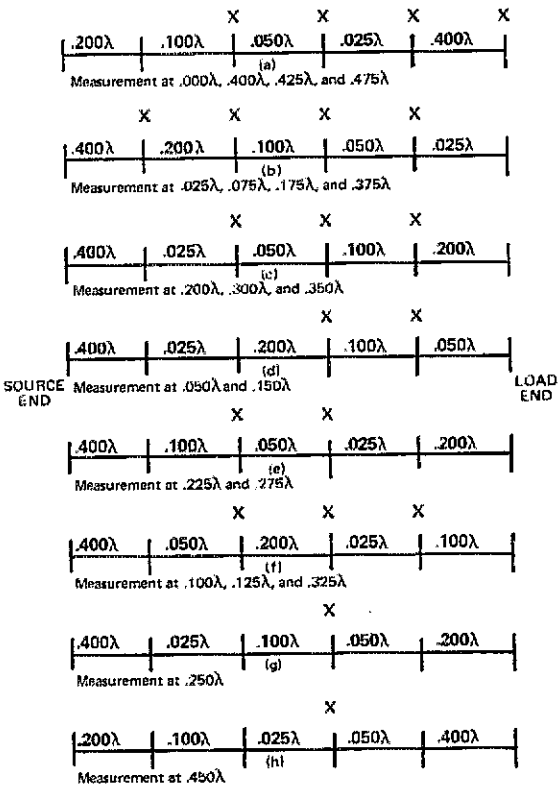


Fig. 2 – Test cable lengths and arrangements for measuring line voltages.

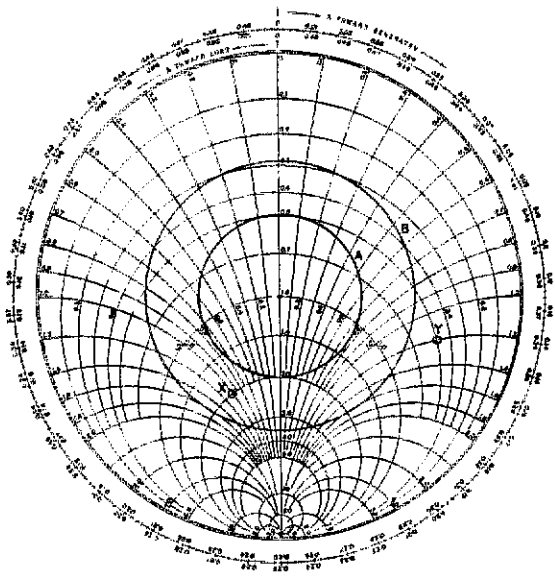


Fig. 3 – Smith chart. See text.

applications to amateur antenna measurements have been given by Hall.[1] Further descriptions of Smith chart theory and applications are found in other literature.[2,3,4] A brief description of the chart given here will allow the reader to follow the instructions of this writing like a cookbook to obtain results with no further knowledge of Smith chart theory or transmission line formulas.

Examine Fig. 3. The outer circle of the chart, the wavelength circle, is divided into evenly spaced wavelength increments. Above the top of the vertical axis is a zero and an arrow pointing in the counter-clockwise direction, marked "wavelengths toward load." Moving along this circle is equivalent to walking along the transmission line being represented by the chart. The antenna is the load, and the transmitter is the source.

The circles which cut across the vertical axis of the chart represent "normalized" resistance values, which simply means resistance divided by the characteristic impedance of the transmission line. The normalized resistance circles are labeled along the central vertical axis, beginning with zero at the top, through 1.0 at the chart's center, to very large values (infinity) at the bottom. The numbers from the center of the chart to the bottom of the vertical axis also represent SWR, as we shall shortly see.

The lines which rise from the bottom of the chart and curve away from the vertical axis represent normalized reactance values. Again, the true reactance is the normalized value multiplied by the characteristic impedance. Reactances to the left of the vertical axis are capacitive; those to the right are inductive.

Circles drawn on the chart, centered at the chart's center, represent transmission lines operating at SWR values above 1.00. The smaller the circle, the smaller the SWR. An SWR of one results in the circle's collapse to the center of the chart. The SWR for a given circle may be read from the normalized resistance value at the crossing of the vertical axis and the SWR circle below the chart's center.

In Fig. 3, point X represents an impedance of 2.0 $-j1.0$ in normalized resistance and reactance values. If the line impedance of Fig. 3 is 50 ohms, then point X represents a resistance of $2.0 \times 50 = 100$ ohms; the reactance is $1.0 \times 50 = 50$ ohms. The notation $-j$ simply indicates that the reactance is capacitive. A notation $+j$ means inductive reactance. Thus, point Y represents a normalized impedance of 0.5 $+j1.2$, or 25 $+j60$ ohms, which means 25 ohms resistance and 60 ohms inductive reactance. Circle A represents a line operating with

[1] Hall, "Smith-Chart Calculations for the Radio Amateur," *QST*, January, 1966, p. 22 and February, 1966, p. 30.

[2] Smith, "An Improved Transmission Line Calculator," *Electronics*, Vol. 17, January, 1944, pp. 130-133.

[3] Bowman, "Impedance Matching and Broadbanding," Ch. 31, *Antenna Engineering Handbook*, McGraw-Hill, New York, 1971, pp. 31-34.

[4] Silver, "Circuit Relations, Reciprocity Theorems," Ch. 2, *Microwave Antenna Theory and Design*, Vol. 12, M.I.T. Radiation Laboratory Series, New York, 1949, pp. 29-36.

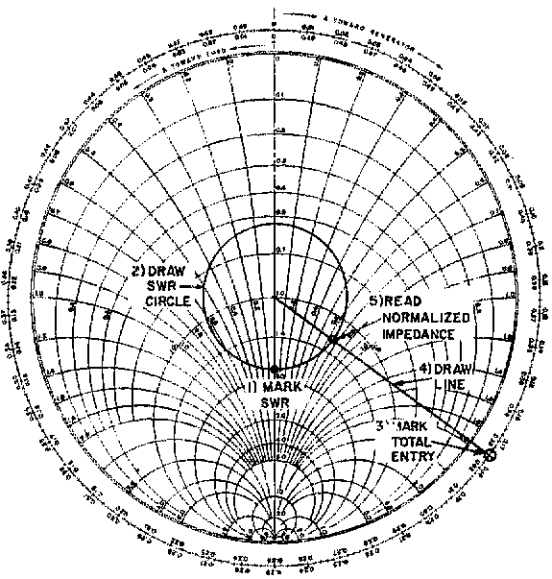


Fig. 4 — The five steps which are used to determine a load impedance by direct voltage measurements along the line.

an SWR of 2.00; circle B represents another line operating with an SWR of 3.5.

An Example

To develop the procedure in its final form, and in as clear a manner as possible, let us calculate the impedance of a 16-foot 6-inch ground-plane antenna for twenty meters, as shown in Fig. 5B. Following the instructions given in the "Operation" section resulted in column B of Table II. The maximum voltage, at .075λ was 54, and this is entered in the MAX position of Table II.

By using trimmers of less than .025λ, a minimum voltage of 29 was obtained, with a line length of .325λ between antenna and voltmeter. These are entered into Table II under the headings MIN and POSITION. In this example, there was no feed line between the antenna and the measuring sections, so .000 was entered into the FEEDER entry of Table II. The TOTAL entry, which is the sum of the entries POSITION and FEEDER, is thus .325.

The SWR entry is obtained by dividing the entry MAX by the entry MIN. The value obtained was

$$SWR = \frac{54}{29} = 1.86$$

Further discussion is based on Fig. 4. Here a five-step procedure to convert Table II to antenna impedance is outlined:

1) Mark the vertical axis at the SWR value of Table II. The mark in this example is placed at 1.86.

2) Draw a circle, centered at the chart's center, which passes through the SWR mark.

3) Beginning at the zero of the wavelength circle, proceed toward the load (counter-clockwise) until the TOTAL entry of Table II is found. If the point to be plotted exceeds .500λ, subtract increments of .500λ from the entry of Table II so that the remainder is between .000λ and .500λ. Mark the wavelength circle at this point. The mark is placed at .325λ in this example.

4) Draw a straight line from this mark to the center of the chart.

5) From the intersection of the straight line and the SWR circle, read the normalized impedance. In this example, the normalized impedance is 1.23 +j0.65. Record these normalized values in Table II as R/Z_0 and X/Z_0 entries. Also record the type of reactance.

We are now finished with the Smith chart. Enter the resistance and reactance of the antenna into Table II by multiplying the normalized values by the measuring-line impedance. In this example,

$$R = 1.23 \times 50 = 61.5 \text{ ohms}$$

$$X = 0.65 \times 50 = 32.5 \text{ ohms}$$

The Procedure Extended

With this information in hand, the antenna may be pruned a bit more intelligently. After each change in the antenna system, record a new column of Table II and obtain new SWR and impedance values. Note that it is not necessary to make measurements at the antenna terminals. Any length of line that has impedance equal to the measuring-line sections may be used between the antenna and the measuring sections. It is only necessary to enter the electrical length of the feed line so used into the FEEDER position of Table II.

Suppose a measurement of the impedance of a beam located atop a seventy-foot tower is desired. Suppose further that the antenna feeder is 73-ohm coax, and that the measurement lines have been constructed of 50-ohm line. The antenna impedance measurement may still be made, as follows: treat the antenna *plus feeder* as one load. Determine the impedance as before, but enter ".000" into the FEEDER entry of Table II. Then renor-

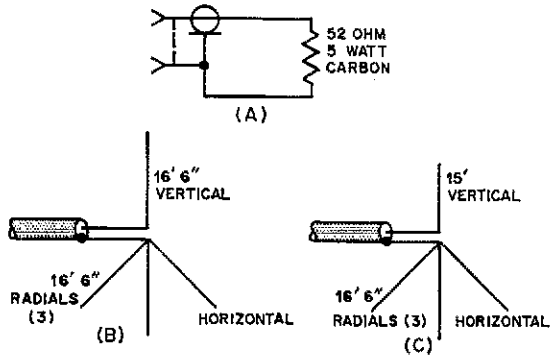


Fig. 5 — Various loads for which the impedance was measured by the author. The results of the measurements are tabulated in Table II.

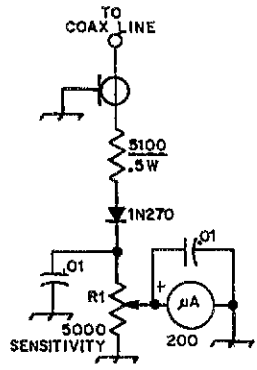


Fig. 6 — A suitable rf voltmeter for measuring line voltages. Resistances are in ohms, capacitances are in microfarads. Once set for a series of measurements, R1 should not be disturbed until measurements are completed for a particular load.

malize the impedance values entered into the R and X positions of Table II by dividing these values by 73 ohms, the impedance of the antenna feeder. Plot this normalized impedance point on a *new* Smith chart. Draw an SWR circle and a radius to the wavelength circle through the impedance point plotted. Proceed counter-clockwise along the wavelength circle, from the intersection of the radius drawn, an amount equal to the electrical length of the antenna feed line. Draw another radius from the final point established on the wavelength circle. From the intersection of the final radius and the SWR circle, read the normalized impedance of the antenna, and multiply by 73 ohms to obtain the actual impedance. Read the antenna's SWR from the SWR circle as before.

Although the line sections described here have been designed for one frequency (or rather, a set of harmonically related frequencies) they may be used at any frequency. As an example, when using the lines at 3.5 MHz, the sections numbered 4, 5, 6, 7, and 8 should be used, to have lengths of .025λ, .050λ, 0.100λ, 0.200λ, and 0.400λ. When using these sections at 3.9 MHz, the electrical lengths are given by

$$Length\ (3.9\ MHz) = Length\ (3.5\ MHz) \times \frac{3.9}{3.5}$$

Thus, the lengths become .0286λ, .057λ, 0.114λ, and so on. In general, the new length is given by

$$New\ Length = Design\ Length \times \frac{new\ frequency}{design\ frequency}$$

When setting up Table II, use these new lengths, and proceed as before.

The Voltmeter

The voltmeter circuit used by the author is shown in Fig. 6. It was built in a small Minibox with a BNC chassis connector and a BNC T connector mounted to the side of the box. Other rf voltmeter designs may be used.

Concluding Remarks

Fig. 5 shows an assortment of loads checked by this procedure, and Table II tabulates the results. It can be seen that the 52-ohm resistor gave a nearly unity (1.04) SWR. The twenty-meter ground plane was found to offer a better match to a fifty-ohm line when the vertical element was trimmed to 15 feet. The initial length of 16 feet 6 inches offered some *inductive* reactance, which prompted the pruning.

Smith chart paper may be difficult to obtain. Some university bookstores carry a supply. The charts used by the author carry General Radio Company's identification "Smith Chart Form 5301-7560-N." The author has sometimes used a piece of tracing paper or waxed paper placed over a chart in an article or book.

The set of lines described herein constitute a piece of test gear, and should be treated accordingly. Too often, the temptation to use one or more carefully prepared sections for some other mundane use will arise. Consequently, a container with hinged lid has been obtained to house the nine sections, the BNC fittings, the voltmeter, copies of Table I, Table II and Fig. 3, and some note paper. The lines have been tagged with the section numbers of Table I for easy identification.

Care in the use of the lines is also in order. BNC fittings fill up with dirt easily — they should be kept clean. A small brush for this purpose is a handy addition to the carrying case. BNC connectors may be bent or crushed by stepping on them! In addition, RG-58C/U is easily removed from connectors when the user trips on a taut line. Don't be in a hurry.

These measurement-line sections and the measurement technique described have proven to be a valuable addition to my shack. The way is now open for at least one "prune-to-tune" enthusiast to have a more fertile antenna farm. I hope the procedure described herein will help the reader as well. May your antenna farm likewise bear fruit. I wish to express my appreciation to R. Nether, W3KFB, whose constant encouragement and many helpful comments have strongly influenced the completion of this paper. QST

"It Seems to Us..."

(Continued from page 9)

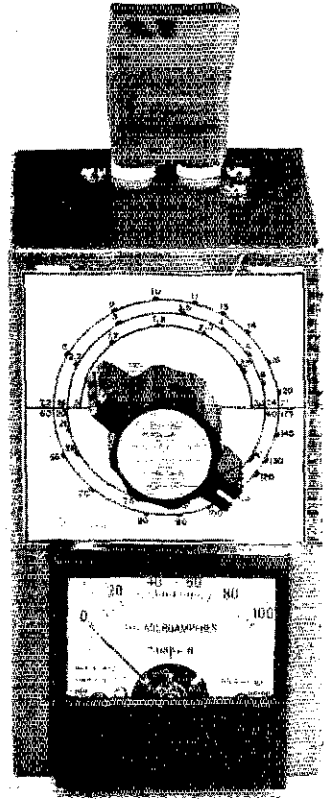
undoubtedly be some conflict between what is happening and what is recommended.

Which brings us to the second big job — that of moving individual repeater channels as necessary in order to conform to the over-all plan. It will mean expense for new crystals in many cases, and it will mean inconvenience in many cases. And, surely, there will be those amongst us who resist any "direction" from the "establishment." But if we are to realize the maximum communications for the greatest number, this approach — coordination through cooperation — is the way we are going to have to go. QST

• *Beginner and Novice*

A Simple Ham-Shack Wavemeter

BY LEW McCOY,* W1ICP



This is the completed wavemeter, with some of the coils.

MANY NOVICES when their tickets arrive, happily get on the air and start calling "CQ," or other stations. To their dismay, they get no answers. Everything *appears* to be working, but the results frequently leave much to be desired. Whenever we are asked to check such a case, we often find that the newcomer is transmitting on one band but listening on another. (And you'll never work anybody that way!)

Whether the rig is homebuilt or commercial it is possible to tune up on the wrong band, even though the band switch is set correctly. What is needed by the amateur is a device that will *show* him visually that his rig is on the correct band. Such an instrument is an absorption-type wavemeter.

What It Is

Probably the handiest device an amateur can have in his station is an absorption wavemeter. Simply, a wavemeter is an instrument that permits you to "see" the presence of radio-frequency energy and tells you where it is in the rf spectrum. When you couple a wavemeter to an rf field, such as near the final tank circuit of a transmitter, some of the energy is detected by the wavemeter, changed to direct current, and the level of dc is displayed on a milliameter. One important point that should be mentioned: An absorption wavemeter is *not* an accurate frequency meter. It doesn't tell you the precise frequency your signal is on, but it will tell you what *band* the signal is in. This is accomplished by using a tunable circuit in the wavemeter.

What You Can Do with a Wavemeter

As we have already pointed out, the most important use of a wavemeter to a Novice (or any amateur) is that of making sure his signal is in the correct band. The wavemeter can be coupled to the final amplifier stage or to the feed line to check the approximate operating frequency.

Another serious problem for Novices is the second harmonic when transmitting on 80 meters. This second harmonic falls outside the high end of the 40-meter band, in an area occupied by commercial services. If the harmonic is strong enough, the Novice may end up with a citation from the FCC. A wavemeter can be coupled to the feed line and the frequency region above 40 meters can be checked. If there is *any* indication of a second harmonic the Novice should take immediate steps to solve the problem.[1]

* Novice Editor, *QST*.

[1] Details for handling the harmonic radiation problem are given in *Understanding Amateur Radio*.

It should be apparent from this inside view of the wavemeter that construction is simple and any beginner should be able to make the instrument without difficulty.

The Circuit

The circuit diagram of the miniature wavemeter is given in Fig. 1. A parallel-resonant tuned circuit is used with a diode detector. Whenever the combination of C1 and L1 is tuned to the same frequency as the rf field being checked, the coupled energy is rectified by CR1 and the resulting dc is indicated on the meter, M1. A 5-pF coupling capacitor, C2, is connected to the high-impedance end of the tuned circuit. The small-value capacitor is needed to lessen the loading effect of the diode detector. Heavy coupling (as with a 100-pF or larger capacitor) would result in decreased sensitivity and broad tuning characteristics.

A hot-carrier diode is used in the model shown here — a Hewlett-Packard type 5082-2811. However, any germanium uhf diode will do nicely in the circuit. A 1N34A was tried in the wavemeter, and performance was nearly as good as with the hot-carrier version.[2]

2 The hot-carrier diode has better vhf response than many other types. This type of diode is discussed in detail in Chapter 4 of the 1972 edition of *The Radio Amateur's Handbook*.

Another hazard the newcomer faces is never being sure that the output from his transmitter is actually leaving the rig and reaching the antenna. The wavemeter can be placed near the antenna to show that rf is being radiated by the antenna system. Also, the device can be loosely coupled to the feed line and used as an output indicator when tuning up the rig. In fact, this is really one of the best methods for tuning up a transmitter. Always tune for maximum output, keeping the transmitter within its rated limits, and of course not exceeding 75-watts input if you are a Novice.

The wavemeter can be used to make sure each transmitter stage is operating on the correct band, or for that matter, operating at all. Receiver oscillation can be checked in a like manner. Another use of the device is as a field-strength indicator to check the adjustment of beam and mobile antennas to make sure that the antennas are tuned up for best performance. One other point: the sensitivity of the unit described here is adequate for checking low-power solid-state gear.

Circuit Details

The wavemeter described here is quite basic in its concept, is small in size, and requires no power source. The plug-in coils are made from the bodies of surplus FT-243 crystal holders. Consequently, the coils are small enough to fit into crowded areas of a circuit under test. The sensitivity is very good because a 100-μA meter is used for visual indication of the rectified rf sampled by the instrument.

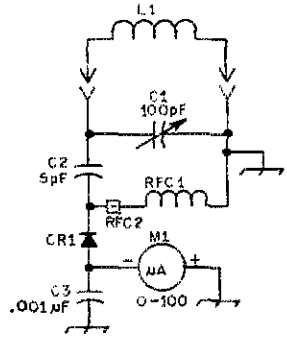


Fig. 1 — Circuit diagram of the wavemeter.
C1 — 100-pF variable (Hammarlund HF-100, Millen 20100).
C2 — 5-pF mica.
C3 — .001-μF disk ceramic.
L1 — See Table I.
M1 — 0-100 μA meter.
RFC1 — 1-mH rf choke (Millen J300-1000).
RFC2 — Ferrite bead (Amidon Assoc.).

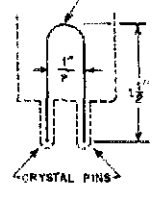


Fig. 2 — Details for making the vhf coil.

Construction

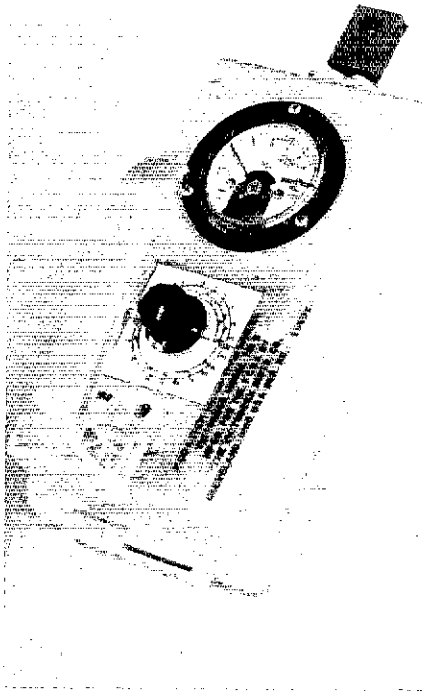
A Minibox measuring 2-1/4 × 2-1/4 × 4 inches houses the wavemeter. A James Millen 33102 crystal socket is located on one end of the box and is positioned near the lower edge of that box wall. Having the coil socket mounted low on the end of the case permits the coil in use to be more easily inserted into a chassis than if it were located at the center of the box wall.

The plug-in coils are wound on surplus crystal holders as shown in the photograph. It is not necessary to employ FT-243 style holders. There are numerous kinds of holders available, and one should use whatever types are readily available at low cost (check those flea markets and swap-and-shop sessions for bargains). The calibration plate given here[3] is set up for the FT-243 holders, but if forms of different size are used one can still use the dial plate if the coils are wound for the inductance values given in Table I.

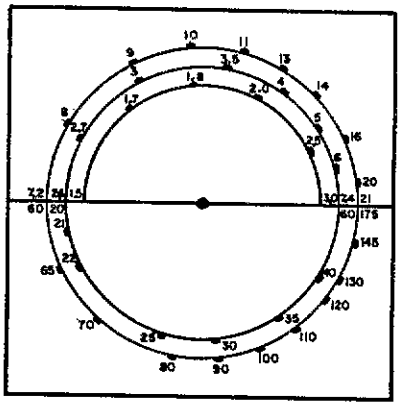
It will be necessary to remove the innards from whatever kind of holder you use. The crystal, its metal plates and compression spring are not used. If the holder has a metal face plate, throw it away too. In place of the metal plate use a piece of phenolic sheeting, Formica, or plastic material. The new cover can be glued in place with model or epoxy cement.

An alternative method for making the wavemeter is to adapt a surplus radiation counter. The unit shown in the photographs is made from such a

[3] Some amateurs may not wish to cut up *QST* to obtain the dial plate. ARRL Hq. will provide a dial plate, with pressure sensitive adhesive backing, for 25 cents and a self-addressed, stamped envelope. Please address your request to: Technical Department, ARRL Headquarters, 225 Main St., Newington, CT 06111.



Here is the modified radiation counter.



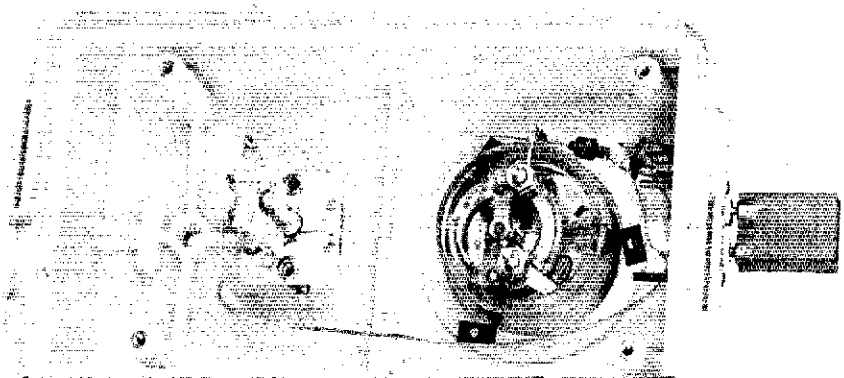
This is the full-size calibration plate for the wavemeter. Also, see footnote 3.

TABLE I

Coil Information

Range MHz	*Inductance*	*No. Turns*	*Spacing*	*Wire Size*
3.5-3.0	100 μH	Millen type J330-100 rf choke		
3.4-7.4	42 μH	70	Close-spaced	No. 30
7.2-20.0	4.8 μH	19-1/2	" "	No. 22
20.0-60.0	0.56 μH	6-1/2	" "	No. 22
60.0-175.0	See Fig. 2.			

Bottom view of the radiation counter case with the wavemeter components installed.



counter which is available quite reasonably on the surplus market.[4] The works for the wavemeter are mounted on the top section of the radiation counter case.

Modification of the counter consists of first removing the switch and resistor knobs from the top of the case and then the top is lifted clear of the rest of the components. This leaves just the meter mounted in the top. C1, Fig. 1, is installed where the switch was located. A crystal socket for the wavemeter coils is installed on the end of the top and the remaining components for the wavemeter are mounted on a standard-terminal tie strip that is secured by one of the bolts holding the crystal socket. The completed unit is larger than the one using the Minibox for a chassis, but the size should be no problem in the use of the wavemeter.

[4] Radiation survey meters are available from John Meshna, Jr., P. O. Box 62, E. Lynn, MA 01904.

Other Comments

Someone is sure to question the use of rectangular coil forms in this circuit. Don't let this be a psychological handicap! The *Q* is as good as that obtained with cylindrical forms. The unloaded *Q*s of these inductors check out at 100 or more. Comparisons were made with conventional inductors (cylindrical) while using the same wire sizes. The *Q* readings were nearly identical. Further checks were made by comparing the *Q*s of the inductors described here against those of commercially manufactured grid-dip meter coils. Almost identical readings were noted on a Boonton *Q* meter. QST

NEW BOOKS

RCA Solid State, RF Power Devices, Databook Series SSD-205, by RCA, Somerville, NJ 08876. Paperback, 6-1/2 × 8-3/4 inches. Price $2, 448 pages, including index.

The first six pages of this manual list a "solid-state selection guide" by category, function, material and performance level in numerical sequence. It is handy for the amateur designer or builder in helping him to decide what power level, frequency, and type of material is available for his project without having to search through voluminous data sheets elsewhere. RCA specification sheets are still available, however, if more information is required than that given.

The next 359 pages are filled with complete electrical specifications, charts, and physical dimensions of each of the devices. Pictures of each show what might be required in the manufacture of the pc board before actually viewing the unit. Included are suggested circuits and component values for numerous practical uses. In addition to all the graphs and charts showing all parameters that a designer might need, there is included the terminal diagram for each unit, similar to that found in the older tube manual series. Power levels to 150 watts and frequencies to 2.3 GHz are treated in the manual.

A great time- and money-saver for anyone interested in the building of solid-state circuits is included in the next three pages, which list types not recommended for new equipment design because of discontinued production.

The operating considerations for the RCA solid-state devices (in the application notes) provide a warehouse of information. They include: MOS field-effect transistors, integrated circuits, and just about every semiconductor device manufactured by RCA. As in the tube manual series, this book covers some suggested methods for the building of complete rf units. Most values are chosen with 50-ohm input and output impedances in mind, which allow a builder to construct a series of circuits and cascade them to whatever frequency and power level desired, and for most any mode of operation.

The rest is devoted to an index of all RCA solid-state devices by number, giving the data-book number for reference, so that if desired, the more complete information can be found quickly in other RCA publications.

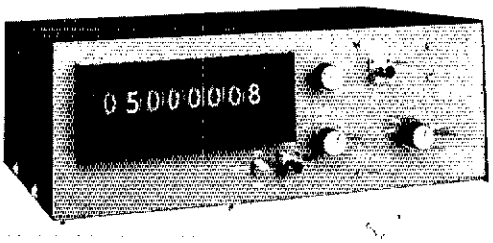
In this reviewer's opinion, a library of several books would be required to equal the information that is contained in these 448 pages. The educational value of the material would be difficult to parallel in any other manner, which makes this book well worth the price asked. – *WINTH*

Thyristors, Rectifiers, and Other Diodes, by RCA, size 6-1/2 × 6-1/4 inches, 512 pages. Price: $2.

The semiconductor industry, over the past several years, has been developing devices at an almost alarming rate. Keeping abreast of state-of-the-art components can be a chore, to say the least! The Solid-State Division of RCA has compiled a very extensive and comprehensive set of data sheets into one bound volume. This publication, when used in conjunction with a monthly newsletter entitled, *What's New in Solid State (available directly from RCA)*, provides the hobbyist or engineer with the latest specifications and product types. Four chapters, encompassing 362 pages, give complete details on RCA's product line of Triacs, SCRs, rectifiers and other diodes. The remaining pages feature useful reference material, and indeed one chapter title, "Types Not Recommended for New Equipment Design," is a bit thought provoking!

Each solid-state device which fits one of the above-mentioned categories is treated in minute detail. Characteristic curves for temperature ratings, surge currents, turn-on times, triggering, and all other parameters are shown. In many cases, operational and mounting considerations are discussed in textbook fashion.

Although this data book is published as a reference guide, over 100 pages are devoted to application techniques and custom circuit design. Typical circuits are given as examples. Whether this book is purchased as a reference guide or a textbook, the two-dollar price represents quite a bargain on today's book stand. – *WIFBY*



A homemade cabinet is used to house the frequency counter. Separate BNC jacks are employed for input connection to the hf counter and the vhf prescaler.

Notes on the Amateur Station Counter

BY DOUGLAS A. BLAKESLEE,* WIKLK

KEN MACLEISH'S COUNTER article in *QST* triggered a wave of construction using digital devices.[1] His article described a digital frequency counter which displayed the operating frequencies of a Collins S/Line transmitter and receiver. Later, Macleish, Pattison and Hejhall described a balanced mixer system that was used to interconnect amateur gear and commercially made digital counters.[2] While the basic Macleish design was most useful as a station accessory, this writer wanted also to use the instrument as a test-bench unit to check the frequency of audio and rf energy and to set vhf fm rigs on frequency.

An Input Circuit

For general bench use, an input section with high impedance and high sensitivity was needed. Many of the popular counter input circuits were tried. For simplicity and low cost the HUA circuit (*QST* for April 1972) proved to be the best choice. The circuit used and a pc-board layout for it are shown at Figs. 1A and 1B, respectively. To assure good performance above 30 MHz, a vhf FET, Q1, and a high-speed inverter package, U1, were employed. A switch was included to allow selection of inputs from the Rec/Counter, a vhf prescaler, or a direct input via a panel-mounted BNC connector.

A Vhf Prescaler

A frequency counter provides an excellent means for fm-ers to set their crystal-controlled transmitters "on channel." To provide vhf coverage, the counter must have an upper frequency response of at least 250 MHz – so that it covers the 50-, 144- and 220-MHz bands. Rather than trying to operate a counter directly at vhf, a device called a *prescaler* is employed to divide the incoming signal by a preset amount, usually 10 or 100. Thus, with a divide-by-10 prescaler, a 30-MHz counter can be used to 300 MHz (provided, of course, that the prescaler has a response of at least 300 MHz).

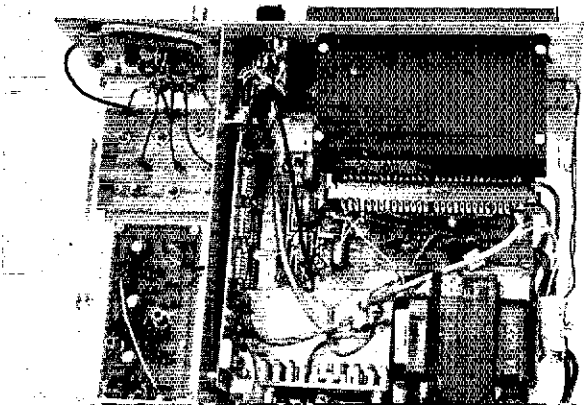
Fairchild Semiconductor recently has introduced an IC which includes an input circuit with excellent sensitivity and emitter-coupled logic circuits providing division by 10. This device, which is designated U6B95H9059X, is rated for operation to 300 MHz, and typical units can be made to operate at 325 MHz. Although the Fairchild unit is expensive ($16 in single quantity)[3] and there have been some long waits for

* Assistant Technical Editor, *QST*.

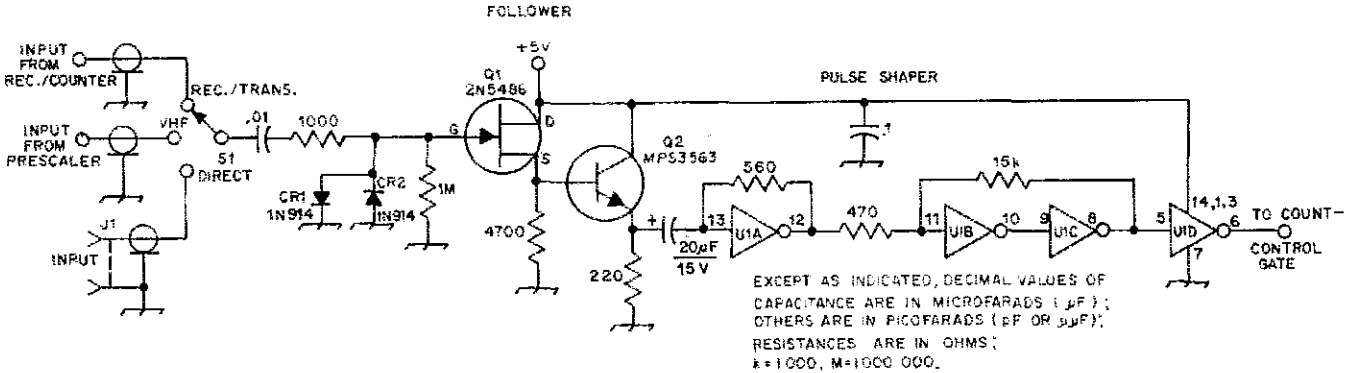
1 Macleish, "A Frequency Counter for the Amateur Station," *QST*, October, 1970.

2 Macleish, Pattison and Hejhall, "The Rec/Counter," *QST*, May, 1971.

3 Some difficulty has been noted in obtaining the Fairchild prescaler IC. The units purchased by the author were obtained from Hamilton/Avnet Electronics, 10916 W. Washington Street, Culver City, CA 90230. Allied Electronics lists the IC in their 1972 catalog, but at $20 rather than the distributor price of $16. A complete list of Fairchild sales offices and distributors can be obtained from Fairchild Semiconductor, 464 Ellis Street, Mountain View, CA 94040.

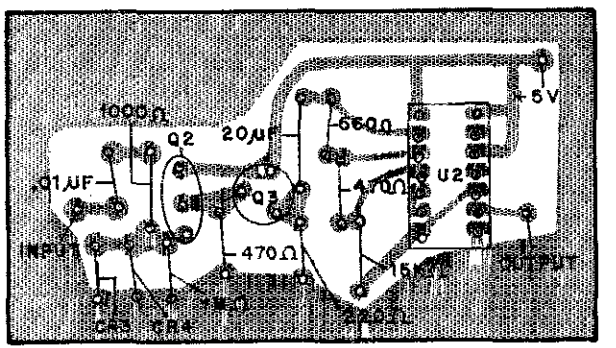


The vhf prescaler is mounted on the front panel, the upper left corner of the unit in this view, just above the two Rec/Counter circuit boards. The frequency standard is positioned vertically at the center of the unit. Portions of the input-circuit and power-supply pc boards are visible below the IDI display module.



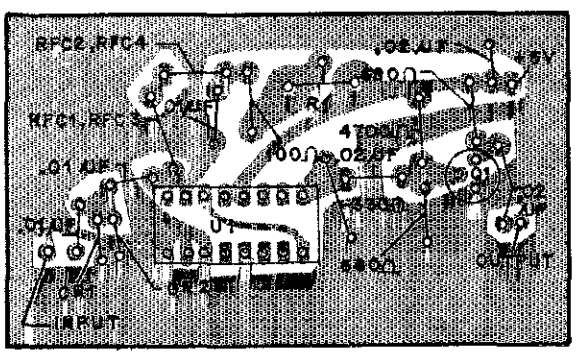
(1A)

Fig. 1 — (A) Counter input circuit. Resistors are 1/4-watt composition and capacitors are disk ceramic, except those with polarity marked, which are electrolytic. (B) Pc board layout for the input circuit.
CR1, CR2 — High-speed silicon switching diode.
J1 — BNC coaxial connector, chassis mount.
Q1, Q2 — Motorola transistor.
S1 — Single-pole, 3-position, single-wafer rotary switch.
U1 — TTL hex, high-speed inverter (Signetics SN74H00 or equiv.).

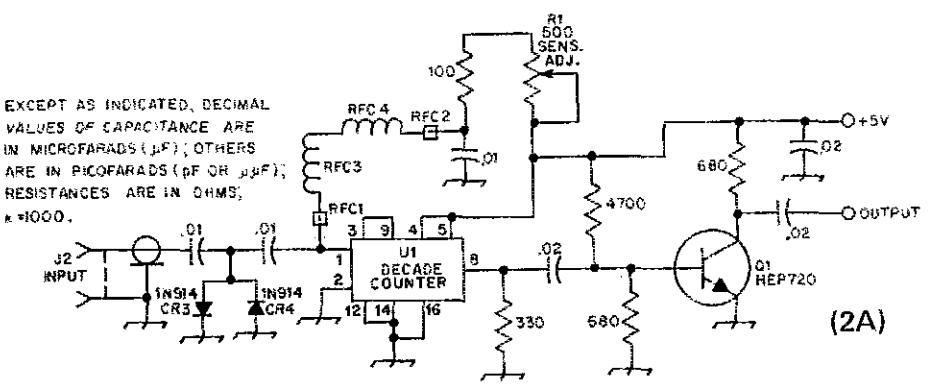


(1B)

Fig. 2 — (A) An IC 250-MHz prescaler. Resisters are 1/4-watt composition and capacitors are disk ceramic. (B) Pc board layout for the prescaler.
CR3, CR4 — High-speed, silicon switching diode.
J2 — BNC coaxial connector, chassis mount.
R1 — Linear-taper composition control, 1/2 watt, pc mount.
RFC1, RFC2 — Ferrite bead (Amidon Assoc.).
RFC3 — 0.82-μH miniature rf choke (James Millen 34300).
U2 — Fairchild U6B95H9059X.



(2B)



(2A)

delivery, it would be difficult to build a unit costing less from either discrete components or IC flip-flops that would deliver the same level of performance.

The '9059X circuit is shown in Fig. 2A. A bias voltage is applied to the input circuit. The bias is set for maximum sensitivity using R1; typical sensitivity at 146 MHz is 0.1 mV. Because the prescaler must work over the 30- to 250-MHz range, an elaborate broadband decoupling scheme using two rf chokes and two ferrite beads is needed to eliminate rf from the bias line. Two diodes, connected back to back, are included at the input to prevent the IC from being damaged by high-level rf voltage. The output buffer uses an HEP720 transistor to drive a 12-inch length of RG-174A/U coaxial cable which connects the prescaler to the counter input circuit.

The simple layout shown in Fig. 2B will provide operation up to approximately 250 MHz. A more sophisticated pc board is needed if the full frequency capabilities of the '5059X are to be utilized. However, as the prescaler covers the 220-MHz amateur band using the simple layout, and it is not possible to get it to operate above 400 MHz – for coverage of the 420-MHz band – a sophisticated layout wasn't used.

A Uhf Scaler

Anyone who has tried to keep a surplus 440-MHz rig on frequency will appreciate the value of a direct-reading uhf counter. Plessey[4] and Hewlett-Packard[5] are now selling divide-by-10 prescaler ICs with a frequency response of 600 MHz. At present the 600-MHz decade counters are priced at $100 each. In March, Plessey introduced a new divide-by-10 IC rated to above 1 GHz.

To keep the cash outlay to a minimum, a divide-by-2 prescaler can be used to drive the vhf prescaler of Fig. 2. This approach doesn't allow direct frequency readout (you must multiply the reading by 2), but it is simple. An interesting approach to get direct frequency readout would be to lengthen the count period by a factor of 2 when using the uhf scaler; this feature was not tried in the author's unit. A suggested circuit for the uhf scaler is given in Fig. 3.

Building the Counter

In his article, Macleish listed the cost per digit of readout at $32.58. Today the same devices can be purchased for $6.99. The drastic price reductions of TTL ICs and readout devices are certainly responsible, at least in part, for the current counter craze. The competition between surplus dealers is keen, so some shopping around for the best prices is worthwhile. Most of the devices sold at cut-rate prices are surplus; occasionally a defective one will be found. Most

4 Plessey Microelectronics, 170 Finn Court, Farmingdale, NY 11735. (Plessey components are available directly from Bernard R. Erde, Components Marketing Manager, for a $.50 handling charge.)

5 Hewlett-Packard Company, 1501 Page Mill Road, Palo Alto, CA 94304.

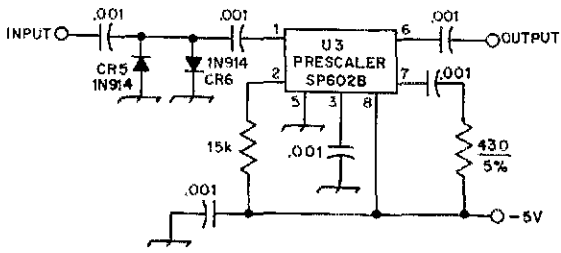


Fig. 3 – Suggested 500-MHz, divide-by-2 prescaler design. Resistors are 1/4-watt composition and capacitors are disk ceramic.
CR5, CR6 – High-speed silicon switching diodes.
U3 – Plessey IC.

dealers will exchange a bad unit, if you can get it back off the circuit board. If you are going to use surplus ICs, use IC sockets. They are well worth the slight additional expense.

The features included in a counter can be chosen to suit individual needs. The author used a commercially manufactured 8-digit readout section.[6] The power supply and the count/control sections followed Macleish's design. The frequency standard was modified to include two additional SN7490s in the divider chain. Two additional positions were used on the RESOLUTION switch to allow selection of count periods of 10 or 100 seconds. The long count periods are useful to increase the measurement accuracy when checking low audio frequencies such as the PL (private-line) tones used with fm transmitters.

The importance of keeping the voltage feeders "clean" and controlling ground returns in digital-

(Continued on page 35)

6 New Apparatus, "IDI Counter Display Kits," *QST*, July, 1971.

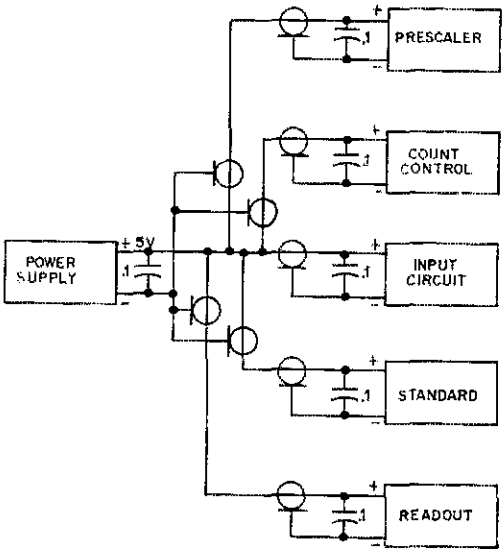
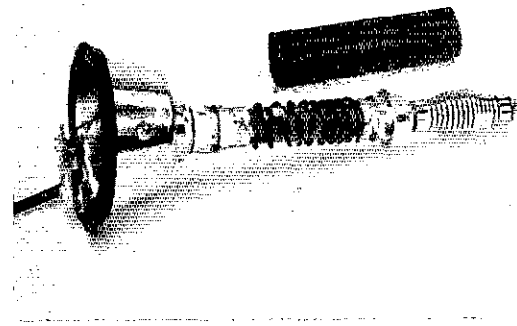


Fig. 4 – Recommended wiring of the 5-V bus to minimize difficulty with ground-return loops. The capacitors are disk ceramic.

Every ham likes to save a dollar. Here is a modification of a CB whip to provide a 5/8-wavelength vertical for 2-meter operation. Savings over commercial ham equivalent? About $20.



The new coil is tapped two turns from the base end. It may be necessary to file the coil ends so that the assembly will fit in the phenolic covering.

CB Whip + Mod. = 2-Meter 5/8λ Vertical

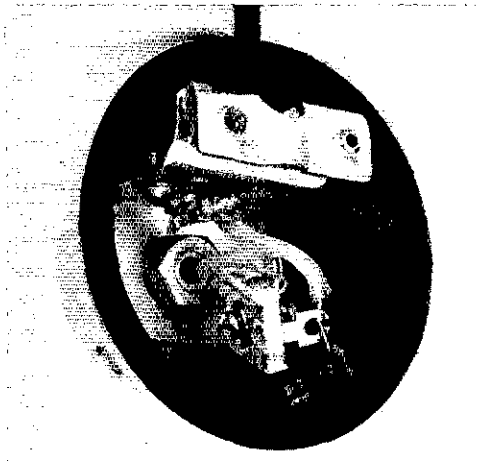
BY LEW McCOY,* W1ICP

PROBABLY THE most popular mobile antenna used by the 2-meter fm gang is a base-loaded, 5/8-wavelength vertical. Commercial versions of this type antenna are in the thirty- to forty-dollar class. One way to save about half the cost is to modify a CB mobile antenna. We won't go into the philosophy of why CB antennas are so much cheaper than ham antennas, but there must be good reasons!

The whip that was chosen for this modification is an Archer Model 21-908 (Radio Shack), but there are similar types available. The antenna consists of a clamp-on trunk mount, a base loading coil, and a 39-inch spring-mounted, stainless-steel whip.

The modification consists of removing the loading-coil inductance, winding a new coil, and mounting a 3-30 pF trimmer in the bottom housing. The capacitor is used for obtaining a precise match in conjunction with the base coil tap.

* Novice Editor, *QST*.



The trimmer capacitor is mounted on a tie point. Note the hole (lower left) that provides access to the capacitor. The hole should be plugged with a piece of rubber to keep moisture out of the assembly.

Modification

The first step is to remove the weather-proof phenolic covering from the coil. Remove the base housing and clamp the whip side of antenna in a vise. Insert a knife blade between the edge of the whip base and the phenolic covering. Gently tap the knife edge with a hammer to force the housing away from the whip section. Proceed carefully, working around the edge of the phenolic covering until it starts to loosen. You'll find that the *housing comes off quite easily.*

Next, remove the coil turns and wind a new coil using No. 12 wire. The new coil should have nine turns, equally wide spaced. The tap point is two turns up from the base (ground) end on the antenna we modified. The trimmer capacitor is mounted on a terminal strip which is installed in the base housing. A hole must be drilled in the housing to allow access to the capacitor adjustment screw.

Adjustments

Initially, the tap on the coil was tried three turns from the bottom. The antenna was mounted on the car, an SWR bridge was inserted in the feed line, and C1 and the whip height were adjusted for a match. A match was obtained, but when the phenolic sleeve was placed over the coil, it was impossible to obtain an adjustment that provided a match with C1 and the whip height. Apparently

the dielectric material used in the coil cover has an effect on the coil. After some experimenting it was found that with the tap two turns up from the bottom, and with the cover over the coil, it was possible to get a good match with 50-ohm line. It was interesting to note that mounting the antenna at different points on the car required a readjustment of C1 in order to obtain a match.

Several tests were run comparing the 5/8-wave antenna to a quarter-wave whip. Both antennas are omnidirectional, but the 5/8-wave vertical is said to have a 3-dB gain over a quarter-wave whip. The gain results from the lower angle of radiation common to 5/8-wave configuration. We made no actual gain measurements, but it was very apparent the 5/8-wavelength vertical was the better performer. In several instances, when operating near the fringe area of a repeater, it was possible to work into the repeater with the 5/8-wave vertical, but impossible with the quarter-wave whip. Another advantage in using the 5/8-wave antenna is the absence or marked reduction in mobile "flutter," so pronounced using a quarter-wave whip.

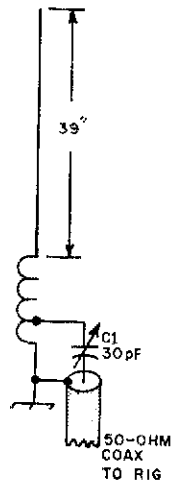


Fig. 1 — Circuit of the whip antenna. C1 is a 3 to 30 pF trimmer.

Fm Front End

(Continued from page 13)

Some of the resistors are installed flat and some are upright, depending on the space available. Power consumption of each stage is low enough that 1/4-watt resistors can be used, resulting in a more neat-appearing board.

Tune-up and Performance

As with most construction projects of this type, a grid-dip oscillator is an almost indispensable tool to aid in getting the tuned circuits on the correct frequency. A good quality crystal should be used for Y1. There is no oven to keep the crystal at a constant temperature, so a good commercial-grade crystal is worth the price. If the oscillator has a low output or shows a reluctance to start, it might need a feedback capacitor connected from emitter to base. Something in the range from 10 to 30 pF should do, but use the smallest value that will assure oscillation. Most of the transistors tried in this circuit did not require extra feedback. The oscillator performance should be checked to be sure that its output is on the 4th harmonic of the crystal, and not the third or fifth.

After the frequency multipliers are tuned for maximum injection to the mixer, the converter can be connected to the input of a receiver. If a transceiver is to be used, the converter must be ahead of the receiver portion only. Accidental keying of a transmitter with the converter connected to it can ruin several hours work! The rf amplifier and mixer stages can be peaked up on a signal while monitoring the limiter current in the receiver. The spacing between L2 and L3 should be adjusted a small amount at a time, and each circuit retuned for maximum limiter current. The ultimate in adjustment requires a calibrated signal generator and an audio-output meter to measure the amount of quieting that a given signal will provide. When this converter was used ahead of a Motorola strip on 52 MHz, sensitivity was such that 0.28-microvolt into the converter produced the sought-after 20 dB of quieting. Under these conditions 0.1 microvolt would open the squelch of the receiver. Performance like this makes the converter equal to many of the two-meter receivers now in use, and better than some. Image rejection was more than 70 dB.

An i-f amplifier was not needed with the strip used to test the converter. If the receiver needs a bit of help in the sensitivity department, it is an easy matter to add a small amplifier. Single-stage preamplifiers for 6 or 2 meters should be adequate. Examples of such amplifiers can be found in the vhf chapter of *The Radio Amateur's Handbook* or in *The Radio Amateur's Vhf Manual.* QST

Station Counter

(Continued from page 33)

logic circuits is often overlooked by newcomers. When the author first tried his counter, there was a lot of action on the display tubes, but none of it seemed related to the input signal. A few tenets of what digital engineers call "good engineering practice" had been neglected. To get the unit to work properly, shielded cables were used for the 5-V lines to each pc card, a 0.1-μF bypass capacitor was added to the voltage feeder at each circuit card, and the only chassis ground point, other than the input, was made at the power supply. The arrangement used is shown in Fig. 4.

If you count the number of devices needed to make it work, the frequency counter is one of the most complex electronic devices ever to be used in the ham shack. Yet, Heath Co. reports that 40 percent of the sales of their popular IB-101 counter have been to hams. By building counters from scratch or a kit, again amateurs are proving they are interested in any device, no matter how complex, which will improve station efficiency. QST

• Technical Topics

Time—IC Controlled

THE FIRST integrated circuits designed for linear applications were general-purpose devices such as op amps. Today, special ICs, intended to do a specific job very well, are being introduced. A good example of the trend to specialized ICs is the Signetics NE555 timer. A block diagram of the NE555 is shown in Fig. 1A. The length of the time cycle is set by R1C1. The voltage across C1 is applied to a high-input-impedance comparator which uses a reference equal to two thirds of the supply voltage. When the voltage across the capacitor reaches the reference value, the flip-flop is toggled, a transistor discharges the timing capacitor, and the output level changes from high to low.

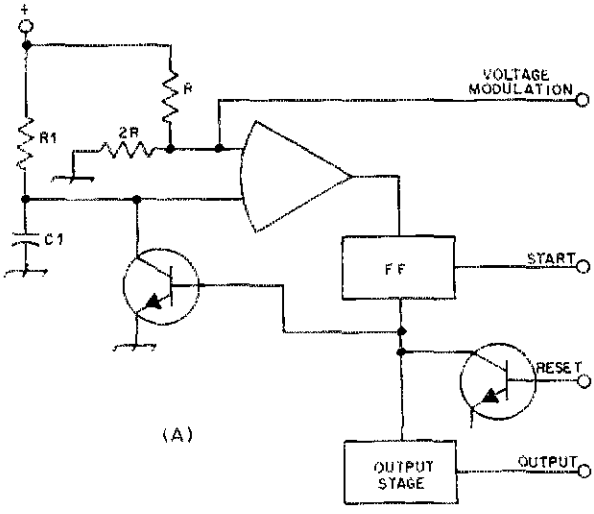
An input on the trigger line will reset the flip-flop and release the short across the timing capacitor, making the output go high and restarting the timing cycle. An unusual feature of the '555 is that the length of the time cycle can be varied by a dc voltage, as shown using R3 in Fig. 1B. The applied voltage changes the reference level at the comparator. Because both the rate of charge on the capacitor and the reference voltage for the comparator are related to the supply voltage, the effects of any change in supply potential will be canceled, making the timing-cycle duration independent of supply voltage.

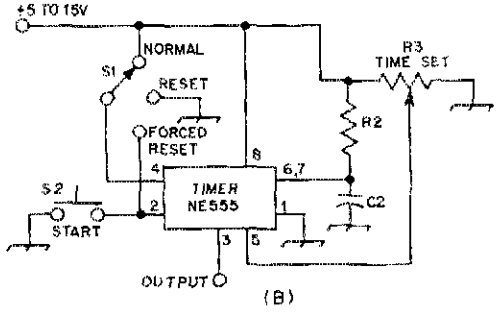
An external reset connection is provided which can be tied to the trigger terminal if the timing cycle is to be restarted when the circuit is triggered, or, the reset terminal can be used for external control. If the reset function will not be employed, its terminal should be tied to the supply line to prevent false triggering. The three reset connections are shown selected by S1 in Fig. 1B.

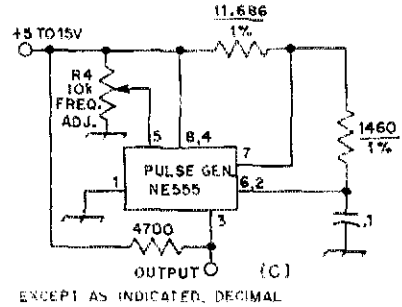
The NE555 can also be used as a pulse generator. The pulse length can be set separately from the frequency. Signetics claims that the stability of the '555 approaches that of crystal control at audio frequencies. Tests in the ARRL lab indicate that the claims are not exaggerated. Temperature stability is rated at .005 percent per degree Celsius. The basic connections for a pulse generator are shown in Fig. 1C. With the component values given, a 1-kHz output with pulses of 10-percent duty cycle will be developed.

Amateur Applications

One use for the NE555 will be in repeater control circuits. A 3-minute "time-out" timer is shown in Fig. 2A. The length of a single time cycle is controlled by the setting of R1. The trigger, S2, and reset, S1, functions would be part of the repeater control circuitry. The relay, K1, can be chosen to provide as many contacts as needed in a particular application. The relay connection at A is the "normally off" wiring. To have the relay "normally on," use the connections at B.







EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR μμF). RESISTANCES ARE IN OHMS; K=1000.

Fig. 1 — (A) Simplified diagram of the Signetics NE555 timer. R1 and C1 are external components. (B) Basic NE555 circuit. S2 is used to start the timing cycle, while S1 selects the type of reset function. The values of R2 and C2 establish the length of the time cycle; dc voltage applied to pin 5 allows remote programming of the time duration. (C) A 1-kHz pulse generator using the NE555.

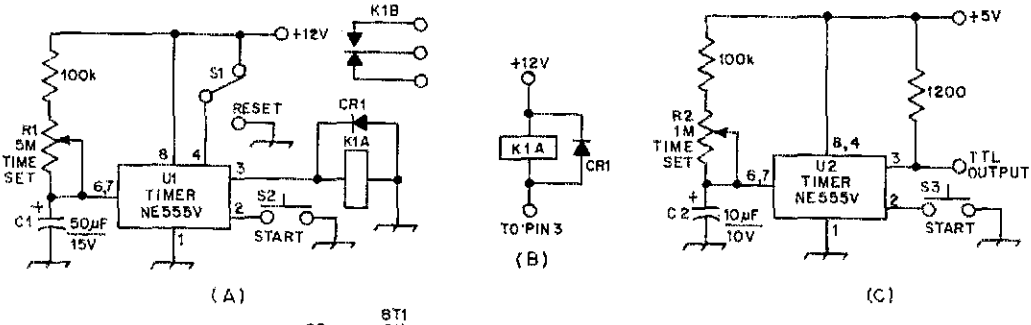


Fig. 2 — Timer circuits using the NE555. Resistors are 1/2-watt composition unless otherwise marked. (A) Repeater timer with "normally off" relay wiring. (B) Alternative "normally on" relay connection. (C) Timer with TTL-compatible output. (D) Identification reminder circuit.
BT1 — 9-V transistor-radio battery.
C1-C3, incl. — Low leakage type, tantalum preferred.
K1 — 12-V coil, contact arrangement to suit application.
R1-R3, incl. — Linear-taper composition control, 1/2 watt, pc mount.
S1-S3, incl. — Part of repeater control circuit.
S4 — Spst momentary push-button type.
S5 — Miniature toggle, spst.
U1-U3, incl. — Signetics IC.
U4 — Mallory Sonalert SC628 (Allied Electronics 854-6502).

A slightly different circuit, providing TTL-compatible output, is shown at Fig. 2C. This arrangement could be used to control a repeater identifier, for example. In the ham shack, the circuit of Fig. 2D will provide 10-minute warnings, reminding an operator of the FCC identification requirement. When switched on, the timer will produce an audible tone every 10 minutes. Reset is accomplished using S4. R3 could also be adjusted for 2.8 minutes, to remind the fm-er who tends to talk longer than the 3-minute time limit set on most repeaters.

Perhaps the most unusual feature of the NE555 is its price. Traditionally, new IC products have been priced high when first introduced. The price is then allowed to float down as volume production is achieved. Happily, Signetics has taken a different approach, gambling that the NE555 is going to be very popular. The price for the NE555V (an 8-pin plastic dual in-line package) is $1 in single quantity. A 12-page introductory application note describing the device is available from Art Fury, WA6JLJ, Signetics Corporation, 811 East Arques Ave., Sunnyvale, CA 94086. Signetics components may be purchased from Compar, 2531 Whitney Ave., Hamden, CT 06518.

WIKLK

Instant Voice Interruption

(Continued from page 21)

other station. However, when operating ssb break-in, especially when working in a group, the loud signals will be uncomfortably loud. If the rf gain is reduced, a weak station attempting to break may be missed. This has happened to the author with embarrassment! Fast release with adequate age will result, however, if the switch is placed in the fast position and the loading resistance reduced.

To obtain quick age action, a slight modification is necessary. Merely solder a 100,000-ohm resistor across R24. As long as the age switch is kept in the fast position, full rf gain may be used without receiver overloading and recovery time is fast enough for speedy cw.

Concluding Remarks

The author has been on the air nearly every day for more than four years using this break-in device. Almost without exception, the response has been enthusiastic. Schematic diagrams are enough to scare off most readers, especially if the subject is new or not of their particular interest. It is hoped that readers of this article may be led through the diagram with understanding and meaning. Hopefully the large number of enthusiastic listeners may become a bit more interested in how the system functions. QST

Technical Correspondence

AFISI – AUTOMATIC FUEL-INJECTION-SYSTEM INTERFERENCE

Technical Editor, *QST*:

Last Christmas I discovered that I could not operate my mobile rig on twenty-meter phone without killing the engine. It worked okay on forty- and seventy-five-meter phone. The car is a 1971 squareback VW.

I was surprised to find that there were other hams in Colorado who had experienced the same phenomenon. A ham in Colorado Springs had the problem with a Mercedes Benz. He tried filtering and shielding the lead to the automatic fuel-injection system to no avail. He even had the American factory back East working on it. He finally had to sell the car as he traveled a lot and wanted to keep in touch with home. KØZCM in Boulder said that they had a few cases of this problem in the Boulder area. He said there was one man in Ft. Collins who couldn't start his VW when it rained or snowed; the trouble turned out to be related to the strong rf field of a broadcast station nearby and his automatic fuel-injection system. KØQAR has told me that he kills the motor of his '72 VW squareback when modulating with ssb on twenty, fifteen and ten meters. He says everything was okay when he ran a carrier in the tune position.

This fuel system is associated with a computer and although the manufacturer (Bosch, I believe) will not issue a schematic diagram, it is rumored that there are some twenty-five transistors in the circuit. Both VW and Mercedes Benz use the same automatic fuel system. Does anyone have a solution for this problem? – *Don Middleton, WØNIT, 920 W. Adams, Pueblo, CO 81004.*

FINDING THE INTERNAL RESISTANCE OF A DC MILLIAMMETER

Technical Editor, *QST*:

The classic method of finding the internal resistance of a current meter is to use a voltage source (generally a 1.5-volt dry cell), a series variable resistance to set the meter to full scale, and a parallel variable resistance to shunt the meter to half scale. The shunt resistance is then removed and measured, its value being approximately the same as the meter's internal resistance.

To understand what really happens, let's say we have a 100-ohm meter with a one-mA movement, and a one-volt source. To cause the meter to read full scale, we will need 1000 ohms in the circuit, 100 ohms in the meter plus 900 ohms in the series resistor. We also find that we have 0.1-volt drop across the meter and the remaining 0.9-volt drop across the series resistor.

We shunt the meter to half scale and now find we have a .05-volt drop across the meter-and-shunt combination while the series-resistor voltage drop has increased to 0.95 volt. The circuit current has increased to 1.056 mA. If the meter draws 0.5 mA then the shunt draws 1.056 – 0.5 = 0.556 mA. The fact is the shunt will be 90.0 ohms, and not 100 ohms as expected.

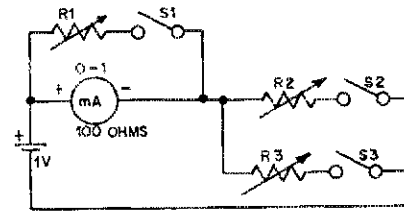
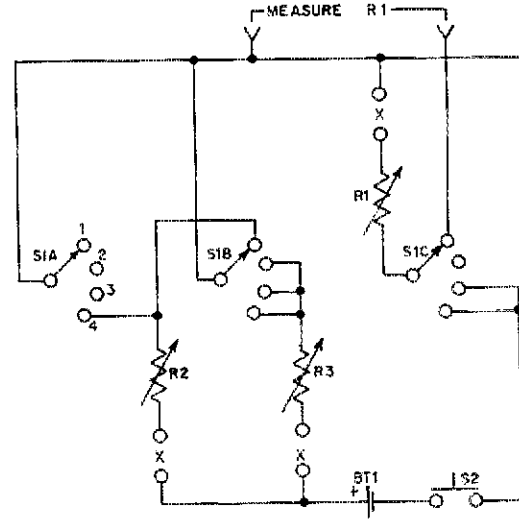


Fig. 1 – W8NN's test circuit for determining unknown internal meter resistances. See text.



S1 POSITIONS:
1–ADJ. R2, MEASURE R1
2–ADJ. R3
3–ADJ. R1 (HALF SCALE)
4–ADJ. R1 (FULL SCALE)

Fig. 2 – W8NN's test circuit for single-switch operation. In use, the selector switch is placed at positions 1 through 4 consecutively, depressing S2 and adjusting the appropriate resistor for each position, as explained in the text. The selector is then returned to position 1 for measurement of the resistance value at which R1 has been set.
BT1 – 1.5 volts.
R1 – 500 ohms, wirewound.
R2, R3 – 2000 ohms, wirewound.
S1 – 3-pole 4-position rotary.
S2 – Momentary push.
X – External resistance, if needed, to limit current; otherwise a direct connection.

At one volt the shunt will be 10 percent low. This percentage will hold true for any meter as long as the source is *one* volt. If the voltage is increased the error will decrease proportionally.

But why use a high voltage when we can add an extra series variable resistor and forget about method errors? See the circuit of Fig. 1. To test:
Close S2 and adjust R2 for a full-scale reading.
Open S2.
Close S3 and adjust R3 for full scale.

Close S1 and adjust R1 for about half scale.
Close S2 and adjust R1 for full scale.
Open S3, S2 and S1, in that order.
Remove and measure R1.
With this setup R2 = R3 = 900 ohms. With R2 and R3 paralleled, we will have 450 ohms. With R1 adjusted for full scale we will have a 0.1-volt drop across both the meter and R1. We will also have 1.0 − 0.1 = 0.9-volt drop across R2 and R3. Then

$$I = \frac{E}{R} = \frac{0.9}{450} = .002\ A = 2\ mA.$$

The meter and the shunt will share one mA each; therefore R1 = 100 ohms.

This method can be used with any voltage or meter resistance combination, as long as R2 and R3 are properly sized to fit the meter current. If you use the method often, you can build the test circuit into a box and use a single switch for ease of operation. The circuit is shown in Fig. 2. — *R. M. Mason, W8NN, 551 Turner, Lot 70, Lima, OH 45804.*

CA3055 IC VOLTAGE REGULATOR AND CURRENT LIMITING

Technical Editor, *QST*:

After tinkering with the CA3055 IC regulator, I must take issue with information on the value of that 56-ohm resistor shown as R1 in Fig. 4, page 14 of *QST* for last November.[1] In the manufacturer's typical circuit, a 5.6-ohm value is indicated.[2]

I measured the maximum output current vs. resistor value as follows:

R1, ohms	5.3	8	16	32	56	110	274	384	Infinite
mA	115	68	40	20	13	8.4	4.4	3.6	1.8

It seems the 5.6-ohm value recommended by RCA is correct for *protecting the IC* by limiting the current to the maximum rated value of 115 mA.

When an external pass transistor is added it may be necessary to limit at lower values, *to protect either the transistor* or some other component. If 56 ohms limited at 1 A in the *QST* circuit I would conclude the transistor was delivering a current gain of about 80, which seems reasonable.

1 Blakeslee, "AC-Operated Regulated DC Power Supplies for Transistorized Rigs," *QST*, November, 1971, p. 11. [EDITOR'S NOTE: That portion of the schematic diagram discussed by Smith is reproduced here as Fig. 3.]

2 *Linear Integrated Circuits*, RCA Technical Series IC-42, Fig. 363, p. 286.

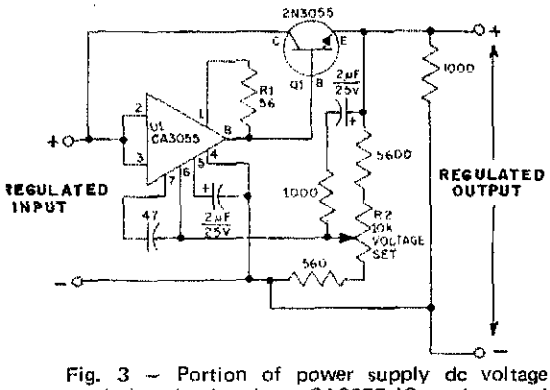


Fig. 3 — Portion of power supply dc voltage regulating circuit using a CA3055 IC regulator and a 2N3055 pass transistor. The complete schematic diagram is contained in an earlier issue of *QST*; see footnote 1.

I tried the RCA circuit with a 2N5496; at 250-mA output it had a gain of a little over 200. With such high gain in the transistor, limiting at low currents presents a little problem. One answer might be to add a bleeder from the IC output (transistor base) to ground, to bleed off the 2 mA or so that flows with the current-limiting terminal open-circuited. In the unamplified circuit (CA3055 barefoot) the voltage divider used to set the output could be selected to bleed the full 2 mA at normal output voltages, so as to permit a variable resistor to set the limiting current right down to zero.

'Twas a good article anyhow. *QST* has the lowest error rate of all the ham magazines. Zero errors can be obtained only with zero output. Keep up the good work. — *William L. Smith, K4RJ, Route 7, Box 315, Franklin, NC 28734.*

ON USING SOLDERING PASTES

Technical Editor, *QST*:

Hey . . . I'll bet all you guys know you're not supposed to use soldering paste in radio-electronics work. I wonder how many of us poor slobs out here know it too. Count me among the ignorant, that is, up until three days ago; after 17 years of amateur radio and ten years earning a living in the field of communications, I find that it has always been "common knowledge" to everyone but me.

It's all like an incalculably bad dream. I have spent nearly every evening and every weekend of the last two years building, rebuilding, modifying and rewiring the entire shack — using copious amounts of "noncorrosive" soldering paste. The shack consists of four bays of equipment plus an operating desk loaded with more; all this is interconnected by extensive amounts of wiring, neatly laced. You now have some inkling as to the amount of work that has been done, plus an idea of how much my family may have been alienated because I didn't spend time with them. All this work was to achieve an end. This end was suddenly shattered one week after its completion, when some learned (?) people advised me of the hazards of soldering paste.

Soldering paste is great stuff. It spreads the heat rapidly, cleans immaculately, and facilitates fast, beautiful soldering jobs. Many types are labeled "noncorrosive," leading any intelligent human being to believe just that — that they're not corrosive, and therefore ideal for electronics work. I just couldn't believe it when I was told otherwise. So I did a little research:

1) Sixteen years of *QST* "how to solder" articles, while warning of the old acid-core solder bugaboo, made no mention whatsoever of the hazards of soldering paste.

2) Out of several years of *CQ* magazine, one article does advise us to throw the old paste flux in the garbage can, but makes no mention of *why*, or whether there are "good" paste fluxes and "bad" paste fluxes.

3) Both Heath and Eico state that they will return unrepaired any equipment showing evidence of the use of acid core solder or paste fluxes. They must be talking about those "bad" paste fluxes!

4) The ARRL *Handbook* (1956 and 1963) encourages the use of soldering paste when soldering hollow pins of male connectors; in the 1966, 1970, and 1971 *Handbook*, I see that a twist drill is advised for the same operation.

5) A telephone call to an engineer at Eagle Electric Mfg. Co. in Long Island City was enlightening. The engineer said that they've just

got to get that "noncorrosive" label out of their catalogs and off of their flux containers. The man was extremely sympathetic, told of the zinc chloride and its acid-producing properties, and advised that the stuff is *NEVER* to be used in electronics work. I felt then that a phone call to the makers of soldering paste would be just a waste of time.

6) A subsequent experiment showed that heating either type of "noncorrosive" paste produced fumes which turned litmus paper red.

7) A check with *Encyclopedia Britannica* revealed that zinc chloride is widely used in soldering fluxes, that zinc chloride is extremely hygroscopic, and that when it takes moisture from the air it produces a nice little acid.

8) I then inspected some four-year-old soldering work of my own. Under the insulation and between wire strands there was considerable white dust, green corrosion, and yellow corrosion. Dismantling some old phono plugs revealed large amounts of accumulated crud in the coax braid. The aforementioned engineer had said that many types of insulation will absorb and retain the zinc chloride. I can add even more to that: The liquified flux is obviously sucked up like a sponge by stranded wire, by coax braid, and by just about any insulated wire.

9) Suppose that the eventual amount of corrosion is negligible, that it doesn't chew away more than, say, 10 percent of any one wire – a person would be inclined to leave it alone, to think that it's all right. That would indeed be poor judgment; not only would he be the proud owner of a sloppy mess, but he could conceivably have a shack full of junction diodes in the form of corrosion/metal combinations. If he lived near a broadcast radio station, like I do, he could be plagued by intermodulation problems, the likes of which I couldn't even begin to predict.

So that's my story. After two years of diligent effort, I am rewarded with a radio shack full of lurking hydrochloric acid – in short, a pile of junk. I don't know whether to spend the next few years redoing everything I've ever soldered, or to abandon ham radio entirely. Who is to blame? Who knows, but it's a pretty sick world when a corrosive substance is allowed to be flaunted as noncorrosive, and then the secret is carefully guarded. The information could easily have been provided in ham magazine articles, radio handbooks, Novice tests, commercial radio license exams, and so on – but it wasn't. – *O. R. Heinz, III, K7KHA, 2530 Tybo Ave., Reno, NV 89502.*

FEEDBACK

In *QST* for February 1972, "Measuring Phone-Patch Levels Accurately," the first heading in the box (page 25) should be 1 mW reference, not 1 mV. Thanks to K4RJ for the correction.

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The voltage-regulating circuit in Hints and Kinks section of the February 1972 *QST* should have the source and drain terminals reversed to work properly.

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In Fig. 3 of the April 1972 *QST* article, "A High-Performance Tunable Fm Receiver," the primary side of T1 has one lead grounded to the chassis. This is a drafting error. In place of the ground connection there should be a .01-μF bypass capacitor. *Never connect one side of the ac line to the chassis!*

In Fig. 2, "Double Standards," *QST* for April, 1972, the input to U9 should be via pin one and the output taken from pin two. The circuit-board layout is correct. The text reference to points B and C of Fig. 2 should have been to A and B. When the circuit is used with a battery supply the 1000-μF filter capacitor must be left in the circuit. If any difficulty occurs with starting of the crystal oscillator, add a 47-ohm composition resistor between the battery and the filter capacitor.

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The relative-rf output meter in Fig. 2 of Hayward's article, "Increased Power for the Solid-State Transmitter," *QST* for May 1972, page 21, should be labeled 0-1 mA, not 0-1 μA! It's a neat trick if you can come up with a 0-1-μA meter. The Hq. technical staffers will take a gunny sack full of 'em if they become available for a couple of bucks each! – *W1CER*

Stolen Equipment

Swan model 55B remote bandswitching mobile antenna, SN 0658. P. G. Poston, K5KMX, 3126 Manila, San Antonio, TX 78217.

– • • • –

Along with my 1968 green Mustang (Wisconsin plates K9CCZ) a thief got away with my Swan 270, SN M207111. Rev. Jerome R. Turner, K9CCZ/3, 1018 Palmer Rd., Apt. 8, Oxon Hill, MD 20022, telephone 301-248-4655.

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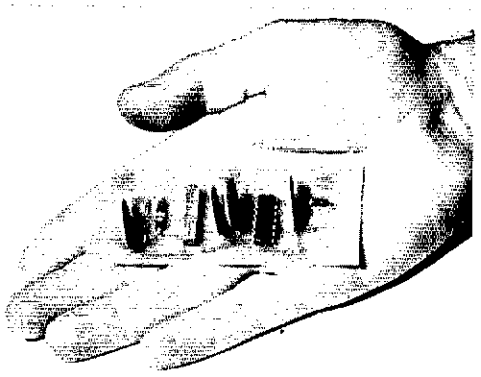
Sometime on March 22 a Collins 62S-1 transverter, SN 10728, was stolen from the Michigan State University Amateur Radio Club, W8SH. Anyone with information is requested to contact the Electrical Engineering Department, Michigan State University, East Lansing, MI 48823 or the MSU Department of Public Safety.

Club Members Retrieve Stolen Transceiver

In January, WA4LBM's 2-meter fm rig was stolen from his car. A few weeks later, a stranger was heard on 146.94 MHz testing in an unorthodox manner for a ham band. Al, WB4TLF, and Eb, K4GEW, engaged the mystery voice in conversation and while Al lured his approximate location from him, Eb decided to go mobile heading in that area. With a stroke of luck, Eb noticed a car pass with a gutter clip vhf antenna. As this was the kind of antenna taken in the theft, Eb jotted down the license number and car description and he then proceeded to follow him. After several blocks of silence, Eb decided to try and jolt the driver ahead into a foolish move by calling WB4TLF and giving him the license number and car description. As was suspected, the driver ahead was monitoring "94" and gave a startled glance into the rear view mirror. He then tried to pass cars but was blocked by oncoming traffic. He turned down a side street which turned out to be a dead end. Eb positioned his car to block any escape from the street. He took a look in the car and, seeing the rig, called WB4TLF and asked for the Sheriff's assistance. After waiting with an aggravated and nervous young man and no sign of deputies, Eb talked him into turning over the gear which he said he "had bought from a couple of 'long hairs' for $5.00." At this time K4RQY arrived on the scene and identified the equipment. Eb notified WB4TLF that he was headed for the Sheriff's office with the gear and complete identification of the man. WA4LBM is now happily operating again on 2-meter fm. – *C. Breunich* (from the Ft. Myers ARC *OSCILLATIONS*)

An IC Audio Tune-Up Device for the Blind Amateur



This photograph shows how small the unit is.

A Simple Unit for Use with the HW-16 and Other Rigs

BY THOMAS P. RILEY,* WA1BYM

SEVERAL ARTICLES have been published concerning tuning devices for blind amateurs. When a sightless friend got his Novice ticket, I decided to build such a circuit for him. After researching some of the published articles on the subject it became apparent that most of the circuits were unnecessarily complex and outdated, as compared with the availability of present-day integrated circuits. The circuit, Fig. 1, was used in conjunction with the HW-16 transceiver, but can easily be adapted to almost any transmitter. It utilizes one monolithic integrated circuit which is available for $2.60.[1]

How It Works

The unit provides an output tone whose frequency is proportional to the meter deflection on the HW-16. Thus, it can be used to dip the final or peak the relative output power. In addition, a reference frequency is provided which is set to give that frequency which corresponds to the plate current for 75-watts input power. The operator can resonate the final, then adjust the power level for 75-watts input.

The IC is a dual-voltage controlled multivibrator (VCM) which is intended for use in a phase-locked loop. It lends itself ideally to this application. The multivibrator provides a square-wave output whose frequency is proportional to the dc voltage applied to its input. The output stage of the device is a TTL driver which can be short circuited indefinitely without damage to the device. Thus, a loudspeaker may be connected directly to the output and sufficient volume is obtained without the need for an additional audio amplifier. Although the output is a square wave, the tone is quite acceptable.

* 12 Tickle Road, Westport, MA 02790.

1 The author is equipped to furnish an etched circuit board and a kit of parts for a nominal charge. Address your requests to Thomas Riley, 12 Tickle Rd., Westport, MA 02790.

The 0.1-μF capacitor, C4, is used to set the output frequency range of the oscillator; in this case it is approximately 1000 to 4000 Hertz (the center of the human hearing range). Since the HW-16 has no built-in loudspeaker, it was decided to use the same speaker for both the receiver and tuning circuit. A dpdt switch performs the necessary switching for the speaker and also applies power to the circuit. When switch S2 is in the REF (reference) position, the input of the oscillator is connected to the wiper arm of a 10-kΩ potentiometer (actually, any value between 5-kΩ and 100-kΩ will do). This provides a variable dc voltage which in turn is used to set the oscillator frequency to any value within its 1- to 4-kHz range. When the switch is in the XMTR position, the input of the oscillator is connected to the meter in the transmitter. A 3 mA, 1000-ohm meter is used in the HW-16 and therefore develops a voltage drop across it of 3 volts at full scale. The voltage-controlled multivibrator, however, is insensitive to input voltages between 0 and 2 volts, and actually delivers its full output frequency range for input voltages between 2 and 5 volts. The combination of diodes CR1, CR2, and CR3 and the 100-kΩ resistor provide a level shift caused by the voltage drop across the diodes. The junction of the diode and resistor varies from 2 to 5 volts for inputs of 0 to 3 volts and is thus within the desired range for VCM. C1, C2, and C3 bypass any rf which may have been picked up in the interconnecting wiring. These should be placed as close to the IC as possible. It was found that on 15 meters a considerable amount of rf was getting on the power leads and dc input to the oscillator, adversely affecting its operation. Addition of the bypass capacitors corrected the problem.

Power is obtained from a 6-volt battery and it is suggested that battery operation be used. Diode CR4 drops about 0.75 volts thus delivering about 5.25 volts to the circuit. Power consumption is on the order of 30 mA. Since the unit draws so little power and is in operation only a small amount of time, battery life is quite high. The first battery

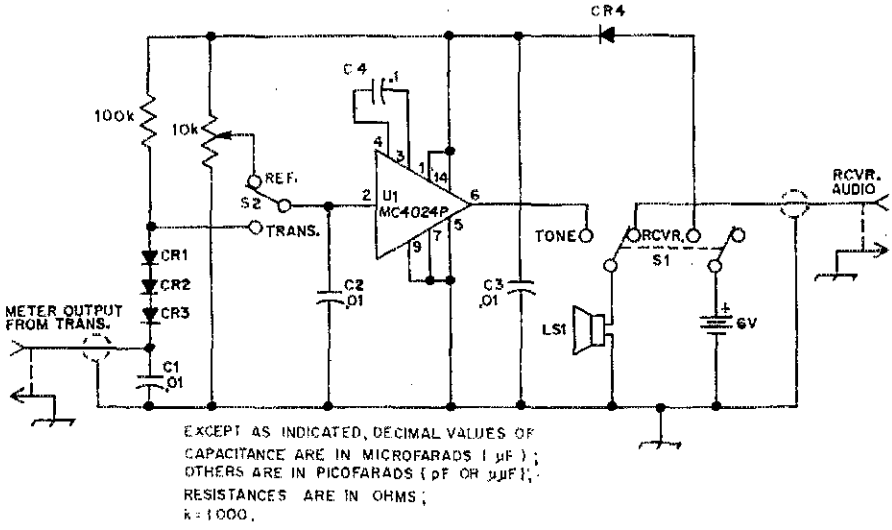


Fig. 1 — Circuit diagram of the tuning aid.
BT1 — 6-volt battery.
C1, C2, C3 — .01-μF disk ceramic, 1000 V.
CR1, CR2, CR3, CR4 — 1N914 or equiv.
R1 — 100-kΩ 1/2-watt carbon resistor.
R2 — 10-kΩ potentiometer, preferably multiturn trimmer.
S1 — Dpdt toggle or slide switch.
S2 — Spdt toggle or slide switch.
U1 — Integrated circuit, Motorola MC4024P.

used was a small mercury cell which lasted a year. Four C or D cells should last in excess of a year.

One attempt was made to power the circuit from the 6.3-V ac accessory output of the transceiver. A full-wave rectifier, capacitor filter and Zener diode regulator were used. However, the small amount of ripple on the power supply showed up as a 120-Hz modulation on the oscillator output. Rather than incorporate an elaborate voltage regulator, it seemed easier and more economical to use batteries, which has proven quite successful.

HW-16 Changes

Only one small addition is required on the transceiver. This is to provide a means of getting access to the meter circuitry. Connect a piece of hookup wire from the positive terminal of the meter, through a grommet in the chassis, and to an unused pin on the accessory socket. In addition, connect a .01-μF disk ceramic capacitor from the pin on the socket to chassis ground.

Calibration

Calibration must be done by a sighted amateur and should be checked about every six months. Battery degradation causes a change in the reference frequency. However, this change is not as great as one might expect because the output frequency is not dependent on the absolute input voltage to the oscillator but is more closely related to the ratio between the input and power-supply voltages. Since this ratio is fixed by the potentiometer, the frequency change is very small. Also, the frequency change is in a negative direction so that as the battery gets weaker, the reference frequency would correspond to a lower input power level. This prevents damage to the final and guarantees that the Novice regulation of 75 watts maximum input is not exceeded.

The transmitter should be tuned up in a normal fashion into a dummy load. The POWER-LEVEL control is then set to give a plate current reading of exactly 125 mA (red mark on meter scale) which corresponds to 75 watts input. Key the transmitter and leave it on. Turn the tuning circuit on and slowly adjust the setting of the reference potentiometer while switching S2 back and forth. When the same tone is heard with S2 in either position shut the tuning circuit off and release the key on the transmitter. The circuit is now calibrated and ready for operation.

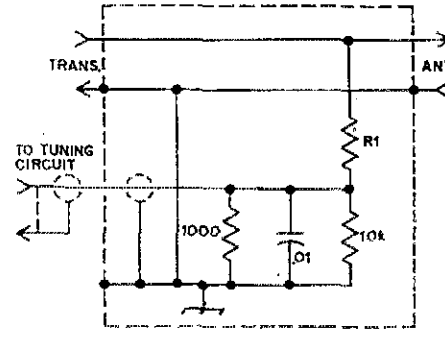


Fig. 2 — Circuit for use with tuning unit for relative output indication.

Operation

Operation is quite simple and straightforward. The tuning circuit is turned on with S2 in the XMTR position. Set the meter switch to PLATE and the POWER LEVEL control to minimum. Key the transmitter and adjust the TUNE control for minimum pitch (plate current dip). The POWER LEVEL is then increased slowly while switching S2 back and forth. When the two tones are equal, release the transmitter key and shut the tuning circuit off. The transmitter is now tuned up to a final input power of 75 watts.

The unit will also monitor relative output power by setting the meter switch to that position. The reference frequency of course has no bearing when using the unit in this fashion, and the TUNE control is adjusted to give the highest output pitch.

The circuit is not limited to use with the HW-16 transceiver, and can be used with almost any transmitter. If the meter circuitry is similar to that of the HW-16 (i.e., the negative terminal of the meter is grounded and the meter provides approximately 3 V full scale) the unit can be used as is. If not, a suitable resistor can be placed in the cathode circuit of the final to develop a voltage drop of approximately 3 volts for full-scale deflection of the existing meter.

In any case, if it is not practical to modify an existing transmitter, the unit may be used to monitor relative output power. In this case the reference potentiometer and switch S2 are not required. The circuit at Fig. 2 may be used in conjunction with the tuner for that purpose.

A special note of thanks goes to John Pavao, WA1LPM, for whom I designed the circuit and who encouraged me to write this article so that other sightless hams may benefit from it.

QST

An Adjustable-Voltage, Current-Limited Power Supply

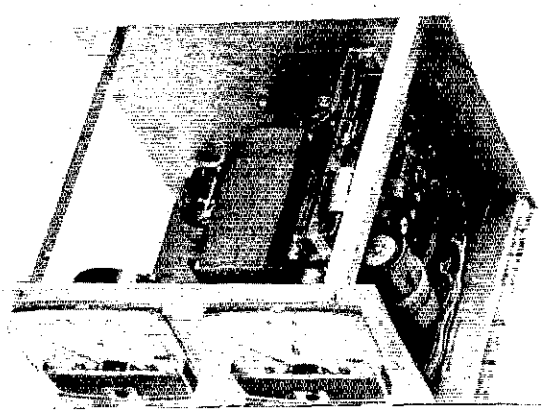
BY H. MAUCH,* DJ6JX

OVER A LONG period of time I searched for an easy-to-build power supply which delivered common voltages and had good hum-suppression qualities. Here I present such a unit for a voltage range from 0.5 to 31 volts with a full-load hum level below 1 mV and adjustable current limitation from 50 mA to 1.1 A. The basic unit consists of a transformer, a printed circuit board, and the pass transistor. In addition one needs only two pots, two meters, a switch, a fuse, and two terminals for dc-output. Arrangement of the components is shown in the photograph. The two transistors, type 2N3053 and 2N3055, should not be replaced by other types. The remainder are not critical. Q5 is mounted on a heat sink. Connections to the circuit board should be made according to the numbers shown in Fig. 1. The author used a 31-pin connector. However, the wires may be soldered directly to the connections on the board. Alignment is very simple. Set R17 fully clockwise and adjust R18 to 31 volts. Connect an ammeter across the output terminals. Adjust the current limits by alternate trimming of R19 and R20 to a range of 50 mA to 1.1 A.

* 7991 Oberteuringen, Eugen-Bolz-Str. 29, West Germany.

The Circuit

Q1 with its associated parts forms a constant-current regulator which is independent of the load. The necessary reference voltage for cascade control is derived from CR1 and CR8 and is applied to the base of Q2. The output voltage comes via pin 12 to the emitter of Q2. The voltage difference between the emitter and base controls the Darlington amplifier. The voltage drop across R12 drives the final transistor, Q5. If the current surpasses the setting of R16, a voltage drop across R13 and R14



The current-limited power supply is contained in a homemade cabinet. The voltmeter is positioned on the left, the ammeter is on the right. Controls for adjusting voltage and current are mounted below the meters.

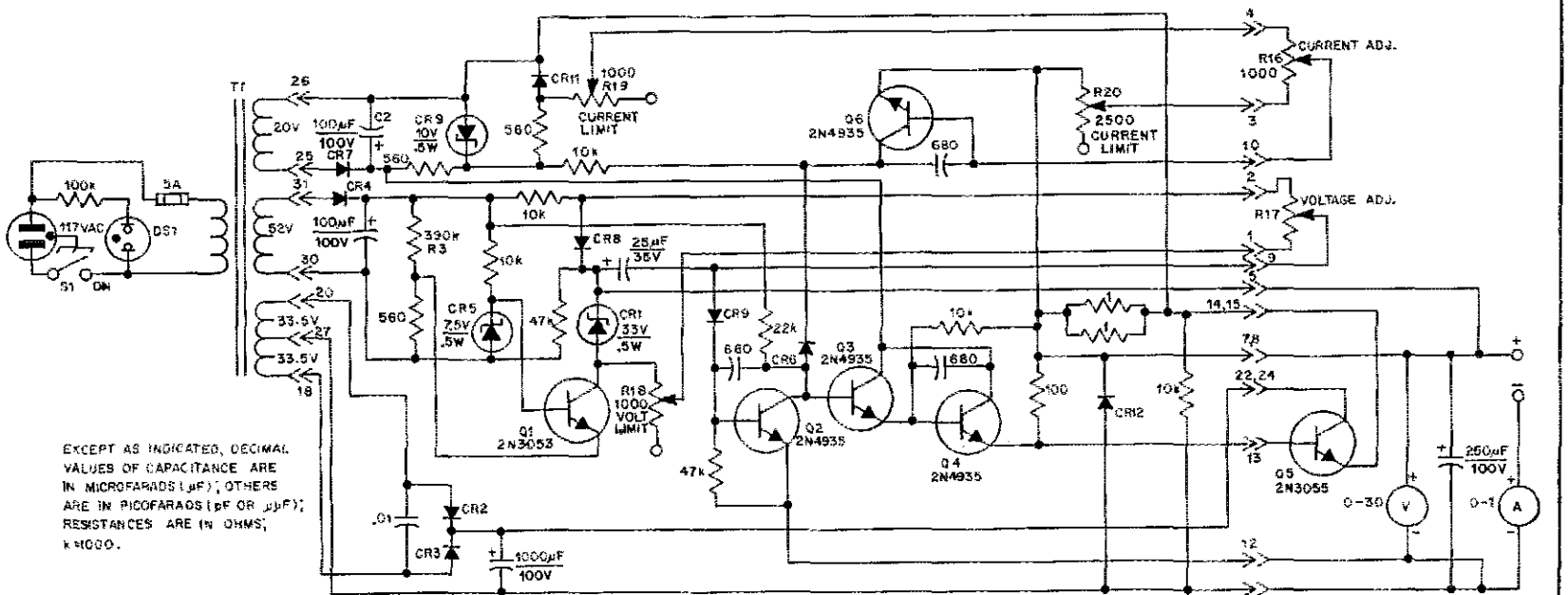


Fig. 1 — Circuit diagram for the power supply. Component designations not listed below are for text reference. The power transformer was custom made by the author, however, suitable substitutes can be purchased from a mail-order supplier.

CR2, CR3, CR12 — 150 PRV, 1-A silicon diode.

CR4, CR6, CR7, CR8, CR10, CR11 — 180 PRV, 0.25-A silicon diode.

R16 — 1000-ohm audio-taper composition control, 2 watts.

R17 — 5000-ohm audio-taper composition control, 2 watts.

R18, R19 — 1000-ohm linear-taper composition control, printed-circuit mount.

R20 — 2500-ohm linear-taper composition control, printed-circuit mount.

S1 — Spst toggle.

T1 — 117-V primary; secondary 20 volts at 300 mA, 52 volts at 45 mA, 67 volts center tapped at 600 mA. (A combination of three transformers may be used. Part numbers 24-1, 60-1/2, and 68-1, all available from Barry Electronics, 512 Broadway, New York, NY 10012 are suitable.)

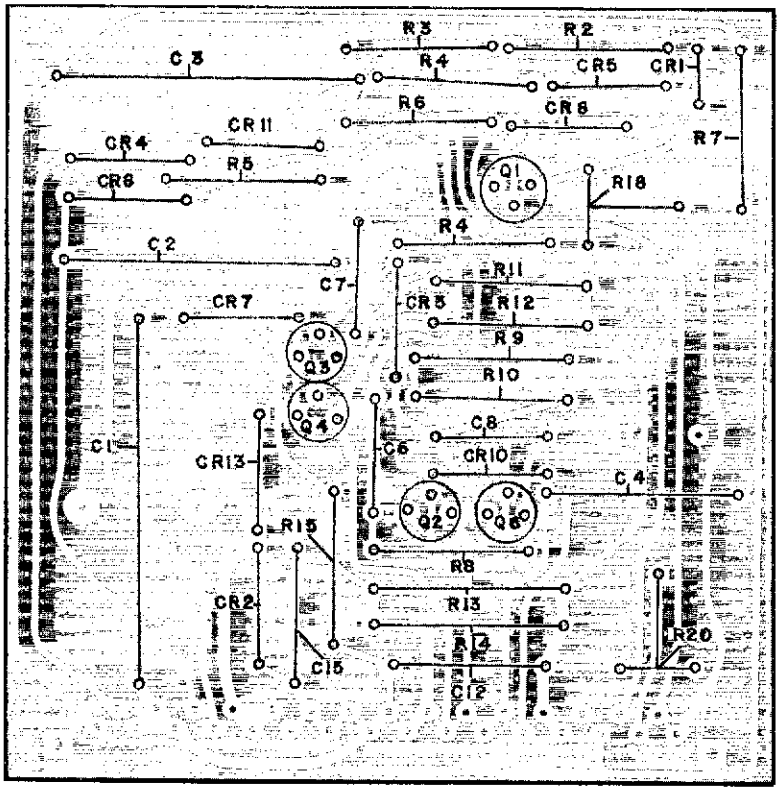
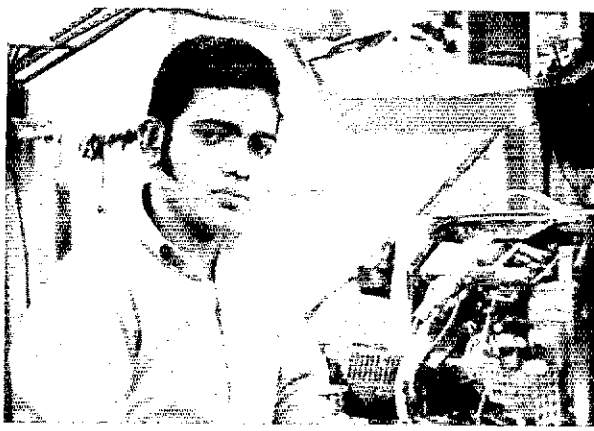


Fig. 2 — Full-size template for circuit board. Foil side shown.

cuts off transistor Q6 thereby lowering the collector voltage of Q2 via CR6 to the emitter potential of Q5. Further driving of Q3, Q4, and Q5 is prevented. The voltage drop across R13 and R14 is compensated by consequent voltage sensing. The unit shows no voltage change or hum at a setting of 30 volts between zero and full load. Should overload conditions occur, hum voltage rises to 7 mV. The relatively simple circuitry for current limitation allows no stable limitation at currents below 50 mA. During the first minutes of operation the voltage rises 200 to 300 mV. I do wish all OMs who build this unit plenty of fun and success. QST

Strays

From June 9-23 the *Rede dos Emissores Portugueses* will be commemorating the IV Centenary of "Os Lusiadas" written by the famous Portuguese poet Luis de Camoes, and 50th anniversary of the first South Atlantic air crossing by Gago Coutinho and Sacadura Cabral. During the International Fair of Lisbon a special amateur radio station, CT1FIL, will be in operation. A special QSL card will be awarded by *Rede dos Emissores Portugueses*, Rua de D. Pedro V, 7, 4.º, Lisboa-2, Portugal, , to radio amateurs who contact this special station.



This is Erasto Ortiz, KP4DID, who at the tender age of 15 not only has his Advanced Class license but also holds a First Class Radiotelephone ticket with radar endorsement. Erasto isn't the only ham in the family; his brother is KP4BIX and his father is KP4GN.

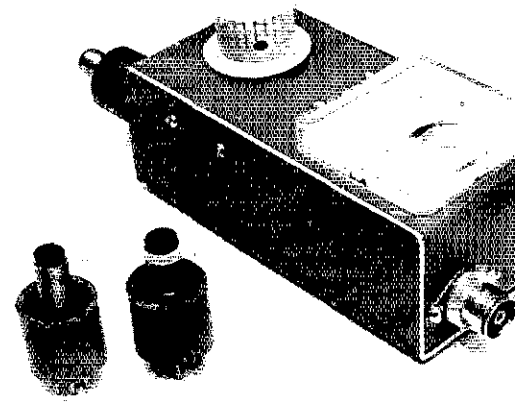
Hints and Kinks For the Experimenter

HIGH-ACCURACY FET DIPPER

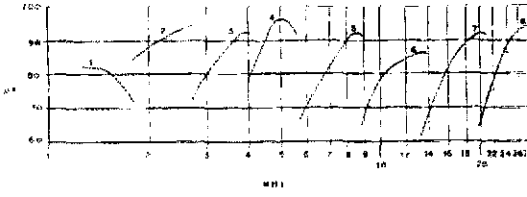
Shown in the photograph and diagram is a sensitive dip meter that cannot be drawn off scale in either direction. It is possible to get an indication of resonance down to 0.5 μA on the meter when coupled to a circuit 2 to 3 inches away. Another advantage of this unit is that there are no spurious responses on any range. Also, there is no need for a sensitivity control. The readings shown on the graph were taken with a fresh battery (9 volts), but satisfactory readings are possible down to 7 volts.

All components, excluding the range coils, have been housed in a metal box measuring 4 × 2 × 1-1/2 inches. The coil forms are of local design and are 7 mm in diameter (0.28 inch), mounted on a base that fits a 9-pin tube socket. The coil winding for L1, starting with the highest frequency range, is 12 turns of No. 22 wire, close wound. The next four lower ranges are wound using wire two gauges thinner, with each successive coil covering about the same amount of space as the first, 3/8 inch. The three lower frequency coils were made from i-f transformer cores. The coils were removed from the transformer and placed over the 7-mm forms, then turns were removed until the desired range was reached.

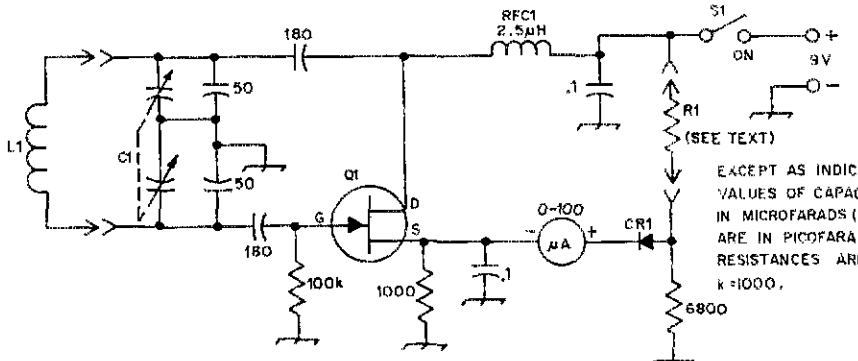
If there is concern by the builder for the lack of coil values, or a tuning chart on the face of the dip-meter, the reason lies in my different means of readout. The unit is quite small, which would make a chart difficult to calibrate and read. It would be only an approximation anyhow; therefore, an additional coil, L2, is added as a pickup loop. Thus at J1 there is a sampling of the oscillator frequency that indicates a dip at the resonance point of the circuit under test. The sample is read out on a



The FET Dipper has power applied. With no resonant circuit near, the meter reads 90 percent of full scale when one of the coils is plugged in. The jack J1 at the bottom feeds a portion of the oscillator signal to a frequency counter.



The approximate frequency range and the meter readings for each of the eight plug in coils used in the FET dipper.



Circuit diagram of the FET dipper. The values for L1, L2, and R1 are given in the text. Resistors are 1/2-watt, 10-percent tolerance, composition.
C1 — 365 pF per section, air variable (J. W. Miller 565-8).
CR1 — 1N34A or equiv.
Q1 — MPF102.
R1 - See text.
S1 — Spst miniature slide switch.

frequency counter and indicates the frequency with greater accuracy than before possible. One of the pickup loops is just visible in the photograph (in the coil nearest the dip meter).

CR1 was added to prevent the meter from going negative when closely coupled to some circuits. R1 is a part of each plug-in coil. The amount of resistance is found experimentally by using a variable resistor in place of R1, and adjusting for an approximately 90- to 95-percent full-scale reading on the meter. Measure the value of the variable resistor, then replace it with one of approximately the same value (in the coil form). In my case, each resistor was in the 10k- to 33k-ohm range. With R1 and CR1 connected as shown, the meter can never read off scale, in either direction. – *Peter Lumb, G3IRM.*

ANTENNA-ROTATOR HEATER

I was having trouble turning my antenna with a small prop-pitch motor when the temperature went below +20°F. This seemed to be caused by the lubricant thickening during these cold spells. K5BXG suggested that I use a heat strap of the type used in mobile homes to keep exposed plumbing from freezing. I purchased a 12-foot heat strap from Montgomery-Ward for $5.30 (83GR9961), which came equipped with fiber-glass insulation and a thermostat set at 35°F.

I wrapped the tape and insulation around the gear box and motor and placed the thermostat outside the insulation. The 117-volt line was run to the tower and the heater is plugged into it there. I have used the rotator at temperatures down to +7°F without experiencing any trouble. – *Harold E. Davis, W5FFW.*

ECONOMICAL WEATHERPROOF HELICAL ANTENNA

Previously, helical antenna elements have been formed from soft copper or aluminum tubing, shaped with a custom-machined mandrel. Antennas made by this technique (and of this material) are expensive, and are susceptible to corrosion. Both of these problems have been solved by using a semi-rigid coaxial cable to form the helical element.

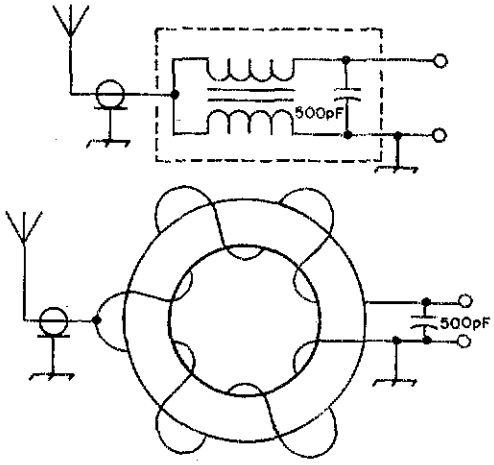
The helix of the weatherproof antenna illustrated here is made of a foam-dielectric Heliax transmission line that has been shorted at each end. The helix is formed by mounting the transmission line on standoff insulators which are attached to the antenna shaft. By using this technique the helix can be formed with any diameter, pitch, or taper without requiring expensive tools or techniques. Because the conductor is sealed in the outer plastic jacket, the resulting antenna element is highly corrosion resistant, and may be used at seacoast installations with minimum maintenance. – *NASA Tech Brief 70-10016.*

The inexpensive helical antenna has been made of flexible coaxial cable which has its plastic jacket retained. The method offers a high degree of protection against the corrosive elements at a seacoast location.

ANTENNA COUPLING UNIT FOR THE WWVL RECEIVER

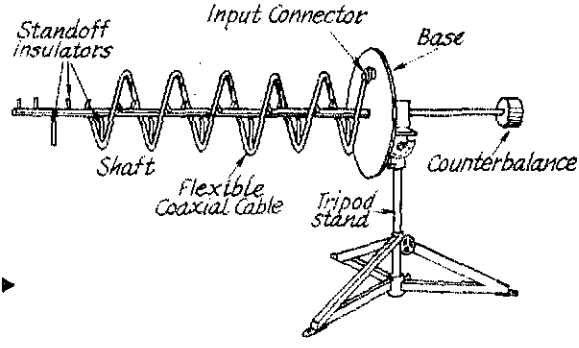
When I built the NAA Receiver (*QST*, October 1962) I found that I needed something in the antenna circuit to reduce bc harmonics and other birdies. A 200-turn honeycomb coil happened to serve this purpose nicely, and ever since then, I have included the coil on the various vlf receivers that I have used.

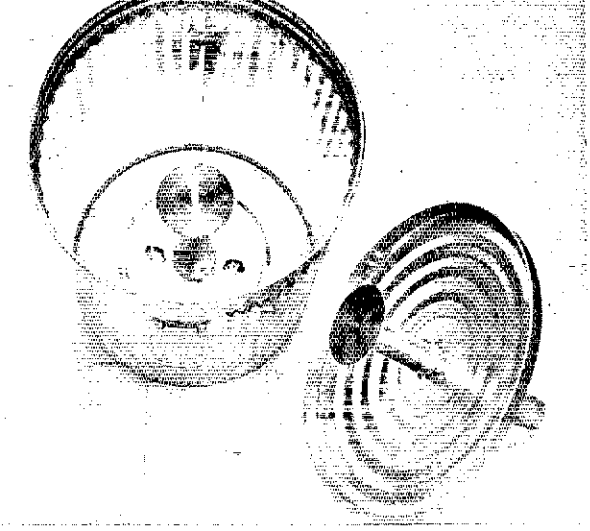
Recently, when I attached the antenna directly to the WWVL receiver (*QST* November 1971) I was utterly dismayed to discover that the local crud was greatly in evidence, so much so that I couldn't find WWVL. I know of two other people in this area of the country who were experiencing similar trouble.



Shown is the method of connecting the 88-mH coupling unit to a WWVL receiver and antenna.

After trying and discarding several different rf chokes (none of which had the magic effect of the old 200-turn coil), I used an 88-mH toroid coil as an autotransformer and fed the antenna to the center tap. For good measure, I placed a 500-pF capacitor across the output, and to my immense relief the signals increased with no trace of crud. The coil and capacitor are mounted in a small tobacco tin and are installed external to the receiver. One might want to try a variable capacitor, but in my case the improvement was so good that I did not go any further. – *Gene Pearson, W3QY.*





Hardly the thing for your transistor portable rig, but the WA1MRF garbage-can filter is fairly simple to build, and it works wonders in eliminating spurious radiation, and can be beneficial during reception.

Taking Out the 2-Meter Garbage

Unique High-Q Filter and Hamburg Cooker

BY DONALD R. MOLER,* WA1MRF

THE WORD *cavity* is much misused, in both amateur and commercial radio circles, in connection with coaxial-line devices. A true cavity is something quite different: a resonant box, with no inner conductor in the sense of the inner conductor of a coaxial or strip-line filter. There could hardly be anything much simpler than a resonant box, but readers brought up on coils and capacitors as circuit elements may find it useful to start with them in a discussion of cavity principles and properties.

Any tuned circuit has inductance and capacitance, and these determine the frequency to which the circuit is tuned. To raise the frequency of the simple LC circuit, Fig. 1A, we must decrease the inductance of L or the capacitance of C, or both. We can continue this process until L is less than a one-turn coil and C is the stray capacitance across its ends, as in 1B. We can flatten L into a horizontal U, as in 1C. The circuit is now, in effect, a transmission line a quarter-wavelength long, shorted at one end and open at the other. In a well-designed line, C is very low, and the electrical and physical lengths are practically identical. It is important to remember that high rf current flows at the shorted end, and the rf voltage is highest at the open end. These are commonly called the "H" and "E" fields, respectively.

We can connect another line of the same dimensions to L, as shown in Fig. 2A, with little effect on the resonant frequency. We have added capacitance C' in parallel with C, which would tend to lower the resonant frequency, but we also added L' in parallel with L, which tends to raise the frequency by reducing the inductance, so the effects cancel out. There is an important side effect: the total resistance in the circuit has been halved, so the circuit Q is higher.

This trick can be repeated indefinitely, 2B, until we eventually have a cylinder with a closed top and bottom, as in 2C. The result is a true resonant cavity, with its E field at the centers and the H field at the sides. If high-conductivity materials are used, such a cylindrical cavity may have a Q of 25,000 to 30,000, many times the Q of the best LC circuit that can be made. Such a cavity can be a highly effective filter, at frequencies where its size does not become prohibitive.

Because of these properties, a resonant cavity can have very high voltages across its center, with quite low levels of rf power fed into it. A surprising experience is to see a cavity arcing across its

* 180 Duer Street, North Plainfield, NJ 07060.

Tuned circuits having very high Q are often used in vhf stations to prevent radiation and reception of unwanted frequencies. Such a device is sometimes called a "garbage filter," but the name was never so appropriate as when applied to this one by WA1MRF. Don "takes out the garbage" with — what else — a garbage can. Though the filter draws a crowd wherever Don takes it, we hasten to assure skeptical readers that this is no gag. The filter really works. The garbage connotation is taken still further when the builder demonstrates the filter's properties as an rf oven — doing hot dogs and hamburgers to a turn with 100 watts or more of 2-meter rf power.

centers. Even more interesting is the demonstration often performed by the author, wherein hot dogs and hamburgers are cooked beautifully in 2 or 3 minutes, by placing them in the E field of the cavity described here. Some 200 watts at 144 MHz will do this very nicely. "Garbage can," indeed!

How To Make It

Our project started with an ordinary 32-gallon galvanized garbage can from a local Sears store. The empty can itself is a fine cylindrical cavity for the 420-MHz band, requiring only installation of coupling loops and coaxial connectors. These are along a line through the center of the bottom surface. The Q of such a cavity is about 6000, at around 432 MHz.

The resonant frequency can be moved into the 2-meter band by adding center posts and a variable capacitor, as seen in the photographs and Fig. 3. This is now a reentrant cavity, not a coaxial tank. Both ends are closed and the E and H fields are similar to those of the self-resonant box. The Q of the cavity, tuned to the 2-meter band in this way, is still much higher than is possible with conventional tuned lines or circuits.

Center posts are made of 2-inch copper pipe, available from plumbing supply houses, and possibly in the Sears plumbing department. The cutaway view, Fig. 3, shows construction of the posts and the capacitor. Three 5-1/2 × 1/16-inch brass disks are needed, two for capacitor plates and one for the base of the lower post. The base is fastened to the inner surface of the can bottom, to stiffen the assembly and provide high conductivity in this high-current area of the cavity.

The bottom post is 13 inches high. The 16-inch top post runs through a copper repair coupling fastened to the can cover. A setscrew at the top of the sleeve makes it possible to lock the capacitor in place, once the proper setting is found. The sleeve is centered in and soldered to the can cover. Finger stock around the bottom edge of the sleeve assures good electrical contact with the movable top post.

The 5-1/2-inch disks for the capacitor plates are drilled at their centers, 1/2 inch in diameter, and 1/2-inch brass nuts are soldered to the disks, concentric with these holes. A half-inch Teflon rod, 6 inches long and threaded its entire length, is held in place, extending up from the lower capacitor plate, as seen in Fig. 3. As the upper post is rotated in its sleeve the upper disk and its brass nut move up or down the insulating rod, to vary the capacitor spacing. It will be seen that a locking nut is threaded onto the end of the Teflon rod, below the bottom capacitor plate. The rod and nut are drilled and tapped for 4-40 thread, and a 4-40 screw is used to pin them together. Thread the rod upward into the nut that is soldered to the lower brass plate, until the two nuts bind together. Be careful not to exert excessive strain in doing this, or the threading on the Teflon will strip.

The installation of the brass nuts on the plates, and the assembling of the threaded rod, must be done before the brass plates are soldered to the posts. Electrical contact between the posts and the can top and bottom must be as good as possible,

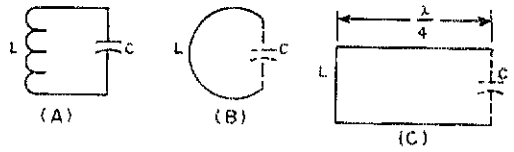


Fig. 1 — Evolution of the quarter-wave line. The conventional tuned circuit, A, can be reduced to a part of a single-turn coil and its end-to-end capacitance, B, and finally flattened to make a resonant line, C.

for highest Q in the finished filter. The inner surfaces of the can top and bottom can be lined with flashing copper, if desired. This may be necessary for use of the filter in critical applications, as in improving transmitter and receiver isolation in a 2-meter repeater.

Coupling into and out of the cavity is by means of loops and coaxial connectors mounted on the bottom surface, near the edge of the base disk. They are on a line drawn through the center, on opposite sides of the post, so that they couple into the cavity and not to each other. The grounded ends of the coupling loops should connect to the base disk, as well as to the can bottom, for best electrical contact. The base disk is held in place by eight 4-40 screws and nuts. The loops are made from 2-inch lengths of 3/8-inch copper strap. They can be made shorter or longer, for varying the insertion loss and circuit selectivity.

Adjustment

There are several ways of setting the resonant frequency of the filter. No rf power will go through it unless the filter is tuned precisely to the transmitter frequency. Most transmitters do not take kindly to being run without a suitable load, so a receiving check is preferable. This is easy if your location is a noisy one, or if you have any kind of signal source or noise generator available. Connect a coax-fed 2-meter antenna through the filter to the receiver, and tune for maximum noise or signal. If the receiver is well-shielded nothing will be heard until the filter is very close to the receiving frequency.

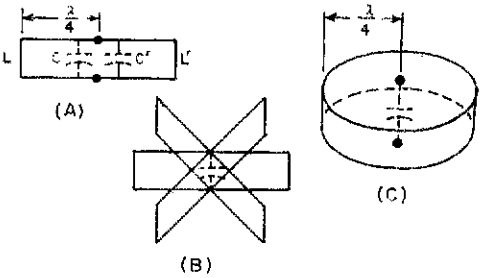


Fig. 2 — Evolution of the resonant cavity. Two quarter-wave lines connected in parallel, A, result in higher Q, with little change in resonant frequency. Process can be continued with more line sections, as in B, until a cylindrical cavity with closed ends results, as in C.

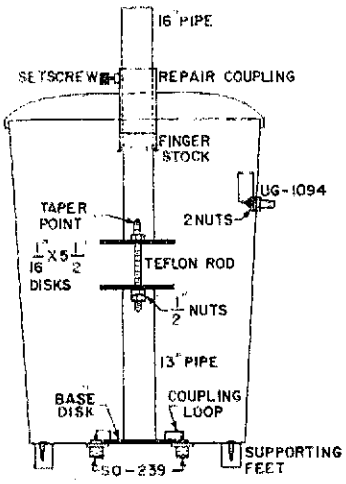


Fig. 3 — Cutaway view of the garbage-can cavity, showing the coupling loops and construction of the tuning device. The *Q* of the tuned cavity is many times the best that is possible with conventional tuned circuits.

A visual indication can be obtained with the transmitter by connecting a No. 47 pilot lamp or a diode-and-meter indicator externally to the coupling loop shown in the upper right portion of Fig. 3. The BNC jack is held in position with two nuts, which are set just tight enough to permit the loop and jack to rotate inside the can. Depending on the power level, and the size and position of the coupling loop, transmitter adjustment should be made with care. The filter tuning is quite critical, and too much coupling will burn out the load quickly as the filter goes through the transmitter frequency.

Uses

No end of interesting tricks can be performed with the garbage can. It was first tested at the writer's home location alongside a busy highway in Hampden, Conn., using an HW-17 transceiver. As any owner knows, the HW-17 is susceptible to ignition interference, and it has strong spurious responses to fm broadcast stations. The fm broadcast interference was completely eliminated with the filter, as might be expected. More surprising, the ignition noise level was considerably lower with the filter in, though the insertion loss at the signal frequency was too slight to be noticeable on any but the very weakest signals. This seems to indicate reception of noise on the image frequency with the filter out of the circuit. In any event reception is markedly quieter through the filter.

The HW-17 was also used to make rough checks on bandwidth and insertion loss. Transmitter power through the filter is down less than 1 dB at the resonant frequency. At 300 kHz away it is down 10 dB, from that at the resonant frequency. Attenuation over greater spreads was too high to be measurable readily by this method.

The tuning range of the filter is roughly 90 to 160 MHz. Attenuation and selectivity can be demonstrated with a small fm receiver with built-in antenna. Tune in a local station, turn up the audio, and place the receiver in the can. Connect about two feet of wire to one of the connectors on the bottom of the can. Tune the filter slowly, near the low-frequency end of the range (plates close together). No sound will be heard until the filter goes through the fm station frequency.

The filter can be calibrated by scribing horizontal lines on the top post, close to the top edge of the repair coupling that serves as a sleeve. If these are marked with the frequencies, and the sleeve and post are given a vertical alignment mark, the filter can be reset with reasonable accuracy, without a test signal.

Other Uses

The filter can be made to simulate a microwave oven by connecting one terminal to a 2-meter transmitter. Place hot dogs, hamburgers, or any moist food to be cooked, between the disks. Turn on the transmitter and tune the filter to resonance, as indicated by a lamp connected to the BNC jack. The dielectric properties of the food affect the resonant frequency of the filter, so it must be repeaked during the cooking process, the cooking resulting from energy losses in the food. About 100 watts of rf power will cook a hot dog nicely in five minutes. Hamburgers can be cooked in three minutes with 200 watts.

A door can be cut in the wall of the cavity, to permit watching the cooking process, and also to probe the E and H fields visually. A neon bulb on the end of a rod of good insulating material makes a useful probe, as does a pilot lamp with a small loop of wire connected across it. Very interesting work can be done in checking the dielectric properties of various insulating materials. To sum up — though the garbage can filter was built as something of a gag, at first, it has turned out to be a most interesting and useful — not to mention entertaining -- tool. QST

Strays

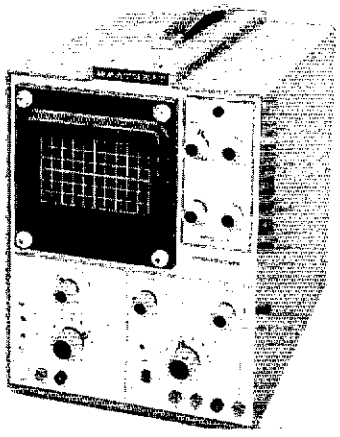
On vacation last summer, K4DKD's wife "finally found a good use for this ugly thing!"

Recent Equipment

To acquaint you with the technical features of current amateur gear.

Heathkit Model IO-102

Oscilloscope



THERE IS scarcely a modern ham shack or workshop in which an oscilloscope does not have frequent application. The price range of highly sophisticated scopes is somewhat beyond the reach of most amateurs, but a good low-cost general-purpose instrument can be justified in most instances. The Heath IO-102 5-inch scope falls into the latter classification. It comes in kit form and is useful for measuring frequency, phase, and ac and dc voltages. The instrument is essential for waveform analysis, especially in audio, transmitter, and video work.

The IO-102 is a solid-state scope. Its vertical amplifier is designed to operate from dc to 5 MHz. The sensitivity is rated at 30 mV pk-pk/centimeter. Rise time is 80 nanoseconds, and the input impedance is 1 megohm (shunted by 35 pF). The horizontal channel has an impedance of 1 megohm (shunted by 50 pF). Frequency response is 1 MHz (±3dB), and sensitivity of the horizontal channel is 0.1 volt per centimeter.

A recurrent, automatic sync generator is used in the IO-102, and ranges (5) are available from 10 Hz to 500 kHz. The display tube is a 5DEP1. It provides 6 × 10 centimeters of viewing area. The trace is a green, medium-persistence phosphor.

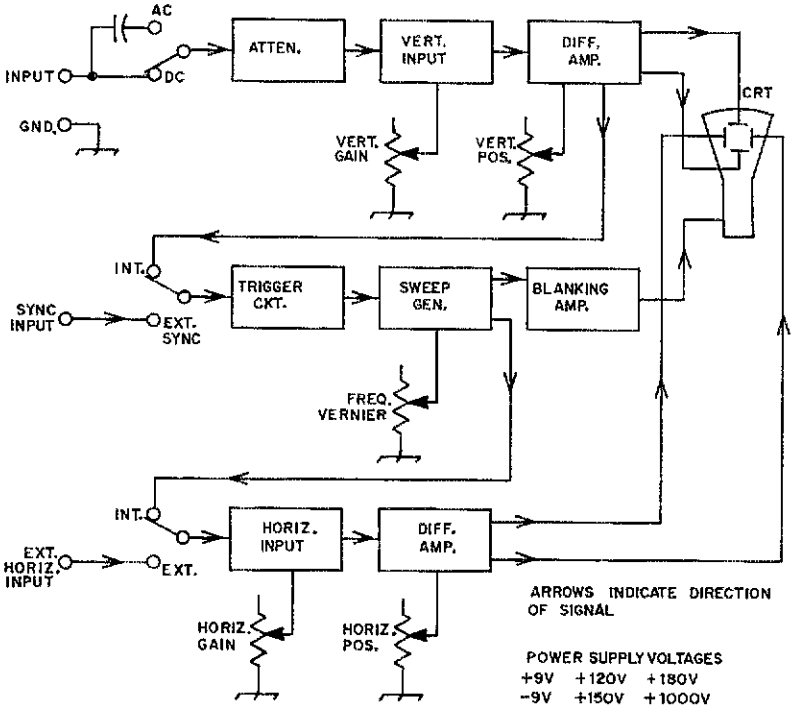


Fig. 1 – Block diagram of the Heathkit IO-102 scope.

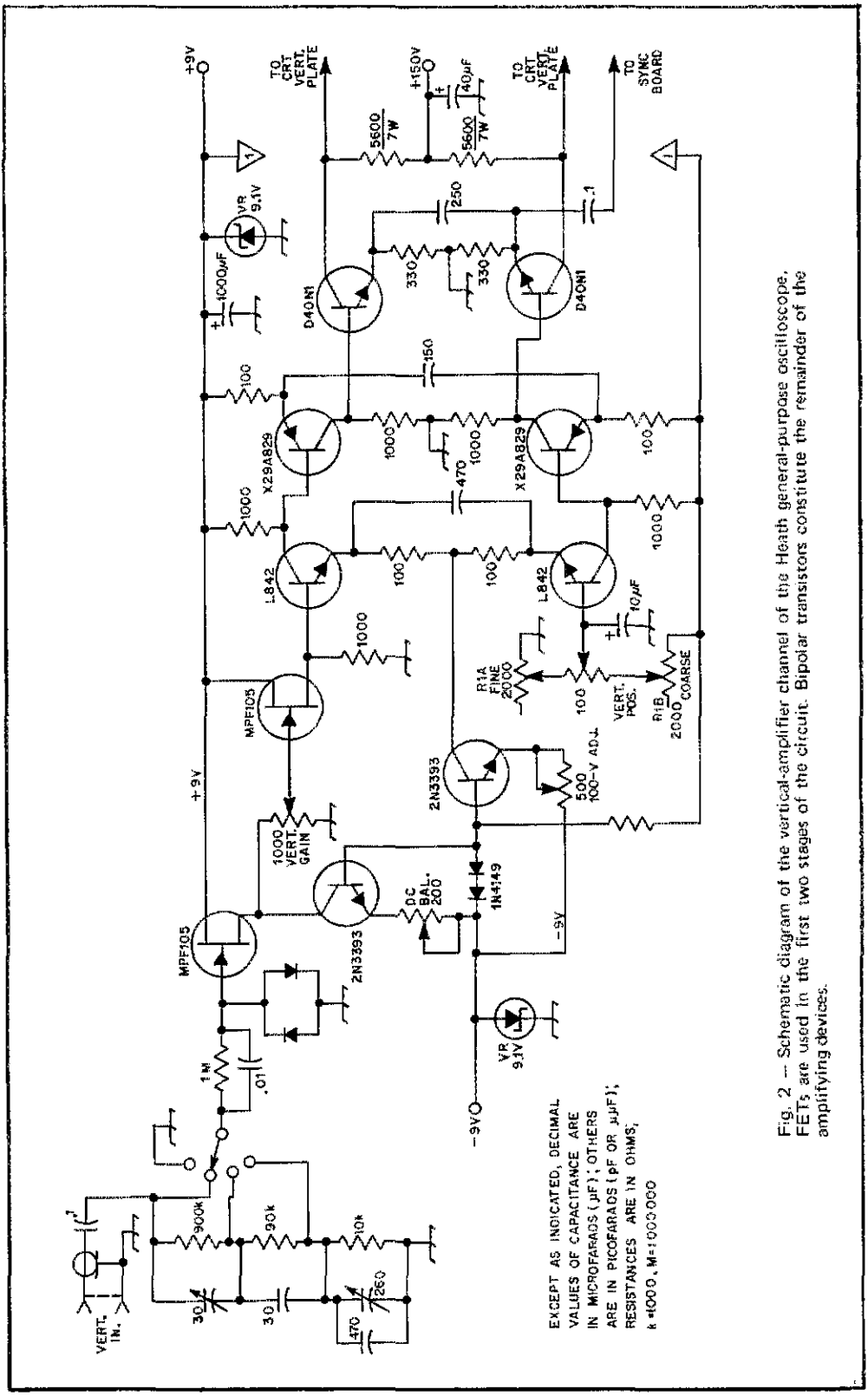
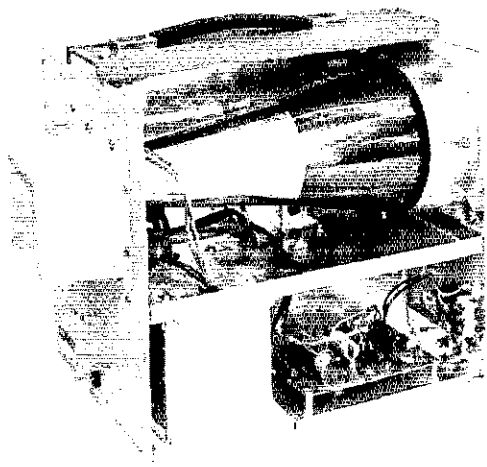


Fig. 2 — Schematic diagram of the vertical-amplifier channel of the Heath general-purpose oscilloscope. FETs are used in the first two stages of the circuit. Bipolar transistors constitute the remainder of the amplifying devices.

Interior view of the IO-102 scope. The vertical amplifier of Fig. 2 is assembled on the pc board at the lower right in the photograph. The heavy-gauge metal box at the lower left houses the power transformer, thus keeping stray ac fields away from the rest of the circuit.



Additional features are regulated voltages to all amplifiers, and careful shielding of the power supply to prevent unwanted ac from being coupled into the remainder of the circuit.

Construction of the oscilloscope was without incident. The manual is complete, instructions are concise, and are rendered in plain language. Assembly time was 10-1/2 hours from start to finish. Alignment and checkout required an additional hour of time. Not bad, indeed, for a relatively "busy" test-instrument circuit! One reason for the rapidity with which one can assemble this kit is that it is built on boards, four in all. The unit uses 30 transistors and 31 diodes. The only tube employed is the CRT.

A block diagram of the scope is given in Fig. 1. The vertical amplifier is illustrated schematically in Fig. 2. Field-effect transistors are used in the early stages of both the horizontal and vertical amplifiers. The circuits of both amplifiers are quite similar, except, of course, there is no attenuator at the input of the horizontal amplifier.

The outward appearance of the test instrument is as professional as is the interior. Those remembering the early day Heath scope kits in this price class will find it difficult to believe that the IO-102 was engineered by the same manufacturer. Gone is the somewhat flimsy cabinetry, the ac ripple found (all too often) on the displayed waveform, and the rather blase' front-panel decor. Furthermore, this scope feels like there is something inside the cabinet other than a handful of tubes and a lot of unused space. Despite the compactness of this scope, it's a heavy little fellow.

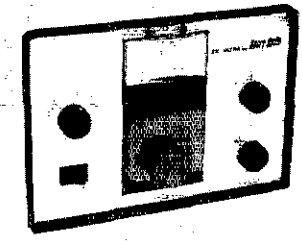
Pages 69 through 74 of the assembly manual contain a down-to-earth short course on the use of an oscilloscope. Data are given on checking audio wave forms for linearity and distortion. A section is provided which shows how to troubleshoot TV receivers with a scope, emphasis being placed on signal tracing. Information is provided on using the scope for receiver alignment and the measurement of ac and dc voltages. There is a section which deals with frequency measurement with the IO-102, and phase measurement is discussed at the end of the presentation. Various significant wave forms are illustrated in the text, thus providing the less-experienced amateur with clues as to what he should look for when analyzing a circuit. — *WICER*

Heathkit Model IO-102 Oscilloscope

Dimensions (HWD) and Weight: 12-3/4 × 9-1/4 × 16-1/4 inches, 27 pounds.
Power Requirements: 110-130 V ac or 220-260 V ac (50-60 Hz).
Power Consumption: 70 watts.
Price Class: $120.
Manufacturer: Heath Company, Benton Harbor, MI 49022.

QST ——— QST ——— QST

The Henry Radio 2K Ultra Amplifier



IF ONE WORD were used to describe the Henry 2K Ultra, that word would be *unique*. This is the first two-kilowatt amplifier marketed for amateur use employing conductively cooled tubes. The Ultra is designed for continuous operation: It is rated at 2000-watts PEP input for ssb service and 1000-watts input for cw and RTTY in the amateur bands between 3.5 and 30 MHz. A-m operation is not recommended. The drive requirement to produce the rated final-amplifier input is only 75 watts.

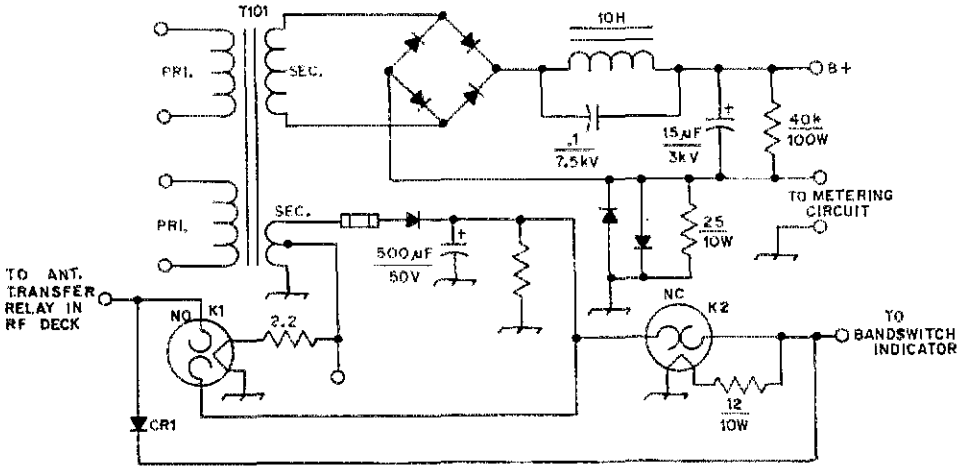


Fig. 1 – Partial circuit diagram for the 2K Ultra power supply. The power transformer may be connected for either 117-V ac or 220-V ac operation. The functions of K1 and K2 are described in the text.

The 8873

The heart of the 2K Ultra is a pair of 8873 conductively cooled triodes. These tubes have a plate dissipation of 15 watts each, but with the addition of a heat sink, the power dissipation capability increases to 400 watts. Actually this is a nominal figure. Eimac states that plate dissipation is limited only by the efficiency of the heat sink. The anode and base-seal temperatures must not exceed 250°C. Henry Radio uses a small blower to circulate air past the heat sink during long periods of key-down service. The blower operates whenever the temperature of the heat sink rises above 210°C and is wired to function even after the amplifier is turned off. With the amplifier tuned for 1-kW input, the blower activates after the key is depressed continuously for twelve minutes!. Since the blower normally is not used (except for the most severe operating conditions) the amplifier produces no mechanical noise.

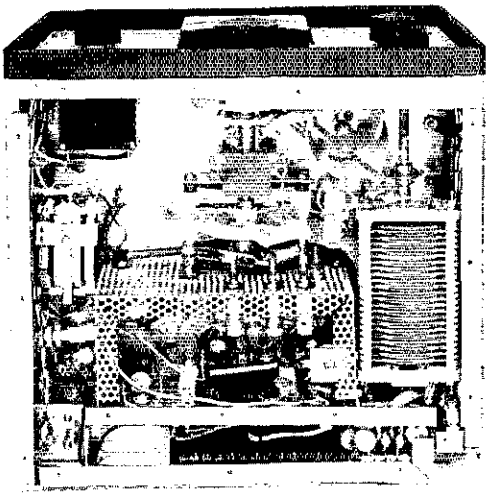
Of particular interest is the thermal link used between the 8873 anodes and the heat sink. It is made from beryllium oxide (BeO) which has heat-conducting properties of aluminum while maintaining high electrical resistance. Thermal compound is used to form a heat-conducting bond between the tube anodes, the BeO link, and the heat sink.

The 8873 has an indirectly heated cathode which requires that heater voltage be applied for one minute before full cathode emission can be attained. A 60-second delay relay prohibits the amplifier from being driven during the warm-up period. Heater voltage is obtained from a separate 6.3-volt secondary winding on the plate transformer. To prevent exceeding the rated heater-to-cathode voltage, excitation is applied to both the cathode and heater of each tube. A bifilar-wound choke keeps the heater above rf ground.

A five-section band switch performs all of the switching functions. The first section controls the indicator lights on the front panel. The second and third sections provide the appropriate taps for the output network. The fourth and fifth wafers select the proper input inductors.

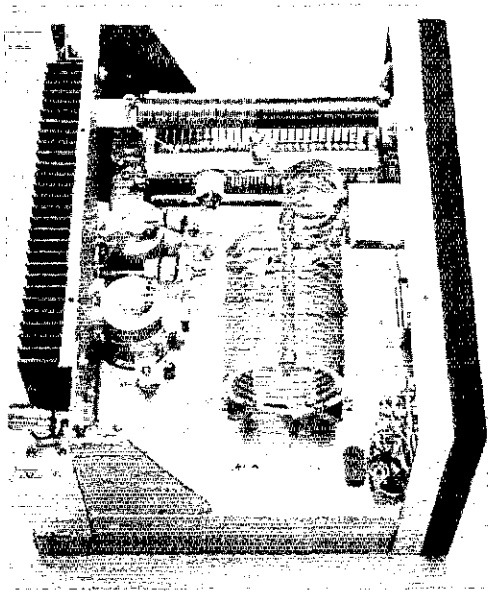
Input and Output Circuits

The 2K Ultra uses a tuned-input circuit which reduces both intermodulation distortion and drive requirements. A broad-band L network is used for



A look into the Ultra shows the L section of the pi-L output circuit. The input circuits are located in the perforated box. The blower is mounted to the bottom cover and is not shown in the photograph.

Interior view of the amplifier. The 8873 heat sink is mounted to the back of the cabinet. Next to it is the directional power meter. The beryllium-oxide thermal link conducts heat away from the tubes. The plate choke is located above the main-tuning capacitor and the multimeter switch is at the lower right.



an input circuit on 10 meters. Pi networks are used on the 40-, 20- and 15-meter bands. Two band-switch positions are employed to cover 3.5 to 4 MHz. The input impedance is 52 ohms.

A pi-L output circuit enables the amplifier to operate efficiently on either ssb or cw without a need for changing the plate voltage. The pi-L network matches a wide range of plate load impedances. It also has the advantage of enhancing harmonic suppression. The amplifier output impedance is 52 ohms, unbalanced. The SWR should not exceed 2:1.

Tuning the amplifier is accomplished quickly by observing the tuning meter located above the large multimeter while making the adjustments. This zero-center meter monitors the current in a bridge circuit consisting of the amplifier tubes and several diodes. When the circuit is balanced, the tubes are operating into the optimum load impedance for ssb and the meter reads zero (marked SSB in the center of the meter scale). For cw operation, the amplifier is tuned so that the meter needle swings left of the ssb position. Rf-output power as well as reflected power are monitored by the large panel meter. When the amplifier is tuned properly as indicated by the small tuning meter, peak output can be confirmed on the large meter, and the drive can be adjusted for any power input up to the legal limit.

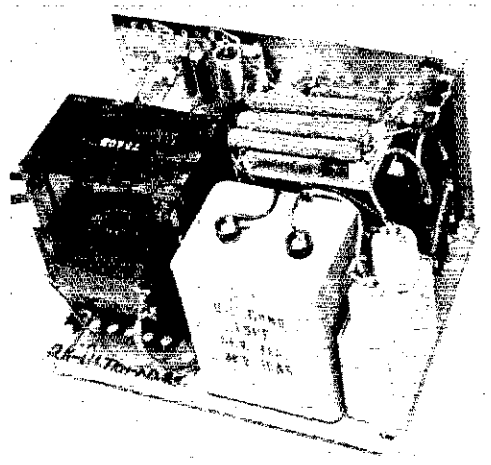
The tuning and loading capacitors each have a reduction drive to make adjustments easier. Approximate band settings are marked on the panel corresponding in color to the band indicator lights.

Power Supply

The power supply delivers 2200 volts under full load and is rated for continuous duty. It is equipped with a handle which makes the supply quite easy to move (considering it weighs 61 pounds!).

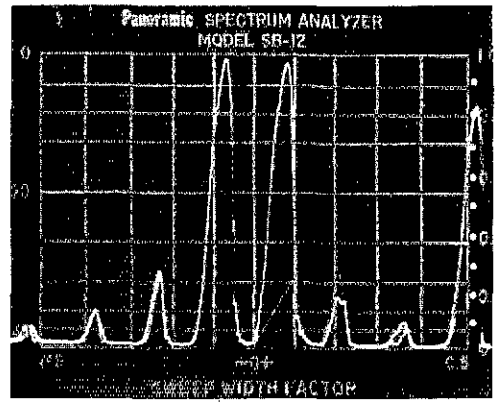
A full-wave bridge rectification circuit with a choke-input filter provides the operating high voltage. The 15-μF filter capacitor is rated at 3000 volts. A 0.1-μF, 7500-volt capacitor is connected in parallel with the filter choke, as shown in Fig. 1. This tuned-choke system is a very effective circuit to provide excellent voltage regulation while improving the filtering during low-current load conditions. Transient suppression is assured by a Thyrector assembly wired across the primary of the transformer.

Two thermally activated relays are used to provide a time-delay function for warm-up and a visual indication of when the amplifier is ready for operation; see Fig. 1. K1 is connected to the filament winding of the power transformer. When primary power is supplied to the transformer, the relay filament begins to heat. At the end of one minute, the filament has heated sufficiently to cause the normally open contacts contained within the relay tube envelope to close. This action allows a dc voltage to appear at the antenna relay so that



The power supply for the Ultra is connected to the rf deck by a twelve-conductor cable. A full-wave bridge circuit with a choke-input filter is used. The power transformer supplies all voltages to the amplifier. The filter choke is mounted next to the diode heat sink under the resistors. Both time-delay relays are shown at the upper left. The small capacitor on the right side is used in conjunction with the filter choke to improve regulation and filtering.

Fig. 2 — Spectral analysis of the 2K Ultra under two-tone test conditions. The third-order distortion products are 34 dB below the output. (The Panoramic scale is calibrated in dB below a single tone. To convert this scale for a two-tone test, subtract 6 dB from the figures indicated at the left side of the scale.)



the amplifier may be activated by means of the exciter VOX control. During the one-minute period before K1 closes, the rf deck indicator lamps receive an intermittent voltage from K2. The thermally operated contacts of K2 open within a short period after voltage is applied, interrupting the relay filament circuit. The contacts then close and the cycle repeats. This low-frequency oscillator is used to provide a flashing indicator on the amplifier front panel. When K1 closes, however, the front-panel indicator lamps receive a continuous voltage directly from the low-voltage line via CR1.

Some Final Comments

The author received many compliments about the clean sounding signal of the Ultra. Fig. 2 is a panoramic display of the third- and fifth-order distortion products. No TVI was noticed at the author's QTH. The 2K Ultra is a very rugged unit. It can be easily overdriven, however, if the alc is not adjusted properly. Excessive grid current will seriously shorten tube life. The replacement cost of the 8873 is comparable to that of a 3-500Z: under forty dollars. – *W*Ø*DRE/1*

The Henry Radio
2K Ultra Amplifier

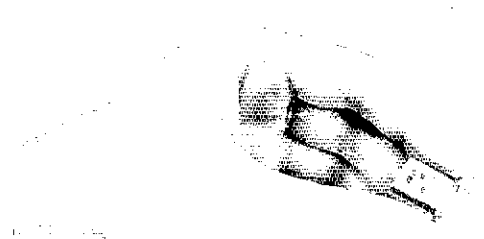
Dimensions (HWD) and Weight:
(RF deck) 8-3/4 × 12 × 11 inches, 20 pounds; (Power supply) 7-1/2 × 12-1/2 × 10-1/2 inches, 61 pounds.
Power Requirements: 220 V ac, 50/60 Hz, 15 A or 117 V ac, 50/60 Hz, 30 A.
Price Class: $850 including tubes and power supply.
Manufacturer: Henry Radio, Inc., Los Angeles, CA 90064.

• *New Apparatus*

A New 10.7-MHz Filter for Fm Receivers

Builders of amateur fm receivers should be interested in this new product by Spectrum International, the XM 107S04 crystal filter. This component is suitable for use in the i-f circuit of a single-conversion receiver, or it can be used in double-conversion receivers that employ a 10.7-MHz first i-f.

The filter is relatively small in size, measuring approximately 0.721 × 0.75 × 0.316 inches. An especially interesting feature is its package style. An HC-6/U-type crystal case, such as used for transmitting and receiving crystals, is used to house the four-pole filter. The assembly is equipped with *two small pins which can be made to fit into a* standard crystal socket. A metal clip is welded to one side of the case, and is used for connection to the ground bus in the circuit.



The XM 107S04 is designed for narrow-band use. A band width of ±7 kHz is characteristic at the 6 dB points of the filter's passband. At 40-dB-down points the band width is ±21 kHz. Insertion loss is rated at 3 dB, and ripple is 1 dB maximum. The filter is bilateral, and has an impedance of 910 ohms with 35 pF of capacitance in parallel with each port.

The filter is the most recent product developed by Schilling of West Germany, and is available from Spectrum International, P. O. Box 87, Topsfield, MA 01983, $15.95 in single lots. – *WICER.*

The First Novice Crystal Bank of San Diego County

BY HARLEY GABRIELSON,* K6DS

"JOE, WHEN ARE you going to clear these things out of this drawer?"

"What things?"

"These."

"Oh, those 'things' are the crystals I used when I was a Novice."

"Do you still need them?"

"No. One of these days I'll find someone who can use them."

Across town, Frank, WN6ZZZ, is listening in on "his" frequency – his only frequency on 15 meters. There has been a ragchew going on there for the past half hour – no chance at all for him to operate. "I sure could use another crystal for 15 meters, but my allowance for the rest of the month went last week for the materials to put up the new antenna. Guess I might as well turn the gear off and go outside and shoot a few baskets with Jimmy next door."

Question: How can Joe get his surplus crystals to Frank?

Answer: Through a Novice Crystal Bank.

Question: What is a Novice Crystal Bank?

Answer: It is an activity sponsored by a club or by an interested amateur which gathers crystals donated by amateurs and which loans these crystals to Novice operators.

One or the other of these two situations is all too familiar to many amateurs. A Crystal Bank can serve as an effective channel for moving unused crystals from the junk boxes of the more advanced amateur into the crystal sockets of the Novices. It assures the donors that the crystals will be put to good use efficiently. Because the crystals become the property of the Bank, they will not disappear into someone else's junk box, never to be used and never to be seen again. Through the Bank, when one Novice has used the crystal(s) and has gone on to get his General Class License, the crystal is returned to the Bank where it can be loaned out again and again.

Here in San Diego County, the Novice Crystal Bank is sponsored by the Amateur Radio Club of El Cajon. Crystals deposited with the Bank become the property of the club and are turned over to the custody of a Bank manager. The manager will then, in turn, distribute the crystals to Novices requesting them. The Bank manager assumes the responsibility for keeping track of the crystals out on loan and for seeing that they are returned to the Bank when the Novice's license has expired or has been superseded by a higher class license.

* 6820 Delaware Ave., La Mesa, CA 92041

Bank Manager, WB6LYG

The existence of the Bank is publicized wherever possible, at club meetings, in bulletins on the air, at Novice classes in the area, by personal contacts, and by notices on bulletin boards which might be seen by Novices. No charge is made for the loan of the crystals and the loans are available on an equal basis to any Novice living and operating in San Diego County.

Much credit for the success of the San Diego County Crystal Bank must go to Bruce Flagg, WB6LYG, who manages its operation. Bruce is a young amateur who came up through the Novice ranks. He is acquainted with many of the local Novices and is aware of the problems they face. If you have spare crystals to deposit in the Bank, or if you are a Novice licensee with a need for additional crystals, Bruce is the person to contact. We have, as a matter of practical necessity, limited the scope of this operation to San Diego County, but it is hoped that branch Banks will be formed to aid Novices in other areas of the country. QST

Strays

"Medicine and its Relationship to Amateur Radio" will be the theme of the scientific program of the sixth annual meeting of the Medical Amateur Radio Council (Marco) to be held in conjunction with the annual meeting of the American Medical Association, on Thursday, June 22, 1972, at the St. Francis Hotel, San Francisco, California.

Such subjects as the "Role of a Satellite in a Bio-Medical Communications Network, Missionary Radio Services, Slow-Scan Television and Telephone Transmission of Medical data, and Amateur Radio and Health Care in Medically Underserved Communities," will highlight the talks to be given during the scientific session.

Dr. Donald W. Needham, D.V.M., W6JNM, will be inaugurated as the new President of the Medical Amateur Radio Council and will preside at the scientific session. A Marco club station will be set up at the St. Francis Hotel to be operated by those members attending the convention.

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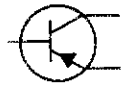
The Purple Martin Net is looking for bird lovers to check in at 4 P.M. CST every Sunday afternoon on 7.251 MHz. WA5MPQ is net control with W5BW the alternate.

One of ARRL's live-wire affiliates, the Yellow Thunder Amateur Radio Club in Wisconsin, has a "transistor quiz" prepared by K9PKQ as part of its general training program. With permission, we reproduce it herewith, plus a couple of additions of our own. It is a good general refresher on principles, and particularly so for anyone going up for FCC exams — which these days have more than a smattering of solid-state coverage.

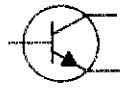
Do You Really Dig Transistors?

1) This symbol is a:



a. Ppn transistor.
b. Pnp transistor.
c. Npn transistor.
d. JFET.
e. None of the above.

2) This is the symbol for a:



a. Pnp transistor.
b. Nnp transistor.
c. Npn transistor.
d. Silicon rectifier.
e. N-channel FET.

3) The three elements of a transistor are:
a. Plate, grid, cathode.
b. Plate, base, cathode.
c. Collector, base, cathode.
d. Collector, base, emitter.
e. Gate, source, collector.

4) Transistor junctions are made of:
a. Clay and silicon.
b. P- and n-type semiconductor material.
c. Copper and germanium.
d. Ceramic and substrate.
e. All of the above.

5) Name the unidentified element of this transistor:

a. Plate
b. Base
c. Gate
d. Emitter
e. Collector

6) One disadvantage of transistors is:
a. They cause harmonics.
b. They use too much power.
c. They will not withstand long periods of excessive voltage or current.
d. They always require heat sinks.
e. All of the above.

7) One advantage of transistors is:
a. They use very little power.
b. They are small in size.
c. They are efficient.
d. They can provide amplification.
e. All of the above.

8) If a transistor is connected with the wrong polarity supply voltage:
a. The sine-wave output will be inverted.
b. It will draw no current.
c. It will probably be destroyed.
d. The internal alarm will fire.
e. The transistor will work normally.

9) In normal operation with a transistor, the emitter-base junction is:
a. Saturated.
b. Forward biased.
c. Reverse biased.
d. Highly reactive.
e. None of the above.

10) If a base current increase of 1 milliampere causes a collector current increase of 10 milliamperes, the dc gain (Beta) of the transistor is:
a. .01
b. 0.1
c. 10
d. 100
e. It has no gain.

11) Transistors can be used as:
a. Amplifiers.
b. Oscillators.
c. Detectors.
d. Rectifiers.
e. All of the above.

12) Transistors usually operate from supply voltages in the range of:
a. 3 to 30 volts dc.
b. 150 to 500 volts dc.
c. 5 millivolts to 50 millivolts ac.
d. 1000 volts ac.
e. None of the above.

13) Basically, transistors have "gain" because:
a. They have no filaments.
b. A small change in base current causes a larger change in collector current.
c. They are operated from batteries.
d. They are unilateral devices.
e. All of the above.

14) Transistors are made of:
a. Various substrates.
b. Emitter materials.
c. Silicon or germanium.
d. Mica and epoxy resins.
e. All of the above.

15) The f_T rating of a bipolar transistor is:
a. The feedthrough capacitance of its junction.
b. Its gain-bandwidth product.
c. Its frequency-temperature characteristics.
d. The maximum collector-current rating.
e. Its alpha characteristics.

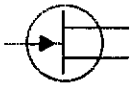
16) A transistor's gain-bandwidth product is:
a. Its gain at some specific frequency of operation.
b. The transistor's low-frequency characteristics.
c. The frequency at which its gain is unity, or 1.
d. The frequency at which it delivers maximum gain.
e. Its dc beta.

17) The Alpha-cutoff characteristic of a transistor:
a. Is dependent upon whether it is an npn or pnp type.
b. Is the lowest frequency at which it will amplify.
c. Is the frequency at which its gain is 0.707 — the value at 1000 Hz.
d. Its feedback characteristics at 100 MHz.
e. None of the above.

18) A transistor heat sink is used to:
a. Increase the operating temperature of a transistor.
b. Prevent the transistor junction from cracking in cold weather.
c. Reduce the junction temperature of a transistor.
d. Assure quick starting of transistor oscillators.
e. Minimize the frequency drift of oscillators.

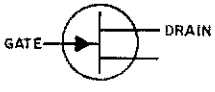
19) A junction field-effect transistor (JFET) is:
a. Characterized by its low input impedance.
b. Similar to a medium-mu triode tube.
c. A unity-gain high-impedance semiconductor.
d. Most often used in high-power audio amplifier circuits.
e. Forward biased to saturation before it can amplify.

20) The symbol at the right is that of:
a. An n-channel tunnel diode.
b. A dual-gate MOSFET.
c. A p-channel JFET.
d. An n-channel JFET.
e. An overlay bipolar transistor.

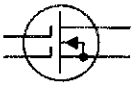


21) A semiconductor device which has a gate, source, and drain is:
a. An npn bipolar transistor.
b. A hot-carrier diode.
c. A single-gate FET.
d. A unijunction transistor.
e. Water-cooled high-power bipolar transistor.

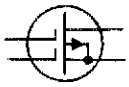
22) The unlabeled element in the diagram at the right is:
a. An emitter.
b. An anode.
c. A source.
d. A substrate.
e. A common collector.



23) The symbol at the right is that of:
a. A two-gate JFET.
b. A twin-base bipolar transistor.
c. A silicon-controlled rectifier.
d. A triac.
e. A dual-gate MOSFET.



24) The symbol at the right represents:
a. An n-channel MOSFET.
b. A common-emitter JFET.
c. A grounded-gate MOSFET.
d. A p-channel MOSFET.
e. None of the above.



25) A transistor that is known for its high input impedance is called:
a. Small-signal bipolar.
b. A field-effect transistor.
c. A balanced-emitter transistor.
d. A bootstrap transistor.
e. A mesa-type transistor.

26) FETs are suitable for use as:
a. Small-signal ac and dc amplifiers.
b. Oscillators.
c. Mixers and product detectors.
d. Solid-state switches.
e. All of the above.

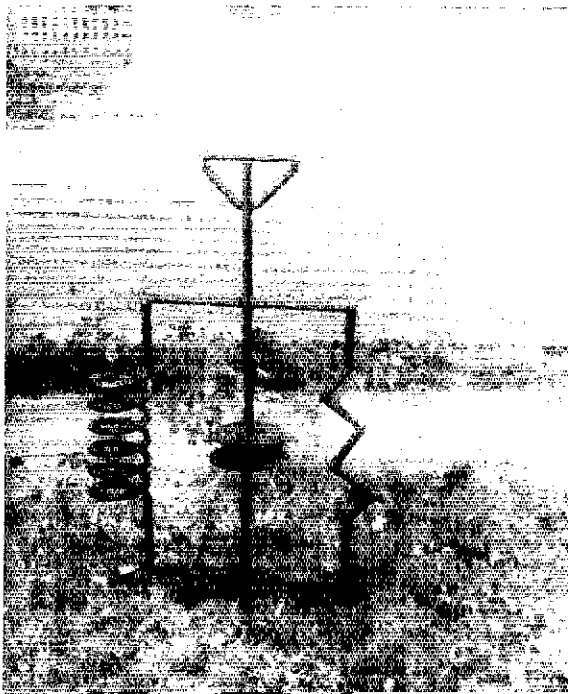
27) The Alpha cutoff of a transistor is measured in:
a. Common-emitter configuration.
b. Common-collector configuration.
c. Common-base configuration.
d. Inverted supply configuration.
e. None of the above.

28) The Beta of a transistor is measured in:
a. Common-base configuration.
b. Common-emitter configuration.
c. Common-collector configuration.
d. Reversed power-supply configuration.
e. There is no such thing as "Beta."

QST

Strays

This bit of iron sculpture, 80 pounds and 39 inches high, adorns the front yard at K8LQM. He welded it from steel bar and plate, and an auto coil spring. Resonant frequency? — Unknown.



"Houston, This is Apollo . . ."

BY PAUL M. WILSON,* W4HHK AND RICHARD T. KNADLE, JR.,** K2RIW

EQUIPMENT ORIGINALLY BUILT by W4HHK for 2304-MHz EME and tropo scatter experiments has been successfully used to receive 2287.5-MHz signals from Apollo 10, 12, 14 and 15 spacecraft in lunar orbit.[1,2,3,4] It was not until the Apollo 15 mission, however, that successful reception of voice transmissions from the Command Service Module (CSM) was achieved. This occurred at 0026 GMT on the morning of August 1, 1971, when the partially quieted fm receiver suddenly quieted completely and the voice of CSM pilot Al Worden was heard loud and clear from the speaker! Unprepared for this reception, I was caught without the tape recorder connected to the receiver. It was an exciting moment I shall always remember. Minutes later the signal cut off sharply as the spacecraft went behind the moon. Initial reception of the Apollo 15 CSM had been made the previous day at 2121 GMT. Unlimited monitoring of the Apollo 15 mission (and others) was not possible because of a regular work schedule and the changing lunar position. The

* Box 430, Collierville, Tennessee 38017
** 316 Vanderbilt Parkway, Dix Hills, NY 11746

1 Tilton, "To the Moon and Back — on 2300 MHz," *QST*, July, 1969, p. 54.
2 Wilson, "A 2.3-GHz Crystal-Controlled Converter," *QST*, April, 1971, p. 34.
3 Smith, "The World Above 50 Mc.," *QST*, December, 1970, p. 92.
4 Fisk, "Parametric Amplifiers," *73*, 1964, p. 53.

The Lunar exploration which the Apollo astronauts are currently undertaking is one of the most exciting technical events of the decade. For amateurs who wish to take part in these events and learn much about modern space communications networks, direct reception of the Apollo transmitter while it is in lunar orbit is possible for the dedicated amateur, using mostly amateur equipment. This article describes two quite different equipment setups; according to NASA, they are one of the first independent stations in the world which have demodulated the Apollo S-band voice signals from a lunar distance.

Apollo 16 took off on April 16; Apollo 17 (which may be the last manned mission) is scheduled for December 9, 1972. The equipment that amateurs assemble for these missions will not gather dust, because it will have the possible capability of receiving Pioneer F and G (1972 Jupiter fly-bys), Helois (1974 sun probe) and Viking (1975 Mars lander) probes, since they all will transmit between 2265 and 2300 MHz. Also tropo and EME experiments in the 2300-2450 MHz amateur band are possible the year round, as W4HHK has discovered.

The first section of this article, by W4HHK, describes the use of a commercially manufactured 18-foot diameter dish and a homemade receiver which have been used to receive signals since Apollo 10 and which achieved voice reception of Apollo 15, as well as the first 2300-MHz EME QSO. The second section, by K2RIW, describes the use of a home-constructed 12-foot diameter dish combined with a receiver, made up of commercially manufactured amateur equipment and laboratory instruments which recorded 3-3/4 hours of voice reception from the Apollo 15 astronauts. This accomplishment resulted in K2RIW's visit to the NASA Manned Spacecraft Center in Houston.

moon is always in view of two of NASA's primary tracking stations in Australia, Spain and California, but not so for the amateur. Some of the most exciting events and transmissions from the Apollo missions always seem to occur when the moon is below the horizon for the continental United States amateur! Nevertheless, five lunar parking orbits (LPO) and several hours of return trip transmissions were observed by this experimenter.

Important! FCC regulations prohibit disclosure of the content of communications not intended for the public. Thus, it is illegal to inform the press or any other third party of the content of any information received directly from the Apollo communications link.

At W4HHK

The block diagram shown in Fig. 1 illustrates the equipment setup. The dish is remotely controlled and fully steerable in azimuth and elevation. Look angles for initially finding the moon and spacecraft are calculated from *The Nautical Almanac* and conversion tables. Visual observation of the moon is unnecessary. Once the signal is acquired, tracking is done by steering for maximum signal strength. However, keeping the dish on target, constant receiver tuning (because of Doppler shift), and log keeping, results in a busy, one-man operation.

The Apollo signal first is converted to two meters, amplified, and then fed to two receivers. A GE Progress Line fm receiver with 30-kHz bandwidth (much too broad for Apollo reception) is used for voice reception. A crystal-controlled two-meter converter changes the first i-f signal to 7 MHz for feeding a 51J4 Collins receiver, which is used for acquisition and to measure signal strength and Doppler shift. The GE fm receiver second local oscillator (normally crystal controlled) is made variable by removing the crystal and feeding in a signal from a Northern Radio 0-165/UR VFO. Once the spacecraft signal is acquired on the 51J4, the VFO is adjusted to center the signal in the fm receiver passband. The 51J4 is used in the cw mode with a 3-kHz bandwidth for signal strength and Doppler-shift measurements. An audio level meter on the 51J4 output is employed to measure the strength of the beat note relative to the background noise level (in the absence of signal). A J-K 1-MHz frequency standard (10^{-8} stability) and harmonic generator provide calibration markers for the S-band/51J4 receiver combination at 2286 and 2287 MHz.

The theoretical gain difference between the 18-foot diameter dish and the 12-foot one (described later) is about 3 dB. This advantage was cancelled by the use of linear polarization at W4HHK, since CSM transmissions employ circular polarization. In addition, feed-line loss at W4HHK is 4 dB (K2RIW's line loss is nearly zero) and the parametric amplifier noise figure is probably 2 dB inferior to the commercially manufactured one. Simultaneous observations of Apollo 15 signals during LPO were not made, but by chance K2RIW and W4HHK were monitoring the same spacecraft transmissions during the return voyage to earth. Maximum main carrier (2287.5 MHz) strength logged by W4HHK during the LPOs was 18 dB. Signals were received for a total of 65 minutes during one of these orbits. Doppler-shift measurements made during this period produced the curve shown in Fig. 2. A total change of 49.9 kHz was measured. NASA says it should be 48.4 kHz for a 60-mile lunar parking orbit. At first glance the amount of shift would appear excessive. It is twice the normally calculated Doppler shift because the transmitted frequency is derived from the frequency received on board the spacecraft which has been shifted on the uplink (from earth) and is shifted again on the downlink. During the return trip a signal strength maximum of 23 dB was first

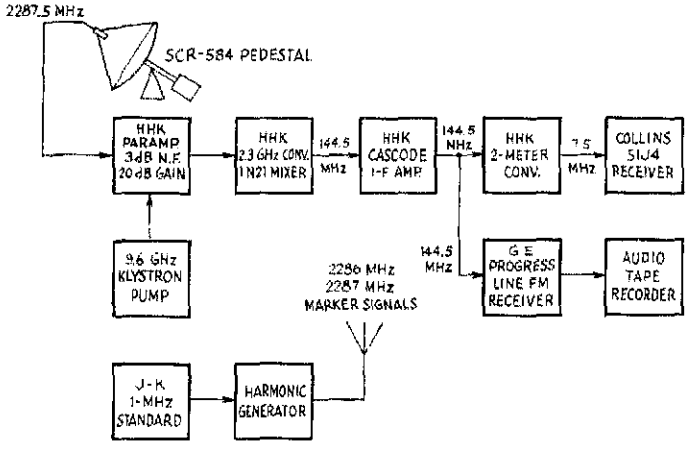


Fig. 1 — Block diagram of the S-band receiver system used to receive Apollo 15 at W4HHK.

A unique view of the gear used by K2RIW, as seen through his screen covered dish.

observed at 0234 GMT August 6, and the following day readings were in excess of 23 dB (off the meter scale). At this time the spacecraft was less than half the distance to the moon. Voice transmissions were correspondingly stronger, but little conversation was heard. The *Endeavour's* crew was apparently enjoying a well-earned rest. Sometimes the voice subcarrier was turned off, leaving on the main carrier for observations. It was reassuring to know everything was probably "A-OK" aboard the CSM by the presence of this continuous signal.

A written report was sent to NASA on the reception of Apollo 15 S-band signals and a letter of confirmation was received from them. Similar letters were received for the 10 and 14 missions.

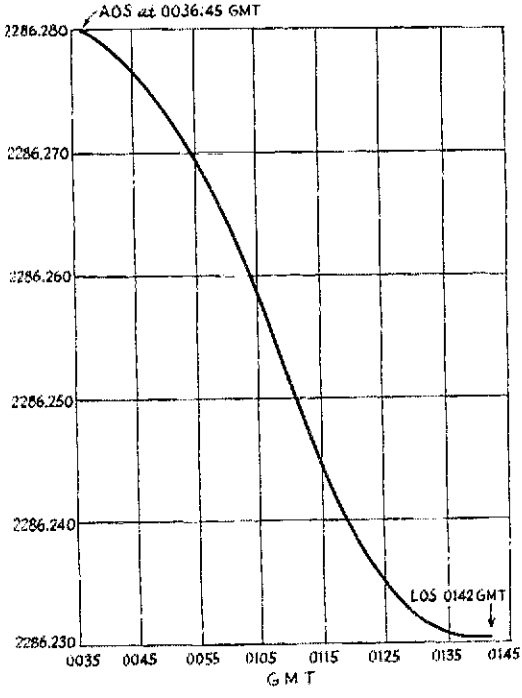


Fig. 2 — Doppler shift measured at 2286.25 MHz as recorded on August 3, 1971.

Treasured even more are two photographs and one Doppler graph submitted with the reception reports for those missions. They were returned bearing the signatures of the heroic crews making those historical voyages to the moon — unique QSLs that this amateur will always cherish.

W4HHK/A4HHK wishes to give special thanks to Third Army MARS for the interest and support received making the Apollo reception experiments possible and to the NASA Manned Spacecraft Center, Houston, Texas, for the attention and response given to the reports submitted by this station.

At K2RIW

"Houston, this is Apollo . . ." These were the first words I heard from the 13.2-watt Apollo 15 transmitter at 7:25 P.M. EDT on August 4 from 240,000 miles in space. Words cannot describe the feelings that Robert Coe, WN2MUE, Mario DiDiego, WB2MLH, Byron David and I shared upon unexpectedly hearing these words of Astronaut Al Worden come booming from the loudspeaker of the equipment we had assembled at the rear door of Airborne Instruments Laboratory. We had listened to the audio subcarrier during two lunar orbits the previous night and not a word had been heard. We were beginning to think that there was a malfunction in our equipment. Not expecting to receive anything for the time being, we had left the tape recorder turned off and had the receiver volume control set quite high, hoping to detect any possible faint voice. Consequently, when modulation suddenly appeared, it gave us quite a jolt. The only record we have of these first sentences is the notes of my wife, WB2HJD.

The Dish

The idea of even attempting the reception of such a small transmitter from so far away using such a small dish (12-foot diameter) seemed quite optimistic to me, especially since several systems communications experts had told me it couldn't be done. NASA's Manned Space Flight Network, by contrast uses antennas from 30 to 210 feet in diameter to assure reliable astronaut communications even during use of the omnidirectional antenna aboard the Command Service Module (CSM).

Amateurs can realize acceptable reception with a 12-foot antenna and probably even a 6-foot antenna during the time the high-gain antenna is

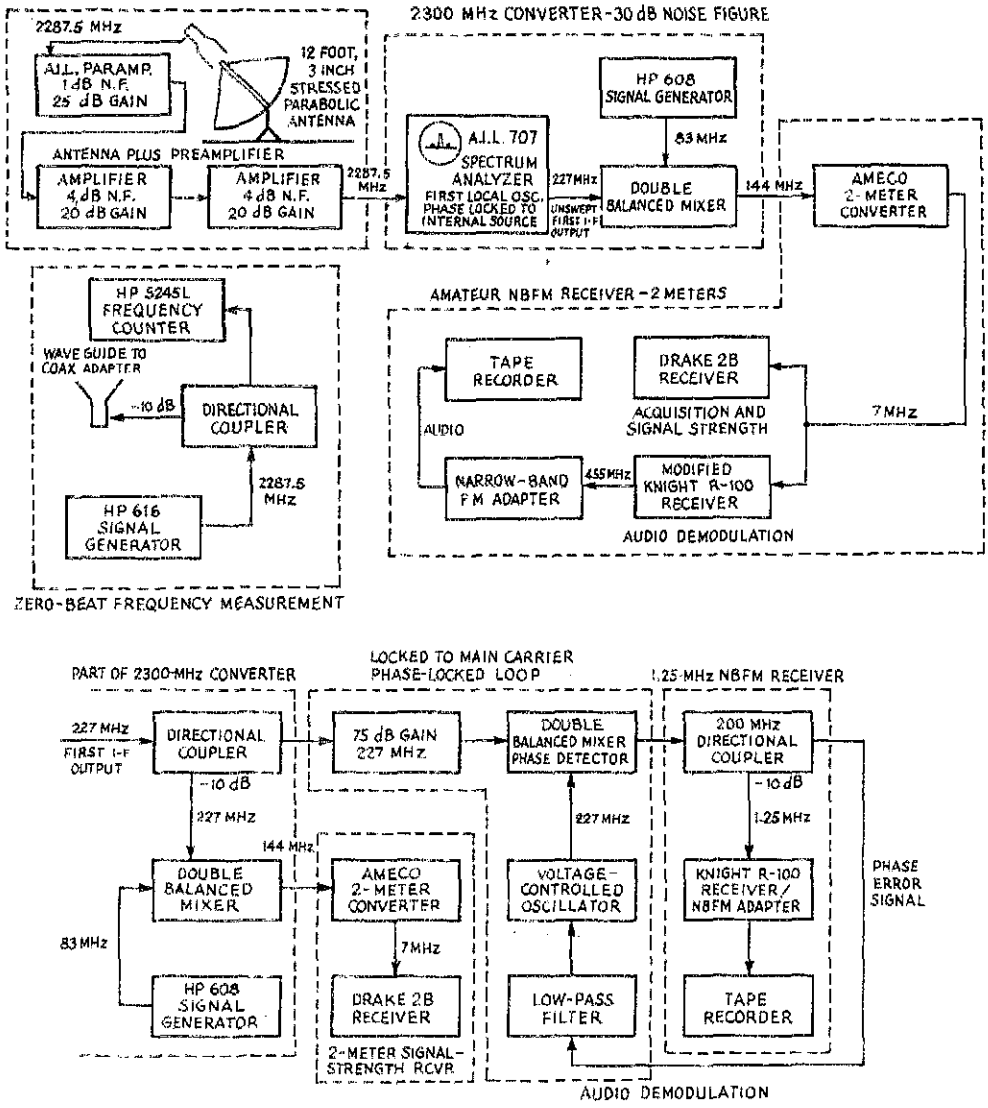


Fig. 3 — (A) Apollo 15 reception system used by K2RIW. (B) Phase-locked loop system used to receive Apollo signals on the return trip from the moon.

being used on the CSM. As the block diagram in Fig. 3 shows, our system contained two expensive borrowed components (a parametric amplifier and a spectrum analyzer used as a 2287.5-MHz converter). However, we received the main carrier as strong as 29 dB above the noise of a 3.6-kHz bandwidth, which leads me to believe that many equipment substitutes will succeed. I know of eleven other amateur groups who are building different receivers for Apollo 16.

The most important component of an Apollo receiver system is the S-band antenna. I found dishes difficult to obtain, so I built a portable 22-pound, 12-1/4-foot diameter dish from window screening, fishing string, and 1/2-inch aluminum tubing. The total cost was $45. It delivers approximately 34 dB of gain and realizes 6-1/4 dB of S-band solar noise. Surface accuracy for S-band use should be better than 1/8 wavelength or 1/2 inch. The circular-polarized feed horn was constructed from an American paint can and an oatmeal can made in Scotland (3-3/4-inch diameter cans are hard to find). All Apollo S-band transmissions use right-hand circular polarization; a 3-dB disadvantage will be suffered if a linear-polarized feed horn is used. Our receiver was quite an inexpensive one, a highly modified Knightkit. The nbfm adapter is from the *Radio Amateurs*

TABLE I

Apollo Frequencies (extracted from information received from NASA.)

Command and Service Module (CSM)
Vhf: 296.8 or 259.7 MHz (a-m voice).

Unified S-Band (usb): on Main carrier: 2287.5 MHz
Fm Voice subcarrier: 1.25 MHz

CSM Backup Voice: on Main carrier: 2287.5 MHz (fm)

Lunar Module (LM) usb: Main carrier: 2282.5 MHz
Fm Voice subcarrier: 1.25 MHz

LM Backup Voice: on Main carrier: 2282.5 MHz (fm)

Lunar Communications Relay Unit (LCRU): 2265.5 MHz
Fm Voice subcarrier: 1.25 MHz

LCRU Backup Mode: Voice on Main carrier: 2265.5 MHz (fm)

Signal loss at 2287.5 MHz and 240,000 Nautical Miles: —213 dB.

Handbook. We were unable to make a phase-lock loop IC fm demodulator have as good a threshold as that tube-type demodulator.

We expected the 2-degree beamwidth of our 12-foot antenna to make aiming difficult; but peaking signal strength by manual tracking with the antenna mounted on a photographic tripod was quite easy. First acquisition was accomplished by aiming the antenna's center pipe at the moon like a gun barrel. The Apollo 15 Command Service Module left Lunar Parking Orbit Wednesday night August 4. The CSM was 12 degrees to the right of the moon on Thursday and 25 degrees to the right of the moon on Friday, the day before splashdown. This surprised us, because we had naively assumed the astronauts traversed a straight path from the moon to Earth.

Receiving System

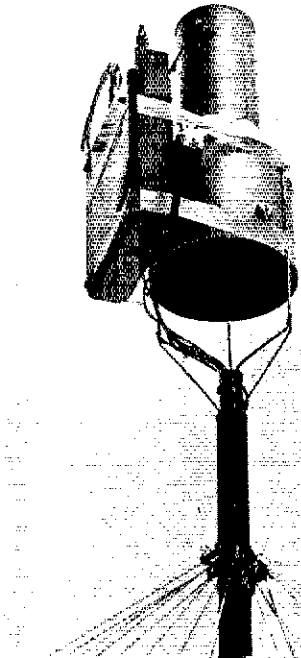
Another important component of an Apollo receiver system is the S-band preamplifier and converter. System noise figure is the critical parameter. I located the low-noise parametric amplifier right at the feed horn and fed power up to it. This procedure avoided the feed-line loss which would have added directly to the system noise figure. The two extra preamplifiers were used to overcome the noise figure of the spectrum analyzer, which is higher than that of an amateur-built 2300-MHz converter. (I have calculated since that one of the preamplifiers was not required.)

The Apollo transmitter is slightly different from the nbfm transmitters we are familiar with. The astronaut's voice frequency modulates a 1.25-MHz oscillator, see Fig. 4. This oscillator, along with others which carry telemetry information, phase modulates the 2287.5-MHz carrier and results in the spectrum shown in Fig. 5.

At least two kinds of reception of this spectrum are possible, depending on system threshold:

1) It is possible to concentrate on the main carrier which is typically 8 dB stronger than the voice or telemetry sidebands. Detection with a BFO yields more than 10 dB of additional threshold, so main carrier detection is at least 18 dB easier to accomplish than voice reception. From the main carrier you can measure Doppler-shifted frequencies, AOS (acquisition of signal) times and LOS (loss of signal) times as the capsule travels around the moon, disappears behind it, and emerges while in LPO (lunar parking orbit). Doppler-shifted frequencies define velocity away from or toward the earth during the mission. The maximum shift is ± 27 kHz, which occurs during LPO. (Doppler shift is the apparent change in frequency of a transmitter which is approaching or receding from the receiver.) If the antenna gain minus system noise figure is 18 dB, the main carrier will be received with 10 dB to spare, even while the CSM is in LPO.

2) For the builder with more system threshold, voice subcarrier reception will be most enjoyable. The upper and lower subcarrier sidebands can be considered as completely independent nbfm signals spaced 1.25 MHz from the main carrier, as we considered them during our first two days of voice reception. We listened to the upper sideband at 2288.75 MHz; W4HHK listened to the lower one at 2286.25 MHz. The more advanced builder can construct a phase-locked-loop system for subcarrier extraction, by which we realized 3 to 4 dB of additional voice threshold on our last day of



Close-up view of the 2287.5-MHz W2IMU dual-mode feed horn constructed from an American paint c.. and a Scottish oatmeal container.

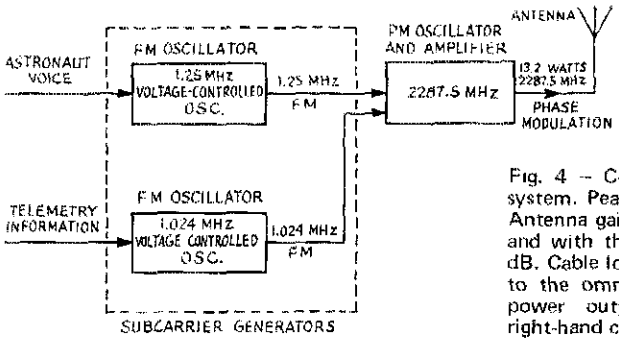


Fig. 4 – Command Service Module S-band voice system. Peak subcarrier fm deviation is ± 7.5 kHz. Antenna gain with the high-gain antenna is 26.3 dB and with the omnidirectional antenna is -6 to +6 dB. Cable loss to the high-gain antenna is 5 dB, and to the omni antenna is 2.5 dB. The transmitter power output is 13.2 watts. Polarization is right-hand circular.

reception, August 6. The loop must lock on the main carrier, and in this manner it extracts the upper and lower sidebands together, thus receiving twice as much energy. The loop output is a 1.25-MHz signal which must be nbfm demodulated. The antenna gain minus system noise figure must be about 30 dB if voice reception is desired. See Fig. 5. It was interesting to note that Command Module Pilot Lt. Col. Al Worden fully modulated the transmitter but Col. David Scott and Col. James Irwin occasionally undermodulated the command module transmitter, a condition similar to what amateurs experience when someone else uses the station transmitter.

Friday, August 6, we picked up the Apollo 15 signal 20 minutes before the capsule came up over our horizon, which suggests that there are some interesting modes of propagation on 2300 MHz which are worthy of investigation. Later I stood in front of the antenna and was amazed that my presence did not affect the signal strength. Only when I put my hand in front of the feed horn did the signal decrease. (The antenna has an area of 112 square feet, and my body was only blocking a few square feet.)

A Visit with NASA

The NASA Manned Spacecraft Center sent me a much-appreciated packet which included a letter of confirmation of astronaut voice reception which I consider a QSL card from a 13.2-watt QRP transmitter a quarter of a million miles away – not bad DX! Our project may sound well-planned, but in reality our enthusiasm for assembling the equipment did not occur until the day of blast off, and the week of the flight was one of the most hectic I've ever spent.

As a result of our Apollo 15 voice reception I had an opportunity to visit the NASA Manned Spacecraft Center in Houston on September 22. I had a talk with systems engineers of the flight support division and had a chance to inspect the

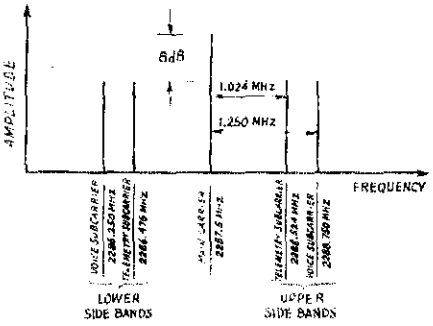
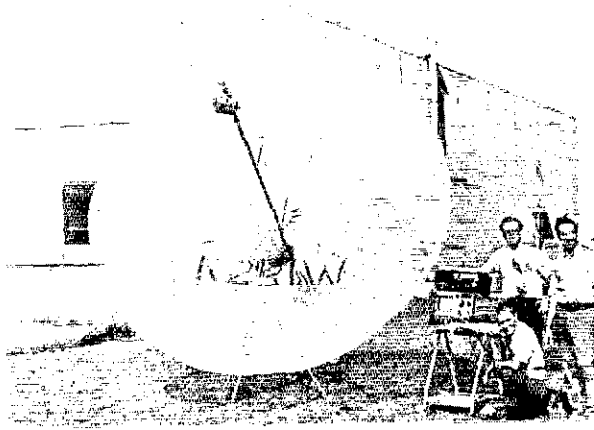


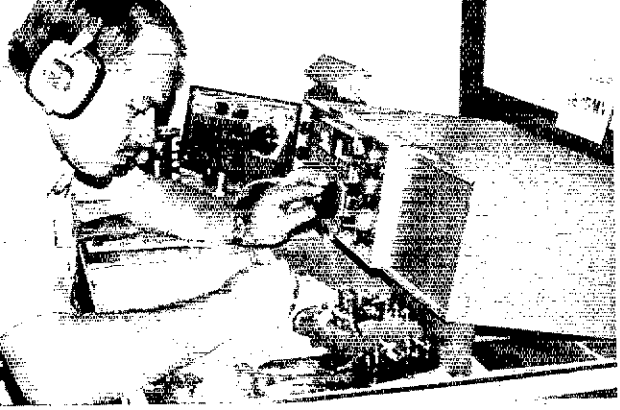
Fig. 5 – Resultant transmitted signal from CSM.

Mission Control Center, Computer Support Complex and Astronaut Training Facilities. I sat in an Apollo Command Module, sat on the Lunar Rover Car, inspected a Service Module, Lunar Module, Lunar Module Landing Simulator and a Zero-gravity Training Tank. I met astronauts and watched them during training exercises.

We are presently making systems improvements in anticipation of Apollos 16 and 17, during which we will attempt reception of the Lunar Module and Lunar Rover vehicles while they are on the Moon. A low-noise Apollo receiver system also makes a fair radio telescope, and our group (the newly-formed AIL Radio Astronomy Group) is considering observing some of the galaxies and pulsars, as well as other space probes. I have a feeling that we're just getting started! QST



A 12-foot diameter parabolic antenna can be used to receive Apollo communications. Shown here are K2RIW (left), WB2MLH (kneeling), and Byron David.



VE3BMV (l.) managed 367 QSOs in 68 sections for a final score of 50,524. This was more than enough to take Canadian Division leadership and places Yuri as 7th among the TOP TEN participants! Earl, W5RTQ (r.) is back again this year as West Gulf Division leader with 175 QSOs in 57 sections!

Results 2nd ARRL 160-Meter Contest

REPORTED BY AL NOONE, *WA1KQM

IN A CONTINUING effort to arrive at a better set of rules for this popular new activity, the 2nd ARRL 160-Meter contest (held Dec. 10-12, 1971) incorporated a number of changes (recommended by the ARRL Contest Advisory Committee) designed expressly to increase participation. The starting time was moved up to 2200 GMT and each DX country (not including KG4 KP4 KV4 etc. which already count as sections) was counted as a separate multiplier.

Did the changes help? You bet! While entries remained at about the same level as last year, 272 to be exact; there were upwards of 1000 different calls noted in the logs sent in to Hq.! (A number of stations commented that the activity seemed almost like a November Sweepstakes at times!)

Even conditions were good to us. East coast stations were able to work into Europe both nights, the West coast gang took advantage of the excellent KH6 activity, caught that occasional JA, KR8 and VS6 and the Central states kept busy cleaning up those section multipliers!

As for DX, well here's just a sample of what was available to work: CO, EI, G, GM, HB9, HBØ, JA, KR8, OK, PAØ, PY, VK, VP9, YN, ZD8 and 8P6. Wonder what the list would be like if all the active stations sent in logs? Oh well, maybe next year!

Some 72 stations have earned certificates as either section or country winners. You can expect them shortly after their June 15th mailing. — *WA1KQM.*

TOP TEN

Single Operator: W3GM 72,200 - 76 multipliers; W3IN 68,406 - 78; K1PBW 66,300 - 78; WØAIH 61,028 - 73; W9DL 59,427 - 71; W9YT (K9LBQ, opr.) 54,270 - 67; VE3BMV 50,524 - 68; W8DB 45,560 - 68; K8KHB 43,485 - 65; and VE5XU 43,470 - 70.

TOP FIVE

Multioperator: W8LT 47,718 - 66 multipliers; K3RUQ 40,257 - 63; K8BYI 37,210 - 61; W9YB/9 33,630 - 59; and KØIJL 30,180 - 60.

SOAPBOX

Fine contest, seemed that there was more activity than last year although my total score turned out about the same. Heard North and South Dakota, Missouri, Montana, North Texas, KV4FZ and some Californians that I just could not seem to work. Did QSO South Texas, Utah, Colorado and Mississippi. (W1FLN). . . The highlight of the

Frank, HB9NL managed 31 QSOs with 14 sections located as far West as W8/9! His FB signal was audible for many hours on the East coast.

QST for

* Asst. Communications Mgr., ARRL.

DIVISION LEADERS

Single Op.		*Multiop.*
W3GM	Atlantic	K3RUQ
W9DL	Central	W9YB/9
WØAIH	Dakota	KØIJL
W5SUS	Delta	. . . . .
W8DB	Gr. Lakes	W8LT
W2EQS	Hudson	K2STO
WØNFL	Midwest	. . . . .
K1PBW	New Engl.	W1OP
K7IDX	Northwest	K7AUO
WB6QJT	Pacific	. . . . .
K4CIA	Roanoke	W4UPJ
WAØCVS	Rocky Mt.	WØMS
W4YWX	Southeast	W4HAW
W7NQ	Southwest	W6YY
W5RTQ	West Gulf	K5DEG
VE3BMV	Canadian	. . . . .

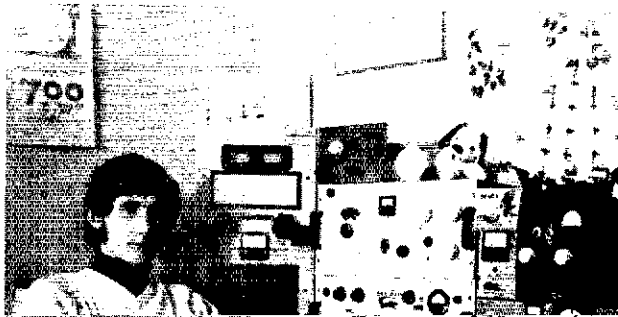
contest was the QSOs with KL7HEE and WAØZQB/KL7 to complete my 1.8 Mhz WAS. Managed to work HB9NL and PY1DVG through the severe W/VE QRM in the 1825-1830 "DX Window." Somehow more emphasis must be made to keep this portion of the band open for the DX stations to use. Also, the W/VEs should be reminded that the DX there is listening between 1800-1807 for replies, not on their frequency. No Asians heard, JA frequencies covered by Loran here. (W9PNE). . . Conditions were very good the first night, and excellent the second. The allocation of the band with everybody on the low end is just great. Climax to the test was working VS6DO! (W7CFI, opr. W7NQ). . . Worked 60 ARRL sections in 42 states, including Hawaii. Biggest thrill of all was when ZD8AY answered my CQ. In addition, I worked Mexico and Brazil. I would like to make skeds (weekends-night time only) with any 160-meter stations in Maine, Vermont, New Hampshire, Idaho, Montana, Oregon, Wyoming and Alaska. (K5AGI/5). . . New 95-foot vertical has lots more punch than last year's long wire. (W3IN). . . The contest went very well, and was a lot of fun for everybody. The changes over the first one were well received. DX stations felt a bit left out, and the participation from DX was low. (W1BB). . . Would be nice to modify the rules again so as to increase DX participation and interest. Increasing the DX QSO point count or providing additional multipliers for continent to continent QSOs might help. (K1PBW). . . Big thrill to hear JA7AO calling CQ with a good signal, big frustration not being able to work him. (KØDCF/Ø). . . Thought this years contest had much better conditions, and certainly, much better participation by US hams, but where were the VEs and DX? (WØII). . . The conditions on December 12 morning here on TOP BAND was fantastic and so I could work many stations from the states never before worked or heard. But the Ws were not listening for Europeans all, like the W9s and especially the WØs! The WØBE and WØAIS

No wonder WØAIH was heard in Europe! The antenna to the left of the picture is a 137-foot vertical fed against over 2000 feet of ground-wire radials!

are here 579 between 0500 and 0600 GMT on the 12th. I also noted W3DA, K1GSU, WA8JUN, and W9YT. For 1.8, 3.5 and 7 MHz I have a 80-meter zepp or a 160-meter dipole, not high, but bent down by about 30 degrees in the direction of the USA. The best frequencies for Ws are 1802 -1804 here, but the broad-band fone stations commercially are QRMing very often if the band is not open good for DX. (HB9NL). . . The frequencies from 1830-1835 here in Australia are usually clear, so during these 160-meter contests, I would suggest using the Europeans DX Window for Australia stations as well. On December 12th heard W8VLN S4 at 1215Z, W5RTQ S6 at 1246Z and W9EIU/9 S4 at 1255Z. (VK3QI). . . Suggest change in the rules to allow DX to DX QSOs only if the station QSOd is on another continent. Of course, any DX to W/VE would be allowed, such as XE to W(same continent). (W5RTQ) . . . Conditions were very good, heard W7 stations and one European. (W1QV). . . Enjoyed the contest very much and have no suggestions for improvement. Antenna was a 130-foot long wire that snaked out of the basement over the air-conditioner, through the tower legs, up the tower for 32 feet and then down to the roof of the house! (KØDYM). . . Didn't hear any DX but did manage to work a lot of needed USA stations for my 160-meter WAS! (WA3OFT). . . Seemed like one heck of a lot of activity. (W8LT). . .

2nd ARRL 160-Meter Contest

Within each section, scores are broken down by callsign, final score, contacts, sections and operating time. Example of listings: VE1ASJ 38,324-268-67 or final score of 38,324, number of contacts 268, number of multipliers 67 and total operating time not given. An asterisk denotes a Hq. staff member, ineligible for an award. The station first-listed under each section or non-W/VE country is the award winner. Multi-operator stations are grouped in order of score following single-operator station listings in each section tabulation.



Here's Jarda, OK1ATP, well-known TOP BAND enthusiast from Czechoslovakia. His 10 watts to a dipole netted him 10 QSOs with 7 East-coast sections.

VE

Maritime

VE1ASJ 38,324-268-67

Ontario

VE3BMV 50,524-367-68
VE3DU 11,610-129-45-13
VE3BVG 2024- 46-22-14

Saskatchewan

VE5XU 43,470-306-70-33

British Columbia

VE7AKI 11,562-123-47
VE7HQ 8424-108-39

Yukon–N.W.T.

VE8OK 1512- 33-21-

USA

1

Connecticut

K1KSH 31,354-248-61-23
W1SG 23,040-234-48-17
WA1PID* 10,920-140-39-12
*WØDRE/1** 8394- 87-31- 6
W1WY 5130- 63- 38
*WA7GWL/1** 4719- 67-33- 6
W1QV 4620- 77-30- 3
W4WFL/1* 1349- 31-19- 4
K1ZNI/1 644- 23-14- 1
WA1KQM/1* 504- 15-14- 3
WA8VRB/1* 32- 4- 4

Eastern Massachusetts

W1PL 12,768-146-42-16
W1JJ 8931-113-39- 7
WA1CTT 7992-111-36-26
W1DMD 7860-131- 30
W1BB 7548- 93-37-11
W1UN 7400-100-37- 7
W1AX 6400-100-32- 6
W1DDC 3120- 65-24-10
W1CVO 2625-125-21-11
W1MX (WA1CQW, opr.) 2175- 42-25- 1
W1BVE 1080- 30-18- 3
WA1HED 944- 28-16- 6
W1BGD/1 750- 25-15- 1

New Hampshire

W1CTW 3400- 68- 25

Rhode Island

K1KN 15,480-172-45-15
W1UCN 12,040-149-40-18
W1QP (K1SHZN NTS) 3264- 68-24-11

Western Massachusetts

K1PBW 66,300-371-78-29

2

Eastern New York

W2LWI 13,185-145-45-15
K2VGR 9152-143-32-17

N.Y.C.–L.I.

K2GNC 34,692-279-59-25
W2KTU 11,505-146-39-22
W2GP 6293-100- 31
WB2MEZ 960- 32-15- 9

Northern New Jersey

W2LQS 36,642-285-62-31
WB2URU 9800-140-35-18
W2AQT 6900-115- 30
W2HUG 6000-100-30- 7
WB2OZW 4480- 80-28- 8
W2GBY 4060- 70-29- 8
WA2CCT 728- 26- 14
W2CVW 600- 25-12-
WA2KWB/2 468- 18-13- 1
K2STO (+WA2PGL) 2814- 67-21-17

Southern New Jersey

K2GAL 28,728-252- 56
W2EJ 26,880-237-56-20
W2BP 1160- 26-20- 2
W2UG 1140- 30-19- 4
WA2KWB 8- 2- 2- 1
WA2LEQ (+WA2IPBI) 100- 10- 5- 5

Western New York

K2LWR 40,105-307-65-20
W2VXA 4712- 76- 31
W2ONP 4650- 75-31-17
K2PKK 3807- 69-27- 6
W2QBB 384- 16-12- 4
WB2TCY (+WA2PKF) 13,065-166-39-12

3

Delaware

W3AGC 21,114-201-51-16

Eastern Pennsylvania

W3UM 72,200-451-76-32
W3LOP 35,620-262-65-20
W3CNS 12,597-160-39-10
WA3OBT 8896-139-32-23
W3ADI 8400-120-35-15
W3AIS 4375- 86-25-18
W3OOR 1932- 42-23- 3

Maryland-D.C.

W3IN 68,406-422-78-25
W3GN 19,110-195- 49
K3KUQ (+WA3NYU,WA4DUS) 40,257-312-63-37

Western Pennsylvania

W3WLQ 26,316-258-51-23
W3UHP 8320-130-32-18
W3SN 5022- 81-31- 7
W3KWH (W3SVJ, opr.) 672- 24-14- 9

4

Alabama

W4KVC 26,314-223- 59
K4MG 3380- 65-26-11
WB4ADT 2756- 53-26- 3

Eastern Florida

W4BRB 24,255-216-55-24
W4OZF 11,790-131-45- 9
WB4IFK 1760- 40-22-11
WB4UCE 400- 20-10-12
W4HAW (7 oprs.) 6876- 94- 36

Georgia

W4YWX 42,746-316-67-31
WB4YCP 18,236-194-47-22
K4BAI 16,254-192-42-19
K4SNI/4 13,981-169-41-11
W4DXI 6981- 88-39-11

Kentucky

K4IU 41,990-323-65-20
W4YOK (+K4DWO,W4TBU) 19,864-191-52-12

North Carolina

K4CIA 36,462-306-59-21
W4TMR 30,942-285-54-30
K4CAX *6262-101-31-11*

Tennessee

K4PJ 27,189-237- 57
W4UD 7400-100-37- 8
W4OOG 1482- 39-19- 3

Virginia

K4CG (WA8RGJ, opr.) 13,420-274-60-26
K4JM 9800-140-35- 7
W4KXV 3538- 61-28- 3
W4ZM 2754- 51-27- 2
WB4WVC 986- 29-17- 4
W4OPJ (+K4GUL,WB4SWT) 13,394-181- 57

West Indies

KG4CS 6120- 90-34-12

5

Arkansas

W5SUS *34,176-267- 64*
W4LEM/5 (W4OQG, opr.) 6664- 98-34- 5

Louisiana

K5AGI/5 *33,831-264- 63*
W5MPX 5848- 86-34-16
K5AJK 1140- 30- 19

Mississippi

W5RUB 14,798-151-49- 7
W5GWD 864- 24-18-14

New Mexico

WB5BHN 12,190-115-53-16
W5RS7 896- 28-16- 1

North Texas

W5QGZ 5824- 91-32- 9
W5HX 5032- 74-34-11
W5JKD 1943- 67- 29
W5KYD 690- 23- 15
K5SOR (5 oprs.) 23,256-204-57-35

Oklahoma

K5JVE 6438- 87-37-21

South Texas

W5RTQ 20,292-178-57-12
W5RUD 18,312-162-56-26
WA5ZNY 13,622-139-49-18
W5RPI 8080-101-40-17
W5IRP 1512- 36-21-
K5HGB/5 816- 24-17- 3
K5DEG (+K5PEL) 30,031-253-59-30
W5YG (7 oprs.) 15,850-157-50-30

6

East Bay

K6ILG 9512-116-41-20

Los Angeles

W6HX 28,520-230-62-26
W6DGH 23,600-200-59-16
K6ODQ 23,246-191-59-22
W6DQX 3886- 67-29- 3
WA6MBP 780- 30-13- 5
W6IPH 598- 23-13- 1
W6ZOL 360- 15-12- 1
K6MHG/6 100- 10- 5
W6YY (K6STI+W6JUJ) 14,160-146-48-20

Orange

WB6NRK 14,382-141- 51
W6AMO 11,520-128-45-16
K6QGV 8170- 95-43-14

Santa Barbara

W7DOL/6 30,380-242-62-42

Santa Clara Valley

WB6QIT (WB5CHK, opr.) 16,626-163- 51
W6GWQ 9416-107-44-14
W6ZO 8080-101-40-11

San Diego

W6ISA (K6VL, opr.) 30,256-224- 61
W6MAR 21,900-181-60-16

San Francisco

W6NUT 6528- 96-34- 6
W6MTJ 754- 29-13- 6

San Joaquin Valley

K6LG 7488- 96-39-12
W6MUV 1326- 39-17-10

Sacramento Valley

W6ZGM 9064-103-44-11
W6NKR 6952- 79-44- 6

Hawaii

KH6RS (K2SIL, opr.) 8820- 95-45-13
KH6HCM 1760- 37-22-13

7

Arizona

W7NQ (W7CFJ, opr.) 40,324-280-68-25
W7GAF 8600-100-43-13
K7NEQ 7896- 94-42-10

Idaho

W7HZL 8400-100-42-26

Montana

W7MKB 4050- 65- 31

Nevada

K7ICW 13,328-136-49-23
W7QJV 1008- 42-12- 8

Oregon

W7IMP 1190- 35- 17
W7LT 102- 17- 3
K7AUO (5 oprs.) 10,240-128-40-25

Utah

K7RAJ 26,082-207-63-17
K7ZIA 18,252-172- 53
W7CYH 5670- 81-35-10
WA7OAU 4352- 68-32-10

Washington

K7IDX 14,469-132-53-25
W7RX 4254- 73-29-11
W7BVP/7 3364- 58-29- 7
WA7QYI 1470- 49-15- 7
K7UWT 440- 22- 10

Wyoming

W7HIA 264- 12-11- 1

Alaska

WAØZQB/KL7 624- 23-12-12

8

Michigan

K8VQP 32,627-275-59-23
WA8JUN 27,360-228-60-13
W8TBZ 20,034-189-53-18
WB8EUN 18,718-191-49-12
W8ROC 16,560-171-48-20
WB8CCE 8960-112-40-14
W8TZZ 8712-121-36-29
WA8GUE 2688- 56-24- 6
K8BYI (4 oprs.) 37,210-305-61-32
WA8CQR (7 oprs.) 5626- 97-29-18

Ohio

W8DB 45,360-332-68-20
K8HKB 43,485-333-65-35
K8SJU *40,680-339-60-30*
K8CCV 34,221-279-61-22
WA8TNO 28,980-240-60-26
WA2ASM/8 23,922-220-54-24
WA8TYF 11,726-143-41- 6
WB8JMD (WA8TGX, opr.) 8496-118-36- 6
W8EX 8403-101- 41
W8HDM 5346- 81- 33
W8PCS 4620- 70- 33
W8WVS 3360- 60-28-11
WB8EDO 418- 19-11- 4
W8LT (7 oprs.) 47,718-360-66-25

West Virginia

W8HZA 6664- 98- 34
W8JWX 3528- 63-28- 4

9

Illinois

W9DL	59,427-417-71-25
W9FTU/9	32,508-258-63-29
WA9RAT	30,900-256-60-21
W9LVT	30,682-263-58-16
W9PNE	18,984-165-56-14
W9ABA	13,728-143-48-15
W9DCN	11,528-131-44-14
WB9BMY	8056-106-38-11
K9KEP	5644- 83-34-11
W9TAL	5312- 83-32- 6
WA9NKT	4950- 75-33- 5
W9RLC	3248- 58-28-10
W9HVP	1054- 31- 17
W9AZJ/9 (4 oprs.)	22,700-227-50-29
W9AML/9 (4 oprs.)	14,720-160-46-25
W9YH (3 oprs.)	6090- 87-35- 5

Indiana

K9CUY	20,400-200-51-12
W9DPL	7344-108-34-13
W9UC	884- 26-17- 4
W9YB/9 (5 oprs.)	33,630-285-59-30

Wisconsin

W9YT (K9LBQ, opr.)	54,270-402-63-29
W9PJT	13,024-148- 44
WB9AVN	10,842-139-39-14
WA9GYF	986- 29-17- 6

10

Colorado

WØCVS	37,554-283- 66
WØNQQ	8686-101-43- 8
WØLW	6840- 90-38-12
WAØYIH	1980- 45-22- 4
WØMS (+WBØCMM)	13,860-154-45-17

Iowa

WØNFL	41,795-320-65-30
WØII	19,096-169-56-16
WØRFT	4312- 77-28-11
KØVMY	3024- 56-27- 5

Kansas

WØPSF	40,937-304-67-26
WØFCL	11,782-137-43-15
WØIUB	4680- 78- 30
WØCHJ	1040- 26-20- 3

Minnesota

WØAIH	61,028-415-73-21
WØOAW	41,752-304-68-21
WØHW	25,630-233-55-13
WØRHI	12,054-123-49-16
W2TA/Ø	10,176-106-48- 5
WAØOOU	7176- 92- 39
WØIH	6480- 81-40- 8
KØDCF/Ø	8- 2- 2- 2
KØIJL (+KØIJP)	30,180-250-60-22

Missouri

WAØRDJ	37,690-210- 65
WA9BZY/Ø	16,464-168-49-24
WØBV	10,836-126-43-12
KØDYM	6364- 86-37- 7
WAØKMJ	5576- 82-34- 8

Nebraska

WØMSC	18,592-166-56-16

North Dakota

WØZTL	18,960-158-60-16

South Dakota

KØUDZ	11,730-115-51-23
KØLXD	11,074-113-49- 8
WAØCPX	7200-100-36-12
WØIT	4500- 75-30-10
WAØOMI	2484- 46- 27

DX

Switzerland

HB9NL	868- 31- 14

Japan

JA7AO	256- 16- 8-
JA1YAC	16- 4- 2

Okinawa

KR8CF	4- 2- 1

Czechoslovakia

OK1ATP	140- 10- 7
OL5ANJ	8- 2- 2
OL1AOH	2- 1- 1

Australia

VK3QI	4- 2- 1-10

Bermuda

VP9BO	3942- 73-27- 5

Strays

The scouts of Denmark are staging a contest 1800Z July 5 through 1800Z July 6, open to hams worldwide. Operate phone or cw 80-2 meters; exchange RS(T) and QSO no. Call CQ FDF Test (the station call from the camp site is OZ1FDF). Score 2 points per complete QSO. OZ1FDF counts 5 points. Multipliers are the countries on the DXCC List plus QZ1/2/3/4/5/6/7/8/9. Figure the score for each band separately and add all single-band scores together for a final result. There will be phone, cw, single and multiband awards. If 4 IRCs are included with the log, the participant will receive a diploma stating his results. Logs plus your QSL should be mailed before Aug. 15. Send to: Peter Hyllested, OZ8XZ, Skovkanten 6, 8500 Grenaa, Denmark.

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Remember the "Let's Talk Transistors" series by Robert E. Stoffels, WB9ESH? We've put together a reprint booklet of this 9-part transistor primer and it is available from ARRL for $1 including postage.

ARRL QSL Bureau

The function of the ARRL QSL Bureau is to facilitate delivery to amateurs in the United States, its possessions and Canada, of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped, self-addressed envelope, about 4 1/4 by 9 1/2 inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below. Recent changes are in **bold face.**

W1,K1,WA1,WN1[1] – Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

W2,K2,WA2,WB2,WN2 – North Jersey DX Assn. P.O.Box 505, Ridgewood, NJ 07451.

W3,K3,WA3,WN3 – Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.

W4,K4 – North Alabama DX Club, P.O. Box 2035, Huntsville, AL 35804.

WA4,WB4,WN4[1] – J. R. Baker, W4LR, P.O. Box 1989, Melbourne, Fl. 32901.

W5,K5,WA5,WB5,WN5 – Kenneth F. Isbell, W5QMJ, 306 Kesterfield Blvd., Enid, OK 73701.

W6,K6,WA6,WB6,WN6[1] – No. California DX Club, Box 11, Los Altos, CA 94022.

W7,K7,WA7,WN7 – Willamette Valley DX Club, Inc., P.O. Box 555, Portland, OR 97207.

W8,K8,WA8,WB8,WN8[1] – Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.

W9,K9,WA9,WB9,WN9 – Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.

WØ[1] – Reggie Hoare, WØOYP, P.O. Box 115, Mitchellville, IA 50169.

KØ,WAØ,WBØ,WNØ[1] – Dr. Phillip D. Rowley, KØZFL, Route 1, Box 455, Alamosa, CO 81101.

KP4 – Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, PR 00902.

KZ5 – Canal Zone Amateur Radio Association, Box 407, Balboa, CZ.

KH6,WH6 – John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, HI 96701.

KL7,WL7 – Alaska QSL Bureau, Star Route Box 65, Wasilla, AK 99687.

VE1 – L. J. Fader, VE1FQ, P.O. Box 603, Halifax, NS.

VE2 – A. G. Daemen, VE2IJ, 2960 Doublas Avenue, Montreal 301, PQ.

VE3 – R. H. Buckley, VE3BW, 20 Almont Road, Downview, ON.

VE4 – D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg R3N OE8, MB.

VE5 – A. Lloyd Jones, VE5JI, 2328 Grant Road, Regina, SK. S4S 5E3.

VE6 – D. C. Davidson, VE6TK, 1108 Trafford Dr. NW, Calgary 47, AB.

VE7 – H. R. Hough, VE7HR, 1291 McKenzie Rd., Victoria, BC.

VE8 – Yellowknife Centennial Radio Club, P.O. Box 1944, Yellowknife, NWT, Canada.

VO1 – Ernest Ash, VO1AA, P.O. Box 6, St. John's, NF.

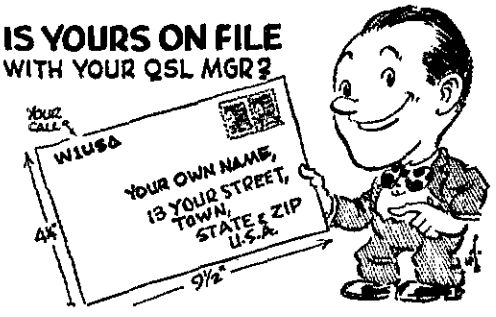
VO2 – Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, LB.

SWL – Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

[1] These bureaus prefer 5 × 8 inch or No. 50 manila envelopes.

QSL Bureaus for other U.S. Possessions and for other countries appear in the June and December issues of *QST*.

Note: First-Class mail in the U.S. and Canada is now 8¢ an ounce. QSL Bureau users should send their manager enough two-cent stamps to cover the envelopes on file.



July 'Open' CD Parties

APPOINTEES–OFFICIALS–LEAGUE MEMBERS

JOIN THE FUN! *JOIN THE FUN!* *JOIN THE FUN!*

IN MAY OF 1969, the ARRL Board of Directors voted to expand one of the quarterly ARRL CD Parties to include all league members.

What, you may ask, is this CQ CD all about, anyway? CD in this case designates the ARRL Communications Department. CQ CD is, in effect, a call for all ARRL appointees (and elected officials, too) to get together, work each other and enjoy a brisk test of operator and equipment. The object is to work as many of the eligibles as possible in as many different ARRL sections (p.6) as possible. The same station may be worked on each of the bands, but a section may be worked just once for credit. Thus, the maximum multiplier will be 75. Now, how come that, when there are only 74 sections? Well, for many years Yukon and the Northwest Territories were grouped together to form the VE8 section. Because of the small number of hams therein, this section (as such) was dropped quite a few years back. However, the VE8 multiplier was retained in ARRL contests – just for fun!

The exchange is brief and to the point. Appointees/ officials transmit a short designation of their "status" plus ARRL section. Non-appointees-officials may transmit: member (MBR), life member (LM) or charter life member (CLM) – whichever is applicable; plus ARRL section.

The appointees and officials you'll run into, with some "probable" cw abbreviations of their designations, are shown below:

President	PRES
Vice President	VP
Past President	PASTPRES
Director	DIR
Vice Director	VDIR
Assistant Director	ADIR
General Counsel	GC
Associate Counsel	ASSTGC
QSL Manager	QSLMGR
Section Communications Manager	SCM
Asst. Section Communications Manager	ASCM
NTS Official	NTSMGR
Contest Advisory Committee	CAC
DX Advisory Committee	DXAC
Repeater Advisory Committee	REPAC
Intruder Watch	IW
Section Emergency Coordinator	SEC
Emergency Coordinator	EC

CW

Starts 2300 GMT July 15
Ends 0500 GMT July 17

PHONE

Starts 2300 GMT July 22
Ends 0500 GMT July 24

You may operate any 20 hours out of the 30-hour periods. Times out must be 15 minutes or more to count as off-time.

Route Manager	RM
Phone Activities Manager	PAM
Headquarters Staffer	HQ
Official Relay Station	ORS
Official VHF Station	OVS
Official Observer	OO
Official Bulletin Station	OBS
Official Phone Station	OPS

Scoring is simple. Count 5 points per QSO (*remember now, you can work the same station*, for example, on 160, 80, 40, 20, 15 and 10 meters – vhf too!). To this figure add your ARRL code proficiency credit (you must have the certificate at that time). Multiply this new sum by the section multiplier.

Suggested frequencies in past parties have sort of "shaken down" to the following pattern: *CW*, up from 3535 7035 14035 21035 28035; *PHONE*, up from 3905 7265 14280 21355 28600. (Try 160 meters at 0530 GMT and keep checking periodically for 10 and 15 meter activity.) Activity on 6 and 2 meters is welcomed!

Reporting should be done on ARRL CD Party report forms. An addressed stamped envelope sent now should get the logs to you in time for use in mid-July! The cut-off date for receipt of entries at Hq. is August 15. All participants reporting activity will receive a copy of the appropriate *CD Bulletin* containing final results. High- claimed CD scores will, as usual, appear in *QST*.

Remember now, CQ CD CQ CD CQ CD de
– *W1YL K*

MULTIPLIER CHECK-OFF LIST

1	2	3	4	5	6	7	8	9	0	VE
Conn	ENY	EPa	Ala	Ark	EBay	Ariz	Mich	Ill	Colo	Mar
EMass	NLI	Del	EFla	La	LA	Ida	Ohio	Ind	Iowa	Que
Me	NNJ	MDC	Ga	Miss	Org	Mont	WVa	Wisc	Kans	Ont
NH	SNJ	WPa	Ky	NMex	SBar	Nev			Minn	Man
RI	WNY		NC	NTex	SCV	Oreg			Mo	Sask
Vt			SC	Okla	SDgo	Utah			Nebr	Alta
WMass			Tenn	STex	SF	Wash			NDak	BC
			Va	C. Z.	SJV	Wyo			SDak	VEB
			WFla		SV	KL7				
			W. I.		KH6					

Strays

Amateur Radio Week in Puerto Rico took place March 19-25. At the signing, left to right: Jose Toro, KP4RK; Roberto Gorbea, KP4AEF; Enrique Boneta, Undersecretary of State; Fernando Chardon, Secretary of State of the Commonwealth; Juan S. Sepulveda, KP4QM; Ramon Vila, KP4SV.

One of the most consistent proclamations of amateur radio week has come from the mayor of Englewood, New Jersey. Mayor Walter S. Taylor makes it official for June 18-24, 1972, while WA2RIN, WA2NVG and WA2CCF (left to right) watch.

Tennessee Amateur Radio Week is proclaimed by Governor Winfield Dunn, for January 24-30, 1972. SCM O. D. Keaton, WA4GLS (right), receives the document for the amateurs of Tennessee.

The October Cover Plaque also went to the Southwestern Division: Jack Althouse, K6NY (at right) receives the award for his article, "Voltage Multipliers." Lyle Farrell, W6KGC, assistant director, makes the presentation on behalf of Director Griggs.

"A 40-Meter DDRR Antenna," the Beginner & Novice article in December 1971 *QST* won for its author W. E. English, W6WYQ, the Cover Plaque Award for best of the month, decided upon by ARRL directors in a mail vote. Making the presentation at the right: Southwestern Director John R. Griggs, W6KW.

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity

CONDUCTED BY GEORGE HART,* W1NJM

QSP VIA SATELLITE?

DON'T LAUGH, it is done all the time, as everyone who watches TV knows, and the technology is already so advanced that pictures received by this means are indistinguishable, to the unpracticed eye, from direct transmissions. But what we are talking about now is relaying *amateur* signals via satellite.

You're all familiar with repeaters, and how a flea-power rig down in a valley can extend its range manyfold by hitting the repeater's input frequency and being sprayed all over the country on its output frequency. How would you like to have this range extended to cover an entire continent by going through a repeater so "high" that its line-of-sight surveys such an area? Imagine, for example, a function of the NTS Transcontinental Corps being conducted on two meters!

Just such a repeater is now being planned by Amsat (Radio Amateur Satellite Corp.) for launch on a NASA vehicle this summer (hopefully July or August). Some details are already in *QST* (May issue, p. 69), more will be forthcoming – and goodness knows we don't want to get involved in such technical details in this column but it's worth noting that the satellite will repeat 100 kHz of 2-meter signals by any mode on 100 kHz of ten meters. In other words, anything that enters the satellite receiver in its 100-kHz bandwidth on two will be retransmitted in the same bandwidth on ten splatter, distortion, key clicks, spurious emissions and all. If the signal you transmit ten kHz inside the bandwidth of the satellite receiver reaches the receiver out in space, it will be contained in the satellite's transmitted signal ten kHz inside the equivalent segment on ten meters.

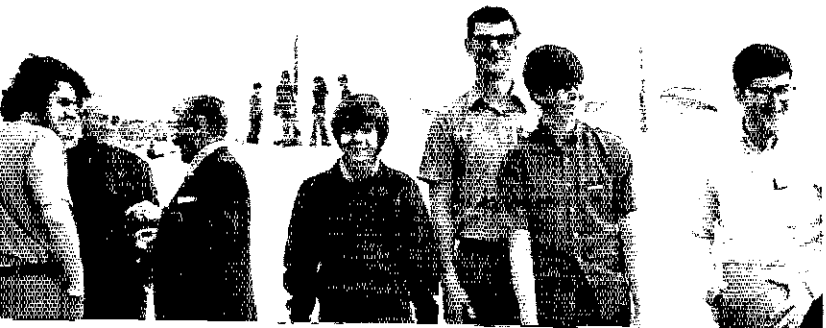
In the upcoming sunspot null, it is not expected that the ionosphere will have any appreciable effect on the return signal, and with a normally "dead" ten meter band, the signal should be pretty much by itself. However, to better the chances, the retransmission will appear in the upper reaches of the band which are not so heavily occupied as the region below 29 MHz.

But read all the details in the May *QST* article. You will quickly see that it offers some intriguing public service possibilities, and indeed this was a strong talking point to obtain NASA launch approval. While it won't do anything that cannot be done on the high frequencies, it has the advantages of being all but impervious to aurora and varying "skip" conditions. In fact, there will be no "skip" zones at all, because a signal sent up on two meters will be audible on ten *anywhere* in the satellite's "line of sight" zone, which will include a circle with an almost-5000-mile diameter. You will be able to work across town or across the continent with equal facility from the same two-meter rig with the antenna pointed at the satellite. And the satellite will repeat as many signals as can be squeezed into its 100-kHz bandwidth. A 100-kHz-wide amateur band impervious to skip and aurora!

The purpose of Oscar-6 (also referred to as the "AOC") is to gain experience in its use, not to determine if it will work. (This has already been determined.) After a year's testing, we'll have a better idea just how and to what extent this new method can be used for public service (especially emergency and traffic) purposes. Future plans, including some units actually under construction, call for additional amateur satellites, with the full approval and cooperation of Uncle Sam, with different configurations, orbits, coverage and purpose, including possibly a synchronous (constant position in horizon, so fixed antenna can be used) satellite by 1975 and special-purpose satellites – for example, one especially for traffic handling, one designed for DXing, phone patching, etc.

We amateurs interested in public service not only have an opportunity but an obligation to investigate this kind of device and make use of it to

*Communications Manager, ARRL.



In February, the Southern California Net held a meeting and a picnic in Newport Beach, Calif. Some of those attending are pictured here. Left to Right: W6UE, WA6ZKI, LA SCM W6INH, WA6AMK, Santa Barbara SCM WA6DEI, Asst. SCN Mgr. WB6ZVC, and SCN Mgr. W6LYY.

This group of amateurs belong to the Kentucky Traffic Net and gathered for this photograph during their meeting at Somerset, Ky. last July.

best advantage. So read the May *QST* article and start getting ready for long distance communication by amateur satellite on the vhfs! – *WINJM.*

Traffic Talk

This is about "legal" and "illegal" traffic. The subject keeps coming up, and although it has been discussed before, seems time for another go-around.

First of all, the booklet *Operating an Amateur Radio Station* comments on the subject, and we assume you are all familiar with it. If not, dig out your copy and read up (p. 9).

The question frequently comes up: "Is business traffic illegal?" This depends on a lot of things. *Whose* business is it? What *kind* of business? Is anybody getting paid (or otherwise compensated in a material way)? Just because the contents of the message indicate some kind of commercial transaction doesn't, by itself, necessarily make the handling of it in violation of any FCC regulation. If you handle the message because you like handling traffic and are doing it "purely with a personal aim and without pecuniary interest," you are in the clear, much as you may disapprove the whole idea.

However, we have said before and we say again that origination of such traffic is a *bad* practice and may do us all dirty in the end if it should become a widespread one. Let's eschew it. As for refusing to handle it, once it has left the originating station, this amounts to setting yourself up as a censor, as a judge of the significance of the text, which is none of your affair. Admittedly, any amateur may refuse to handle any message for any reason, and in rare circumstances this could be justified. In our opinion, it is *not* justified when the only reason is that the contents sound "commercial" or "like business" to you. If you receive the message from the originator, perhaps you can talk him out of it; but if you are receiving it from a relayer, like yourself, just QSL. If you wish to express an opinion on the contents, express it to the licensee of the originating station. Meanwhile, relay the message onward.

The alternative to this is completely impractical: to query a station about to send you a message to make sure it meets your personal requirements. This might mean asking if it asks for money, mentions a death, uses stupid or inane words, makes sense (to whom?), sounds commercial – also how long it is, whether a telephone number is included, and a lot of other things. Let's not be ridiculous. Let's not refuse traffic unless it's *really* illegal. The only clearcut cases of illegality involve messages containing indecent or obscene language or messages illegally handled with foreign countries.

And that brings up the second part of this discussion. While our message-handling privileges domestically are pretty broad, internationally they are comparatively strict. In fact, an international regulation prohibits the handling of *any* third-party communication internationally by amateur radio. A "third party" is anyone other than the two operators involved in the contact.

This prohibition is modified, however, by a provision for special agreements between specific countries to permit such communications under whatever circumstances and/or restrictions they wish to stipulate. The U.S. has such agreements with 24 countries, plus partial agreements with three others. Canada has such agreements with 11 countries. (See p. 87, April *QST*, for complete list.) In handling third-party traffic with these countries, there *is* typically a restriction against business or commercial or any traffic which would normally utilize regular commercial or government-operated international communications facilities.

One correspondent calls to our attention the fact that some amateurs appear to feel that if the third party being addressed or being heard from is on the *other* end, the restriction applies only to the licensee at that end. Not so. It applies to the licensees at *both* ends, both of whom are violating an international regulation to which their governments are signatory. It is the *fact* of third-party communication that governs, not the location of the third party. Both licensees are liable to prosecution by their respective governments.

It should also be noted that although third-party traffic is permitted with certain foreign countries, this doesn't necessarily mean that regular routes exist for handling such traffic, or

Public Service Honor Roll March, 1972

This listing is available to amateurs whose public service performance during the month indicated qualifies for 30 or more total points in the nine categories below. A delineation of the points awarded for each function is given in the category key at the end of the Honor Roll listing. Please note maximum points for each category. Those making fewer than 45 points are listed with point totals only.

Category	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	
Max. Pts.	*10*	*10*	*12*	*12*	*12*	*30*	*3*	-	*5*	*Totals*
WA3QUZ	10	10	12	12	12	8	3		5	72
WA2EJI	10	10	12	12	12	10	3			69
WB6ZVC	10	10	12	12	20				5	69
WA8ETX	10	10	12	12	12	3	3		5	67
WA3OGM	10	10	12	12	12	7	3			66
K7CTP	10	10	12		12	20				64
WA8UPI	10	10	12	12	12	2			5	63
WB8HMV	10	10	12	12	12	1			5	62
WB4KDI	10	10	12	12	12				5	61
WB4PNG	10	10	12	12	12				5	61
W@LRW	10	10	12	12	12				5	61
W3EZT	10	9	12	6	12	6			5	60
W3FCS	10	9	12	12	9	3			5	60
WA3FRV	10	10	12	12	12	4				60
K3ZNP	10	10	12	12	12	3				59
W7BQ	10	8	12	12	12				5	59
WB4JMH	10	10	12	12	12					56
WB4SON	10	10	12	9	12		3			56
WB4SVH	10	10	12	12	12					56
WB5DEK	10	10	12	6	12	1			5	56
WA7JQS		10		12	12	17			5	56
WA3NAZ	10	10	12	6	12				5	55
WA2ICU	10	10	12	12		8				52
WB4NCH	10	10	5	12	12				5	52
WA2EUO	10	10	12	6	12					50
WA3PIG	10	10	9	9	12					50
WB4PTH	10	10		12	12		6			50
W5SBM	10	10	12	12					5	49
WB9ANT	10	10	12		12				5	49
W9HRY	10	10	12		12				5	49
K@MRI	10	10	12		12				5	49
VE3ERU	10	10	12		12				5	49
VE3GFN	10	10	12		12				5	49
W7OCX	10	5	4	12	12				5	48
WA8NOQ	10	10		12	12	4				48
WA2QNT	10	10	12		12		3			47
W2TPV/@	10	10	12	3	12					47
W@4VOS	10	10	12	3	12					47
K@HAD/4	10	4	12	9	12					47
WA@VAS	2	10		12		20	3			47
VE6YL	10	10	3	12	12					47
WB@BIY	10	10	12		12	2				46
WB4THU	9	10		12	12	2				45
W6OAW		10		12		18			5	45
WA@MLE	10	8	12		12		3			45

WA2AFL/4	...44	W1UBG	39	WA3DPU	34
W2BU	...44	W2ER	39	W3LOS	34
WA2NZJ	...44	W2RUF	39	W3NEM	34
K3MVO	...44	K3OIO	39	W3OKN	34
K5ROZ	...44	W4ZJY	39	WA4YA	34
WA6DEI	...44	W7GHT	39	K4EAC	34
K7QUF	...44	K@AEM	39	VE3AIA	34
WB8BPY	...44	W@HI	39	W6YBV	34
W8IMI	...44	VE3DPO	39	WA8ETW	34
WB9AHJ	...44	WB4EKJ	38	W9QLW	34
W@BV	...44	WB5EIN	38	VE3AWE	34
WA@IFC	...44	W7LRK	38	VE3EWD	34
W@YC	...44	W3TN	37	VE3FXI	34
VE3GBR	...44	WA5VJW	37	VE6EK	34
VE3SB	...44	W6INH	37	W2MTA	32
WA6TVA	...43	WA@VYB	37	WB4UOC	32
W1BVR	...42	WA3JSU/1	36	WB6AKR	32
K3BR	...42	W4UQ	36	W6DEB	32
W6MNY	...42	WB8ALU	36	WB8DNZ	32
K8NQW	...42	W8LT	36	W8IGW	32
VE3NO	...42	WA6AAW	35	WB8KVU	32
WB8CWD	41	W7PI	35	WA@AAD/@	32
WA@ZIW	41	W1CE	34	VE3EHL	32
VE4EA	41	K1SXF	34	VE3FRG	32
WB6MXM	40	WA2ELD	34	WA1MYK	31
WA8VKF	40	K2KTK	34	W7EM	31

* Denotes multioperator station.

Category Key. (1) Checking into cw nets, 1 point each; (2) Checking into phone/RTTY nets, 1 point each; (3) NCS *cw nets, 3 points each;* (4) *NCS phone/RTTY nets, 3 points* each; (5) Performing assigned liaison, 3 points; (6) Legal phone patches, 1 point each; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points.

even that it is encouraged. The problem is mainly *in getting outlets in the foreign countries* (other than Canada, of course). NTS has no regular outlet for such traffic, although there is usually someone who can take it to an independent net which can frequently get it through.

Incoming MARS traffic from foreign countries has diminished considerably, but such traffic from U.S armed forces personnel is perfectly okay to handle. When transferring it from MARS to regular amateur circuits, it is treated as an originated message by the transferring station, with a standard amateur preamble and an amateur "check." The only difference is that if it originated in an "illegal" foreign country (e.g., Viet Nam, Japan or Germany) the "place of origin" is given as that country followed by the words "via MARS," to show that the message was not handled illegally. For example, a message originating in Germany and sent on MARS frequencies (outside the amateur bands) to a stateside MARS station, then transferred to amateur circuits, would bear the place of origin "Germany via MARS."

National Traffic System. Plans are soon to get under way to implement a proposal for a daytime NTS supplement, to operate on sideband frequencies, dovetailing into the regular NTS evening cycle. Recruiting for leadership positions is already starting, and we hope to present further details in *QST* shortly. Please stand by.

March Reports: W2FR of 2RN reports the early arrival of "traffic doldrums". Howie also reports that annual certificates went out to W2MTA, WA2CAL, K2RXQ and WB2LZN. W3NEM reports another 100% representation rate and sez "It looks like 3RN is coming into its own." W9HRY, victim of another lost 9RN log sheet, wonders if some of his NCS keep their logs on disposable tissue. Bob also reports that a decreasing representation rate is bringing the other statistics down.

Net ..... *Sessions*	*Traffic*	*Rate*	*Avg.*	*Rep.(%)*
EAN 31	2360	1.510	76.1	98.4
CAN 31	1286	1.110	41.5	100.0
PAN 31	1246	1.060	40.2	98.0
1RN 62	673	.453	10.9	94.1
2RN 62	424	.552	6.8	97.7
3RN 62	526	.476	8.5	100.0
4RN 53	600	.379	11.3	87.6
RN5 60	787	.462	13.1	94.4
RN6 62	794	.475	12.8	100.0
RN7 61	294	.320	4.8	60.0
8RN 62	1036	.649	16.7	89.2
9RN 61	526	.424	8.6	90.6
TEN 62	658	.580	10.6	89.6
ECN 62	213	.243	3.4	90.0
TWN 53	330	.266	6.2	61.6
TCC Eastern[1] 124	*908*			
TCC Central[1] 93	562			
TCC Pacific[1] 124	985			
Sections[2] 2205	14088			
Summary 3020	*28296*	*EAN*	*18.1*	
Record 3219	*33737*	*1.420*	*15.8*	

[1]TCC functions not counted as net sessions.

[2]*Section and local nets reporting (68):* AENB, AEND, AENM, AENO, AENR (Ala.); NCN, SCN (Calif.); CCN (Colo.); CN, CPN, NVHF (Conn.); DEPN (Del.); QETN, QFN, FMTN, VEN (Fla.); GSN, GTN (Ga.); ILN (Ill.); TLCN (Iowa); KTN (Ky.); LAN (La.); PTN, SGN (Me.); MDCTN (Md.); WMN, WMEN (Mass.); MNN (Mich.); MSN, MJN, MSPN, PAW (Minn.); MTN (Miss.); NLI (N.Y.); NCSSB, NCNN, CNL (N.C.); APRMN, SSEN, BNR, BN, OSSBN (Ohio); GCRN, KSSN, EPA, WPA, PTTN (Pa.); RISPN (R.I.); CNL (S.C.); TTN (Tex.); BUN (Utah); VSBN (Va.); WSN, NSN, PSEN (Wash.); WVNN (W. Va.); BEN, BWN, WSBN, SW2RN, WIN, WSSN (Wis.); APSN (Alta.); MTN (Mant.); GBN, OPN, OQN (Ont.); WQV/UHF (Quebec); SATN (Sask.).

Transcontinental Corps. The only comment this month comes from W6VNQ of TCC Pacific, who sez "Anybody who

On March 26, the Elkhart Red Cross Amateur Radio Club held an emergency test of their facilities which include a two meter fm repeater and the radio-equipped trailer, pictured above. Standing in front of the club's trailer are, left to right: WB9BFU, K9SRI, K9IXB, WA9RNT, K9MNF, W9FJA, WA9WYY, K9ADF. *(Photo by WN9HNM)*

would take a vacation in New Jersey during February should have his head examined." Bob made that comment after spending a month in "the frozen East". All in all, things seem to be on an even keel in the three TCC areas.

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	124	94.3	2719	908
Central	93	97.7	1126	562
Pacific	124	96.8	1970	985

The TCC roster: Eastern Area (W3EML, Dir.) – W1s BJG EJI NJM QYY YNE, K1SSH, W2s FR GKZ, K2KTK, WA2s ICU UWA, W3EML, K3MVO, W4s SQQ UQ, K4s KNP VDL, W8s IBX PMJ RYP VDA/4, K8KMQ, WA8PIM. Central Area (WØLCX, Dir.) – W4s OGG ZJY, WB4KPE, W5s MI QU SBM, W9s CXY DNU YB, WØs HI INH LCX ZHN, KØAFM, WAØs IAW MLE. Pacific Area (W6VNQ, Dir.) – W5RE, K5MAT, W6s BGF EOT IPW MLF MNY RSY VZT, WA6s DEI LFA, W7s BQ EM KZ PI DZX EKB GHT, WØLQ, KØJSP.

Independent Net Reports (March)

Net	*Sessions*	*Traffic*	*Check-ins*
Hit & Bounce	31	848	342
Eastern Area Slow	28	75	246
Early Eighty Free	31	265	217
East Coast Teenage Traffic	30	91	326
Forty Meter CW Traffic and Emergency	31	107	352
75 Meter ISSB	31	253	1211
7290 Traffic	46	628	2043
All Service	4	10	45
Mike Farad Net	27	246	396
20 Meter ISSB	23	2066	454
Northeast Traffic	31	242	410
20 Meter North American Tfc.	27	141	414
IMRA Traffic	27	411	1108

Public Service Diary

On Feb. 12, at the request of the Civil Air Patrol, the Tippecanoe Co., Ind. ARPSC, aided by the Purdue University ARC, participated in an air to ground search for a missing man. Three aircraft, seven mobiles, and two portable base stations were used. Two of the aircraft were equipped with amateur radio equipment. A two-county area was searched until darkness and poor weather curtailed the operation. While waiting for the weather to clear the next day, it was learned that the man had been located in an adjoining county. A total of sixteen amateurs participated in the search. – (K9LQG, EC Tippecanoe Co., Inc.)

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On Feb. 13, a priority message regarding the death of a friend was filed with VE1NH of Aroostock, N.B. at 1545 GMT. The purpose of the message was to notify a son of the deceased in Harrington Harbor, Quebec, an isolated outpost on the northern shore of the Gulf of St. Lawrence. A recent storm had rendered commercial communications and power sources inoperative. The message was delivered to Harrington Harbor via VO1CV and VO1GF at 2045 the same day and a reply was received early the next morning. – (VE1NH & VO1CA, EC Nfld.-Lab.)

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Shortly after noon on March 20, severe weather alerts were issued for the Harris Co., Texas area. The local two-meter fm net was alerted and a number of mobiles responded. They were used to keep track of the flooding conditions in the area and assisted county officials in evacuating a number of local residents. Thirty-three amateurs took part in the activity. – (WA5ABA, EC Harris Co.)

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for Mar. Traffic

Call	*Orig.*	*Rec'd.*	*Rel*	*Del.*	*Total*
W3CUL/4	279	1801	1716	49	3845
KØONK	113	596	584	17	1310
WA8ETX	59	499	497	3	1058
W7BA	12	512	477	29	1030
K4NSN	10	499	499	–	1008
WAØVAS	117	423	31	392	963
WB8GED	21	414	397	10	842
KØZSQ	7	385	–	384	776
W3EML	23	368	284	1	676
WA5VJW	259	212	31	173	675
W3VR/4	204	249	199	12	664
WØZWL	–	345	1	277	613
W9CXY	8	302	302	–	612
WA8WZF	72	267	255	8	602
K8NQW	155	211	175	24	565
WØLCX	28	305	212	7	552
WA1NNL	50	248	235	10	543
KØYEK	–	265	–	265	530
W5ML	17	253	253	–	523
K5TEY	2	260	258	1	521
WB8JEL	19	246	240	10	515
WB4FJK	94	230	162	21	507

More-Than-One Operator Station

K8LME	623	31	–	26	680

BPL for 100 or more originations-plus-deliveries

K8ONA	196	WB4SON	120	WAØMLE	108
K6UYK	169	WA2EPI	119	K3BR	106
WB4PSP	160	WAØYVT	116	WA3QJU	102
W7AXL	155	WA8HGH	115	WA3PJG	101
WB2KZM/5	152	WAØAUX	115	WA1QNT	100
WA3QOZ	149	VE3ASZ	113	W4ILE	100
W3TN	145	WA2AEL/4	109	W8IBX	100
WB4OMG	133	W4BAZ	108	KØYEK(Feb.)	229
W2OE	121				

More-Than-One Operator Station

VA2UN	125

BPL Medallions (see July, 1968 *QST*, p. 99) have been awarded to the following amateurs since last month's listings: WA2ICU, WB2WFJ, W3HK, W4RUW, WR4SVH, W8IBX, WA8WPQ.

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.

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On March 11 the Medical Amateur Radio Council Net was operating on twenty meters when W8BXO heard a distress call from W1RGJ maritime mobile in the Bahamas. W8BXO learned that a 37 foot sloop had run aground on a reef and was in danger of breaking up. W1RGJ had been unable to reach the Coast Guard on the usual ship-to-shore channels. WB4KKB and W4RFA were both in Miami and they contacted the Coast Guard rescue station via phone patch. The exact position and details of the emergency situation were relayed to the Coast Guard by W8BXO. W2IHV was on duty at the Coast Guard station and he attempted to copy W1RGJ directly but had no luck. K1EEG also assisted in relaying the information. A plane and helicopter were dispatched from Miami and located the sloop. They also found another boat in the general area and directed it to the disabled yacht. The crew was rescued shortly before the yacht was totally destroyed. — (W8BXO & W2IHV/4)

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At 0300 GMT on March 26, XE2LR in Monterray, Mexico contacted K5ABG and K5MQR on seventy-five meters, in an attempt to locate a special piece of hospital equipment needed for a brain operation on an eleven month old infant in Monterray. Attempts to locate the equipment went on for several hours that night without success. At 1400 GMT the group was joined by WA5RNV and W5UKN, both of San Antonio, Texas. At about 1430 GMT, K5ABG located the equipment in Wichita Falls, Texas and was ready to ship it by parcel post. The time element was a major factor, however. About forty-five minutes later W5UKN located similar equipment in a military hospital in San Antonio and arrangements were made to have the equipment shipped on a commercial airliner. About an hour later, the equipment was in the hands of the Mexicans. — (WA5RNV)

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On the evening of April 2, The Eastern Sierra Mountain Rescue team of Bishop, Calif. alerted all of its members of some missing climbers on Mt. Whitney. A number of AREC members were included. Two different teams were dispersed to climb Mt. Whitney and search for the lost climbers. K6GCT set up a portable base station and maintained communications with the two teams and also with Bishop. W6APD provided communications at Bishop utilizing WESCARS. Early the next morning the climbers were found in good shape and the operations were secured. — (WA6YWS, EC Orange Co., Calif.)

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During the afternoon of April 5, a tornado struck Vancouver, Wash. and destroyed a number of buildings, including a school and a supermarket. Six people were killed and a number were injured.

K7SUX mobile checked in with the Northwest Amateur Monitoring Service on 3970 kHz and informed monitor control station W7DFL of the situation. He reported that he was on his way to Red Cross Headquarters where the Clark County ARC, W7AIA, was located. K7SUX contemplated putting the club station on the air but he discovered that it was inoperative. He then continued his operation from his mobile rig until WA7MQC arrived with a transceiver for W7AIA.

In the meantime, an auxilary frequency of 3960 kHz was set up to handle health-and-welfare traffic. WA7KKC was driving near the tornado struck area enroute to his home. He had to make a number of detours along the way and thus was aware of the affected areas. After arriving home he obtained a map of the city and circled the devasted areas. He handled a number of health and welfare messages from his home before reporting in at W7AIA. Some phone patches were also completed and W7EEA handled a large number of them from his home station. Well over 1500 messages were handled before operations ceased some three days later. Other amateurs known to have participated include WA7OAS, K7SUQ, and W7s SNY and UU. — (W7UU)

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During the early evening hours of April 5, W1FYN was traveling on Route 2 in Conn. when he came upon an injury accident. He put out a call for assistance on his ten meter fm mobile transceiver and was answered by K1MFD who notified the proper authorities. Within minutes police and an ambulance were on the scene. — (W1FYN)

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On April 8, the Winnebago Co., Ill. Sheriff requested assistance from RACES members in the search for a missing child near Rockford, Ill. Within an hour the ed communications trailer manned by W9MAP, K9QYY, and K9PAK was moved into the area to function as a command post for the sheriff and the volunteers. WB9BHY set up a second control point to coordinate snowmobile and horse patrol searchers and the large number of mobiles and portables who were taking part in the search. All stations operated through the K9CLW repeater. The search was terminated six hours later when the boy's body was found at the bottom of a neighborhood swimming pool. Other amateurs taking part in the search included W9LRZ, WA9s BLE BWK, WB9s ETH EZY, and WN9HHH.

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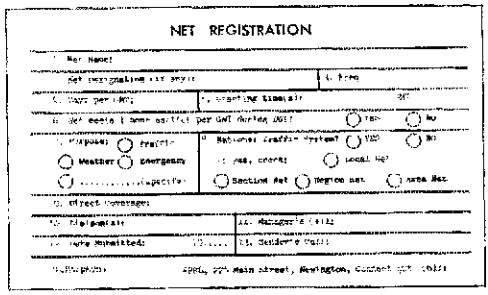
Thirty-six SEC reports were received for the month of March with a reported AREC membership of 11,528. This is three more reports than last month. Let's keep up the trend. Sections reporting: Alta, Ariz, Colo, Conn, Del, EFla, ENY, Ind, Iowa, Kans, Mich, Minn, Mont, Neb, Nev, NC, NNJ, NTex, Ohio, Okla, Ont, Org, Oreg, SDgo, SD, SNJ, Tenn, Utah, Va, Wash, WFla, WMass, WNY, WPa, WVa, Wis. QST


NET REGISTRATION

Time to Reregister Nets!

If your public service net has not been reregistered since July of 1971, it will be necessary to do so before July 1, 1972 to ensure listing in the Fall 1972 tabulation. Every eligible net *must* reregister annually. Send to ARRL at once for the special registration card, CD85. To expedite the mailing, please enclose an addressed stamped envelope.

COMING ARRL CONVENTIONS

June 10-11 – Georgia State, Atlanta
July 1-2 – West Virginia State, Jackson's Mill
August 5-6 – Michigan State, Sault Ste. Marie, Michigan
October 14-15 – Pacific Division, San Mateo, California
October 20-22 – Hudson Division, Tarrytown, New York
October 20-22 – Southwestern Division, Santa Maria, California

NOTE: Sponsors of large ham gatherings should check with League Headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.

GEORGIA STATE CONVENTION

Atlanta **June 10-11**

Circle June 10-11 on your calendar. The Atlanta Amateur Radio Club will hold the 1972 ARRL Georgia State Convention on the Mall at the Lenox Square Shopping Center in Atlanta on those dates.

A banquet will be held on Saturday evening, June 10, and much enjoyable entertainment is planned. Experts on RTTY, fm, DX, and many other topics will be present for sessions on Sunday. If you are a swap-shop enthusiast, you won't want to miss this year's fantastic event. Be sure to attend the ARRL Forum for the latest word on League affairs.

Reservations are available at the Roadway Inn, 3387 Lenox Road (261-5500). This motel is located directly across from the hamfest site. In fact, once you get to Atlanta you won't need your car again. For further information contact James Gundry, W4JM, 2498 Echo Drive, N.E., Atlanta, GA 30345.

ARRL WEST VIRGINIA STATE CONVENTION

Jackson's Mill **July 1-2, 1972**

The Fourteenth Annual ARRL West Virginia State Convention will be held July 1 and 2 at Jackson's Mill. The Mill is located near Weston, W.Va. and is a natural for a family outing. Activity is planned for the whole family. Convention opens with lunch on Saturday. Presentation of the Outstanding West Virginia Amateur Award, MARS meetings, swap and shop, flea markets, special activities for the ladies and much more. A highlight of this year's Convention will be Harry J. Dannals, W2TUK, our new League President. ARRL Deputy Communications Manager Ellen White, W1YL, will also be attending.

Full registration tickets include lunch and dinner on Saturday, dormitory lodging, breakfast and lunch Sunday and registration fee. Full registration is $10 for adults and $6 for children under 12. Tickets should be ordered from Vivian Kibler, WA8OKG, 182 Monterey Drive, St. Albans, WV 25177. Registration only tickets are $3 each or two for $5. This fee entitles you to participate in the many activities of the convention but does not include any food or lodging. Registration only tickets may be ordered from Robert J. Degenkolb , W8IMX, 3709 Marlamont Way, Weirton, WV 26062. Please make check or money order payable to West Virginia State Radio Convention. An s.a.s.e. will be appreciated. Convention station W8WVA will be on the air and attractive certificates will be issued for confirmed contacts. Brochures are available from the Convention Secretary, Vivian Kibler, WA8OKG.

Hamfest Calendar

Illinois – The Egyptian Radio Club Swap-Fest/Picnic is June 25 at the Egyptian RC grounds near Granite City, 1 mile southwest of the intersection of Route 3 and Interstate 270. Food available. Talk-in on 146.16/146.76.

Illinois – Radio Expo '72 is July 8 and 9 at the Lake County Illinois Fair Grounds. Flea market from 6 A.M. to 6 P.M. The Exhibition Hall will be open from 9 A.M. to 6 P.M. Indoor manufacturers' displays, camp area, refreshments, free parking, technical movies and seminars. Tickets are $2 for both days. ($1.50 advance sale price). Children under 12 free. For tickets and information write Tickets, Radio Expo '72, Box WA9ORC, 230 East Ontario Street, Chicago, IL 60611.

Indiana – The Tippecanoe ARA and the Indiana Radio Club Council is sponsoring the Annual Indiana Radio Club Council Picnic and Hamfest on July 9 at the Indiana Fairgrounds at Lafayette which is located at 1100 Teal Rd. (Indiana Route No. 25). This is a family hamfest. Flea market, games, trailer parking, awards, and more. Tickets from any IRCC club or by mail or at the gate. Advance tickets $1.50 from W9YIP, 477 Robinson, West Lafayette, IN. Deadline July 4. Tickets at the gate, $2.

Indiana – The Muncie Delaware ARA Hamfest is June 11 at the Gaston Lions Club Fair Grounds, 1 mile east of Gaston from 9 A.M. to 3 P.M. Food, trailer parking, vendors welcome, radio-controlled model airplane flights, call-in frequencies 52.525, 7.258, 146.34/146.76, and 146.94 MHz.

Manitoba – The Ninth Annual International Hamfest will be held July 8 and 9 at the Centennial Pavilion in the International Peace Garden between Dunseith, North Dakota and Boissevain, Manitoba. Camping, contests, and fun for all. Information from Mel McKnight, WAØSJB, 909 Main St., Bottineau, ND 58318 or Ron Samchuk, VE4SR, 834-9th St., Brandon, MB, Canada.

North Dakota – See Manitoba.

Ohio – The Goodyear ARC 5th Annual Hamfest Picnic and flea market is Sunday, June 18 at Goodyear Winggoot Lake Park near Akron on County Rd. 87 near Route 43 from 10 A.M. to 6 P.M. Family tickets $2, $2.50 at the gate. Mobile check-in on 50.4, 146.94, 3.9725 MHz. For tickets and information contact Gene Cooke, K8ORL, 3079 Rose Bay Blvd., Norton, OH 44203, telephone 216-825-3811.

Pennsylvania – The Two Rivers ARC Annual Hamfest is July 16 at the Clairton Sportmans Club off Route 51 near Pittsburgh. For flier write WA3MWM, C. Thomas, 7022 Blackhawk, Pittsburgh, PA 15218.

Quebec – The Radio Amateur Quebec 1972 Convention is June 30, July 1 and 2 at Cite des Jeunes Vaudreuil, Quebec.

Tennessee – The Oak Ridge Radio Ops. Club Hamfest is the weekend of July 15 and 16 at

(Continued on page 104)

What can compare to the performance of the Southwest Louisiana AREC gang? Their efforts were consumed by a simulated hurricane that devasted the area. W5TVH (standing) and WA5LBT are shown manning the group's mobile communications van on the outer perimeter of the disaster area while, at *right, WA5LBT is shown taking advantage of WN5FQL's culinary ability.*

Reviewing the 1972 SET

REPORTED BY FRANK CONNELLY, WA1PMD/WA7GWL*

WHILE THE 1972 SET did not break any records, we did turn in a very respectable performance. In fact, the 1972 SET can be labeled second only to 1971 in the twenty-five year history of this emergency-preparedness exercise.

For those readers not familiar with the SET, a short explanation is in order. This activity is not considered a contest in any sense except that each Amateur Radio Emergency Corps (AREC), Radio Amateur Civil Emergency Services (RACES), or National Traffic System (NTS) group is competing with its previous performance and trying to improve upon it. The objectives of the SET are several-fold. They are: (1) To provide a test of the capability of local amateur communications organizations such as the AREC; (2) to test the ability of NTS, the long-haul division of ARPSC to function under emergency conditions; (3) to demonstrate, to served agencies and the public, amateur radio's value as an emergency communications service; and (4) to provide operator training and experience in emergency communications practices.

A little history may also be enlightening. It was back in 1947 when the first SET results appeared in print, taking less than a full page. By 1950 we started "keeping score" under the present system. The scoring system, while not perfect, has been kept the same ever since so that year-to-year performance would be comparable. The only other significant change, until this year, involved a change of date. The SET had traditionally been held during the month of October. In 1967, to avoid conflict with the World Series and football games, which were adversely affecting participation, the date was changed to the last weekend in January, effective in 1968. Thus, there was no SET in 1967.

Several changes were incorporated in the 1972 SET and they produced some interesting results. The most revolutionary change was the revised NTS schedule. Fewer sessions were held by nets at all levels this year, and the attempt to keep most of the traffic at section and region levels appears to have met with reasonable success. It is also apparent that the authorized cancellation of most uncleared SET traffic at the end of the normal schedule reduced the customary after-SET traffic overflow to a trickle. Most of the net managers who commented on the new NTS SET procedure favored it.

The mandatory requirement for emergency power during the SET made it perfectly clear that we are still relying too heavily on commercial power sources. A number of nets and a few AREC groups completely ignored this phase of the SET, as they knew beforehand that it was hopeless. Some ECs and net managers attempted to hold their activities on emergency power only to find themselves alone on the net. If we cannot function without commercial power, how can we expect to function at all during a real emergency!

The scores to follow are only one means of quantitatively judging our performance. We should look well beyond them to make an accurate assessment of our achievements. The scoring system, at best, is inconclusive, but it does give us a general indication of how the SET went on a national scale, compared with previous years. Perhaps more informative, and certainly more interesting, are the many comments received from

*Communications Assistant, ARRL.

VE5RJ, EC for Central Saskatchewan, piloted the SET from this station located in the Saskatoon Civil Defense Communications Center. Bob was only one of a multitude of Canadians who turned out for the SET.

the ECs, ROs, and net managers. These leadership officials must determine how well their groups did in the SET and then search for ways to improve their capabilities. And we *all* have room for improvement.

Traditionally, the SET is divided into two separate categories: We'll first consider AREC/RACES participation, then examine National Traffic System results.

AREC and RACES

Fifty-four sections reported activity in the 1972 SET compared to sixty-one last year. This is probably the most disappointing statistic of the SET. However those fifty-four indicated an overall improvement over last year's performance and the other statistics seem to bear this out. Here is a rundown of how we did nationally:

EC/ROs submitting mail reports or mail and radio reports: 263 (289)
ECs/ROs submitting radio reports only: 20 (49)
Total AREC/RACES membership of participating groups: 8918 (9615)
Total reported participation: 4554 (4769)
AREC/RACES messages to SEC/State RO: 3097 (3163)
EC/RO messages to HQ: 153 (231)
Self-powered portables/mobiles: 1549 (1567)
Fixed stations on emergency power: 433 (451)
Total SET points: 43,219 (44,854)

Scores of participating groups are listed alphabetically by name of jurisdictional area within each section of each ARRL division. Scores are

BROAD LOCAL COVERAGE IS NECESSARY

based on the sum of the following: 1 point per every registered AREC/RACES member; 2 points per every amateur who participated in the SET; 1 point per message from an AREC/RACES member to his SEC or state RO, with a maximum of one point per amateur; 1 point for an EC/RO message to ARRL Headquarters; 5 points per every emergency-powered portable, mobile, or fixed station in the SET; 5 points per community for originating a message on behalf of a served agency; 10 points per community for contact with an agency or agencies to be served; 10 points for a press release (copy with report); and 10 points for submitting a copy of the local emergency plan. Last year's scores are listed in parentheses.

ATLANTIC DIVISION

Delaware		288	(28)
New Castle Co.	WA3DYG	169	
Sussex Co.	WA3GSM	119	
Eastern Pennsylvania		349	(580)
Chester Co.	W3ZAT	90	
Lackawanna Co.	W3VAP	130	
Montgomery Co.	W3HD	22	
York Co.	K3FOB	107	
Maryland-District of Columbia		127	(601)
Calvert Co.	W3ZNW	40	
Frederick Co.	WA3GDC	42	
Howard Co.	WA3FHK		
Prince Georges Co.	WA3AJR	45	
Southern New Jersey		204	(493)
Gloucester Co.	WA2SFA	136	
Mercer, Burlington Cos.	W2YPZ	68	
Western New York		804	(770)
Chemung Co.	K2DNN	169	
Delaware Co.	W2TFL	121	
Glens Falls	K2AYQ	302	
Herkimer Co.	WB2FAW	140	
Oswego Co.	K2DUR	103	
Tompkins Co.	WB2TQF	69	
Western Pennsylvania		916	(698)
Allegheny, Westmoreland Cos.	K3SMB	764	
Greene Co.	WA3NAZ	108	
McKean Co.	W3OCR	44	

CENTRAL DIVISION

Illinois		462	(654)
Cook Co.	W9HPG	462	
Indiana		753	(819)
Clark, Floyd, Harrison, Ohio, Scott, Switzerland Cos.	WA9YXA	33	
Fayette Co.	W9BDP	3	
Gibson Co.	W9UWR	94	
LaPorte Co.	K9HYV/9	202	
Madison Co.	WA9OKK	72	
Northeast Ind.	K9LSB	255	
Tippecanoe Co.	K9LQG	94	
Wisconsin		705	(485)
Dane Co.	W9ZBD	495	
Manitowoc Co.	K9REZ	105	
Racine	W9SZL	105	

DAKOTA DIVISION

Minnesota		430	(286)
Hennepin Co.	WØPAN	366	
Hubbard Co.	WØFDM		

The Bristol (Conn.) AREC operated during the SET on emergency power from base control station W1DGL at Bristol Central High School. Twenty-three members participated and handled thirty-one messages, including six test emergencies. Seated (center) EC W1DGL; seated (foreground, left to right) WA1PAJ, WN1PWH; Standing, WA1NSJ; far background, WN1PAL.

Mower Co.	WØAZR	64	
Winona Co.	WAØOVV		
North Dakota		77	(26)
Grand Forks Co.	KØRSA	32	
Stark Co.	WBØAUM	45	

DELTA DIVISION

Louisiana		2315	(1811)
Algiers, Westside	W5EKF	74	
Southwest La.	W5SKW	2241	
Tennessee		7917	(1710)
Anderson Co.	WB4DYJ	295	
Benton, Carroll, Humphreys Cos.	WB4PRF	27	
Bradley Co.	WA4GOL	179	
Bristol	WA4JCF	200	
Carter Co.	W4LRD	7	
Cocke Co.	K4HHA	4	
Coffee, Franklin Cos.	WA4RAS	484	
Cumberland Co.	WB4PHW	59	
Davidson Co.	WB4MSS	111	
Dyer Co.	WA4EQO	36	
Gibson Co.	WA4YBG	85	
Greene Co.	W4ANB	96	
Hardin Co.	WB4KAT	67	
Knox Co.	WA4HGQ	187	
Maury Co.	WB4TPS	105	
Obion, Lake Co.	WB4TPS	105	
Putnam Co.	WB4JTS	21	
Rutherford Co.	WA4ZXF		
Shelby Co.	W4OQG	391	
Sullivan Co.	K4LRI	430	
Sumner Co.	WB4MDA	27	
Washington Co.	W4VTU	89	

GREAT LAKES DIVISION

Kentucky		2048	(1365)
First District	WA4ZSJ	*14*	
Second District	W4ESN		
Fourth District	W4LWM	1623	
Sixth District	WA4AGH	45	
Thirteenth District	WA4GHQ	210	
Eighteenth District	K4AVX	94	
Twentieth District	WB4ILE	62	
Michigan		1825	(1489)
Calhoun Co.	WA8VXI	61	
Kalamazoo Co.	WA8STV	331	
Monroe Co.	WA8EFK	499	
Muskegon Co.	WA8GVK	122	
Oakland Co.	WA8PII	539	
Washtenaw Co.	K8RUR	233	
Ohio		5055	(4992)
Allen, Auglaize, Putnam Cos.	WA8MIH	229	
Ashland, Richland Cos.	W8BWV		
Belmont, Guernsey, Monroe, Noble Cos.	W8IQ	71	
Central Ohio	*W8ERD*	598	
Clark Co.	W8VZL	138	
Clinton, Highland, Fayette	K8CKY	18	
Columbiana Co.	K8DHD		
Detroit Area	W8BF7	367	
Harrison, Jefferson Cos.	W8LRR	143	
Holmes, Wayne Cos.	WB8DQU	106	
Montgomery, Greene, Preble Cos.	W8ELC	499	
Northeast Ohio	W8GRG	660	
Northwest Ohio	K8LEH	537	
Pike, Ross Co.	K8SUB	128	
Scioto Co.	K8BNL	65	
Southwest Ohio	WA8COA	491	
Stark Co.	WA8EFX	753	
Tuscarawas	W8OIL	310	
Trumbull Co.	K8BXT	-	
Tuscarawas Co.	K8DHJ	102	
Wayne Co.	WB8DQU		

HUDSON DIVISION

Eastern New York		809	(772)
Albany Co.	W2GTI	124	
Rockland	K2CXO	88	
Schenectady Co.	W2PKY	314	
Westchester Co.	WA2JWL	283	
New York City-Long Island		2394	(2916)
Huntington	W2HAI	473	
Nassau Co.	W2IH	673	
Queens	W2LXC	48	
Queens Co.	WB2RXB	131	
Suffolk Co.	K2HTX	1069	
Northern New Jersey		954	(1376)
Bayonne	WA2FUI	153	
Belleville	K2DQT	137	
Clifton	WA2JIM		
Englewood	WA2CCT	130	
Jersey City	*WB2LIW*	*28*	
Passaic	K2KDG	216	
Red Bank	WB2BCS	290	

MIDWEST DIVISION

Iowa		773	(842)
Johnson Co.	WAØEMX	108	
Linn Co.	WBØBPH	377	
Story Co.	WAØIYG	152	
Zone 7C	WAØROM	136	
Zone 9	WØLIJ	-	
Kansas		1498	(1529)
Zone 1	WAØOZP	125	
Zone 3	WAØPMS	90	
Zone 4	*KØIME*	*125*	
Zone 5	WØBGX	193	
Zone 7	WØGUR	269	
Zone 9	WAØUFT	352	
Zone 12	KØIXN	160	
Zone 13	WØEDI	121	
Zone 15A	WAØDAV	73	
Missouri		123	(247)
Henry, Saline Cos.	KØONK		
Johnson, Warrensburg Cos.	KØBIX	123	
Nebraska		59	(229)
Jefferson Co.	WØAGK	14	
Seward Co.	WØDDU	45	

NEW ENGLAND DIVISION

Connecticut		231	(198)
Bristol	W1DGL	196	
Enfield	WA1OPB		
Southington	W1WHR	35	
Eastern Massachusetts		379	(329)
New Bedford	W1LL	93	
Newton	W1RM	111	
Norwood	K1HRV	41	
Wellesley	WA1DMC	68	
Winthrop	W1BB	66	

New Hampshire		389	(438)
Cheshire Co.	WA1MAR	51	
Merrimack Co.	K1BCS	34	
Rockingham Co.	K1RSC	304	
Western Massachusetts		–	(393)
Berkshire Co.	KJKZS	–	
Rhode Island		21	(74)
New Shoreham	W1EVY	21	

NORTHWEST DIVISION

Idaho		428	(210)
Ada Co.	W7JMH	428	
Montana		301	(430)
Deer Lodge Co.	WA7MKY	46	
Great Falls Co.	K7EGJ	165	
Missoula	WA7JQS	65	
Park Co.	WA7IZR	25	
Washington		1089	(1260)
Adams Co.	W7CTS	29	
Grays Harbor Co.	WA7BLW	56	
Island Co.	K4ZDK/7	79	
King Co.	K7WTG	253	
Area 1	W7YRC	101	
Area 3A	W7RJW	131	
Area 4	K7CZF	81	
Area 9	W7GVC	359	
Area 10	WA7IKZ		

PACIFIC DIVISION

Sacramento Valley		577	(329)
Sacramento Co.	WB6KZN	394	
Yolo Co.	WA6TQJ	178	
Santa Clara Valley		766	(957)
Fort Ord, Monterey Area	WA6YAM	47	
Los Altos, Palo Alto Area	W6ASH	189	
Redwood City, Menlo Park Area	W6DEE	472	
San Jose	W6ZRJ	58	

ROANOKE DIVISION

North Carolina		528	(622)
Alamance Co.	WA4FFW	84	
Buncombe Co.	WA4VNV	134	
Cumberland Co.	WB4MTG	263	
Onslow Co.	WB4ICF	47	
Virginia		309	(1022)
Alexandria	W4HE	120	
Augusta Co.	WB4KIT	37	
Area 11	WB4HNJ	21	
Area 12	W4ACC	131	
West Virginia		446	(573)
Berkeley Co.	W8AEC	101	
Cabell Co.	W8DUW	–	
Hancock Co.	K8QLW	124	
Harrison Co.	WB8CPU		
Kanawha Co.	WA8YTP	156	
Lewis, Upshur Cos.	WA8NDY		
Marion Co.	WB8BMV	31	
Putnam Co.	WA8SHT	34	
Wetzel Co.	WB8EMG		

ROCKY MOUNTAIN DIVISION

Colorado		457	(870)
Boulder, Gilpin Cos.	KØGZG	94	
Eagle, Garfield, Pitkin Cos.	WØYED	18	
Metro Denver	KØFLQ	345	
Prowers Co.	KØWAR		
Utah		102	(–)
Weber Co.	W7GPN	102	

SOUTHEASTERN DIVISION

Alabama		1157	(832)
Autauga Co.	WB4LTD	25	
Calhoun Co.	K4HJM	21	
Chambers Co.	WA4VEK	4	
DeKalb Co.	WA4SNU	60	
Jackson Co.	WA4NPL	54	
Jefferson Co.	W4GFT	728	
Marshall Co.	K4WSS	61	
Morgan Co.	WB4NLM	119	
Tuscaloosa Co.	WB4SVH	85	
Eastern Florida		2705	(3495)
Alachua Co.	WA4UFO	22	
Bradford Co.	WB4OMG	6	
Broward Co.	WB4HML	577	
Clay Co.	W4WHK	9	
Columbia Co.	W4YNM	49	
Dade Co.	W4LYT	467	
Duval Co.	WA4VZI	305	
Hendry Co.	WB4BMR	35	
Hillsborough Co.	W4BNF	252	
Indian River Co.	WA4SCK	89	
Lee Co.	W4JMK	74	
Orange Co.	W4BKC	387	
Pasco Co.	WA4WBM	106	
Polk Co.	WA4WZZ	177	
St. Johns Co.	WA4EYY	24	
St. Lucie Co.	W4NTF	29	
Volusia Co.	WB4NGI	197	
Georgia		245	(184)
Augusta Area	K4FDU	245	
Western Florida		492	(516)
Escambia Co.	WB4JCV	200	
Okaloosa Co.	K4CLM	221	
Washington Co.	W4IKB	71	

SOUTHWESTERN DIVISION

Los Angeles		95	(51)
San Fernando Valley	WA6ILI	95	
Orange		1219	(1284)
Inyo Co.	WA6YWS	157	
Orange Co.	K6LJA, WA6TVA, WB6WOO	436	
Riverside Co.	WA6TAG	107	
San Bernardino Co.	K6GGS	519	
San Diego		372	(1043)
Imperial Co.	K6CXR	25	
Northern San Diego Co.	K6HAV	197	
Southern San Diego Co.	W6GBB	150	
Santa Barbara		393	(309)
Southern Santa Barbara Co.	WB6WKC	75	
San Luis Obispo Coastal Area	WB6PGK	139	
Northern Santa Barbara Co.	W6DKQ	69	
Ventura Coastal Area	K6VBX	110	

This hive of activity is the Arapahoe Chapter Headquarters of the American Red Cross located near Denver, Colo. Only a few of the eighty or so participants in the South Metro Area AREC are pictured here.

How effective would the AREC be without the large number of mobile units? Not very, to be sure. Taking this into account, K7HEN, a member of the Ogden Amateur Radio Club and the Weber Co., Utah, AREC takes to the road during SET '72.

WEST GULF DIVISION

Northern Texas		143	(131)
Hood, Johnson, Tarrant, Wise Cos	WA5IOC	143	
Oklahoma		888	(788)
Comanche Co	K5BYE	328	
Garfield Co	WA5EVJ	185	
Muskogee Co	K5WPP	74	
Oklahoma Co	W5NI	274	
Pottawatomie Co	K5EIU	27	
Southern Texas		553	(487)
Bexar Co	W5UMH	303	
Calhoun Co	W5ZPI	22	
Jefferson Co	W5EFW	94	
Orange Co	W5ICL	129	

CANADIAN DIVISION

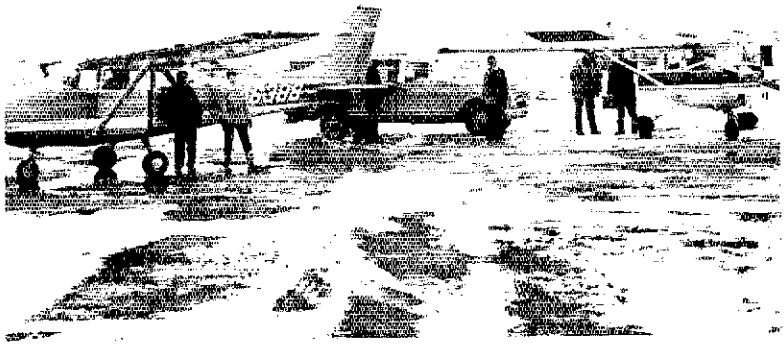
Alberta		244	(–)
Calgary	VE6FM	244	
Manitoba		17	(–)
Dauphin	VE4NL	17	
Maritime		878	(377)
Dartmouth, Halifax	VE1ASN	140	
Labrador, Newfoundland	VO1CA	481	
Moncton	VE1WV	169	
Prince Edward Island	VE1ARB	88	
Ontario		905	(595)
Carleton Co	VE3BMC	169	
Haliburton Co	VE3APL	95	
Halton, Wentworth	VE3AYR	141	
Lincoln Co	VE3WT	84	
Peel Co	VE3IQZ	165	
Perth Co	VE3EOK	96	
York	VE3PJ	155	
Saskatchewan		1010	(607)
Moose Jaw, Southwest Saskatchewan	VE5IL	230	
Prince Albert	VE5BO	252	
Regina, Southeast Saskatchewan	VE5KF	224	
Saskatoon, Central Saskatchewan	VE5RJ	304	
		43,219	

Kudos to those sections that showed a marked increase in performance over last year's activity. Those worthy of special mention are Delaware, Wisconsin, Tennessee, Kentucky, Maritime, and Saskatchewan. Our thanks also to all the AREC leadership personnel and members who devoted endless time and effort to make this a successful exercise.

National Traffic System

While scores were down in all categories of the NTS portion of the SET only one reflects any deterioration. This again is the number of reports received. We don't know why, but the number of nets reporting dropped from one hundred and twenty last year to this year's even hundred. The other decreases in scoring were to be expected and in no way reflect a poor showing of NTS. The revised NTS schedule resulted in fewer net sessions at all levels and we purposely didn't try to overload NTS this year, as we had proved many times in the past that it could be done. The feeling expressed by many traffickers was that we should place more emphasis on the AREC in the SET and less on NTS, especially at the higher echelons. To this extent we were very effective. Most nets complied with ARRL's request for an "unplanned" approach to the SET and the emergency power session, while not too successful, was definitely revealing, as the comments to follow indicate.

The reporting nets are listed below. Area and region nets head the listing and are followed by section and local nets under state or province headings. Column A refers to the number of messages handled; Column B is the time in directed session, in minutes; column C is the number of



Members of the Oswego County RACES and AREC took to the air in more ways than one during the 1972 SET. The planes, piloted by WA2GRV and W2WZN, were used to conduct an aerial survey of a simulated train wreck.

stations participating; column D is the number of net control points obtained; and column E is the number of liaison points. To determine the actual number of stations performing NCS and liaison duties, divide the figures in columns D and E by five.

Net Name	*A*	*B*	*C*	*D*	*E*	*Total*
TAN	687	348	138	35	60	1258
CAN	544	272	194	20	50	1080
PAN	489	281	70	25		865
1RN	341	500	74	30	35	980
2RN	216	253	64	30	55	618
3RN	175	296	66	20	45	602
4RN	411	438	96	15	70	1030
RN5	451	362	100	35	80	1028
RN6	262	138	20	10	25	455
RN7	231	341	56	25	40	693
8RN	219	366	56	35	60	736
9RN	276	293	54	35	45	703
TEN	337	394	76	15	60	882
ECN	101	169	38	20	35	363
IWN	98	236	44	20	20	418
TCC Eastern						
TCC Central						
TCC Pacific	142					142
ALABAMA						
AENB	189	314	28	30	40	601
AENT	166	553	60	30	50	859
CALIFORNIA						
Monterey Bay AREC	18	210	6	5		239
NCN	116	414	66	25	35	656
SCN	163	480	76	25	30	774
COLORADO						
CCN	26	234	28	20	15	323
CONNECTICUT						
CN	307	443	60	30	55	895
CPN	245	245	136	25		651
Two Meter Nutmeg VHF	31	188	14	5	15	253
Bristol Emergency Net	31	200	48	15	15	309
DELAWARE						
DEPN	32	198	32	25	30	317
FLORIDA						
EMTN	367	403	356	30	35	991
GN	120	660	78	45	55	958
QFN	385	898	186	45	95	1529
QFTN	21	83	12	10		134
VEN	67	135	28	15	5	250
WFPN	93	723	56	50	20	942
GEORGIA						
GSN	289	551	104	45	60	1049
GSSBN	392	930	584	85	140	2131
GTN	20	194	24	20	20	278
ILLINOIS						
ILN	116	427	36	25	35	639
INDIANA						
S. Ind. Emerg.	35	900	6	5	5	951
IOWA						
Johnson Co. AREC	10	115	12	15	10	162
Linn Co. 2 Meter CD	27	150	20	10	5	212
KANSAS						
Kansas Phone Net	304	1560	204	20	50	2138
Kansas Zone 15 AREC	6	30	10	5	10	61
QKS	94	316	36	40	35	521
KENTUCKY						
Cent. Ky. 6-M. Emerg.	58	4800	40	20	5	4923
LOUISIANA						
La.-Ms. Tfc. Net	32	200	30	30	25	307
MAINE						
SGN	125	345	84	20	15	589
MARYLAND-DISTRICT OF COLUMBIA						
Frederick Co. AREC	12	480	8	5	5	510
Md. Emerg. Phone & Traffic Net	253	960	112	55	55	1435
MDD	125	437	54	30	60	706
MASSACHUSETTS						
Greater New Bedford Emergency Net	9	230	16	10	5	280
WMN	24		48	15		87
MICHIGAN						
Muskegon Co. CD Net	22	66	10	15	10	133
WMN	117	445	80	40	45	725
MISSOURI						
MSN	21	100	14	25	10	170
Warrensburg Emerg. Net	21	230	14	20	20	305
NEW JERSEY						
Bayonne AREC/RACES Tfc. & Emerg. Net	124	290	18	30	25	487
Navesink Emerg. Tfc. Net	77	360	118	35	10	600
NJEPTN	294	1033	452	45	25	1849
PVTEN	793	1800	110	135	95	2933
NEW YORK						
NLI	35	186	16	15	30	282
NYS	248	948	96	65	80	1437
Westchester Co. AREC Net-2	40	111	18	5	5	179
NORTH DAKOTA						
N.D. Post Office Net	306	230	96	15	5	652
OHIO						
Apricot Message Net	144	1500	62	5	20	1731
Buckeye Net	146	390	70	40	40	686
Clark Co. Emerg. Net	38	180	22	15	10	265
Ohio 6 Meter Net	64	329	44	20	20	477
Ohio Valley Net	14	180	68	15	10	287
Scioto Co. Emerg. Net	18	240	12	10	10	290
S.W. Ohio AREC Net	397	1379	106	30	45	1957
Stark Co. Emerg. Net	342	1535	232	100	140	2349
Steubenville Area AREC Net	48	76	46	5	10	185
Tuscarawas Co. RC Net	60	105	24	10	10	209
Wayne Co. Emerg. Net	135	1050	10	5	5	1205

Eastern Florida always turns in an impressive performance during the SET and this year was no exception. Helping the section along was the gang at the Dade County Red Cross radio shack, K4IWT. Pictured, front to back are: WB4HIS, WA4QLZ, WB4PWD, WB4HKP, and W4IIS (standing).

PENNSYLVANIA						
EPA	127	321	46	25	25	544
E.Pa. Emerg. Phone/& Traffic Net	169	432	64	40	45	750
Greene Co. ARES/RACES	37	228	10	20	15	310
Pa. Phone Net	168	964	86	50	30	1298
WPA	103	349	52	20	20	544
RHODE ISLAND						
Aquidneck Island Comm. Net	24	124	34	5	10	197
TENNESSEE						
Bristol 10 Meter Net	15	180	22	15	10	242
Davidson Co. 2 Meter Net	15	90	20	15	25	165
Gibson Co. ARC/RACES Net	20	330	28	10	10	398
Tenn. EW Net	91	422	42	30	45	630
Memphis Emerg. Net	25	180	146	20	15	486
UTAH						
BUN	41	135	24	20	20	230
VIRGINIA						
Alexandria RACES Net	50	50	24	10	5	139
Area 11 RACES Net	3	1			5	9
WASHINGTON						
Gray's Harbor AREC Net	6	180	8	5	5	204
Wash. State ARES Net	221	660	60	15	40	996
WSN	113	324	44	20	34	546
WEST VIRGINIA						
W. Va. Novice Net	18	71	12	5	5	111
ALBERTA						
Alta. Public Service Net	156	390	90	30	25	691
MANITOBA						
MTN	117	510	18	30	30	705
MARITIME						
APN	122	455	22	25	25	649
Newfoundland-Labrador Net	214	672	166	40	55	1147
ONTARIO						
Grey Bruce Net	133	548	48	30	25	784
SASKATCHEWAN						
SSTN	208	132	12	25	20	397
Totals (1972)	*14,806*	*44,240*	*6,580*	*2440*	*2950*	*71,016*
(1971)	*28,108*	*64,805*	*13,244*	*4530*	*3770*	*113,447*
Record	*28,108*	*64,805*	*13,244*	*3643*	*3370*	*113,447*

Emergency Power

"Because of the lack of participation by commercially powered stations, the emergency-powered session was not planned and was not held by NLI. There was no liaison whatsoever between NLI, the AREC, the SCM, and the VHF nets. Let's see if we can strengthen the ties between NTS and the AREC before we begin to restrict the participation of the stations by use of only emergency power." (WB2LSN, Mgr. NLI, N.Y.) "Emergency power flopped. Many stations had emergency power available but I think most thought it was not worth the trouble to use it since the emergency was only simulated!" – (WA3PLP, PAM, E.Pa.) "I directed the net on emergency power only—got no check-ins— so on EPA it was a flop." – (W3MPX, RM and Mgr. EPA, Pa.) "Had simulated power failure over entire 3RN area and it wiped out the entire net except for the EAN RX man, me, and the EAN TX man." – (W3NEM, Mgr. 3RN) "Did not hold emergency power session as planned. Had several stations available to operate such, but made decision that clearing the traffic was more important. Should have held it on Saturday instead of waiting, but that was the manager's decision and his own gas can was empty. Not funny, but very typical." – (W9HRY, Mgr. 9RN) "Our emergency sessions were successful, but more points should be given for traffic passed on emergency power." – (VE1RO, RM, Mari.) "Emergency power was used exclusively on the first net session of the SET. I was the only QNI." – (VE3ERU, Mgr. ECN) "Since emergency conditions are generally local in nature, I think the lack of emphasis on long-haul traffic was excellent planning." – (W3FCS, PAM, Md.)

Remembering a happening of about a year ago, the Orange Co., Calif. AREC drill centered around a simulated earthquake. Pictured at the base control station are WA6OAD (left) and WA6TVA, Orange Co. 40 meter EC.

NTS

"This SET ran smoother and more efficiently than others. In fact, more traffic was handled this year with fewer sessions than last year. One should not compare this year's score with other years' since our time in minutes is less and the number of liaison stations is necessarily fewer due to fewer sessions." – (K1EIR, RM CN, Conn.) "Much less confusion this year. We handled almost as many messages as last year in a little over half the time." – (W3LOS, RM WPA, Pa.) "A very interesting exercise. I thought traffic handling in this section was much better and more orderly this year." – (WB4HNJ, EC Area 11, Va.) "NTS schedule was much better than last year. Entire SET went very well." – (WB4OMG, RM E. Fla.) "While the total number of points was down from previous years', this year's operation showed greater efficiency. Let's continue the concept of fewer sessions during SET and discourage swamping the higher NTS levels. The emergency power session was revealing. Let's continue that too." – (W4SHJ, Mgr. 4RN) "There was an insufficient number of sessions this year for us to get rid of our traffic." – (VE1RO, RM, Mari.) "Wonderful! Not a marathon like in the past. Let's keep it this way from now on." – (W6LRU, Mgr. RN6) "Much smoother operation in 1972 with more preplanning involved. Noticed more messages originated with proper form and better directions by NCS in following precedence priorities." – (W7BQ, Mgr. RN7) "The SET functioned better this year than before. No attempt was made to overload the NTS. This was most likely due to the fact that the SET traffic not cleared by NTS during the SET was cancelled and serviced.....a good idea." – (W7OCX, Mgr. BUN, Utah) "Everyone in TWN remarked on the greater ease of meeting commitments at local levels with the reduced schedule. Also, there is now greater emphasis in holding region sessions to a half hour and making more efficient use of the time." – (K7NHL, Mgr. TWN) "We like the HXB precedence on SET messages. The two cycles of NTS each day of the SET worked real well here in Kansas. We had plenty of help and nobody was overworked." – (KØMRI, RM, Kans.)

Slivers & Splinters

"Would suggest that this be expanded to a twice a year drill, with the second occuring in July." – (WB4HNJ, EC Area 11, Va.) "This test should be run twice a year to help keep the rust

(Continued on page 105)

I.A.R.U. News

INTERNATIONAL AMATEUR RADIO UNION, THE GLOBAL FEDERATION OF NATIONAL NON-COMMERCIAL AMATEUR RADIO SOCIETIES FOR THE PROMOTION AND CO-ORDINATION OF TWO-WAY AMATEUR RADIO COMMUNICATION

CANADA-BRAZIL RECIPROCAL

Amateur licensing reciprocity now exists between Canada and Brazil under the terms of an agreement recently concluded. Canada now holds 22 such agreements. In addition, all Commonwealth countries are eligible for reciprocal operating privileges in Canada unless there is evidence that such a country does not grant operating privileges to Canadians. A complete summary of Canadian and U.S. reciprocal agreements appears elsewhere in this column.

NOTES

It is with much regret that we report the passing of Reginald S. Pitman, VP9AX, past-President of the *Radio Society of Bermuda*. Professionally, Mr. Pitman served as the Government Wireless Telegraphy Inspector.

With the admission of Tonga as a full member of the International Telecommunication Union, a new series of amateur call signs will go into use. Replacing VR5 is the new prefix A3 which for amateur stations will be followed by the numeral 5. Thus, a typical call would be A35XX.

The *Osterreichischer Versuchssenderverband* reports that U.S. amateurs applying for a reciprocal OE license should not cite a DJ0 call or other such reciprocal license as the basis for application. U.S. licensees should apply under their stateside calls.

DX OPERATING NOTES

Reciprocal Operating

(Bold face type indicates changes since last list.)

United States reciprocal operating agreements exist only with: Argentina, Australia, Austria, Barbados, Belgium, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Finland, France*, Germany, Guatemala, Guyana, Honduras, India, Indonesia, Ireland, Israel, Jamaica, Kuwait, Luxembourg, Monaco, Netherlands*, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, Sweden, Switzerland, Trinidad and Tobago, United Kingdom*, Uruguay, and Venezuela. Several other foreign countries grant FCC licensees amateur radio operating privileges on a courtesy basis; write League headquarters for details.

Canada has reciprocity with: Belgium, **Brazil,** Dominica, Dominican Republic, Ecuador, France, Germany, Israel, Luxembourg, Mexico, Netherlands, Nicaragua, Norway, Peru, Portugal, Panama, Senegal, Sweden, Switzerland, U.S., Uruguay, Venezuela, and Commonwealth countries.

Third-Party Restrictions

Messages and other communications – and then only if not important enough to justify use of the regular international communications facilities – may be handled by U.S. radio amateurs on behalf of third parties *only* with amateurs in the following countries.** Argentina, Barbados (only U.S. stations /8P), Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Greenland (XP calls only), Haiti, Honduras, Israel, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad & Tobago, Uruguay, and Venezuela. Permissible prefixes: CE CM CO CP CX EL HC HH HI HK HP HR LU OA PY TI VE VO W or K/8P XE XP YN YS YV ZP 4X 4Z and 9Y4. Canadian hams may handle these same type third-party messages with amateurs in Bolivia, Chile, Costa Rica, Dominican Republic, El Salvador, Honduras, Israel, Mexico, Peru, U.S., and Venezuela. Permissible prefixes are: CE CP HI HR K OA TI W XE YY YV 4X and 4Z.

DX Restrictions

Amateur licensees are warned that international communications are limited by the following notifications of foreign countries made to the ITU under the provisions in Article 41 of the Geneva (1959) Conference.

Vietnam forbids radio communications between their amateur stations and those of other countries. U.S. amateurs should not work XV or 3W8. Canadian amateurs may not communicate with Cyprus, Gabon, Iraq, Pakistan, Turkey, Khmer Republic, Vietnam, Libya, and Yemen. Prefixes to be avoided by Canadians are AP TA TR8 XU XV YI ZC4 3W8 4W 5A. QST

* Agreement includes overseas entities.

** By special agreements, third-party traffic is also permissible with Australian amateurs for traffic regarding amateur satellites, and with 4U1ITU.

The President of Colombia, Dr. Misael Pastrana (right), turns over the management of the Institute of Territorial Credit to architect Alberto Vasquez, HK4FB (left). In the center is attorney Rafael Naranjo, Secretary General to the President.

Happenings of the Month

QRM AND NETS

Amateurs who are frequent participants in net operations, particularly on phone in the hf bands, are more-than-familiar with interference which at times seems intentional and even organized. Joint efforts by FCC and amateurs have now been developed[1] to the point where there will be a great increase in disciplinary actions against those who deliberately interfere.

At the same time, recent FCC comments make it clear that the net participants also have some responsibilities toward fair sharing of the bands:

> Amateurs generally are encouraged to avoid frequencies known to be used by nets when the nets are active or near activation. However, nets do not have any priority and, while net-stations may ask non net-stations to shift frequency, the latter have no obligation to do so if they were using the frequency prior to activation of the net. It is the Commission's belief that most amateurs are willing to cooperate with established public service nets if requested to do so in a courteous manner.
>
> Good amateur practice contemplates that amateurs, before transmitting, will determine to the best of their ability that the frequency they intend to use is clear. Inasmuch as all amateur frequencies are shared, good amateur practice contemplates that individuals or groups will not monopolize a frequency for an unduly long time to the exclusion of other amateurs, especially during the periods of band congestion. The latter is implicit in the sharing concept.

PITCAIRN ISLAND TRAFFIC

Pitcairn Island (VR6) is one of the most isolated communities in the world. There is, for instance, no commercial telegraph or radio service to the outside world. When there is an urgent need for communications, the island's one amateur station manned by Tom Christian must be used.

Thus, there is an "informal and temporary" agreement between the United Kingdom and the United States permitting VR6TC and W/K amateurs to exchange messages concerning medical emergencies, urgent need for equipment or supplies, and private or personal matters of island residents. The agreement applies equally to phone patches and written traffic.

LOTTERY CHATTER

On the national level, the exchange of information on lotteries is barred from the mails (even to the point where hamfest circulars describing door prizes have been rejected at some post offices). Similarly, broadcast stations are prohibited by Title 18, USC 1304 of the U. S. Criminal Code, from transmitting any information about these "games of chance."

Several state governments, however, now operate lotteries as a means of raising revenue for their budgets. Initially, interest is high among the public, including radio amateurs, and consequently there has been much chatter about the drawings in the ham bands.

Should amateurs discuss lotteries on the air? ARRL General Counsel Robert M. Booth, W3PS, points out that these activities are still illegal in many states; that amateur communications cross state lines; and that the subject is not remotely related to the basis and purpose of the amateur service as set forth in Section 97.1 of our rules. Thus, he concludes that transmission of any lottery information by amateur stations – however casually – be avoided and discouraged as forcefully as possible.

SUMNER H. FOSTER, WØGQ
KENNETH E. HUGHES, W6CIS

It is our sad duty to report the deaths of two former ARRL directors, Sumner H. Foster, WØGQ, on March 23 and Kenneth E. Hughes, W6CIS, on April 7.

Sum was vice director from the Midwest Division from January 1, 1956 until May 7, 1966 when he succeeded to the directorship vacated by Robert W. Denniston, WØDX who became League president on that date. WØGQ served several terms as president of the Cedar Valley Amateur Radio Club; was a Charter Life Member of ARRL; was active in RACES until last autumn. Sum moved to Denver from Cedar Rapids in September upon his retirement as vice president of Penick and Ford Limited. First licensed in 1926 as 1GP, he later held the calls W2FJU, W9ZAS and W1GP. He was 61 years old.

Ken was alternate director from the Pacific Division in 1948 and 1949, director from 1950 through 1954, and was still in the League's "official family" as an assistant director. In times past, W6CIS has been SCM of San Francisco; NCS of National Traffic System nets, ORS, OO, and, recently, RACES radio officer. He was also active in radio clubs variously in the Sacramento and San Francisco areas. A resident of Merced, California, Ken was 64 years old at the time of his death following heart surgery.

RADIO REHABILITATION

At the request of the Bureau of Prisons, U. S. Department of Justice, FCC has changed its procedures so that prisoners released on parole can obtain commercial radio licenses immediately upon leaving prison if the institution provides the FCC District Engineer with a signed release statement.

Electronics courses are taught in many prisons these days, so quite a few men prepare for the tests during confinement. Parolees who obtain jobs soon after leaving have a better chance of staying out. Yet in the past it often was six months before a

[1] Copies of the Intruder Watch Bulletin describing surveillance procedures are available from Hq. An s.a.s.e. would be appreciated.

The whole Hq. gang gathered in the lobby on April 12 to greet Treasurer Dave Houghton, who marked his 50th anniversary of service to ARRL on that day. One wag remarked, "Are we gonna stop the whole place every time someone reaches the 50-year-point?"

license could be obtained. The new procedures should stimulate rehabilitation through radio.

OHIO AMATEUR RADIO WEEK

John J. Gilligan, Governor of Ohio, proclaimed amateur radio week in Ohio for April 16-22. This year's papers specifically mention the work of the Apricot Message Network following the floods in West Virginia, the Dayton Amateur Radio Association, and the Dayton Hamvention.

And "national" amateur radio week, applying wherever there hasn't been a local declaration of other dates, is June 18-24, culminating in Field Day. Chance are good that you can get display space in a library, bank or shopping mall to help acquaint the public with our activities, particularly in the public service.

STAFF NOTES

Mark Dane, W1FXJ, advertising manager since April 1970, (and much earlier, a summer assistant in the lab) resigned effective May 1, 1972, and is now back in the computer field from which we drew him two years ago.

Laird Campbell, W1CUT/W5TQD, moves across the hall to fill the ad manager vacancy. Laird joined the Hq. crew in September 1954 as a contest-log checker in the Communications Department. The following March he moved to the Technical Department, building gear, editing and writing tech articles (notably on mobile noise suppression). In 1964 he moved again, to the Editorial Department, and the next year became Managing Editor. His job since then has included changing over ARRL publications from letterpress to offset, from hot-metal composition at the printers' plant to "cold type" at Hq. using an IBM Magnetic Tape Selectric Typewriter (MTST) system.

Taking over the "*QST* factory" is William I. Dunkerley, Jr., WA2INB/KL7ELA, since December 1966 an assistant secretary doing membership services work. Bill is our resident expert in the Russian language (hmmm, does IBM have a Cyrillic ball for the MTST . . .?), is staff liaison to Amsat and a member of its Board of Directors, has written *QST* articles on Oscar, and, in a separate field, has been our contact man with Boys Clubs of America, helping to form radio interest groups in city clubs.

WAØ QSL CHANGE

Lloyd Harvey, WØQGI, has had to resign as QSL manager for WAØ because of the pressures of business. Dr. Phil Rowley, KØZFL, who has been handling KØ, WBØ, and WNØ now will handle the WAØ group as well.

The Canadian-American Sportsman's Show in Cleveland provided an opportunity to present amateur radio to the public. Robert A. Kestner, W88AZH (back to camera) mans the display put on by the Apricot Message Net. *(Photo by WA8PCT)*

The *QST* Cover Plaque for July 1971 was presented to Frank N. Van Zant, W2EGH, for his article, "A Solid State Noise Blanker." The ceremony was held during a banquet in March of the Delaware Valley Chapter, QCWA and the award was offered by ARRL President Harry J. Dannals, W2TUK, right, while Atlantic Director Harry A. McConaghy, W3SW, beams approval.

Correspondence From Members-

The publishers of *QST* assume no responsibility for statements made herein by correspondents.

KEY QUESTIONS

● For the past year I have read, in *QST* and other ham publications, considerable discussion about various aspects of the Incentive Licensing law. Subjects include lowering the code requirement from 13 to 10 wpm, extended operating privileges for Novices, and a reduced waiting period for Extra-class eligibility, to name but a very few. It occurs to me that all of these proposed innovations are fragmented efforts, fostered apparently by special interest groups within the ham fraternity. I believe that most of the discussion and arguments surrounding these issues are of extremely limited value because there seems to be no attempt to relate to an up-to-date big picture or master plan.

If we are honest with ourselves we must admit that, at least in part, critics of amateur radio hold some valid contentions. Despite efforts of the ARRL to unite the fraternity, we seem to be an organization of many informal splinter groups, each seeking to protect and perpetuate its own objectives and vested interests. It should be fully understandable, therefore, that our antagonists can factually claim we really don't know what we want, where we are going, or why!

We are now moving into a new, challenging, and exciting era of wireless communication, with use of TV, satellites, etc. Never before in the history of amateur radio has there been a more urgent need for the ham fraternity to find its bearings, identify or up-date basic objectives, and stop floundering with fragmented licensing and operating privilege proposals. The fact is, in relation to a reduced code speed requirement and many other proposals, we really have no basis for evaluating their merit, because they are not being related to future objectives of amateur radio. I frankly have no idea whether these proposals are to the overall advantage of the ham fraternity and I have read nothing on these subjects which I consider authoritative from a comprehensive point of view. If we ask ourselves and objectively answer a few basic questions, however, I believe those proposals holding substantial merit will surface, and new valid proposals will likely develop as a result. Some of these key questions are: Do we really want an increase in the size of the ham fraternity? How much sincerity, interest, knowledge, and ability must an individual demonstrate, by way of initiation (examination), to earn entry into the fraternity? In light of the current state of the art, rather than history, what requirements will be meaningful measures of individual ability to meet challenges of the fast-evolving field of wireless communication? What do we presume the future holds for amateur cw, phone, TV, facsimile, and RTTY? In this regard, which of the current licensing requirements conform to the anticipated future configuration of amateur interests and technology? Do we intend that amateur radio will ever regain its image as a pioneer in any facet of wireless communication, or do we agree to permanently default this mission to commercial electronics? What will failure to modernize and deviate from the status-quo ultimately cost us under pressure of emerging non-amateur wireless interests?

I believe that if we answer these and related questions with sincerity and formulate the answers into objectives, the requirement to fill many pages of ham publications with discussion and dispute over specific proposals will sharply decrease. It will also become quite evident which licensing requirements should be deleted or modified and which requirements need to be added. Instead of organising committees to study the code requirement and other specific proposals, time and effort might be more productively expended studying basic questions and objectives. After this task is accomplished, each ham should be evangelistically solicited to lay aside the protective interest he might hold for his particular class of license and to unite with others behind a common set of objectives for the entire fraternity. If such efforts are successful, current and future specific licensing proposals will identify in clearer perspective.

The choice is still ours. We can modernize and assume our legitimate role in this new era of wireless communication or we can default to non-amateur interests by indecision, fragmentation, and internal strife. Let us not deceive ourselves, however, by believing that if we do little or nothing we can retain the status-quo. Political and economic interests are too dynamic and too demanding to much longer permit us this luxury.

We can all help by being positive and constructive and by thinking in terms of the best interests of the entire ham fraternity when we submit suggestions to the ARRL. Self-centered complaints and threats to terminate membership are not in keeping with the camaraderie of ham radio and they serve only to provide ammunition for militant opponents of our hobby. So how about it, elders of the fraternity? – *Bill Vimont, WN7QGH/WH6, Tripler Army Medical Center, HI*

PIGPILE!

● I'd just like to know how many other amateurs turned off their rigs in sickening disgust after listening to the mob chasing the CEØ DXpedition stations.

I've never heard such obscene language used on the amateur bands before in my life – not to mention the dirty name calling exchanged between U.S. and foreign amateurs.

Way to go guys! I'm sure your actions did a lot for the U.S. amateurs' reputation, along with such a great promotion of peace and good will! – *Larry Pfeiffer, WA9JCO, Crystal Lake, IL*

SUCCESS STORY

● As to the fable of not being able to learn the code, I won't buy it. I started from scratch October, 1970, and made up my mind to have my Advanced ticket before I was 60 years old in January, 1973. I got that license on March 17, 1972. – *Gerald B. Roadhouse, WB2BZD, Brockport, NY*

TRUTHFUL RST

● I feel that the present RST system is much too finely divided. Experience over many years has convinced me that the following system would convey much more, and much more truthful, information:

R: 0: I cannot read you at all.
1: I am catching less than half of your transmission.
2: I miss occasional words.
3: Solid copy.

S: 0: I cannot hear you at all (as distinct from *read*).
1: Your signal competes with the noise.
2: Armchair copy.
3: I have turned my rf gain down.

T: 0: Chirp and buzz.
1: Chirp.
2: Buzz.
3: Clean signal. – *Norman Pos, WA6KGP, Imperial Beach, CA*

ARMCHAIR COPY

● I'm amazed at the extremely high percentage of "S9 Armchair Copy" we have these days.

When two stations running about the legal limit and both within the same general area "compliment" each other on the 20 to 30 dB over S9 signals they each have, do they ever give a passing thought to the fact that they are obliterating weaker signals hundreds of miles away? Or, do they even dream that the same "Armchair Copy" could be enjoyed between them at 10% of that wasted power?

Whenever I hear some of these "power happy" boys *bragging* about how they finally contacted 7K1AA or PY2QK, I feel sorely tempted to advise them that such great "feats" leave me *cold*. I did it too, but I did it with 50 watts!

"Now that I am old and grey,
And, soon or late, will pass away –
I'd like to leave this word from me:
'QRO' hurts you – and everyone.
Try 'QRP' – it's much more fun!"
– *R. D. Johnson, W7NUN, Seattle, WA*

URBAN PROBLEM

● I see that W1AW has a bad case of TVI and RFI, and that the station has gone QRP on 2 meters. Good! Perhaps now the League will do something about a problem that is putting all those urban hams out of business. All the cheap unshielded solid-state TVs and hi-fis are flooding ham radio out except for the rural ops. I have written lots of letters on this (one was printed in *QST* several years ago) but nobody seems very interested in the problem. Too bad. *Nick Leggett, WA1PCM, Chicago, IL*

QRX FOR MM SURPLUS

● W1WQH's Stray about 2-MHz marine transceivers on page 98, *QST*, April 1972, is somewhat in error. The FCC has withdrawn type acceptance of this a-m equipment and will not license any *new* installations after January 1, 1972. However, the *current licensee* may continue to use 2-MHz a-m equipment until January 1, 1977, as long as he keeps his license current. This is clearly spelled out in Part 83, paragraph (66)(c)(2) of the Rules and Regulations.

I doubt if there will be any rush to vhf until 1977. Marine vhf equipment is more expensive than the a-m it is replacing. There is still some confusion as to what channels can be used by the various marine services. Finally, limited range and propagation problems in some areas have caused the recreational boating community to be less than enthusiastic about vhf. *Ben Warriner, W8MQ, Lambertville, MI*

FINE MOBILING

● In "The Fine Art of Mobile Radio" (page 70, April, *QST*) WB6MKV offered many fine suggestions for a successful and safe mobile excursion whether local or cross country.

For myself, the safest and most convenient way of keeping a log while mobiling is having a small cassette tape recorder either mounted under the dash or laid on the seat. Simply record the necessary data, and later transfer it to the main log. – *Gary Bullinger, WB9BVZ, Aurora, IL*

RASER SHARP

● I have read with interest your recent article on RASER technology (*QST*, April 1, 1972). The principles described therein are actually quite well known and were first applied to the radio spectrum many years ago using the familiar gas discharge tube. At that time the acronym GASER applied (gas discharge amplification by the stimulated emission of radiation).

Unfortunately, in those early days antenna couplers were not so refined as today and radiation patterns were quite limited. It is quite pleasing to now read that more amateurs are being acquainted with the new solid-state version of this classic method of wave propagation. – *Michael P. Schulhof, K1OKI, New York, NY*

● With my RASER antenna coupled to my polydimensional cw rig and my QS-S9 receiver, SBDXCC can't be far away. Thanks! – *Scott Liebling, WA3OXG, Pittsburgh, PA*

● To those who are having difficulty locating the references to the April article on the "RASER," the following company can supply them:

Ada N. Betting Publishing Distributer
1210 Raiffery Road
Gastowne, PA 19601
– *Howard W. Radke, K7NJM, Boring, OR*

● It is well known that either wood or an inert form of sodium must be used for the bottom flask. I believe that the 4 dB of "extra" gain is easily explained by impurities induced by the plastic containers. Perhaps this impurity could be isolated for further study. – *David W. Graham, WA@YDO, Ames, IA*

● Is it adaptable to 27 MHz? I have a horizontal-vertical polarized cubical quad, but I can't get 17 dB gain. I need the RASER's edge, so my Charlie Browns aren't so incoherent.

We get frost until June here. When is the best time to plant rubies in my time zone? – *Jim Scholz, WB2FVP, Greenville, NY*

● The article was so interesting that I decided to do some detailed research into the author. (See "Everything you wanted to know about family trees, but were afraid to ask," by the well-known researcher, I. Kan Hindum, also published by Double-Cross, 1965.)

I found that he was a distant relative (fourth in-law on his second cousin's side, thrice removed) of someone named Nikola Tesla. Hmmmm, I thought that gadget looked familiar! – *J. Bradley Flippin, K6HPR, Monterey, CA*

● I grew a ruby rod 125 feet long and have been using it quite successfully as a dipole on 80 meters.

Gains on these antennas have been fantastic, as WB9BMY, my neighbor, can now actually hear me, and I have completely fried a hi-fi in the next block. — *Mark Van Cleve, WN9ILD, Peoria, IL*

● My wife suggested adding the green type lawn food urea crystals in the dish of the ruby-growing apparatus to have a broader spectral range. Green would extend the low end of the raser to 3.5 MHz thus making it possible to complete my 5BDXCC. — *Orlando O. Okleshen, W9EXE, Richton Park, IL*

● Every year I go through a cycle of activity similar to the events as published in *QST*. In the winter a little traffic, then the contests. By that time I am ready to ease off operation and heat up the iron to start a project, just about in time for the April issue. So with mag in hand I construct an article from the pictures (there's never a diagram) on those April devices. Just finished the "Raser" and am happy to report – like all the others in the past — it ----- — *John Oliver, K6UU, Granada Hills, CA*

● I asked my electronics teacher what he thought about it. After reading it intensely he came to me and said, "If they could only get it somehow to receive."

I may mysteriously fail at the end of the year — hi! — *Doug Hoggatt, WN7QNA, Scottsdale, AZ*

● Congrats!! *QST* did it again!

Mr. Lamboley's feature article on the "Fundamental RASER Principles" almost caught me! With a fantastic sense of technical humor, he has indeed succeeded in carrying across the new technology's capabilities in a really stunning article aimed at those of us who think we've seen everything. I'm almost left speechless . . . It was really great reading. — *David Bernhardt, WA2OJQ, Scotia, NY*

● Oh, you clever rascals, you've done it again!

Your wonderful piece of fiction, so cleverly disguised as a technical article ("Fundamental Raser Principles," page 56, April) left me gasping at your technical perspicacity and erudition.

So what if most of your readers were "sucked in"? After all, you can't stoop to their level. Let them get their knowledge someplace else. Hang the poor soul who is laboring along trying to understand what ham radio is all about. What if he doesn't understand it? There are other places where he can get *his* kind of technical information.

Let's continue to enjoy our private jokes. The fellows who don't understand these annual April spoofs are probably not going to make any kind of a contribution anyway. I think you're absolutely right in ignoring them completely. — *L. W. Aurick, K3AZ/W2QEX, Lancaster, PA*

BOTH BARRELS

● League Lines in *QST* for November, 1971, concludes with its Quote-of-the-month from Senator Goldwater to the effect that the ARRL is doing a fine job for us in Washington. The same issue contains an excellent illustration of how it is doing it, and April *QST* gives us another.

In November it was the splendid presentation in the "Eyebank" matter, Docket 19245, (the interpretation of S 97.39 of the Commission's rules) which just about covered everything from A to Z.

But the April presentation in the matter of CB on 220 MHz, RM-1747, tops this off, if that is possible. The EIA really got it with both barrels! Not only was it shown how the grant of the petition would be contrary to the public interest, but several alternatives were offered that would do what was asked much more effectively.

I wonder if the suggestion of sealing high-power linears might be extended to requiring the registration of ownership of all transmitters? Manufacturers would report to FCC sale to dealers, who in turn would report sale to users, by serial number. In addition to curtailing bootlegging, this would discourage theft in much the same way as registration of autos does.

ARRL requested that we inform you of actual and proposed use of 220 MHz: I'm constructing a transmitter for that band here, and hope to have it operative in a month or so, running about 100 watts to an 829B. — *The Rev. Chuck Clark, WB4OBZ, Moncks Corner, SC*

NOT A "YES MAN"

● For years I have refused to renew my membership. To me, the ARRL was only masquerading as a one-man, one-vote system. A Hq. official has led me to realize the ARRL polls its membership and its international and legal sources for information to make its decisions. This makes more sense to me than anything to come out of Hq. for years. Everyone knows you don't tell your lawyer how to plead your case. To have this information and know the ARRL is aware they are operating this way will make one tackle membership in a different light.

In the past there were a few things I did not find comforting: the contributors' list for the new building looked like a reprint of the DX Honor Roll; incentive licensing giving special phone-band privileges in the DX part of the phone band happened at the same time; the apparent lack of support for the proposed phone-band expansion by the DX fraternity.

If I sound as though I blame most of ham radio's problems on the DXers, it is not the act of DXing but rather the overplayed emphasis on this subject. It is obviously a matter of patience and brute power rather than skill or ability. I personally cannot conceive how it adds anything to amateur radio, but I do not begrudge the boys their fun as long as the main body doesn't suffer.

It has long been apparent to me that people like myself who have resigned for reasons of disagreement with the League on some matters have left the League with an absence of disagreeing members. There are still all kinds of disagreement on the bands but very little at the ARRL meetings and forums. In order that you will not be overrun with "yes men," please consider my enclosed application for membership. — *Bill Rogers, KØZPN, Elkhart, KS*

MUSICAL MORSE

● The latest industry to exploit amateur radio, it seems, is the music industry! As a disc jockey at our campus radio station, I came across several pre-release promos for a new rock group call the "Morse Code Transmission." When the album finally was released a few weeks ago, the jacket had a picture of one of the group members sitting at a desk with a hand key sending "our" cw. At first glance, one might ask, "Is this yet another cause for our League to take up to preserve our hobby from 'undesirable intruders'?" No cause for alarm yet – their music isn't very good! — *Cary Rubenfeld, VE4EA, Winnipeg, Manitoba, Canada*

ARRL Proposed Band Plans for 220 and 420 MHz

In *QST* for December 1971 and February 1972, ideas were solicited from groups and individuals concerning plans for the utilization of the 220- and 420-MHz amateur bands. The Vhf Repeater Advisory Committee and Amsat also were asked to submit comments. Figs. 1 and 2 show the ARRL proposals that have been developed from the comments received. These are *proposals* for *voluntary* sub-bands. Final adoption as *recommended* plans will be undertaken only after consideration of suggestions from interested parties and the eventual FCC Report and Order on Docket 18803. However, the two plans do represent a compendium of current thinking on the use of the 220 and 420 bands which can serve as a guide for those wishing to establish operation today.

220 MHz

The 220-MHz band plan (Fig. 1) provides for weak-signal and other narrow-band work in two segments, 220 to 220.3 and 222 to 222.3 MHz. In some areas of the country the low end of the band is used for long-haul communication via cw, a-m and ssb, while in other sections problems associated with radiation from TV sets have forced a move to 222 MHz.

Fm simplex, repeater, and control-link communications are established on 40-kHz-wide channels (from 224.98 MHz down) with a specified transmitter deviation of 5 to 10 kHz. When band occupancy demands it, split channels of 20 kHz, using 5-kHz deviation, can be implemented. A national calling frequency for fm is established at 223.0 MHz. Most of the current 220-MHz activity fits well into this plan. Operators of fm repeaters on 220 have found that 3-MHz spacing of input and output frequencies greatly simplifies the problem of receiver desensitization.

420 MHz

A noteworthy feature of the 420-MHz band is that all of the modes popular with amateurs – cw, ssb, a-m, fm, SSTV, and TV – are in use. Direct, repeater, satellite, and moonbounce transmissions are employed. Although the 420 band is 30 MHz wide, it is proving increasingly difficult to find space for all of the uses that hams have found for the uhf band.

Wide-band transmissions, primarily fast-scan TV, are allocated the segment from 422 to 431 MHz. See Fig. 2. In areas where no TV activity exists, this 9-MHz segment can be used for wide-band fm (deviation of 150 kHz or more) such as generated by some of the ultra-simple transceivers. The spectrum around 432 MHz, plus or minus 25 kHz is designated for weak-signal cw and moonbounce work. The area from 432 to 435 MHz is set aside for a-m, ssb, SSTV, and satellite up-link work. The band from 435 to 438 MHz was allocated by the recent ITU conference for the Amateur Satellite Service, and the proposed plan follows this instruction.

Fm repeater groups now constitute the largest single user of the 420-MHz band. Repeater inputs and outputs, control links and simplex frequencies are contained between 438 and 450 MHz. Channels 50-kHz wide, with transmitter deviation up to 15 kHz, are called for. Full duplex operation is possible with the 5-MHz input/output spacing specified for repeaters. For those who need to transmit on a cross link simultaneously with a down link or 440-MHz repeater (such as in the Texas Intercity Repeater System), operation of the link between 420 and 422 MHz is suggested.

One of the most difficult choices in the 420-MHz band plan was the position of the

(Continued on page 98)

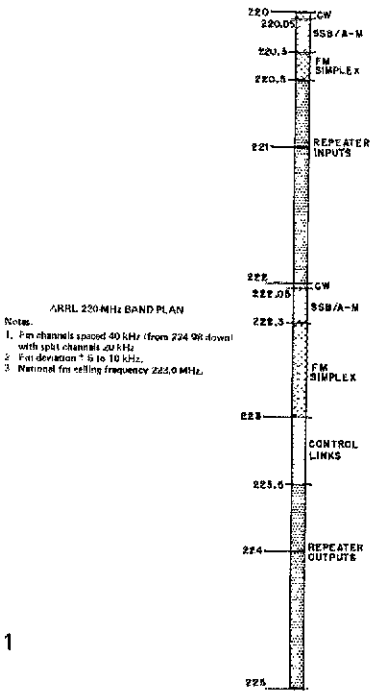


Fig. 1

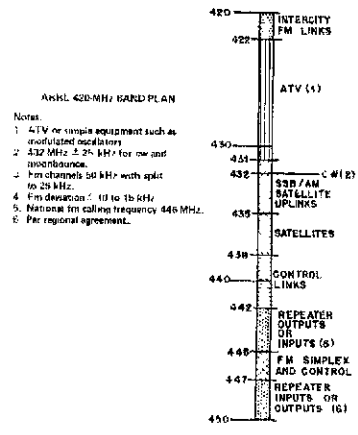


Fig. 2

The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* KØCER

More on CAT

I THOUGHT comments published on these pages in April by W5HFV on CAT or "clear-air turbulence" would prompt a number of letters, but only two have been received.

One came from Bill Davidson, VE3CQU, an airline pilot. He says tropospheric conditions rather than CAT would, in his opinion, be the more likely cause of the highly-localized long-haul openings on 144 MHz noted by W5HFV. Bill says he is not a meteorologist, but has spent some time gathering information on CAT and possible ways of detecting its presence. Bill says pilots have a rule of thumb, "while in cruise in clear air and the static air temperature rises approximately 4° centigrade fairly quick, expect some type of turbulence within the next minute or so."

VE3CQA suggests the next time conditions similar to those reported by W5HFV are noted, the supervisor of the local air traffic control center be contacted and asked if any aircraft are reporting turbulence. If they are, a call to the weather bureau may identify a responsible weather formation. Jet streams are usually found above the position of the front as shown on the 500-millibar chart. Also inquire about the tropo level.

On a recent flight to Europe, VE3CQU saw the tropo height drop from 34,000 to 28,000 feet in a few hundred miles on a north-south line. Bill suggests this type of condition *may* cause a reflective wall for vhf signals. He concludes: "One thing about CAT is that one aircraft can report it and the next aircraft only 5 to 10 minutes behind will have a smooth ride through the same area."

A second letter came from Hugh Drake, WØIPT, recalling some "freak" late-night conditions on 10 meters in 1948 and in the spring and early summer of 1952. Most of the paths covered were highly localized with a skip distance of approximately 800 miles. While Hugh says sporadic *E* could have been responsible, the common denominator on all contacts was local rain. He asks, "could something like a high-altitude electrostatic charge layer in cloud formations have served as a reflector? Or was it CAT ahead of the storm?"

Whatever, the speculations are interesting. Perhaps this summer we might find an answer?

*Send reports and correspondence to Bill Smith, KØCER, ARRL, 225 Main St., Newington, CT 06111.

220-MHz E Beacon

Again this summer, WB6NMT, at Dixon, near San Francisco, is operating a beacon transmitter on 220.005 daily from 1500 to 0300 GMT, with times extended if 50-MHz *E* looks favorable. The transmitter runs 600 watts output to an array of four 3-element vertically stacked Yagis pointed east.

WB6NMT will activate the beacon earlier on weekends if there is any interest in observing meteor rates at 220.

WB6NMT solicits reports from any station listening for the beacon, via *E* or meteors, even if nothing is heard. All such information should be detailed as possible.

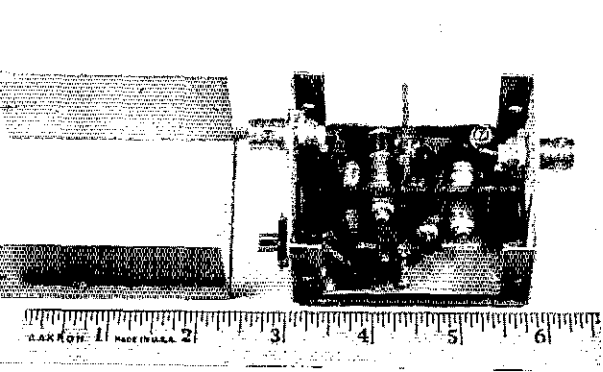
And Mel Wilson, W2BOC, requests detailed sporadic *E* reports on any vhf band this summer as his *E* investigation continues – well into its *fourth* decade!

OVS and Operating News

50-MHz DXers in the southern latitudes of the U.S., the Caribbean, Latin and South America experienced an interesting spring, after many operators had written off the DX possibilities of Cycle 20. In the May column we documented the *F*-layer openings through March 19. The Pacific got in on the action also. KX6HK, on Kwajalein in the Marshall Islands, says 6 meters was open every day between at least March 6 and April 8, especially to Japan. One March 22, Bill worked nine Australians, VK9ZAP, Port Morseby, New Guinea, and C21AA, Nauru Island.

March 24 found K5LZJ and WA5HNK working LU3EX and LU2DEK, Argentina, on *F2* during a 30-minute opening. The following day was similar, except there was strong backscatter from Florida to Arizona as well as South American DX. K7PXI, Arizona, worked LU3EX, on *F2* and W5s and 6s on backscatter. XE1PY was a popular catch on backscatter. March 26 again found six open to South America with CE4CP, Chile, working WA5HNK for his first U.S. contact. Joe, WA5HNK, again worked XE1PY on backscatter.

Six meters was apparently quiet stateside until March 29 when a wide-spread opening involved the entire southern U.S. with South America. WB4JHQ, Pensacola, worked LU3EX, K7PXI,



In the March, 1972 column WB6NMT detailed his low-noise 220-MHz preamp. This is a photograph of the finished product, now popular with the 220 weak-signal group.

QST for

In the St. Louis area, 144 MHz a-m is popular. One of those active is Royce Brown, WA9UUF.

Phoenix, worked LU2DEK, LU3EX and XE1PY, while the same stations were being worked by a number of operators in the Los Angeles area including WA6JRA. In the San Francisco area, WB6NMT worked LU2DEK and XE1PY on what Louis thinks may have been an *E* to *F2* connection. The DX signals were heard less than 15 minutes. K7PXI heard weak South American signals March 31, 2000 to 2230 GMT.

April Fool's Day brought more DX. WA5HNK worked LU5DJZ and CE4CP during a 2-hour opening. Similar conditions were reported April 2 when WA6JRA worked LU1MDA, and WA5HNK worked his now usual South American DX. K7PXI worked XE1PY, 2020, LU1MBJ, 2045, and heard LU3EX. K5ZMS worked LU1MBJ and LU7FA April 5th. On the 6th, K7PXI heard backscatter at 2200, heard LU7FA at 2220, and worked him at 2230. On the 8th he heard 4-5-6 backscatter at 2000, but only very weak DX. WA5HNK says the *F2* and backscatter lasted from around 1900 to nearly 0000 GMT on the 8th. Stations all across the southern U.S. from Florida to California were involved and as usual, the LUs added *F2* to the backscatter fun. The 50-MHz band opened again from Texas to Argentina on April 10 and 13. The opening on the 13th was the 11th day of *F2* noted by WA5HNK. Most of the openings came between 1900 and 2200 GMT. Rusty, XE1PY, told WA5HNK *F2* began from Mexico City March 1 and lasted for 37 consecutive days.

Pat, WA5IYX, sent his usual highly-detailed propagation report which, along with several previous ones, I have filed for future use as reference material regarding the events of this spring. Pat's comments and conclusions will make interesting reading as a column lead in the near future.

One final note on 50 MHz: WB6NMT has received his own moonbounce echoes, with his rhombic and 500 watts output. Louis would be interested in 50-MHz EME schedules with anyone who thinks he has the antenna gain necessary. 20 dB at 50 MHz is not easily achieved.

We will be interested in detailed *E* reports this summer, especially short-distance skip and multihop. Exact times, beam headings and what was heard should be carefully logged.

144-MHz DXers were disappointed with the beginning of the usual meteor scatter season around mid April. The Lyrids shower produced few pings, fewer bursts, and apparently no contacts. Meteor activity was higher prior to the Lyrids than during the predicted shower. A possible meteor storm had been predicted for the late afternoon and evening hours of April 22, but in the United States, anyway, it did not develop. There had been conflicting opinions in scientific circles about the possibility and apparently the pessimists were correct.

While waiting for the meteors, KØMQS, Iowa, worked VE7BQH, Vancouver, April 16 and 17 on moonbounce. The pair also had contacts on March 20 and 21. K6MYC worked KØMQS on both of the latter dates.

In Europe meteor scatter has some interest. German stations DK1KO and DL3YBA schedule Northern Ireland's GI3SUM, while G3CCH, England, tests with TF3EA in Iceland.

XE1PY, Mexico, says he is ready for meteor scatter schedules with a 5CX1500A coaxial tank amplifier and 28-element array.

Around the U.S. and Canada, little has been reported happening on 144 MHz. Perhaps activity and reporting will increase within the next 30 days.

220-MHz reporting was likewise light this past month. K1OJQ, Mass., is converting a Hallicrafter HA-2 to 220, and in New Jersey, WA2BLE has completed an 11-element Yagi, converter and 6360 transmitter. WB6NMT has his moonbounce array of sixteen 10-element Yagis working and is running transmitting tests with VK3ATN, listening in Australia. Australia has no 220-MHz ham band so no two-way is possible. WB6NMT's 220 beacon transmitter is active as reported elsewhere in this column.

K7BBO, Tacoma, has successfully tested for moonbounce echoes and will soon have his 160-element collinear array mounted on a 40-foot tower. K7HSJ, at Bend, Oregon, has a new 600-watt final operational and has run successful tests with WB6NMT over a tough mountainous path. K8BBN, Ohio, says he will be on 220 ssb and cw before summer's end, and in Illinois, WA9UQO promises a kilowatt and extended collinear this summer. The increasing use of higher power on 220 will help indicate the true potential of the 1-1/4-meter band.

New 432-MHz EME Record

The seven-year-old 432-MHz moonbounce DX record was shattered April 19, 1972 when WA6HXW, near Los Angeles, exchanged reports with Australian station VK2AMW around 0400 GMT.

Harley Herndon, WA6HXW, says VK2AMW is located at Wollongong University, about 80 miles south of Sidney. VK2AMW was running one kilowatt, apparently with special permission, and a 30-foot dish. Signals peaked 3 to 6 dB above the noise at both ends of contact. The equipment used at WA6HXW has been documented in the past several editions of this column.

The terrestrial distance between WA6HXW and VK2AMW is 7500 miles, while the previous record, held by G3LTF and WA6LET since September 25, 1965, was 5730 miles.

Repeater Update

Area	Call	Frequency In	Out	Access
New Haven, CT	WA1KGD	146.01	146.61	COR
Vernon, CT	WA1KGQ	146.19	146.79	COR
Torrington, CT	WA1KGY	146.25	146.85	COR
Western MA	WA1KHC	146.13	146.73	COR
Groton, CT	K1IGF	146.07	146.67	COR
Ithaca, NY	W2CXM	146.34	146.94	COR
Met. NY	WA2SUR	146.13	146.73	COR
Long Island, NY	WA2PDJ	146.25	146.85	COR
Greenbrook, NJ	WA2UWC	146.34	146.94	COR
		146.37	146.97	Tone
Long Island, NY	WA2UZE	146.16	146.76	COR
Northern NJ	WA2ZVQ	146.31	146.91	COR
Frederick, MD	W3IJF	146.13	146.73	COR
Charlotte, NC	WA4IPQ	146.16	146.76	COR
Charlottesville, VA	WB4KNX	146.28	146.88	COR
Grifton, NC	W4NBR	146.16	146.76	COR
Mobile, AL	W4QEF	146.22	146.82	COR
Roanoke, VA	WB4QET	146.34	146.94	COR
Washington, DC	WB4QFP	146.31	146.91	COR
Roanoke, VA	WB4QFS	146.38	146.98	COR
Durham, NC	WB4QFT	444.25	449.10	COR
Brazoria Cty, TX	WA5DUC	146.31	146.91	COR
Gautier, MS	WA5RMS	146.28	146.88	COR
Riverton, LA	WA5VOR	52.827	52.525	COR
Arlington, TX	WA5WDW	146.07	147.67	COR
Port Arthur, TX	WA5YUS	146.34	146.94	COR
San Mateo Cty, CA	WA6BTH	147.31	145.49	COR
		445.75	439.75	COR
		51.900	51.350	1800 Hz
		439.75	51.350	COR
Pomona Valley, CA	WA6ITC	441.85	449.85	Tone
San Francisco, CA	W6PZE	145.98	146.91	1800 Hz
		146.31	146.91	1800 Hz
		448.60	146.91	COR
		145.98	443.60	COR
		146.31	443.60	COR
		448.60	443.60	COR
Mt. Wilson, CA	WA6TDD	145.45	146.40	COR (a-m)
Phoenix, AZ	W7GNP	52.75	52.525	COR
Cook Cty, IL	WB9HWS	146.73	145.995	2000 Hz
		146.67	145.995	2000 Hz
Fort Wayne, IN	W9NIX	146.28	146.88	COR
		52.68	53.88	COR
		146.28	53.88	COR
		52.68	146.88	COR
Indianapolis, IN	WB9RAI	146.10	146.70	COR
Milwaukee, WI	W9VZR	29.44	29.60	2100 Hz
Northern CO	WB0ERV	146.25	146.85	COR
Boulder, CO	WØIA	146.16	146.76	COR
Minneapolis, MN	WAØJCX	146.28	146.88	COR
Salina, KS	KØKED	146.34	146.94	COR
Minneapolis, MN	KØLAV	146.34	146.94	1400 Hz
Minneapolis, MN	KØPMU	146.16	146.76	1800 Hz
Elk River, MN	KØRIU	146.34	146.94	1800 Hz
Pueblo, CO	WAØSNO	146.34	146.94	COR
Faribault, MN	WAØSSN	146.16	146.76	Tone
Waseca, MN	WØUGR	146.94	146.46	COR
Cheyenne, CO	WAØVTV	146.16	146.76	COR
Monte Vista, CO	WAØZCI	146.16	146.76	COR
Honolulu, HI	KH6EQF	146.28	146.88	COR
Honolulu, HI	KH6EQQ	146.20	146.80	COR
Maui, HI	KH6EQK	146.20	146.80	Tone
		444.15	449.15	COR
Waialua, HI	KH6GKD	146.16	146.76	COR

The June contest is just a few days off and certainly to be a popular location is Mt. Battie near Camden, Maine. K1OOY operated from this picturesque spot in September. *(W8SKP photo)*

432 MHz is getting much attention from DXers. Around the country by area, K1OJQ, Mass., has nearly completed a 500-watt amplifier. W4AWS, Largo, Florida, took his first look at 432 after *building a single WØEYE Yagi and varactor tripler.* Art's first contact was with K4NTD, Florida, then he caught one of those ducts across the Gulf to Texas where he worked W5LDV in Houston! Art's next two contacts were with W4LSQ, Alabama, and W4VHH, S.C. Some guys have all the luck – four contacts, four states and a DX of 750 miles! K4NTD also caught the March 23-24 Gulf duct working W5LDV on 432 and hearing the Houston station for 3 minutes on 1296 over an 840-mile path. Signals peaked S5 on 1296 with W5LDV running 100 watts output. K4NTD's 6-watt signal was not heard in Houston.

March was good to WA6HXW. On moonbounce, Harley worked VE7BBG three times and had a non-scheduled contact with W9WCD, Illinois. Harley was testing for his own echoes March 19 when he heard W9WCD suddenly calling on frequency and the contact was completed! The contact was W9WCD's first on 432 EME and makes George the first operator to have worked nine call areas on 432. George is scheduling and hearing VE7BBG so that contact is likely not far off.

At least four 432-MHz DXers in California have *switched to horizontal polarization; W6DQJ*, W6FZJ, WA6EXV and WA6HXW. W6FZJ says K6YNB is planning 432 mountain-topping this summer, including stops in Nevada, Utah, Arizona and possibly Colorado.

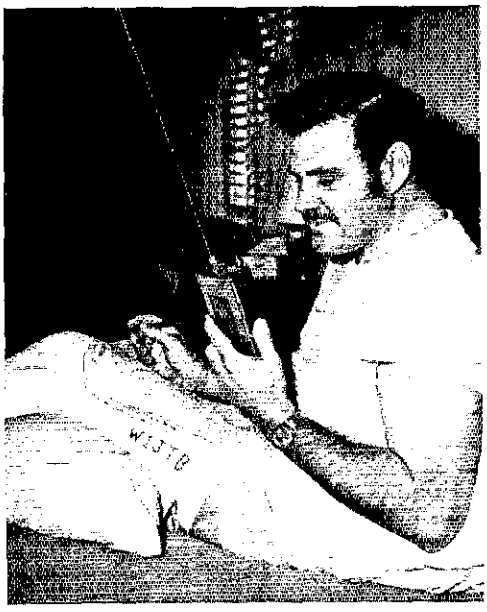
In the midwest, W9JDJ will soon be active in Wisconsin and his appearance is eagerly awaited. WØYZS, Missouri, has a new 200-watt amplifier and *WØLER*, Minneapolis, has completed the K2RIW kilowatt. KØAWU, N.D., has been working VE4MA, WØLER, WØPHD, and KØCER. In South Dakota, WØIT, Watertown, has 200 watts and an 80-element collinear. KØCER, Sioux Falls, has a *similar station.*

VE3DKW has updated his states worked on 432 to 19.

1296 MHz interest keeps growing. K4QIF, Virginia, has modified a UPX-4 with six 7289s giving Rusty some 400 watts output. WA6EXV has completed a water-cooled 2C39B tripler and converter. WA6GYD, in his "Brass Band" newsletter, reports a dozen active 1215-band stations in the San Francisco area mostly using converted APX-6s *or 2C39 triplers.*

W9WCD says OZ9CR, Denmark, is receiving some 12 dB of sun noise on a 26-foot dish. George plans summer moonbounce schedules with the European as well as W2NFA. PAØSSB is reported working on an EME station in the Netherlands. In Australia, VK3ATN has a 16-foot dish ready while VK3AKC, near Melbourne, has a 20-footer. VE3DKW has a single 2C39 running 20 watts, and a corner reflector. He says Tony, VE3DIR, is seriously considering 1296 activity.

A high cost for repeater frequency coordination? After the NERA meeting in Hartford on April 8th, Gordon Pugh, W1JTB/W2GHR, set out for his repeater on Mt. Snow, Vermont. His WA1KFX repeater on Snow and K1FFK on Mt. Greylock had experienced mutual interference problems as both machines were using 146.31 input, 146.91 MHz output. Leaving the Mt. Snow location, Gordon suffered a skiing accident, ending up with a leg broken in eight places. But, he was on the air the same day from his hospital bed using a Motorola HT, keeping his log on the leg cast. (A note was added for the doctor stating the log-form portion of the cast must be kept until 1973 per FCC regulations.) Gordon will be confined to bed at home for a minimum of 6 months.



W4HHK Reports Apollo 16 Reception

The first report of Apollo 16 reception comes from W4HHK, Collierville, Tennessee. Paul's preliminary log is as follows:

April 19 — Acquisition of signal (AOS) 1752 GMT, shortly after moonrise. Loss of Signal (LOS) 1917:30. The Command Service Module was heard again from 2045 to 2208:50. Total Doppler shift on this pass was 49.5 kHz, 2287.4995 to 2287.450 MHz. A third pass was heard, 2322 to 2350 GMT; LOS due to paramp trouble.

April 20 — AOS 0202 GMT. LOS 0208.

Voice transmissions from the astronauts were received marginally on 2286.25 MHz. They could be heard reading figures to ground control, but complete quieting of the receiver was not realized. W4HHK was using the fm adapter described by W1KLK in February, 1971, *QST*, with his 75A3.

Northeast Repeater Association Meets

At a meeting in Hartford on April 8, the Northeast Repeater Association announced a number of changes, including its name. Formerly known as the Northeast FM Repeater Association, the group heard a report from the temporary officers about changes in the organization, agreed upon at a get together the evening before. Bob Waters, W1PRI, replaced Gordon Pugh as president. Pugh, W2GHR, becomes vice president, and W3DTN, Gary Hendrickson, will be the secretary, replacing K2IEZ who resigned. W1PRI announced the group was being incorporated in Massachusetts, a process which would be completed by the annual meeting, set for the first Saturday of October, 1972, at a place to be announced. The area to be covered by NERA was increased to include Virginia and West Virginia. Eight area vice presidents, to be chosen later, will form a board of directors.

The Hartford meeting, sponsored by the Pioneer Valley Repeater Association, was held at the Tower Suite in the main building of the Hartford Fire Insurance Group. Representatives from 52 repeaters (105 people) attended. Lew Collins, K4GGI, presented band plans for 50, 144, 220 and 420 MHz that had been developed by NERA's frequency coordinating committee. The constitution and bylaws of the new organization were read to the group. Annual dues were set at $20 per repeater. Any repeater owner or group wishing to join the Association can obtain an application form from the president or secretary.

A significant action of the session was the passage of the resolution quoted in full below:

WHEREAS, amateur radio vhf-fm repeater stations are primarily intended to be used to improve the range of mobile and low power portable stations, and

WHEREAS, the primary use of such amateur repeater stations is intended to be in the public interest, convenience, and necessity, and

WHEREAS, many existing amateur repeater stations are presently occupied to the point of being overcrowded, and noting a projected continuation of the increase in the numbers of using stations, and

WHEREAS, radio amateurs have had a long history of maintaining pride in the quality and capabilities of the amateur operators' individual station; therefore be it

RESOLVED, that the member groups of the Northeast Repeater Association adopt a policy of encouraging the use of simplex frequencies by all individual stations whenever feasible, and in order to implement the aforesaid policy, that the member groups of the Northeast Repeater Association establish a program for reinstilling the pride in and improving the capabilities of the individuals' station by making improvements in the antenna system, transmission lines, and receiving and transmitting equipment. QST

At the April 8th meeting of the Northeast Repeater Association, K4GGI explains the fine points of vhf band plans. NERA president W1PRI provides support for the large charts.

YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

Those Contests

WE LOOK AT the calendar and find that another contest is coming up and the activity begins, for a contest is far more than just logging others whose favorite activity is this particular phase of amateur radio. We check the antennas to be sure that they are what we want this time; if not there is a flurry of labor as new ones go up and are tested to be sure they are as close to perfection as we can make them. We go over the equipment, retube if necessary, and often if not necessary. We make sure the receiver is as sharp as it can be, lay in log sheets and check lists, and pile up ball points and pencils. We double check for all the things that might possibly go wrong and hope silently that Murphy is taking a vacation, for a contest is first of all preparation and planning.

And then it is working. We get our feet wet when we are Novices in the Novice Roundup, for that is where we get the "taste" of contest operation in the seven- or eight-layer-deep "CQ NR" that can, and often does, blot out the interference from the other services on 40 meters. Here we begin to learn the techniques and pack up the ability to follow a single signal through the thick QRM and log it. When that "N" becomes a part of our past we find contests are QSO parties and, with our official appointment, CD Parties and, if we wish, the big ones.

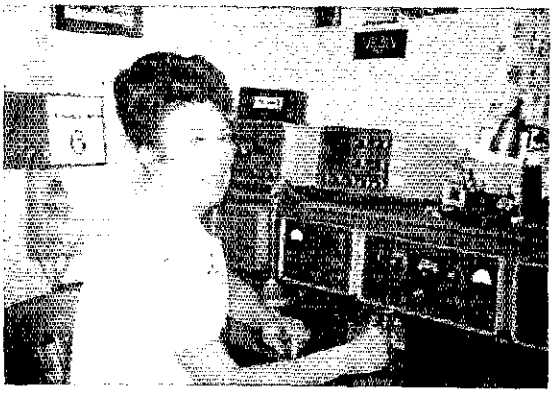
"For YLs only" are the ones we all look forward to – working and meeting other women amateurs with the same zest for contests as we. Some contests are as lazy and casual as the YLRL "Howdy Days"; or celebrate the club's birthday in the YLAP in October and November . . . the Trillium Weekend of the Canadian YLs . . . or the Floridoras in October . . . while February and March open the doors wide for the annual YL-OM.

The big ones mean work. They mean concentrating on conditions and areas and new prefixes. They mean a regretful sigh over a YL we have never worked and need for DX-YL, but this time all we are allowed is an OM. And sometimes to our delight the YL stops long enough in her hunt to have him work us for one more on the log. There is more work ahead, for when the last one is logged and the tubes are cooling, we sit over the work sheets deciphering our scribblings and begin the copy to be submitted so that we will get it off to the custodian before that deadline that hangs like a curtain ahead of us.

The forgotten person in all contest operation is the Contest Custodian, the gal behind all the other activity who plans, sets up the rules with any new changes from last year, and decides the dates and sees to it that they are in the contest calendar for the year. She makes sure that those rules and dates are sent out for publication well in advance so that they will be available to DX as well as at home. After all that, she really goes to work – for all those logs must be reviewed and scored. She must go over each one meticulously checking every detail, verifying claimed totals, notifying the winners, sending out the awards, and finally making sure that copies of the scores are sent to *YL Harmonics* and to other publications. And she must note and answer all those gripes and complaints, as well as the other comments that may be of assistance in the next one.

A contest is made up of many forms of activity from the mechanics of getting it into operation, on both the contestant's side and the sponsoring organization's. It is the thrill of pitting our ability and know how against conditions and getting results, and it is the satisfaction of working in the activity we love the best, or it is the excitement of something new for a beginner. Ask anyone who works contests and she will probably answer, "Try it, you'll like it."

* YL Editor, *QST*. Please send all news notes to WB6BBO's home address: 1036 East Boston St., Altadena, CA 91001.

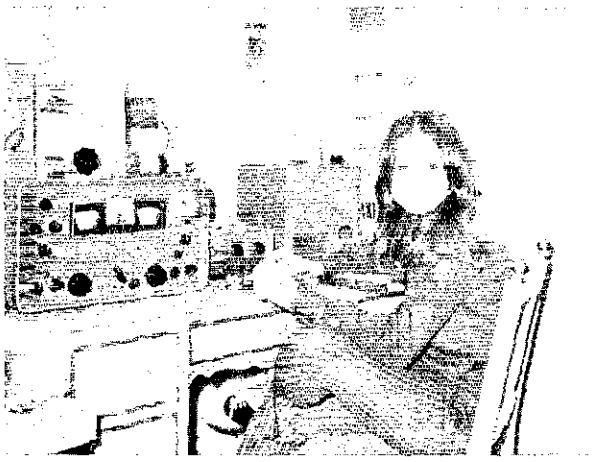


VE3IV, Ivy Smythe. Active in all the Canadian YL nets as well as contests, Ivy has been granted the new call VE3IV instead of her former one, VE3EZI.

Buckeye Belles Honored

The Buckeye Belles, Ohio's statewide YL club, was again honored in 1972 as Governor John J. Gilligan issued a proclamation declaring the week of April 9, 1972, as "Buckeye Belle Week" in the

WN4YNC, Sara Sander, who just passed Novice class in January, can be found on 80, 40, and 15 meters. *(WB4SXX photo)*



State of Ohio. Representatives of the club were invited to the Executive Mansion in Columbus, Ohio, to witness the signing of the proclamation that acknowledged the work of this YL group's many activities that were in the public interest.

"YL News and Views" adds congratulations to the Buckeye Belles for their public service activities that have resulted in this recognition for the second year.

1972 Buckeye Belles Officers

The Buckeye Belles, of Ohio, have announced the 1972 officers for the club. They are: President — K8CKI, Lillian Abbott; Vice-President — K8ONV, Mary Ryden; Secretary — WA8BWD, Lucy Benner; Treasurer — WA8QFL, Elaine Simon.

Canadian YL Directory Supplement

The first yearly list of additions, deletions, and changes of addresses or calls of the *Canadian YL Directory*, published in 1971, has been released, and copies will be mailed to all those who subscribed to the *Directory*.

Anyone who is interested in having this list of the directory and the succeeding supplements as they are issued, write to Cathy Hrischenko, VE3GJH, 30 Lisburn Crescent, Willowdale, Ontario, for details and an order form.

YL Code Class

The Palisades Radio Club is sponsoring a code and theory class at the VFW Hall in Culver City, California, each Monday at 7:00 P.M. with Bill Ellis, WB6USB, as instructor.

Over 30 women of all ages from junior high school through grandmothers and of various national origins are attending this class that is being taught in such a way that the gal who is familiar with only a crochet pattern or a recipe book has found little trouble in understanding the theory. The code is geared so that all remain at the same speed levels until all are ready to increase to a higher one.

An additional code class at speeds of 15 to 20 wpm is being held on Thursdays for those women who want to increase their code proficiency.

YLRL Certificate Custodians

Requests for information regarding YLRL certificates or, as in one case, QSLs, plus requests for the certificate have been sent to this column. All such requests should be sent to the women who have been appointed as custodians for the various YLRL sponsored certificates. The present custodians are: WAS-YL — Irene Akers, W3RXJ, 5943 St. Clair Drive, Washington, DC 11368; WAC-YL — Miriam Blackburn, W3UUG, Box 2, Ingomar, PA 16127; YLCC — Onie Woodward, W1ZEN, 14 Emmett Street, Marlboro, MA 01752; DX-YL — Emma Berg, WØJUV, RFD 2, Box 171, Lawrence, KS 66044.

Marcia Rast, K6DLL.

K6DLL, Marcia Rast

You may have worked her with a W4, W7, VP3, or a KA2 call, but she is best known as K6DLL. Marcia began her amateur radio activity as W4STU in 1950, but was interested long before that since the OM was an active amateur operator. The trouble was that she and the OM never stayed in the same place long enough for her to get a license. When she finally settled down in California the well-known K6DLL was issued in 1954.

A member of YLRL, and the 1972 6th District Chairman for that group, Marcia is a member of ARRL, AREC, and WESCARS. Her other major activity is YL contest operation, and she holds high-score awards from several YL-OM and YLAP contests.

Marcia and the OM, Ted, W6SMU, operated VP3TR in British Guiana for two years and, because there was only one other VP3 on the air at the time, were a very much sought-after team.

When not busy with YL contest work, or handling phone patches to keep service personnel in touch with their homes, she may be found on almost any band, but 20 meters is her favorite.

Besides Marcia and Ted, their oldest son holds the call WA6ILE; their daughter and two younger sons are not licensed. QST

Band Plan for 220/420 MHz

(Continued from page 91)

repeater input channels. Some people desired a high-in/low-out scheme while others favored the opposite. The proponents of low-in/high-out argue that, in metropolitan areas, intermodulation products from the commercial services in the 450-MHz band are troublesome in the range 448 to 450 MHz. On the other side, much of the commercial gear now being sold contains receivers that will tune down to 442 MHz, but transmitters that will not go below 446 MHz without modification. The large number of retired commercial transceivers that are now selling for $30 to $50 makes a move from the crowded hf and 2-meter bands attractive. Adopting a high-in/low-out plan will allow hams to put the surplus gear into operation with a minimum of bother. Thus, the selection of an input/output plan for repeaters is left as a matter for regional agreement, until the regional coordinating committees can meet and agree on a national plan.

Time to Comment

Interested groups or individuals are invited to *submit comments – pro or con – about these* proposed "gentlemen's agreements." In Docket 18803 FCC indicated that some frequency segments may be set aside for repeater operation. Thus, final band-plan recommendations cannot be established until FCC acts and the locations of repeater sub-bands, if any, are known. This leaves sufficient time for anyone to make his feelings known to the Vhf Repeater Advisory Committee or to ARRL Hq. – *WIKLK*

Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

WA1KRN, James R. Lightfoot, Weston, MA
WA1LDA, Robert H. Moore, Chelmsford, MA
W1MMH, George N. Leonard, Quincy, MA
W1ODQ, Sumner E. Merrill, Mansfield, MA
Ex-W2CRL, Charles R. Josefson, Brooklyn, NY
W2EAR, Thurston C. Bassett, Freeport, NY
WA2EFG, John G. Kreer, Jr., Bloomfield, NJ
K2FD, Jack L. Follett, Bronxville, NY
W2FXP, Orison B. Sloat, Brooklyn, NY
E2GWD, John J. Hanyak, Camillus, NY
WA2PPL, Robert K. Chapin, Mahwah, NJ
W2QZU, John J. Helfrich, West Seneca, NY
W2WMG, George W. Rosch, Jr., Massapequa Park, NY
W3BTR, Robert L. Murray, Uniontown, PA
WA3ELC, Eugene E. Barkowski, Arnold, PA
WA3HWC, William C. Stallings, Harrington, DE
*W3IXB, Francis E. Riffle, Westminster, MD
W3JCE, Charles E. Cowan, Brackenridge, PA
W3JSD, John L. Houser, Huntingdon Valley, PA
W3IYU, Fred M. Hassenplug, Camp Hill, PA
WA3MQX, Irene K. Wishner, Washington, PA
W3OC, Hunter J. Lohman, Elizabeth, PA
W3OGR, Dr. Paul A. Sweeney, Philadelphia, PA
W3SFN, Paul W. Douglas, Pittsburgh, PA
W3UO, Robert K. Pierson, Wilmington, DE
K3ZPQ, Robert W. Elmer, Oreland, PA
W4AZY, Carl A. Newman, Pewee Valley, KY
K4BEK, Marion L. Russell, Huntsville, AL
WB4BHI, Everett V. Goings, Sr., Winston-Salem, NC
WA4CVE, Virgil L. Testerman, Roanoke, VA
W4PDY, James W. Stanfield, Altavista, VA
W4PXM, Wilbur M. McDonald, Dadeville, AL
W4QC, Theodore B. Winstead, Elm City, NC
W4TLU, Edward J. Reh, Louisville, KY
WB4VTR, Richard K. Harmon, Sarasota, FL
WA4WSZ, William O. Jenkins, Eden, NC
W4ZHI, Edward B. Schofield, Lantana, FL
W4ZJN, Walter J. Gralewski, Salem, VA
W5AQL, Brodie E. Cain, Big Spring, TX
W5AQN, Joe V. Wright, Rockport, TX
WA5CTD, James W. Cole, Jr., Wichita Falls, TX
WA5DTU, Frank J. Sellers, Midwest City, OK
W5FRS, Joe L. Brady, Irving, TX
WA5HUN, Mary F. Demand, Noble, OK
W5MDN, Adelbert L. Albright, Sr., Sulpher, LA
W5ML, Arthur J. Bates, Vivian, LA
W5SJ, Floyd G. Close, Checotah, OK
K5WWZ, Peter A. Thaanum, Garland, TX
W6AVT, Anthony V. Tronske, Los Angeles, CA
WB6CQE, Roderick N. Brown, Laguna Beach, CA
W6KUL, J. Norman Phillips, Cathedral City, CA
W6LSV, Leonard G. D. Thompson, South Gate, CA
WA6LWI, Joel C. Garrison, Temple City, CA
W6LZE, Dr. Henry W. Turkel, San Francisco, CA
W6MCF, George F. Clough, Chester, CA
WA6MUE, Lloyd M. Saunders, Long Beach, CA
W6POV, James E. Henning, Santa Rosa, CA
W6UQN, Orval M. Pond, Los Angeles, CA
W6YWJ, Owen A. Marron, Pomona, CA
W7BSM, Cecil S. Fuller, Seattle, WA
W7BXU, Charles McGinley, McKenzie Bridge, OR
W7EGN, Fred B. Tintinger, Whitefish, MT
K7IZD, Pr. Harold T. Conley, Billings, MT
W7JEL, William Lee Parker, Williams, OR
W7LOC, Lester H. Kephart, Kalispell, MT
W7NDS, Lyle H. Conner, Helena, MT
K7QCO, Thornton G. Newlove, Butte, MT
W7UDI, Bernard Solomon, Cottonwood, AZ
K7YUS, Stephen L. Geymann, Lebanon, OR
W8BAS, Jack B. Hoagland, Marion, OH
W8BIO, Daniel E. Hasley, Detroit, MI
W8DWK, Margaret E. Rank, Marion, OH
W8LAQ, Amos E. Schmidt, Detroit, MI
W8LSQ, John C. Sauer, Detroit, MI
W8SEW, Ernest L. Darsey, Otsego, MI
WA8UIL, Bruce Costill, Cuyahoga Falls, OH
K8VEB, Harry E. Sherman, Holt, MI
W9DUO, Kenneth C. Shirk, Gary, IN
W9EKE, Rudolph M. Crandall, Indianapolis, IN
W9GUH, Walter M. Granik, Chicago, IL
W9HJJ, Ewing P. Chancellor, Muncie, IN
WA9MJN, Robert G. Westwick, Skokie, IL
W9NOD, Ralph R. Buddenhagen, West Bend, WI
WA9QWK, John F. Tochterman, Kokomo, IN
K9WQE, Lucian Kosieniak, Bridgeview, IL
W9ZDQ, John V. Steinborn, Crete, IL
KØAYG, William M. Cohen, Aurora, CO
WØFUZ, John J. Logan, Kansas City, MO
*WØGQ, Sumner H. Foster, Golden, CO
WØIPA, Kendall Powell, Floodwood, MN
WØKFL, Wendell L. Philippi, St. Louis, MO
WØMAE, Doug R. Blick, Kansas City, KS
WØRQK, William T. Gemmer, North Platte, NE
WØSYG, Harry L. Peterson, Anoka, MN
WØTHF, Lynn W. Webb, Bloomfield, NE
VE3DZ, Alex Hunter, Sarnia, ON
VE7BHW, G. Daniele, North Kamloops, BC
VE7UP, Gordon S. Armstrong, Salmon Arm, BC
HK3AO, Luis Caicedo R, Bogota, Colombia, SA
VK3UM, Maj. William T. S. Mitchell, East Malvern, Victoria, Australia
VP1CP, Father John C. Ruoff, Belize City, British Honduras
VP7NA, Harold K. North, Nassau, Bahama Islands
VP9D, James A. Mann, Saint George's, Bermuda

* *Life Member*

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

W h o m :

We thought Grommethead Schultz was putting us on when he turned in that Murphy letter for December '70 "How's." Didn't you? Well, now *we* just got one. Possibly somebody out there in radioland with a rich sense of gaiety. Postmark does read APR 1; the post office and Zip we can't quite make out.

But it's one of those things, after being read and reread a few times, that portend dire consequences if ignored. And why disregard it? It has a constructive theme, in fun or not, so we'll pass it along at face value. . . .

Dear Scribbles –

If you knock off that alphabet soup long enough to read something more sensible I got real news for you. You should get this in time for the ARRL Field Day and you better find space for it, hack.

The deal is this: Gals in my Lib chapter are hot after me to cut the modesty bit and quit hiding my light under a heat sink. Now I never made the scene with a lot of flaunting but I got to agree they have the big picture. It boils right down to credit, man.

Why should I knock myself out keeping careless hams from doing themselves in and tiptoe around like a speechless spook? What's the future? And all the while my male-chauvinist pig of a nephew, just by being the nastiest kook this side of Jupiter, gets himself glorified with top billing as some sort of great wireless Dennis the Menace. "Murphy this" and "Murphy that." Bah! You nuts gotta be miserable to be happy? Sometimes I even get to wondering if he's right and I'm wrong. Maybe you lids *do* enjoy collecting rf burns, B-plus jolts and lumps on the head.

Remember the time Murph jammed the interlock and you forgot to pull the plug when you reached in to change your driver tube? I made you drop the screwdriver that shorted out 1690 volts before you leaned on it. And the time a passing truck (driven by you-know-who) whipped that lowered No. 12 antenna wire around your feet? If I hadn't happened along and busted it quick you'd be a walking skin graft, if you could walk.

Anyway, I'll be out on Field Day again this year as usual and I get around fast. You just let all those mosquito-bitten, rained-on clowns know that when their skyhooks almost fall down, when their rigs get hit with Murph's 150-volt-ac generator surges and almost blow up, when their tents almost blow away in his thunderstorms, etc., Auntie Murphy is the likely why not.

Sure, I lose a few but I think I bat a lot better than .500 against my skunky nephew. And I say again, doodles, I'm fed up to here with all this devil-worship noise the louse thrives on. From now on, baby, and you better believe it, let's hear it – loud and clear, I mean – for good old *Auntie* Murphy. Or maybe you would like to try a Field Day with me picketing on the sidelines? That would be some FD, let me tell you. Yeesh! Murph would slaughter you.

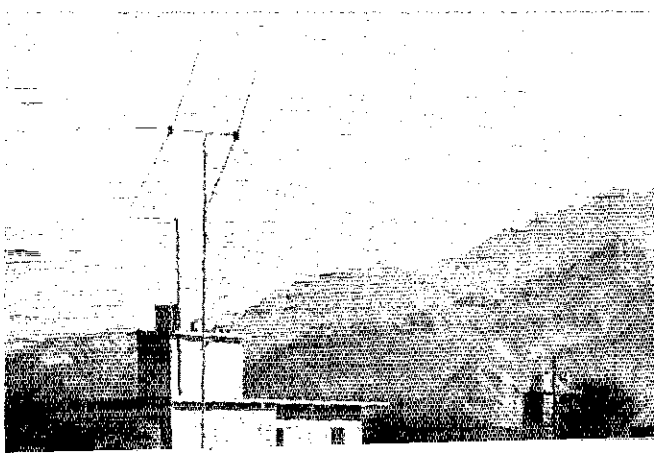
– *Your Auntie M.*

So there it is for what it's worth. Oh, you can laugh it off if you like, but the fourth paragraph really bothers us. You see, we've always told that screwdriver-hitting-the-high-voltage yarn using 1500 volts. So far as we know, and we just measured it to be sure, only the writer of that letter could possibly know it was actually a hair under 1700 no-load.

† † †

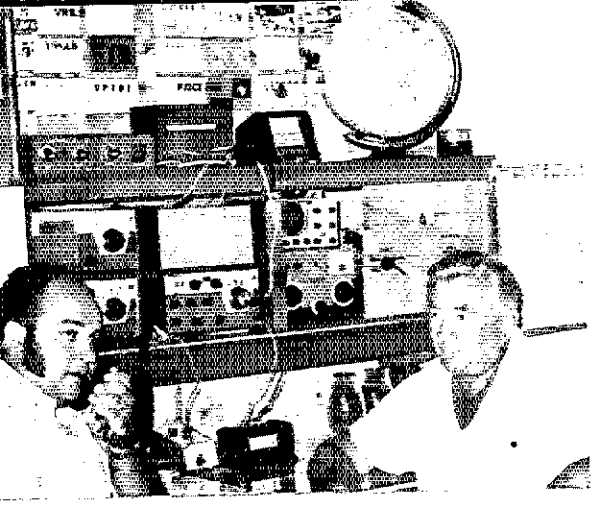
W h a t :

With Field Day lyin' gently on our minds this month DX takes a back seat. Or, poison ivy here we come! Good time to wrap up some remaining "How's" roundtable remarks from local clientele. Resuming where we left off, then. . . .



MP4TDM's impressive Oman setting, your QTH of the Month, lies in the emirate of Ras Al Khaimah. An interior photo of Sam and his hamshack appeared in last October's "How's." MP4TDM expects to keep active on 20 and 15 for another year or so with QSLs handled by K1DRN who contributes this picture.

* 7862-B West Lawrence Ave., Chicago, IL 60656.



VP2s MAA (VE3GCO) and MF (VE3FHO), left and right, keep their ear on DX bands at the latter's vacation spot on Montserrat. All the wireless comforts of home! Neighbor Ernie provides friendly local QRM from VP2MW. *(Photo via VE3GCO)*

(WA9UCE) . . . My new address complicated QSL duties for EL2DF. (WA9ZAK) . . . Found old GD3AIM signing GM2AIM. (W1ZW) . . . Guess our AP3 is just another no-good. (K2HYM, WØWO) . . . The gang sure feeds a lot of info into limited "How's" space. (WA1JSD) . . . Real fun chasing the JCC and WAJA awards issued by Japan's JARL. (W7FCD) . . . Boy Scout Jamboree's ZL1JAM was S6 here on 3738 kHz. (WN7RTA) . . . Are hams totally extinct in South Dakota? (WA7PIB) . . . Very much interested in your Novice DX notes. (WN4RGQ) . . . Keep that Novice news coming! (WN2PWS) . . . Glad to make my small contribution to "How's". (WN3PMT) . . . QSOd and QSLd W1AW. (WN9FBG) . . . My new Overland Park location seems fine for DX. (WNØCTQ) . . . Oh, if we could only accept station logs and forget about QSLs! (WB5FIU) . . . ZE1CY writes that Malawi amateurs were extremely helpful during his 7Q7CY operation. (W4JUK) . . . I'd like more advance warning on imminent DXpeditions. (W5CNU) . . . I'll go along with that. (W9BRD) . . . Considerable effort went into finding a suitable Galapagos map to reproduce on our HC8GG QSLs. (K9YBC) . . . Still keep busy on 28-MHz cw with the Valiant, also watching 160. (W7CWN) . . . Back on as a Novice with 2NT and 2C after a thirty-year layoff. There have been some changes in the game! (ex-W8KI) . . . The DX angle is new to me so I'm collecting information and literature on the subject. (KØIPD) . . . After forty years I'm still wondering who operated shipboard as B4UP. (W9NN) . . . Hamming took a back seat to fishing and general loafing during my recent visit to Europe. (W4WFL/1) . . . Ex-TJ1QQ is back at it from HK1QQ. (W4DQS) . . . WA6MWG, Ks 4ZCP and ØZFL get my vote as outstanding QSL managers. (WA5UHR) . . . Half a year already since my KB6 promised to QSL. (WBØCAB) . . . Here's a Thailand tidbit in exchange for your Australian six-meter item. (KØCER) . . . My no-logs problem as QSL manager for a 9J2 was a sad experience. (W2GA) . . . Enjoyed a recent one-day "WAC" on 100 watts and a vertical. (WB6KMW) . . . Every QTH is said to have a DX pipeline going somewhere and mine hits Russia. Hardly ever call 'em twice. (W6EAY) . . . Nice meeting the Rev. Duncan, WA4KPH/HKØ, a two-year San Andres resident and Baptist minister. (W9UCW) . . . Enjoyed reading the varied comments inscribed on QSLs received for my FOØTG operation. (WA6IVM) . . . BV2AB was difficult to work at first because he fired up without a beam. (K4ASI) . . . Many long-time Chicagoland DX hounds are moving to Florida; W9s AMU (K4GUI), QQN (WB4YJE) and WKU, to mention a few. (K4UAU, ex-W9DSO) . . . Standing by high in the Ozarks to supply QSOs and QSLs to anybody needing Arkansas. (K5CDA) . . . Ten was great in late January when I worked all continents in a few hours on ssb. (K1NOK) . . . I plan to operate from EA8-land this autumn. (WA2GZC) . . . In December I had 113 New Jersey countries worked and only seven confirmed. Some sort of record? (K6SE/2) . . . Been more active in traffic than DX since returning to Eightland. (W8IBX) . . . *Tora! Tora! Tora!* was being filmed at Ford Island during my K5MWZ/KH6 days there. (K5MWZ) . . . Our DXpeditionary group also stayed at that St. Lucia "QTH of the Month" for October's issue. (W7VRO) . . . Thought all Africans were a dime a dozen back in the middle '60s but I haven't heard another TL8 since. (WB2AMO) . . . We'll never make "QSL managers of the month" if logs don't come through faster from TU2-land. (WA6s MWG OET) . . . I was enjoying the DX end as OE6ZEG a year ago. (K9KRZ) . . . Here's another vote for more band-by-band reports in "How's." (WA2KWB) . . . Yes, these one-liners are fun but band-by-band DX reports can be very useful. (WB4SIJ) . . . Got a vertical going for 40, nothing yet on 80. (WB2ZHM) . . . I'll settle for 200 countries on these dipoles. (K4PR) . . . Cw really cuts through that 160-meter static. (W4DFR) . . . PAØHR, mostly active on 14,080 kHz, also gets a kick out of working 15-meter Novices. (WN5ERI) . . . My year of SWLing resulted in a 10-wpm code speed. (WNØELM) . . . A new 160-meter vertical has more DX clout than the old long-wire. (W3IN) . . . Off the air for a month or so for gear repair and a new tower. (K4SD) . . . Cohort VE7BZY does quite well for himself on 80. (VE7BAF) . . . With 3.5 and 7 MHz so fantastic my higher-frequency quad gets little use. (WA2EAH) . . . Calling CQ on an apparently dead 10-meter band got me Andorra. (WB9DRE) . . . As a QSL manager I find that DX logs do not grow on trees. Postal delays require more patience all around. (WA1HAA) . . . No late word from OX5AP makes me wonder if he's Stateside. (W3HNK) . . . At my school QTH a 150-foot wire 100 feet high outperforms a beam. (WB4SXX) . . . Ten's getting spotty, all right, but 15 holds up well. (K3YVN) . . . KR8CF looks for more 160-meter W/Ks after working K6DDO in December, and OK1ATP's recent VK QSO gives him all continents on 1.8 MHz. (W1BB) . . . Let's hope that old 160 continues to improve as sunspots decline. (W1HGT) . . . Marconi commemorative stations GB3MSA and VB1MSA operated from QTHs at each end of the first transatlantic wireless QSO.

(WB2AQC) . . . Fine reception on the ham bands at my location high in the hills overlooking San Francisco Bay. (E. Hamill) . . . Thought an OMQ was somebody pulling my leg. (W9GX) . . . That prefix had *me* wondering, too. (K9EYA) . . . Full break-in, a facility for any modern radiotelegraph station, is a great operating aid in cw pile-ups on 20. (WA1GGN) . . . HM5EE operates Seoul University station HMØB on 15 cw. (WA6TMQ) . . . Working on a 160-meter DX set-up. (W9EY) . . . A little Ranger and vertical are still good for cw goodies on 20. (K7JRE) . . . QSYing back to Lancaster and W3AXT this month. (W4MOX) . . . Rare ones are rolling in on 40 as I pen these lines. (WA9NNA) . . . Sent TU2DD a Ten-Tec for QRP fun. (K2QHT) . . . Really like to see those "How's" pictures of DX stations and operators I've worked. (W9OQI) . . . As ex-WA2BCT I find easy ones hard and hard ones easy out west. (WA6KBI) . . . Worked PY5GA and HK3BGB on 15 sideband while aeromobile over Maryland. (WA3RDU) . . . DX still pretty fair in Arizona. (WA7MMK) . . . Running down my ET3 QSL presented real problems. (WA7KEP) . . . Found my 80-meter MP4TDT QSL invalid (shipboard) for DXCC credit. (W1SWX) . . . The first 100 5B-DXCC winners included no U. S. Zeroes. (W1YL) . . . Forty's looking better and better for DX. (W4ZYT) . . . A well-timed two-by-two with 40 watts can beat out the kW horde. (WB9BUV) . . . The number of DX stations holding out on 28 MHz rapidly declines. (WA2HZR) . . . 5B-WAS hunters may run into KH6s AQ IJ RS and KL7HCZ on 80's low cw edge. (K5MHG/6) . . . KL7s DND FBC GKY and HGA offer No. 50 on 14 MHz. (WA5YLM) . . . New linear surely raised my percentage of comebacks. (W8EFW) . . . VK phones still abound near 7090 kHz around 1230 GMT. (W8YGR) . . . I'm no DX man so 9H1R surprised me on 15. (K9BNP) . . . Tough time determining if my KC6BT was for real. (W5BZK) . . . After forty years I finally caught up with an "easy" one, VP2AAA. (W6AKM) . . . JA8IOC could be operated by foreign hams visiting the Sapporo Olympics. (K6ARE) . . . Wonder what all those non-QSLers do with the stamps they soak off my s.a.s.e.s. (W5IB) . . . DX beginners have a problem finding literature appropriate for newcomers. (K4PLD) . . . I'm still interested in finding Ken and Pete, USAF operators who signed CEØAE on Easter Island. (K4TXJ) . . . Husband WA6CJC and I have once again been bitten by the DX hug. (WA6TWG) . . . Ran across your "Christmas, 1944" in an old *QST* and it brought back my own WW-II radio days in the southwest Pacific. (W1PNY) . . . MS *Skyward*'s radio shack is an up-to-the-minute cw and phone installation. (W3CY) . . . Gave JAØAIG a whirlwind tour of Norfolk when he dropped by aboard *Caracas Maru*. (K4SF) . . . A tardy QSL from 5X5FS would make 200 confirmed by my KX6FJ operation. (W1BRJ) . . . My own No. 200 was ZD3Q on 40 cw, all on dipoles. (VE1AL) . . . YN1MG took no gear on his Asian tour, hoping to operate from stations visited. (WA5GFS) . . . It's rough breaking through the coast QRM for my last few needed 5B-DXCC countries on 80. (WAØEMS) . . . Applicants should use only my latest QTH for QSL managerial mail. (W5QPX) . . . Long-path DX gets more interesting on 20. (K1HBX) . . . International DX Association members now number 2300. (NTDXA) . . . OK1AKO/DL is the first such reciprocity noted here. (K2CUI) . . . Son WA1NNC haunts both 20 and the mailbox. (W1CW) . . . Had 106 worked and almost DXCC confirmed as W1IQD. (W1CTW) . . . DJ1US passed his ham exam at 13, a record, but by regulations had to wait for his 16th birthday to receive a license. (WA7LMZ) . . . Caught no Annobon prefix in W1AW's '71 OB No. 341. (W5ABQ) . . . Trap vertical and 500-C work fine aboard SS *Delta Mexico*. (W5FG)/mm) . . . Heard several weird W/Ks CQ-DXing atop JT1KAA's CQ! (WB9EGG) . . . We cruise as far as Turkey aboard the Navy's USS *DuPont* and I keep an ear on ham-band W/K/VEs. (WB4IJH) . . . The kid with just enough cash to get his rig on the air can hardly compete with money-gouging QSL tactics. (K6IBI) . . . There's good ssb DX unavailable on cw, and vice versa. (WAØVJF) . . . Most users claim QSL returns of ninety percent or higher using W2AZX's mint postage approach. (W2SAW) . . . DX activity has been irregular here since turning in my W3LMM call. (W3VW) . . . New 6146s may help on 160. (W9HL) . . . Info would be appreciated toward securing old-time telegraphy books such as mentioned in October '71 "How's". (Ws 1HQO 1TCX 7ZC) . . . 3B8AD had trouble finding new KT88s. (W9CRO) . . . That dock strike really slowed things down at the local ARRL Bureau. (WB6GFJ) . . . Though not a serious DXer I enjoy humor and satire on the subject. (VE3CJB)

Where:

HEREABOUTS – Read VE3FME's request for my QSL in April's "How's" so I sent him one today. There are only two XP calls issued in Greenland and they are used mostly on MARS frequencies. We'll try to get XP1AA on the phone bands each weekend for Stateside QSOs, also occasionally during the week. Note that XP1AA contacts by operators Chuck and Bob should be QSLd via W3HNK, QSOs by other operators through the bureau here. (OX5AT). . . Due to a change of residence it is now clear that some stations have not received QSLs for my March '70 PJ9GF contacts. They should reapply to my current *Callbook* address. (K4GTS) . . . I still hold logs for YS1HUKE operator in 1965-'67 and will respond to the usual s.a.s.e. (self-addressed stamped envelopes) or s.a.e. with IRCs (International Reply Coupons). (W8CSK) . . . K4BZH/VP7 closed down in March but I'll continue QSLing from the home QTH. There will be some delay in the forwarding of cards from my Bahamas address but confirmations will go out as promptly as possible. (K4BZH) . . . Still receiving missent QSLs obviously intended for WA8TDY. (W8TDY) . . . I do not manage HTØHSM's QSLs but I am handling cards for FM7AA, HD1RF, HUs 2CEN ØA,

CO2FA helps Five-Band DX Century Club aspirants readily on 10 through 80 meters. Fernando keeps Havana's post office Box No. 1 filled with QSLs. Though dozens of CM-CO amateurs are active you don't see their pictures very often. *(Photo via VE7AAR)*

KZ5JF, VP2AR, WA6JZL/TI and YS2CEN, as well as for 1972 ARRL DX Contest work by DU1FH and YNØHSM. (WA8TDY) . . . Note that contemporary VP9AD is not the previous one listed in *your current Callbook*. (VE7s BAF BZY) . . . When s.a.s.e. to W/Ks and IRCs to DX all go unanswered I suppose the next move is a loud squawk via "How's." (WA6ZKI) . . . Help! These parenthesized colleagues seek hints toward the QTHs and QSLs of holdouts mentioned: *VR1KZ/CR8 (W1FTX); YA1DLC*, 9A1T (W2EUO); HR1WSG (W4REZ); KØYVR/HR2 (K2HYM); G3TXX, OX3ND (WA6ZKI); UA9VB, 4S7AB (WB6WHM). Any 'alp? . . . Add my availability for service as a QSL manager for DX stations, QTH okay in the Spring *Callbook* supplement. (VE7BBL) . . . "QSLers of the Month" CP1EU, CX7BBB, EAs 6BJ 9EJ 9EO, EI9J, EL2CB, EP2PR, ET3USE, F8TC, FB8XX, G3EJZ, GC2TR, JA3GZN, JD1ACH, KA2AI, KH6RS, KSs 4BH 6DY, KV4CK, KX6EB, PJ9JT, VPs 2DAE 9AD, *VR1AA, YK1AA, YN1CW, ZL1BHQ*, 4X4TI, ST5CJ, 8R1G, and 9Y4T, saluted for superbly snappy QSL combacks, are applauded in "how's" mail from Ws 2EUO 3CTE 4YOK 5IB 8YMB, K7JRE, WAØYLN, WBs 6WHM 9DRE, WN7QWS, VE7s BAF BBL and BZY who also commend the work of QSL aides Ws 3HNK 4BBP, Ks 3RLY 8IRC, WA4UOE, VE3CBG and ZL2AFZ. Anyone particularly punctual postally out your way?

ASIA — Effective with reversion of the Ryukyu Islands to the government of Japan the amateur radio call sign prefix KR6 will no longer be authorized for use by U. S. Forces personnel stationed in the Ryukyus. The prefix KA6 has been authorized for these personnel effective with reversion. (KR6XL) . . . Good news for those who still need QSLs from VS9OC. I had a visit from him today and he says he is anxious to confirm outstanding QSOs. Ex-VS9OC's address until september is [in the list to follow]. (G2MI) . . . The Winter 1971-'72 edition of the *Callbook* incorrectly links my call to the mailing address of VU2UX. Previous issues list my QTH properly as U. Kapadia, 37 Laxmi Niwas, Napean Sea rd., Bombay 6, India. Since I am a very active Stateside-worker I hope the error does not result in QSL unhappiness. (VU2UK) . . . YK1AA holds the logs and QSLs for the operation of YK1OK and will act as QSL manager for Jenda who returned to OK3CBY in March. (W2MLO) . . . W5WJQ can assist in obtaining QSLs from HSØUDN as well as HS4AFT. (LIDXA)

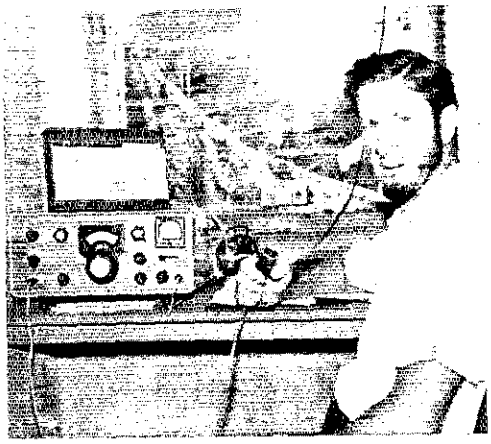
AFRICA — VE3IG is still managing QSLs for my 9F3USA pleasure from April 1, 1971, to this January 19th. I'll also pitch in, holding log copies *and several hundred QSLs*. (K3BSY) . . . FLØQQ, a contest call of F5QQ, has confirmations handled through my new St. Cloud address. Also, anyone still needing a deserved QSL from 3V8AA should consult F6BHK. (F2QQ) . . . We shall handle QSLing for QSOs resulting from our April-May trip through Africa. (WB2AQC, WA2BAV)

OCEANIA — *5W1AU's QSL agent is W6KNH* effective April 3, 1972. (W6TTS) . . . I receive WØKON/KG6's logs once a month and will respond to the customary self-addressed stamped envelopes from W/Ks, s.a.e. plus IRCs from others. (W1DXB) . . . Guess we can forget about ZK2s AJ and AU, both unknown to NZART and various specified QSL managers. (W4REZ, WA2FHV) . . . VR5s become A35s, suffixes unchanged, as the Kingdom of Tonga dons new International Telecommunications Union prefix garb. (DXNS, LIDXA)

SOUTH AMERICA —CP1AP reports writers' cramp setting in but Tony's tackling his QSL backlog with a fresh batch of cards. *The Callbook* lists apparent Peruvian novices as OA4Ns but one OAN4AHA is active on 20 cw. (VE7s BAF BZY) . . . Wonder if anyone else has my trouble getting cards from Uruguay. I've worked several CXs with no QSL luck direct or via bureau. (W3CTE) . . . Despite spurious indications to the contrary, W9IGW says he was not in FS7-land around March 4th. (W1FTX) . . . K4MZU mails out South Shetlands QSLs for LU1ZC's January effort. (WCDXB) . . . HC1RF occasionally signs HD1RF down Quito way. (DXNS)

EUROPE —Bottlenecked? UA3ABH writes me, "Worked about forty W/Ks last year but still no QSLs." (T. Kearns) . . . OHØAM 75-meter sideband QSOs of March 25-26, 1971, can be QSLd via the operator, OH3XZ. (DXNS) . . . *UM8FM used the call UM5OE in early May.* (LIDXA) . . . W2FXA keeps current with 9H3C QSLing, striving for 24-hour service. (WCDXB) . . . Now for new postal suggestions from the mailsack but be advised that each item is necessarily neither "official," complete nor accurate. Incidentally, we normally have no space to duplicate data already available in the latest *Callbook* supplement, and we usually repeat information no more often than every six months or so. Help yourself:

A35s FX LT (see text)
CO6JH, J. Hernandez, Box 180, Cienfuegos, Cuba
CO8HF, P. O. Box 5, Santiago, Cuba
CR5AO, P. O. Box 261, Sao Thome
CR8AK, P. O. Box 123, Dili, Portuguese Timor
CX7BBB, A. Villano, P. O. Box 37, Montevideo, Uruguay
DU1JMG, P. O. Box 8221, Manila, P.I.
F2QQ, R. Gemehl, 9 Petit Beauregard, 78 La Celle, St. Cloud, France
FGØADT/FS7 (to W2BP)
FP8RU, P. O. Box 284, St. Pierre
FR7ZQ/e, H. Namtameco, P. O. Box 5, St. Clothilde, Reunion *HB9AHA/p* (to HB9AHA)
HC1KP, K. Parrish Quito, Dept. of State, Washington, DC 20521
HC7RD, Apdo. 1007, Quito, Ecuador
HD1RF (via WA8TDY or to HC1RF)
HM4GF, P. O. Box 25, Chonju City, R.O.K.
HP1GU, Box 7646, Panama, R.P.
JY6HA, Box 2353, Amman, Jordan
ex-K4BZH/VP7 (to K4BZH)
KJ6CW, USCG Loran Stn., Johnston Is., APO, San Francisco, CA 96305
OE1ZOB, BM/W4WFL, London, WC1, England
ON8VB, BM/W4WFL, London, WC1, England
OX3EA, E. Arnholtz, Storno Radio, DK-3970, Dundas, Greenland
OX5AT, C. Rains, K5MZJ, Box 8, Krebs, OK 74554
OX5BX, Box 353, APO, New York, NY 09023
PZ9AC/1, Box 1021, Paramaribo, Surinam
SVØWLL, R. Grigg, 5214 Castlewood Rd., Richmond VA
TG7MI/VP1, St. Johns College, Princess Margaret Dr., Belize, Br. Honduras
TU2DJ, Box 1295, Abidjan, I.C.R.
TU4s AB AC (to WB2AQC)
VKØRC, S. McPhee, 18 Centre Dandenong Rd., Cheltenham, Melbourne, Victoria, Australia
VP2s EEE MAB VAS (to W5RER)
VP9AD, A. Davidson, P. O. Box 5, Paget, Bermuda (see text)
ex-VS9OC, T. Smart, 21 Berwick Cresc., Sidcup, Kent, England (or via G2MI)
WA2BAV-WB2AQC/6WØ (to WB2AQC)
WA2BVU/3D6 (to WA2BVU or via 4X4WP)
WA6FSC/OA (via VE6AKV)
YA1RG/DL, W. Renner, Fridensstr. 25, Gottingen 34, Germany
YA2ZL, Box 279, Kabul, Afghanistan
YJ8GH, G. Hickin, P. O. Box 26, Tanna, New Hebrides



VQ9NEW sticks to 14-MHz sideband with this Mahe layout feeding an effective half-wave vertical. Neil hails from Australia. *(Photo via VQ9N)*

YN1JES, Apdo 2876, Managua, NicaraguaZD8FM, Ascension Island via Patrick AFB, FL 32925
3D6AP, Box 99, Amsterdam, Tvl., South Africa
5R8BD, P. Detrau, V. P. 20 BIS, Tananarive, Malagasy
ST5FP, P. Flambard, B.P. 42, Svc. 540, Nouadhihou, Mauritania
5U7AK, D. Keppie, P. O. Box 4, Tillaberi, Niger
5W1AK, P. O. Box 721, Apia, Western Samoa
9L1JT, Box 1111, Freetown, Sierre Leone
9L1MF, P. O. Box 376, Freetown, Sierre Leone
9X5GJ, Box 420, Kigali, Rwanda
9X5VA, A. Vandenberghe, P. O. Box 30, Butare, Rwanda

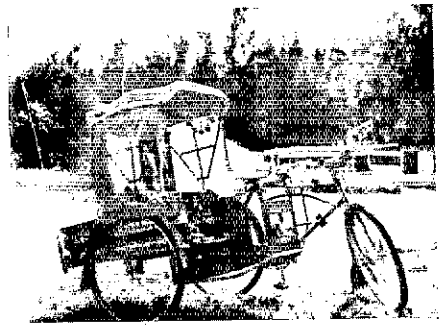
DA2SO (via REF)	OX3JW (via OZ8WX)
DF1WA (via DK2BI)	OX5AU (via W3HNK)
DFØMOD/p (via DARC)	PJ8DX (to K2FJ)
DU1GJM (to K8GJM)	PJ9GF (see text)
EP2TC (via K3RLY)	PY1ZAL (to K4OD)
FØZZ (via F6BHK)	SV1EN/p (to SV1EN)
FGØAGC (via W3HNK)	UM8FZ (via W5OYH)
FLØQQ (via F2QQ)	VEØNK/VP9 (to VE1DV)
FR7ZU/e (via F9MS)	VK9OM (via ZL1BGV)
FS7EY (via W3HNK)	VR1AC (via K3RLY)
FWØAB (via VE6TP)	VS9MZ (via G3UKN)
GC3BID (to G3BID)	VU2UK (see text)
GC5AYC (to DJ4EI)	W4IZ/KV4 (via K4DSN)
GC5AYD (to DJ1GX)	WØKON/KG6 (via W1DXB)
GD5APJ (via F6BHK)	XP1AA (see text)
HBØXJJ (to DL7HZ)	YB3AAY (via W3BRB)
HC2JR (to WB4KPZ)	YK1OK (via YK1AA)
HS2AGF (via K4FPF)	ZB2CK (to G3ZCV)
HS2AGP (via W2GHK)	ZF1BR (to W9ABA)
HS3AGG (via W1YFZ)	3AØGA (to DJ9ON)
HTØHSM (see text)	3V8AA (via F6BHK)
JW7FD (via LA3UJ)	5W1AU (via W6KNH)
JX2HK (to LA2HK)	9F3USA (see text)
JX6RL (via LA8AG)	9H3D (via SM7DXX)
KB6CU (via K3RLY)	9M2CW (via WA6AHF)
KG6JBO (to K1JHX)	9Q5HE (to DK5JP)
KM6DY (via KM6BI)	9X5MS (via DL9PC)
KS4BH (via K3RLY)	9Y4MFY (to WA2MFY)

Where did all these come from? Not from thin air — through the unselfish efforts of W2 2UEO 2MLO 3CTE 4DQD 4YOK 5IB 6AM 6TTS 8YMB 9LNq, Ks 2HYM 5MZJ 9CUY, WAs 2FHV 4BAA 9EBR ØYLN, WBs 2FIX 5DOJ 6WHM 8IJI 9DRE, WN6OSS, VE7s BAF BZY, F2QQ, Columbus Amateur Radio Association *CARAscope* (W8ZCQ), *DX News-Sheet* (G. Watts, 62 Bellmore Rd., Norwich N.72T, England), Far East Auxiliary Radio League (M) *News* (RA2LL), Florida DX Club *DX Report* (K4KQ), International Short Wave League *Monitor* (E. Chilvers, 1 Grove Rd., Lydney, Glos., GL15 5JE, England), Long Island DX Association *DX Bulletin* (K2KGB), Newark News Radio Club *Bulletin* (J. Heien, 3822 Marshall Ct., Bellwood, IL 60104), Nigeria Amateur Radio Society *News* (5N2ABG), North Texas DX Association *Bulletin* (W5SZ), Northern California DX Club *DXer* (Box 608, Menlo Park, CA 94025), Southern California DX Club *Bulletin* (W6EJJ), VERON's *DXpress* (PAØs INA TO), West Coast *DX Bulletin* (WA6AUD) and Western Washington DX Club (W7FR). Curious about these publications? Some of them are available to nonmembers, others are not, and you can address inquiry to the parenthesized sources indicated.

† † †

Whence:

Let's concentrate on the local hemisphere for this month's chatter, and the north-south skip is solid! . . . Home again in Johnstown after DX sport as 9F3USA, ET3ZU/a, etc., and I'm out of the Army studying for my Advanced and Extra. Tempted to return for Kamaran Island 7OK fun with friend Aldo! (K3BSY) . . . W4IZ/KV4's contest crew included W4PIG, K4BBF, WA4DWR and myself. (W4DQD) . . . Intend more ZF1BR operation next February and March. (W9ABA) . . . Western Washington DX Club, founded in '54, now has 120 members. We hold memorial call W7FR and our WWDXC net meets on 147.0 MHz. (W7APN) . . . The Florida DX Club 147.36-MHz net extends from south Miami through Fort Lauderdale. [What is this, Boss — a vhf column? — *Jeeves.*] Fifteen meters is still roaring down here and so is ten. W9BRD must need some new tubes in his SW-3. (K4KQ, FDXC) . . . We broke out our last mint 58s and a 57, Chuck, and there *are* signals in there — Florida Fours working juicy DX! (W9BRD) . . . Ten's been fine up north, too. Worked 106 countries since October with an HW-100 and four-element beam. (K1NOK) . . . So many big beams going on 40 meters now you have to wait for somebody to throw you a bone. As a whole the '72 ARRL Test suffered most from a scarcity of multipliers, not from poor conditions. Friend W8GZ enjoys a world tour after fifty years of DXing. (W8ZCQ, CARA) . . . 9Y4s LP and MM do brisk DX business around 14,175 kHz. (VE3DPQ) . . . I'm situated Stateside for a spell after operating HC2JR from January, 1970, to October '71. (WB4KPZ) . . . Bermuda radio inspector VP9AX recently passed on. The vine indicates little possibility of early South Sandwich activity by LUs. W4BRB, after 372 portable-VP7 160-meter QSOs, hopes for future action at HH9DL. K3BHL sometimes operates CP1AP and may increase Bolivia's cw output with his own call. Check with RCP awards manager ZP5CE for data on several interesting Paraguay DX certifications. (WCDXB) . . . What a comedown. The 7-MHz DJ1 calling me turned out to be DJ1US/W1. (Wn3RQB) . . . Switched QTH to 5775 Alma Dr., Rockford, IL. (K6YRA) . . . Here are some QTHs gathered from recent listening. Dad is W8OYP. (N. Grasso) . . . VP8ME intends multiband ssb and RTTY DX doings from South Orkneys till '73. 6D4s EB FFC and J scored more than six thousand Revillagigedos QSOs with some



KM6DX volunteers a Hamshack of the Month. Rick dispenses good humor on 15 and 20 from this bomb, merrily exercising as he goes. Field Day, anyone? Midway's QRV!

150 countries on 80 through 10 meters. (DXNS) . . . K2OJD may add to his FPØCA QSO collection this month. (VERON) . . . Finally went QRO with a Valiant on 160, now at 15 countries and four continents. W5QPX probably will donate my old Navigator to a deserving DX station. (WB9BUV) . . . TI2CF is said to be contemplating a Malpelo island thing this fall but needs more Colombian cooperation. (NTDXA) . . . This month's transequatorial 160-meter tests will call for minimal non-DX usage of 1825-1830 kHz, the European "DX window." Southern hemisphere participants are to transmit on 1800-1807 kHz. These will be daily sessions at 0030-0100 GMT. (PY1DVG) . . . Club officers include Pres. WB6UJO, V.P. K6KQN, Secy. WA6ISX, Treas. K6AUC, *DXer* editors K6s AUC and HIH. Our simplex net spot is 147.9 MHz, and W6TI (W6RGG trustee) transmits DX news bulletins on 14,002 kHz at 1800 GMT Sundays, 0200 Mondays. (NCDXC) . . . FCC monitors apparently occasionally miss the "VP7" subprefix and cite W/Ks operating in the Bahamas for failure to observe W/K-land's subband boundaries. (K4BZH) . . . First licensed in 1924 as 8BXP. Wrote the old Department of Commerce kid fashion that I didn't like my call. They then issued me 8DX! Was W8DX until 1946, then W2DY, and now await another DXCC in North Carolina retirement. (K4SD) . . . Stamp-collecting neighbors have also been bitten by the DX bug, demanding my envelopes from overseas. (WN2SXD) . . . I'll be manning our club's 160-metter Field Day position this month. (WA2KWB) . . . Eighteen countries on an indoor quarter-wave but doesn't anybody QSL? (WA2QJN) . . . Looking over my old logs I find 102 countries worked by calling CQ DX, the latest being 5R8BD. (W1VG via W1YL) . . . Hurrah for "dead" 10 meters! Worked 175 ssb countries in eighteen weeks, 100 of these during the thirty days encompassed by the '72 ARRL DX Text. (WB4SIJ) . . . Sent a courteous reception report to a Caribbean commercial station whose cw parasitics were persistently messing up 7020-kHz DX. It went away, at least for the present. (W2OLU) . . . Our brass includes Pres. WB6UDC, V.P. W6APW, Secy. W6JPH, Treas. K6SVL and *Bulletin* editor W6EJJ. W6DQH reports the 10-10 International Net (28.750 kHz for sidebanders, 28,800 for carrier-a-m-ers) helping to keep 28 MHz interesting with 4000 membership certificates issued so far. (SCDXC) . . . Friend VE7BZY is joining the harmonics club so it will be diapers versus DX for both of us. Poor conditions? Springtime skip was never better! (VE7BAF) . . . Following a restless rate one from band to band can be a frustrating DXperience. (W5BZK) . . . Novices can work good cw-to-ssb DX on 15. PY1DMS, VE8CB and VP2LY are recent crossmode catches, and WN7RPI has sideband ZLs logged. (WN2AMU) . . . ARRL Test multipliers/contacts here ran (cw) 10/23 on 3.5 MHz, 22/98 on 7 MHz; (phone) 12/24 and 9/12. (W6AM) . . . W5ACL's 100-vs.-470 watts DX results made interesting April reading. I believe the standard S-unit is six dB, however, which agrees readily with Mel's averaged RSTs. (W6PMU) . . . Strange to have 20 countries and no G contacts. Mornings on 15 have been great! (WN4WHE) . . . A 21-MHz dipole and 14-MHz ground-plane and less than 200 watts got me 101 countries in about six weeks. Sunspots no, DX yes! (WN5DOJ/9) . . . Guess I'll have to get a beam to keep up with the DX crowd. I've hammed on and off since 1924, formerly signing 8ABW 8LJ and W8CTE. (W3CTE) . . . Wrote "How's" about the lack of Jersey activity, then promptly worked GCs 2TR and 5AYC. How do you do it? (WB6WHM) . . . Ten or twenty CQ DXs in a row invariably will have a U.S. or Canadian call at the sorry end of 'em. (W5IB) . . . KX6BU made it 102 on ten for me by mid-March. (WB9DRE) . . . The XYL's imminent General status may cause DX congestion at my QTH. (W4YOK) . . . Close to a DXCC in six months with my Ranger and ground-plane. (K7JRE) . . . Went over the hundred-mark in this year's Test so my second DXCC should soon be in hand (first was as W9CVO/1). Patience is the great power-equalizer. (W2EUO) . . . Hams up this way watch for *QST*'s arrival wishing for faster mails. (OX5AT) . . . KZ5JF is a handy 5B-DXCC item on 10 through 75. So are FM7AA, VP2AR and YS2GEN. (WA8TDY)

Hamfest Calendar

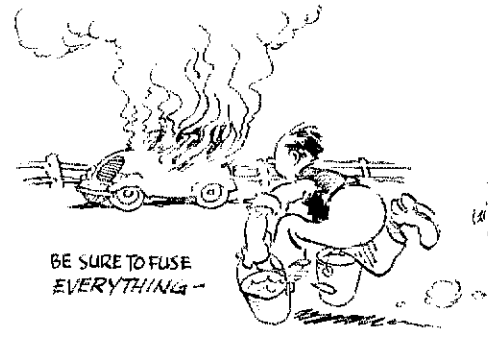
(Continued from page 77)

Crossville. More information from the Oak Ridge ROC, P. O. Box 291, Oak Ridge, TN.

Texas – The South Texas Emergency Net Annual Convention is June 9, 10, and 11.

West Virginia – The Tri-State ARA 10th Annual Hamfest is June 4 at Camden Park, Huntington from 11 A.M. to 4 P.M. Cw contest, QSL bulletin board, flea market, and more. Tickets are $1.25, or 5 for $5.00 from Tri-State ARA, P. O. Box 1295, Huntington, WV 25715.

Wisconsin – The South Milwaukee ARC 3rd Annual Southeastern Wisconsin Swap-Fest is July 15 at Shephard Park (American Legion Post 434), 9327 So. Shephard Ave., Oak Creek. Activities start at 7 A.M. and will run until 5 P.M. or later. Parking, picnic area, hot and cold sandwiches, and liquid refreshments will be available on the grounds. Admission is $1 and includes a "happy hour" with free beer and soda. More details from William LeCourt, WB9EQA, 1900 West Kimberly Ave., Milwaukee, WI 53221.



Operating Events ..... de W1YL

JUNE

3-4 *R.I. QSO Party, CQ-WE VHF Contest*, p. 121 May. *RCA DX Contest*, full 48-hour period GMT, open to all amateurs single operator multiband. The object is to work as many LU stations in the various Argentine Provinces as possible, as well as non-LU stations. Logs must show at least 20 LU QSOs. Work 80-10; LU stations worth 3 points per QSO per band. No points for QSOs in one's own country but good for a multiplier. For multipliers, count each LU province from LU-A to LU-X and LU-Z (Antarctica) on each band. LU-A/B/C/D and E counts as one multiplier. On phone or cw, exchange report and serial no. starting with 001. Appropriate awards. Logs must show date/time(Z)/stations/serials plus bands/points/multipliers. Furnish your full name, location, describe your gear, mode and appropriate statement. Mailing deadline is July 14. Send entries to Radio Club Argentino, Box 97, Buenos Aires, Argentina.

4 *Minnesota QSO Party*, p. 121 May.

6-8 *K4NAA AFCEA Operation*, p. 121 May.

7 *W6OWP Qualifying Run* (W6ZRJ, alternate) 10-35 wpm at 0400 GMT on 3590/7129 kHz, 10-35 wpm. This is 2100 PDST the night of June 6. Underline correct minute of highest speed copied, certify copy made without aid and send to ARRL for grading.

10-11 *VHF QSO Party*, p. 77 May.

11-17 *Mass. Amateur Radio Week*, Mass. amateurs must work 16 other Mass. amateurs, amateurs in the rest of New England must work 8 Mass. hams, all other U.S. amateurs work 5 Mass. stations, DX including KH6/KL7 must work 2 Mass. amateurs – any band/mode. Exchange report, county, state. Logs must show date/time/frequency. Certificates will be endorsed for band and mode ONLY if requested. Applicants must include a no. 10 s.a.s.e (DX enclose an IRC). Applications meeting requirements will be issued a certificate signed by the Mass. governor. Receive date July 31. Send to William Holliday, WA1EZA, 22 Trudy Terrace, Canton, Mass. 02021. *Worked All Mass. Cities and Towns Contest* from 0001 GMT June 11 to 0400 GMT June 15 (100 hours maximum). Exchange report, city or town, county and state. Count 1 point for each Mass. station worked regardless of band. Multipliers are Mass. incorporated cities and towns (a total of 351). Mobiles do not count for multipliers. Community subdivisions count only for the city or town of which they are a part. For example, Dorchester is a part of Boston, Hyannis is part of Barnstable, etc. Final score is the no. of diff. Mass. stations times the no. of different Mass. cities/towns worked. Mobiles may be worked only once regardless of date or location. Portable and/or mobiles shall be considered as separate stations from the base station of the licensee. A minimum of 25 points will be required to qualify for any award. Single and multiband entries, separate awards. Entries must contain the usual info. and be received no later than July 31. Send to Warren Baker, W1DFR, 66 Rexford St., Mattapan, Mass. 02126.

15 *WIAW Qualifying Run* 10-35 wpm at 0130 GMT on 1.805 3.580 7.080 14.080 21.080 28.080 50.080 and 145.588 MHz. This is 2130 EDST the night of June 14. Underline one minute of top speed copied, state no aids used (typewriters OK), sign and mail to ARRL with your full name, call (if any) and complete mailing address.

24-25 *Field Day*, p. 78 May. Please avoid EastCars, MidCars and WestCars frequencies, all within about 3-5 kHz of 7255.

28 *WIAW Morning Qualifying Run*, 1300 GMT (this is 9 am EDST). Same frequencies and details as under the June 15 listing.

JULY

6 *W6OWP Qualifying Run.*

14 *WIAW Qualifying Run.*

15-16 *"Open" CD Party* cw, this issue. *Space Net Vhf Contest* (commemorating Apollo 11) local time 6 pm to 6 pm, single or multiop. Three power classes with trophies for each. Each complete QSO counts 2 points, zip codes are the multipliers. All modes of operation except repeaters. Each contact on a different band counts, however the zip code counts just once. All stations submitting a log will receive a participation certificate. Logs must be postmarked no later than August 5. Send to Tony Slapkowski, WB2MTU, Box 909, Sicklerville, N.J. 08081.

15-17 *South Carolina QSO Party*, sponsored by the Univ. of S.C. ARC starts at 0200Z July 15, ends at 0400Z July 17. Count 1 point for QSOs on 50 MHz, 2 points for 144/220 MHz, 3 for each contact on 432 and above. Contacts made by relay devices do not count. Multiply QSO points by S.C. counties (plus 10) for claimed score. S.C. stations multiply QSO points time ARRL sections. Contacts on different bands with the same station count for QSO points but only 1 multiplier. Exchange call, time in GMT, QSO no., RST, ARRL section (or county for S.C. stations). Logs showing calls, dates/times, numbers, county/section, band/mode must be sent by Aug. 31 to the club, Box U-5090, Columbia, S. C. 29208. Appropriate plaques. Reports become the property of the USCARC and the decision of the judges is final.

22-23 *"Open" CD Party* phone, this issue.

23-29 *100 Year Centennial of Bismarck, N.D.*, sponsored by the Bismarck RC, special QSLs for all contacts. Suggested frequencies: 3575 3975 7045 7270 14055 14320.

29-30 *CW County Hunters Contest*, full 48-hour period. Exchange QSO no., P for portable or M for mobile, RST, state (province or country) and county for U.S. stations. Stations may be worked once on each band and again if the station has changed counties. Portables or mobiles changing counties during the contest may repeat contacts for QSO points. Stations on county lines give/receive only one no. per QSO but each county is valid for a multiplier. QSOs with fixed stations earn 1 point, with portables or mobiles 3 points. U.S. counties = multiplier. Suggested freqs. 3575 7055 14070 21070 28070. Appropriate certificates and trophies. Logs must show category, date/time in GMT, stations, exchanges, points, location and claimed score. If you make 100 or more QSOs you must include a check sheet of counties worked or be disqualified from receiving awards. If results desired, enclose an s.a.s.e. Postmark logs by Sept. 1 and send to James E. Hoffman, K1ZFQ, 42 Gresham St., Milford, Conn. 06460.

AUGUST

9 *W6OWP Qualifying Run.*

15 *WIAW Qualifying Run.*

19-20 *SARTG World Wide RTTY Contest.*

26-27 *All-Asian CW Contest.*

26-28 *Delta QSO Party.*

September 9-10: VHF QSO Party.

September 10: Frequency Measuring Test.

November 11-12, 18-19: Sweepstakes.

December 9-10: 160-Meter Contest. QST

SET

(Continued from page 84)

off." – (W4SDR, RM and Mgr. FMTN, Fla.) "After much hair-pulling, everyone on the net during the SET wrote a message to the SEC as per the instructions from Headquarters and the SCM. I have in hand a stack of messages all alike except for the obvious differences and they make a good book. Really it amounts to one message and nothing has been accomplished except that a local drill has taken place. A local drill would be just as effective for us without all the headaches that go with the SET. I have a feeling that I must surely be against motherhood." – (W5ICL, EC Orange Co., Tex.) "A great deal was learned from the exercise since this was the first SET for the majority of the participants. Other exercises are being planned in conjunction with the Red Cross for the future so that by the time the next SET rolls around we should be prepared for the worst." – (WA6TVA, 40 Meter EC, Orange Co., Calif.) "We had an excellent local drill; however, it was by no means perfect. There are many weak spots and we need much improvement, but we are pleased that we do have a small percentage of the area hams who are public-service-minded and willing to give some of their time not only to the SET once a year but also to the AREC net once each week." – (W8AEC, EC Berkeley Co., W. Va.) "Many thanks to the fine ops who come out of the woods for SET and go away just like the groundhog did a couple of days later." – (W9HRY, Mgr. 9RN) "Liked this SET better than those of recent past." – (WØINH, Mgr. CAN)

Well that's about it for this year. But let's not forget the '73 event to be held on January 27 and 28. It's not too early to start planning. QST

Operating News

GEORGE HART, W1NJM
Communications Manager
ELLEN WHITE, W1YL
Deputy Communications Mgr.
ROBERT L. WHITE, W1CW; *DXCC*
GERALD PINARD, *Training Aids*
ALBERT M. NOONE, WA1KQM; *Contests*

Neighbor Relations. When WB8GEH moved from Toledo to someplace down south, his first move was to establish good relations with his new neighbors, and at the same time make a good name for all radio amateurs. How? Easy; by circulating a dittoed sheet to all the houses in his neighborhood reading as follows:

"I am your neighbor and have recently taken up the interesting hobby of amateur radio. As is now the policy, and has been for many years, one of the purposes of amateur radio is service to the public in peace and war. This not only means helping the public in communications needs, but also making every effort to see that no one, especially my neighbors, is bothered unnecessarily or caused any interference by the practice of this hobby. For this reason I am informing you of my frequent use of radio transmitting equipment. Although all basic steps have been taken by me and the manufacturer of my equipment, there is always the possibility that interference may inadvertently result in your radio or TV reception due to the complexity of radio electronics.

"If at any time you feel that your reception is being distorted for unknown reasons, please feel free to call me or have your repairman call me and I will take immediate steps to find out if I am at fault, and I will also be happy to assist in finding the cause or recommending a remedy if the trouble is elsewhere. By acting in this way I can further my knowledge of the art and do my part in keeping amateur radio in the intended favor of the public.

"If I can assist you at any time in getting an urgent message to a relative or friend, also feel free to call me and I will make every effort to help. Thank you."

You might call this a "frontal attack" on the problem of neighbor relations, and it may be the last thing many of us would dream of doing. Call attention to the fact that you'll be using transmitting equipment and might cause TVI? Rocks in head! Asking for trouble. First thing a neighbor will do when he sees a blink on his TV screen will be to call you, start chewing you out.

But hold on a minute. If you were the neighbor, how would you react to receipt of such a note? Oh, admittedly there are stinkers in the world, but they are a small minority (just make a lot of stink, that's all). The average neighbor will be impressed with your straightforwardness and honesty, and since in most cases this will be his first contact with an amateur, this impression will be projected to all of amateur radio. Sure, you'll probably still get telephone calls, but they probably won't be angry ones. Most likely they'll be inquiries, and if you tell the caller that the pattern they see in their screen is not you, they'll probably be perfectly willing to believe it, especially if you explain what it might be and/or offer to come over and take a look. Or, if perchance it *is* you, your assistance in clearing it up will be accepted with gratitude and cooperation rather than with righteous and indignant expectation.

We think Dick, WB8GEH, has something. Maintaining mutual respect with neighbors is one of the most important things we can do as amateurs and for amateur radio. Maybe you wouldn't approach it in just the same way Dick did, but the basic principle seems a sound one. Let your neighbors know who and what you are, and offer them assistance and advice. It's part of the price we pay for our operating privileges, and it's no different, really, from letting them know you're the father of six little mischief-makers. Don't hide your ham status – be proud of it and show that it's something to *be* proud of.

The Halitosis of Ham Radio – FLAT-TOPPING

You settle down with lighted pipe in anticipation of a nice, satisfying rag chew. You check the frequency and find it clear, *put out a short CQ, and wow! a clear* response is waiting. Now, brother, all the trials and tribulations of the day fade into non-existence because you visualize the ultimate joy you are about to realize from the world's greatest hobby -- an arm-chair rag chew! Then the SIS (HalitoSIS) hits the fan! Some joker, about 3 kHz away, comes blurting all over the frequency simply because he failed to tune his transmitter properly.

Unfortunately, there are no specs for all transmitters on all frequencies. A 'scope would do the trick, but how many of us have 'scopes? Most flat-topping can be eliminated with the mike gain at 9 o'clock or less. The best method, just to be positive, is to take a few moments to check during a QSO *and the station with whom you are in* contact can quickly help you discover the *proper* mike gain dial setting on your transmitter to *eliminate* flat-topping.

What's that you say? Anybody knows this simple fact? You know something? You are just 100% correct. But it isn't what you *know* that counts. It's what you *do* with what you know that pays off! So, we'll take it for granted that all good ham operators know this simple fact. Let's *practice* it more often and our hobby will become lots more enjoyable for all – *K3FDL*.

W1AW SPRING-SUMMER SCHEDULE

(April 30–October 29)

(The specific frequencies shown below are approximate and indicate general operating periods)

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.-1 A.M. EDST, Saturday 7 P.M.-1:00 A.M. EDST and Sunday 3 P.M.-11:00 P.M. EDST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate, you must have your original operator's license with you. The station will be closed May 29, July 4, and September 4.

Times/Days[6] *GMT*	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	.....	← CW BULLETIN[1] →					
0020-0100[4]	.....	.....	3.7 Nov.[5]	14.080	14.080	7.15 Nov.[5]	14.080
0100	.....	← PHONE BULLETIN[2] →					
0105-0130[4]	.....	.....	3.990	50.190	145.588	1.820	21.390
0130	← CODE PRACTICE[7] (35-15 wpm TThSat, 5-25 wpm MWFSn) DETAILS BELOW →						
0230-0300[4]	.....	.....	3.580	.....	1.805	.....	3.580
0300	RTTY BULL.[8]	.....	← RTTY BULLETIN[3] →				
0310-0330[4]	.....	.....	3.625	14.095	7.095	14.095	3.625
0330	PHONE BULL.[2]	.....	← PHONE BULLETIN[2] →				
0335-0400[4]	.....	.....	7.290	3.990	7.290	3.990	7.290
0400	CW BULL.[1]	.....	← CW BULLETIN[1] →				
0420-0500[4]	.....	.....	3.7 Nov.[5]	7.080	3.990	7.15 Nov.[5]	3.580
1300	← CODE PRACTICE[7] (5-25 wpm MWF, 35-15 wpm TTh) DETAILS BELOW →						
1700-1800	.....	21/28cw[7]	21/28ssb[9]	21/28cw[7]	21/28ssb[8]	21/28cw[7]	.....
1800-1900	.....	14.290	14.080	14.290	14.080	14.290	.....
1900-2000	.....	7.080	7.290	14.095	7.290	7.080	.....
2000-2030	.....	21/28ssb[8]	21/28cw[7]	21/28ssb[8]	21/28cw[7]	21/28ssb[8]	.....
2030	.....	.....	CW BULL.[1]	.....	CW BULL.[1]	.....	.....
2100-2130	.....	7.15 Nov.[5]	21.1 Nov.[5]	7.15 Nov.[5]	21.1 Nov.[5]	7.15 Nov.[5]	.....
2130	.....	.....	RTTY BULL.[3]	.....	RTTY BULL.[3]	.....	.....
2200	.....	CPN[6]	7.095[4]	3.625	14.095[4]	CPN[6]	.....
2300	.....	.....	6N[6]	RTTY BULL.[3]	CN[6]	.....	.....
2330	← CODE PRACTICE (10-13-15 wpm) DETAILS BELOW →						

[1] CW Bulletins (18 wpm) and code practice on 1.805, 3.580, 7.080, 14.080, 21.080, 28.080, 50.080 and 145.588 MHz.
[2] Phone Bulletins on 1.820, 3.990, 7.290, 14.290, 21.390, 28.590, 50.190 and 145.588 MHz.
[3] RTTY Bulletins sent at 850 Hz shift, repeated with 170 Hz shift, on 3.625, 7.095, 14.095, 21.095, and 28.095 MHz.
[4] Starting time approximate, following conclusion of bulletin or code practice.
[5] W1AW will tune the indicated bands for Novice calls, returning the call on the frequency on which called.
[6] Participation in section traffic nets.
[7] Operation will be on one of the following frequencies, 21.02, 21.08, 28.02, 28.08 MHz.
[8] Operation will be on one of the following frequencies: 21.270, 21.390, 28.590 MHz.
Maintenance Staff: WIs, QIS, WPR, YNC.

W1AW CODE PRACTICE

W1AW transmits code practice according to the following schedule. Approximate frequencies are 1.805 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. For practice purposes the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries checking references.

Speeds	*Local Times/Days*	*GMT*
10-13-15	7:30 PM EDST dy 4:30 PM PDST	2330 dy
5-7½-10- 13-20-25	9:30 PM EDST SnTThS 6:30 PM PDST	0130 MWFSn
5-7½-10- 13-20-25	9:00 AM EDST MWF 6:00 AM PDST	1300 MWF
35-30-25- 20-15	9:30 PM EDST MWF 6:30 PM PDST	0130 TThS
35-30-25- 20-15	9:00 AM EDST TTh 6:00 AM PDST	1300 TTh

The 0130 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period. To improve your fist by sending in step with W1AW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and *QST* practice text (from the issue 2 months previous) to be sent in the 0130 GMT practice on the following dates.

June 9: It Seems to Us
June 13: Correspondence
June 19: League Lines
June 29: ARPS

The subject of practice text for the following session is *Understanding Amateur Radio*, First Edition.

July 5: Other Measurements, p. 275
July 7: Antennas and Masts, p. 277

Decisions, Decisions. . . . Back in the February issue we had a section in this column entitled "Cheaters," which attempted to analyze the problem of what to do about them, assuming that we would always have them. The reaction was most interesting. Several different groups were convinced we were talking specifically about them, and we were variously accused of advocating vigorous enforcement and taking a spineless "let 'em cheat" attitude. There was so much "putting it on because it fits" and reading what the particular reader subconsciously wanted to read that the whole reaction was a pretty good testimonial that the approach was right down the middle, as it should have been and as was intended.

There is no denying that specific instances triggered the writing of the piece, but no single instance was being referred to. The problem of enforcement of the rules has come increasingly to the surface in recent months, along with the

corollary question of how or to what extent this is practicable. As of the present time, the procedure seems to be to get input from advisory committees, document each case as thoroughly as possible, consider also general input from the field (naturally mostly from affected parties), then make a decision on each case as it comes up. What kind of decision? Whether to disqualify, not to disqualify, or in what manner and to what extent take other action. Who makes the decision? The

DX CENTURY CLUB AWARDS

Radiotelephone listings follow the general-type "New Member" and "Endorsement" listings.

March 1-31, 1972

New Members

W5KGX	325	WA6DPQ	133	CN8DW	110	EA6BD	105	DL4DL	102	DL7QE	100
K5EVK	282	JA8ARA	127	DL1JS	110	KI4GB/7	104	JA8LH	102	K2HYM	100
K4AEB	230	W3GJH	127	PAØLVK	109	W9KBZ	104	K4YQR	102	K4ELV	100
JA1DQT	211	K6VA	123	DL3MO	108	3C1EG	104	YU4JHI	102	K4FAC	100
W6LOC	201	KH6CCL	123	K3KMA	107	F6BHX	103	JA6MJV	101	SP9AJM	100
JA1VNA	200	HB9AHL	121	LA7V	107	WB2POC	103	K2GBC	101	WA1LXE	100
W3ZJ	160	OZ5LZ	118	WA2DNY	107	WAØZRD	103	W1PNH	101	WA3JYV	100
WA4OVQ	143	YU4ALM	118	WA4RTX	107	3CØAN	103	WA1GFT	101	WB4TUX	100
W2TA	142	WB6HDG	114	DL5RA	106	DJ1PH	102	WB2ZOW	101	W9EJM	100
W5KV	140	DM2BNI	112	K4EJQ	106	DJ3GK	102	WB4ADT	101	YU3IY	100
EA4KC	133			WA2JRD	106			WB4QKG	101		

WA2HSU	278	JA1DQT	135	9H1BG	112	WA2JRD	104	WA2MBP	102	YS1CCK	101
K5EVK	264	EA4KC	132	W8WWH	111	W5IFA	104	WB5CBJ	102	EI8BY	100
K4AEB	228	WB6JJN	126	9G1WW	110	DJ8VJ	103	DK1EE	101	K6SE/2	100
K3JLI	206	CT1IC	118	WB9EBO	108	W5HCJ	103	EL2BU	101	KØSGJ	100
K4HS	177	WB6HDG	114	WA8JZY	105	WB6NSI	103	KH6CCL	101	W3PIX	100
SV1GA	151	JA8ARA	112	DK3SE	104	I1CWF	102	W1PNH	101	WB4JGF	100
SM7EVM	145	VE2ADZ	112	I1RAC	104	JA1ILN	102	W4GKF	101	WA5OXK	100
DK1SL	140	WB2YLB	112	OE1GHC	104	JA8DWU	102	WB5BKT	101	W7ZJB	100
WA4OVQ	137									W8TQP	100

Endorsements

In the endorsement listings shown, totals from 120 through the 249 level are given in increments of 20, from 250 through 300 in increments of 10, and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

W8FWS	350	K4QBP	300	W8CFG	270	IS1FIC	220	ZS1ACD	200	K4FJC	140
W4PLL	340	WB6UDC	300	ZE4JS	270	K6KQN	220	JA1ILN	180	PY1BV	140
W6DZZ	340	WA8ZDF	300	I1FO	260	W7ZHZ	220	K6MP	180	SM7EVM	140
G6XL	335	YU2NEG	300	I2IR	260	W8UM	220	K8AVR	180	VE3CVZ	140
W1CBZ	335	K3AFO	290	KH6SP	260	WØDMA	220	SP3DOI	180	VE3HD	140
W5GO	335	W6BIL	290	W3HDZ	260	F9AP	220	VE3KP	180	W4MVE	140
W5FT	330	W6GMF	290	WA3FGS	260	K2OLG	220	W3FNV	180	W4ZVX	140
W5IO	330	W7LFA	290	WAØDUB	260	K6TWT	200	WA7FFS	180	W5NCB	140
K2TQC	325	G6RC	280	K6OJO	250	KP4DIW	200	W8TJO	180	WA5ZNY	140
K6EIV	325	W6CS	280	KL7ME	250	OE1CP	200	YU1QBC	180	WB6VGF	140
F9RM	320	WA8EDC	280	KV4AM	250	SM5BFC	200	GM7WN	160	WB6VUZ	140
K6OM	320	VE3AGC	280	SM6CVX	250	VE2MW/W2	200	K4NT	160	W8QVO	140
W2QK	320	YU1BCD	280	W4BKP	250	W3QZA	200	K6GKU	160	W9KQB	140
W9EB	320	5H3LV	280	W4WVF	250	W3YX	200	KØDEQ	160	WØIL	140
W1MIJ	315	K2BT	270	KP4BJD	240	WB4BMV	200	WB2VHC	160	5Z4LS	140
K4CIA	310	K2SHU	270	W2ABM	240	W6MUF	200	VE3BHZ	160	K9EHP	120
W7DY	310	K4MG	270	WA4HHW	240	W6ZYC	200	W4HU	160	K9UQN	120
W2NIN	305	K5ZJK	270	WA9VGY	240	W7NP	200	W8WWH	160	W1SPK	120
WØHZ	305	W1OR	270	DJ5BW	220	W8KC	200	I5QE	140	WA1LKX	120
CR7BC	300	W4DUQ	270	DL7FP	220	WA8VRB	200	G3RWF	140	WA3AXQ	120
DL8NU	300	WA5AUZ	270	F8OP	220	WØIBZ	200	K1LBB	140		

W5IO	330	VE3GMT	290	EA1IY	260	KV4AM	220	W6ZYC	200	F8NI	140
W6RKP	330	WB6UDC	290	DJ3CN	260	PY1CLI	220	CP1FW	180	K6TXA	140
EA7ID	320	W7LFA	290	W8CFG	260	VE3AGC	220	JA1HBC	180	K8AVR	140
F9RM	320	WA8ZDF	290	K5ZJK	250	W3KVS	220	K4AJR	180	KP4DIW	140
W2QK	315	WØMGI	290	OE3WWB	250	W4ORT	220	KL7ME	180	K1KSN	140
W4CWV	315	DL6NX	280	PY1AQT	250	WA8OSE	220	PY2DLC	180	WB2HBD	140
W5MB	315	WA3IUV	280	W2PBI	250	DK3LP	200	SM5BFC	180	W3BLC	140
K6EC	310	VS6DR	280	W4BKP	250	K2OLG	200	YV1YC	180	WA6LEN	140
FG7XL	305	K4MG	270	W7GOC	250	K4UAS	200	ZE1BP	180	WA7FFS	140
KH6BB	305	K8AXG	270	DL5GI	240	OZ8EA	200	FM7WN	160	WA9OHM	140
DL8NU	300	OE1MEW	270	K6OJO	240	W3KCS	200	W3YX	160	K9EHP	120
W6GRV	300	W2PDB	270	W6HUR	240	WA5AUZ	200	WA5ZGI	160	WA1HXY	120
G6LK	290	5H3LV	270	K6KQN	220	W6TTS	200	PY1MHB	160		

communications manager, that's who. The committees are advisory.

If this sounds dictatorial, take a closer look. On one of the advisory committees (the Contest & Awards Committee at headquarters) sit the general manager and assistant general manager, among others. These two officials sit on the committee only as committee members, to assist the communications manager, who presumably could replace them, but their participating as voting committee members serves the dual function of contributing their individual expertise and experience and of keeping them intimately advised on all controversial matters. The general manager, since he is superior to the communications manager within the headquarters organization, could overrule any decision made by the latter if he decided this was necessary. Although in some cases such decision did not follow his *personal* leanings, he has never yet done so.

The other committee is the Contest Advisory Committee, appointed by the president of the League and backed up by the Board of Directors. This committee so far has declined to participate in individual enforcement matters, preferring to confine its activities to formulation of rules – some of which may, of course, have enforcement considerations behind them.

The communications manager does not vote on either committee, is not an avid contester or award-seeker (although he participates tokenly in both), and must answer to both the general manager and Board of Directors for the decisions he makes in controversial matters. Any such decisions are usually "wrong" in the opinion of a sizable segment of people (hopefully not a majority) involved or interested.

If this be dictatorship, it is an involuntary and most reluctant one and heavy rests its crown of responsibility and the guillotine of consequences in today's mad, mad world. – *WINJM.*

5-Band Awards

(Updating the November 1971 listing.)

5BDXCC: (Starting with number 121), OK1MP W6DZZ W3WPG VK6HD W3WJD W2LWI W6MAR W3MWC G3TXF K2LGJ W9JT IT1ZGY K1KDP VE7BDJ WA3HGV W4SSU K8UDJ W3CRE W4CRW W2APU UR2AO VE3KZ EP2TW DL1RK PZ1AH W9RER DL7HU WA3IUV W6CN K1AGB K4BBF W2HO ZS5LB OK2DB W1FZ W4REZ DL6FN WØNGJ EA6BN W2PDB K4CEF CT2AK W1BIH F2MO K6HN W4BFR W3WGH K1HSN K2TQC W1GL.

5BWAS: (Starting with number 72), WA5YMW W6ITD KØAYO WA6CPP K1OME WØNQQ W4WSF W2PDB WA8VWK WA4FDR WA9NYA XE1J WAØIZF KG4CS W3AXW W6TTS K5YRK W4CRW K4KQ HR1KAS WA3HGV K2BK K7LTV W8SH W4SYL W4AZU K4CIA K4ZCP W6EJ WA6AAW WA4LDM W6CLM WA9ZAK WA2DZU WB4OGW.

In these days of raising requirements in one place and lowering them in another, the affiliated club that can maintain its ARRL membership at 100% deserves some special recognition. Headquarters bestows such recognition twice a year in the form of an honorary listing in *QST* and a special certificate.

Each year, as annual affiliated club questionnaires are received, those showing that all their members are also ARRL members are noted and put aside for this special honor. The list below are those clubs who are 100% ARRL according to questionnaires so far received. If your club is 100% ARRL, and is not listed below, it means we do not have your questionnaire form yet; fill it out and send it in, so you will make the next listing of 100% ARRL Clubs in December *QST*. Ladies and gentlemen, our Affiliated Club Honor Roll!

Aeronautical Center Amateur Radio Club, Oklahoma City, Okla.
Anderson Radio Club, Anderson, S.C.
Associated Mountain Toppers, Anaheim, Calif.
Athens Amateur Radio Club, Athens, Ga.
Atomics International-Rocketdyne ARC, Tarzana, Calif.
Central Kansas Amateur Radio Club, Salina, Ks.
Central Virginia Contest Club, Richmond, Va.
Connecticut Wireless Ass'n., Hartford, Conn.
Dividing Ridge Amateur Radio Club, Carrolltown, Pa.
Eufaula Amateur Radio Club, Eufaula, Ala.
Greater Cleveland VHF Radio Club, Maple Heights, Ohio
The Huntingdon County Amateur Radio Club, Mill Creek, Pa.
Kings County Band Scanners, Brooklyn, N.Y.
Lamar College Engineers ARC, Beaumont, Texas
Laurentian DX Club, Beaconsfield, Quebec, Canada
Lockheed Amateur Radio Club, Burbank, Calif.
Loudon County ARC, Lenoir City, Tenn.
Lower Columbia Amateur Radio Assn., Kelso, Wash.
Massillon Amateur Radio Club, North Canton, Ohio
Mike and Key Radio Amateur Club, Newbury Park, Calif.
Norfolk County Radio Assoc., Norwood, Mass.
Norfolk Radio Club, Norfolk, Neb.
North Jersey DX Assoc., Paramus, N.J.
Northeast Nebraska Radio Club, Norfolk, Neb.
Northern Illinois Amateur Wireless Assoc., Chicago, Ill.
128 Contest Club, Merrimack, N.H.
Order of Boiled Owls, Columbus Ohio Chapter, Reynoldsburg, Ohio
Potomac Valley Radio Club, Fairfax, Va.
Radio Amateur Transmitting Society, Hermitage, Tenn.
Radio Operators' Association of New Bedford, Fairhaven, Mass.
Roanoke Valley Amateur Radio Club, Roanoke, Va.
Rockaway Amateur Radio Club, Ridgewood, N.Y.
Rome Radio Club, Inc., Rome, N.Y.
Skagit Amateur Radio Club, Seattle, Wash.
Smoky Mountain ARC, Maryville, Tenn.
South Eastern Virginia Wireless Assoc., Norfolk, Va.
Southern Nevada Amateur Radio Club, Inc., Boulder City, Nev.
Victor Valley Amateur Radio Club, Victorville, California
W.E.N.S. Radio Club, Philadelphia, Pa.
Worthington Amateur Radio Club, Worthington, Minn.

CLUB COUNCILS AND FEDERATIONS

British Columbia Amateur Radio Association, Mr. Ernie Savage, VE7FB, Acting Secy., 4553 West 12th Ave., Vancouver, B.C., Canada

Chicago Area Radio Club Council, Inc., Mr. Karl A. Kopetzky, K9AQJ, Secy., 1052 Loyola Ave., Chicago, Ill. 60626.

Federation of Eastern Massachusetts Amateur Radio Assoc., Mr. Eugene Hastings, W1VRK, Secy-Treas., 28 Forest Ave., Swampscott, Mass. 01907.

Foundation For Amateur Radio, Ethel M. Smith, K4LMB, Secy., 2012 Rockingham Street, McLean, Va. 22101.

Hudson Amateur Radio Council, Inc., Mr. Stan Zak, K2SJO, 13 Jennifer Lane, Port Chester, N.Y. 10573.

Ohio Council of Amateur Radio Clubs, Mr. James W. Benson, W8OUU, 2463 Kingspath Drive, Cincinnati, Ohio 45231.

Radio Society of Ontario, Inc., Mr. W.W. Loucks, VE3AR, Secy., P.O. Box 334, Toronto 550, Ontario, Canada.

Tennessee Council of Amateur Radio Clubs, Mr. George W. Dowd, Sr., W4CYL, Secy., P. O. Box 2311, Nashville, Tenn. 37214.

West Virginia State Radio Council, Vivian L. Kibler, WA8OKG, Secy., 182 Monterey Drive, St. Albans, West Virginia 25177.

SCM ELECTION NOTICE

To all ARRL members in the Sections listed below.

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

ARRL CERTIFIED AT 35 WPM

January 1970 – December 1971

W1FDN	WB2KVL	K4FAC*	WA5ZKE	WB8BBG	WBØBVH*
WA1HOL*	WB2LYB	WB4FJK	WB6ATA	WA8EZW*	WØIYP
WA1KVC*	WB2NAG*	K4FN	W6BOW*	WB8GEQ*	WØLTB
K1IMA*	WA2NGB	W4GEQ*	K6CIO*	W8IBX	WØLZ
W1IOT/6	W2UJR*	K4KA*	K6DM*	W8ME*	WØNEE
WA1IRY*	WB2VPR*	K4KNP	W6ENO	K8NXN*	WØOOC*
WA1JTM	WA2YHK	WB4MLI	WB6ERT	W8OQH*	WAØRKU*
WN1NMM/KP4	W2ZRC*	WB4MRI	K6HEY*	W8PRM	WAØRVR*
W1ORF*	W3CQJ	K4MY*	W6KZJ	W8SRK*	WAØVKI/9
W1TEE*	WA3EXW	WB4ODN*	WA6LCF*	WB9AZZ*	WAØZIR
WA2AAJ*	WA3HTQ	WB4OMG	W6PMH*	W9BK	VE2AQV/W6*
WA2BCT*	W3INW*	WN4PZU	K6RHB*	WB9BXX*	VE3AIA*
WA2CAL*	W3JGT	WB4QNP*	K6SY	W9EI	VE3BHZ*
WA2CFG	K3JJJ/1	WA4TBN*	WB6TYZ*	W9ERW*	VE3CQA
W2CSQ	WA3JYV*	K4TXJ	K6UH*	W9FF	VE3DQY*
K2HBA*	WA3LAK*	K5AYH	K7AUZ/5	WA9GUM/3	VE3GIK*
K2HTQ*	WA3NTL	K5FJZ*	W7CTX	W9PIC*	KG6ARQ
WA2HVA*	W3TOS	K5KBH/4*	K7KSA	K9TXJ	KH6CB
WA2JLU	K4BOM*	W5KIW	W7LX*	WA9YKM	VP2AZ
W2JQM	W4BP	W5RB*	WA7RXF	WA9ZSA	YV5KL*
WA2JVB	W4COU	W5REL	W7TJ	WØBGX*	Benkey
W2KLN*	WB4DFO	WA5RRH	K7UQH*	WØBUR*	Matta*
					Weber

*Endorsement sticker

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been both the holder of amateur Conditional Class license or higher (Canadian Advanced Amateur Certificate) and an ARRL full member for at least two years immediately prior to receipt of petition at headquarters. Petitions must be received on or before 4:30 PM Eastern local time on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, Zip code of the candidate and signers should be included with the petition. It is advisable that a few extra full-member signatures be obtained, to insure that it will be valid.

Elections will take place as soon after the closing dates specified as full information on the candidates can be obtained. Candidates' names will be listed on the ballot in alphabetical order.

The following nominating form is suggested. (Signers should be sure to give city, street address and Zip code.)

Communications Manager, ARRL (Place and date)
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the . . . . . ARRL Section of the . . . . . Division, hereby nominate . . . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.

You are urged to take the initiative and file nominating petitions immediately.

George Hart, W1NJM, Communications Manager

Section	*Closing Date*	*Current SCM*	*Present Term Ends*
Ariz.	6/9/72	G.M.Hamman, W7CAF	8/9/72
W.N.Y.	6/9/72	R.M.Pitzeruse, K2KTK	8/17/72
S.J.V.	6/9/72	R.Saroyan, W6JPU	8/20/72
W.I.	7/10/72	*Pedro J. Piza, KP4AST	—
S.C.	7/10/72	E.Y.Miller, WA4EFP	6/26/72
Mont.	7/10/72	H.A.Roylance, W7RZY	9/9/72
Minn.	7/10/72	J.H.Halstead, KØMVF	9/10/72
N.Tex.	7/10/72	L.E.Harrison, W5LR	9/12/72
Sask.	7/10/72	B.Ogden, VE5BO (resigned 6/30/72)	1/11/73
Nev.	8/10/72	L.M.Norman, W7PBV	10/22/72
Utah	8/10/72	C.F.Soper, K7SOT	10/23/72
Ky.	8/10/72	T.H.Huddle, W4CID	10/30/72

*Acting SCM

SCM ELECTION RESULTS

Valid petitions nominating a single candidate were filed by members in the following sections, completing their election in accordance with applicable rules, each term of office starting on the date given.

S.C.V.	J.A.Hauser, WA6LFA	4/11/72
Ont.	H.H.Shepherd, VE3DV	5/11/72
Neb.	V.A.Cashon, KØOAL	5/29/72
Iowa	A.Culbert, KØYVU	6/10/72
E.Mass.	F.L.Baker,Jr., W1ALP	6/15/72
Wyo.	W.M.Moore, W7CQL	6/25/72

Strays

Feedback

The April FMT report incorrectly noted WA2GQT at 548.0 ppm. We stand corrected, OMs. WA2GQT wound up with 3.6 ppm – *fb!*

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In the May *QST* SS writeup, the score of the Mad River Radio Club was listed as the winner of the affiliated club competition, with a footnote indicating that it is under challenge and being investigated. After careful consideration of all facets, on recommendation of the Contest and Awards Committee, this score has been disallowed. Therefore, the Potomac Valley Radio Club is declared the winner of the Affiliated Club Aggregate Score SS Competition. The decision was based primarily on interpretation of the rule regarding attendance of meetings by members between 50 and 175 miles from the affiliation location.

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The 1971 ARRL cw DX Competition entry from K6LOM (L.A.) has been disqualified for logging discrepancies. The section leader becomes W6RR and the division high scorer W6MAR of San Diego.

All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE – SCM, Roger E. Cole, W3DKX – SEC: WA3DUM. RM: W3EEB. PAM: WA3GSM. The newly formed Delmarva Hamfest Committee has elected K3KAJ, pres. and W3ZNF as secy-treas. K3KAJ also is displaying a new Extra ticket in his shack. W3GUS was honored at the Army MARS Spring dinner meeting prior to moving to a new permanent QTH at Sun City, Ariz. W3FEG/4 is returning to Rehoboth after wintering in Fla. K3NEZ is an active OO with 17 notices mailed in Mar. W3EEB is checking into cw nets from his business location at the North Delaware KOA Campground. WN3SOO is a new licensee in the Newark area. WA3GSM, K3YHR and W3DKX are all working on newly acquired RTTY equipment. DEPN statistics for Mar.: QNI 53, QTC 7/7 154 minutes in session. Traffic: (Mar.) WA3QJU 230, W3EEB 71, W3DKX 36, WA3FRV 26, WA3DUM 24, WA3GSM 23, K3KAJ 2. (Feb.) WA3LTA 46. (Jan.) WA3LTA 73.

EASTERN PENNSYLVANIA – SCM, George S. VanDyke, Jr., W3HK – SEC: W3FBF. RMs: W3EML, K3BR, K3MVO, WA3AFI, K3PIE, W3CDB. PAMs: K3BHU, WA3PLP. OBS reports from K3EMA, WA3KFT, K3BHU, WA3AFI, W3CBH, WA3QOZ, WA3LWR, W3ID, WA3EEC. OVS reports from W3PST, WA3KFT, W3ZRR, W3CL, WA3EEC, K3EMA. OO reports from K3OIO, K3NSN, W3BFF, K3RDT, W3NNC, W3KEK, K3TXG, W3ZD, WA3EEC, K3EMA. PSHR this month WA3OGM, K3BR, K3OIO, K3MVO, WA3QOZ. BPLs: W3MPX, W3EML, WA3QOZ, K3NSN. Net activity:

Net	*kHz*	*Operates*	*QNI*	*QTC*	*RM/PAM*
PTTN	3610	6:00 P Dy	115	58	WA3AFI
EPA	3610	6:45 P Dy	492	410	K3BR
PFN	3960	5:30 P M-F	678	299	K3BHU
EPAEP&TN	3917	6:00 P Dy	415	205	WA3PLP

HK1AMW visited K3NSN both active on missionary nets. W3EML reports TCC doing real good, he is going to try vertical for 40 TFC nets. K3BR reports the EPA CW nets are doing fine. K3MVO retired but working at local radio station! WA3QFN should be on RTTY with model 19. W3AXA has rig problems but continues to meet his skeds. WA3CFU now has a 200 MW 6-meter rig going. W3CL now hot on 6-meter fm from car with repeater. WN3RKH finally captured his harmonics and put them at rest. WA3EEC active on 2 meters in Scranton area. Wyo. Valley ARC named W3KU and XYL as man and wife team of year! W3ID reports the IRC ARC seems to be destined for constant troubles! They always have to relocate. W3ZD keeps skeds with Cleveland on 2 meters. W3GMK says RTTY going to get organized for TFC. WA3QLC received his General this month. WA3RCA, Penn ARC now on 2-meter RTTY. WA3ATQ permenantly in the Poconos. W3PST recovering from two operations! WA3NNT made the big "A" ticket. New officers for Lancaster Radio Transmitting Society are WA3JMJ, pres.; K3HEC, vice-pres.; K3OEN, secy.; K3MAW, treas.; W3CWE, W3PIX and W3DYT, dir. Traffic: (Mar.) K3NSN 1008, W3EML 676, K3BHU 488, WA3QOZ 447, K3BR 283, K3PIE 248, WA3OGM 235, K3OIO 199, WA3KWU 118, K3MVO 113, WA3ATQ 100, WA3GUK 88, WA3QFN 60, W3ADE 47, WA3LVC 47, WA3AFI 46, WA3LWR 45, WA3GYT 36, W3HK 34, W3BNR 23, WA3OVZ 23, WA3IZ 19, WA3KKM 15, W3AXA 14, W3CBH 13, WA3CFU 12, W3KCM 12, W3YR 11, W3CL 9, K3KNL 8, W3OY 8, K3KTH 7, W3LC 4, WA3QLC 4, WN3RKH 4, WA3OZB 3, WA3BJQ 2, W3VA 2, WA3EEC 1, K3EMA 1, W3EU 1, W3GMK 1, K3HXS 1, W3ID 1, W3KFK 1, W3YPF 1, W3ZD 1. (Feb.) K3OIO 97.

MARYLAND-DISTRICT OF COLUMBIA – SCM, Karl R. Medrow, W3FA – SEC: K3KMO. RM: W3PZT. PAM: W3FCS. Last month W3EZT made PSHR with 40 points. Mar. PSHR leaders were W3FCS, W3EZT, WA3PJG, W3TN and W3OKN. W3TN and WA3PJG made BPL with originations and deliveries. MDD had 62 sessions with 502 QNI; MEPN 20 with 445 check-ins hand MDCTN 17 and 278 check-ins. W3OKN was traffic leader. AMSAT honors W3ZM by perpetuating his call. COMSAT's ARC call is WA3IGQ. The Randallstown ARC WA3NSZ has a new prexy WN3SOR. Springbrook High trusteeship goes from WA3IYS to WA8FAF/3. WA3EOP is busy checking the logs of the Worldwide VHF activity sponsored by the Itchycoo Park VHF ARS, WA3NUL. The Goddard ARC spawned new Novices WN3SKN, WN3SLD, WN3SLV, WN3SMJ, WN3SKO, WN3RVU and WN3RVV with WA3MIL showing them how. W3BHE is helping the Novices in the Cumberland area and invites you to the PO Net any Thur. at 6 P.M. on 3905. K3JYZ was multi-op in the DX fray. W3AU and his gang were the big guns to beat. W3FEB was the QNI leader with W3ABC getting the traffic disease. WA3IYS earned the CP-60 certificate from the Conn. Wireless Assn. WA3PJG has the 30 wpm sticker. W3OKN led the section in traffic. W3MSN finds SSTV rewarding on 20 meters to start his 5th decade of hamming. W3JZY still gets snow up in the mountains. WA3MSW is sporting a new rig and antenna. W3ZNW has a sneaky outlet on the Eastern shore – RTTY on 50 MHz. W3HXF has his rig temperature compensated and voltage regulated. W3QU opines it doesn't pay to volunteer around holidays. W3EOV has been trying DX on 20 and 15 and liking it. WA3OAO was home from Penn State for the holidays as was WA3LFU from Case. W3ECP reports the passing of W3BIO. K3NCM has No. 1 son, WN3OYP handling all the traffic. WA3RDU is a new OPS and qualified Class I OO. K3LFD took vacation. K3KMO had the AREC gang together at APL. The Hagerstown gang was out in force. W3LQY's Termite Log says K3QMD, pres.; WA3ERP, veep; K3LFD, secy.; WA3HEN, treas.; WA3NWS, dir. ARPSC note: WA3EHK FC Howard Co. reports that early in Mar., 10 amateurs along with CD, Police and Fire personnel participated in a 4 hour search for a lost 11-year old boy. All were members of Howard Co. RACES. Traffic: (Mar.) W3OKN 294, W3TN 256, W3QU 171, WA3PJG 147, W3EZT 68, W3FCS 66, WN3OYP 64, W3FA 62, WA3MSW 46, K3BA 45, WA3IYS 42, W3ABC 34, W3FZV 34, K3GZK 28, WA3IIV 23, W3EOV 18, W3ECP 17, WA3EHK 16, WA3LFU 15, W3ZNW 14, K3TNM 4, W3HXF 3, K3LFD 1. (Feb.) W3EZT 48, WA3RDU 11.

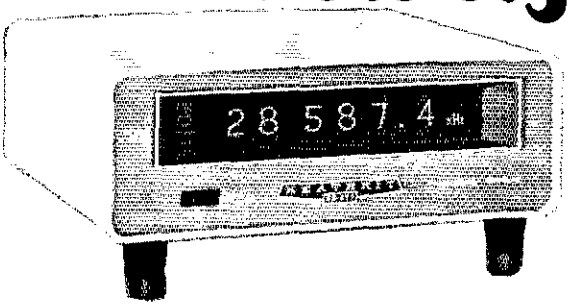
SOUTHERN NEW JERSEY – SCM, Charles E. Travers, W2YPZ – SEC: W2LVW. PAMs: WB2FJE, WB2HMU, W2YPZ. RM: W2JJ.

Net	*Freq.*	*Time(PM)*	*Sess.*	*QNI*	*Tfc.*	*Mgr.*
NJPON	3925	6 Su	4	90	17	WB2FJE
ECTTN	7290	5 M-F	30	326	91	WB2HMU
MCoVHF	145.9	8 F	2	7	0	W2YPZ

The following is a summary of activity carried on by the Gloucester Co. Radio Assn.: On Mar. 18 a 6-meter group provided communications for the annual clothing drive by the Goodwill Industries of Southern NJ. 10,000 bags were distributed to the 10,000 Boy Scouts in Camden County. Goodwill established seven collection points throughout Camden Co. Through the courtesy of Local 676 of the Teamsters Union, 7 trucks were dispatched to the various collection points which were manned by members of the JC's. At Goodwill Hq., W2OSD assisted by WB2BNE and K2UWH were set up with 6-meter equipment. The SIRA had WB2WRP/M located at the Scout Service Center in W. Collingswood. WB2GKH assisted by WA2MFS was at the Cherry Hill Mall; WA2WOD the Black Horse Shopping Center; WA2OVQ assisted by WN2AXI, Grant City in Clementon; WA2SEA the Echelon Mall and WB2FJE the Woodcrest Shopping Center in Cherry Hill. Operations started at 9:00 A.M. and continued until shortly after 3:30 P.M. The drive proved to be very successful. It is gratifying to note that in the Jan. CD Party, W2ZI led the South Jersey area. Traffic: WB2VEJ 331, WA2NJZ 75, WB2HMU 52, WB2FJE 8, W2ORS 7, W2YPZ 7, WA2KWB 1.

WESTERN NEW YORK – SCM, Richard M. Pitzeruse, K2KTK Asst. SCM: Rudy M. Ehrhardt, W2PVI. SEC: W2CFP. All appointees are reminded to check the expiration date of their appointment and get it to me if it needs renewal. K2CEC and WA2HCT have installed mobile 2-meter fm gear in their wheels. K2DWI and K2HYQ report their shacks went maritime mobile in spring floods. WA2LCC sports a new Tempo I. W2CUU was lucky in a way – robbers rifled his house but left the ham gear. W2SOK's

New digital readou



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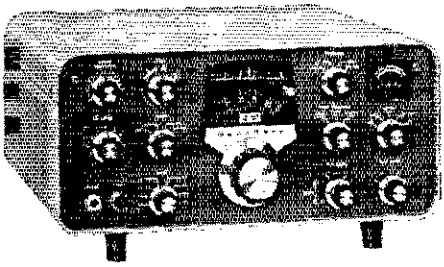
- **Full 80 through 10 meter coverage**

An exciting new piece of ham gear to bright-light your operating frequencies in digits, the SB-650 "reads" the three frequencies of a heterodyne circuit, then computes and displays the actual frequency to show you exactly where you are anywhere from 3 to 40 MHz, right down to tenths of a kHz. When used with a Heathkit SB or HW multiband transceiver, it displays both received and transmitted frequencies. Solid-state circuit uses 35 I (socket mounted), 6 transistors, 6 display tube and double sided glass epoxy board. Just 4 ea *adjustments, no tuned circuits.* Another "first" y can count on, from the hams at Heath.

Kit SB-650, 9 lbs., mailable ..... **$179.**

SB-650 SPECIFICATIONS — Frequency Range: 3-40 MHz (8 10 meters.) **Frequency Display:** 6 display tubes (kHz to places, plus tenths of kHz.) **Maximum Viewing Distance:** 30 **Maximum Input Signal:** 5v rms. **Accuracy:** 100 Hz ±1 cou **Compute Time:** 160 msec. **Sensitivity:** Adjustable. **Input I pedance:** 2000 ohms. **Internally Generated Spurious Frequ cies:** Approx. 0.25 uV equivalent signal level. **Crystal (clo Frequency:** 1 MHz. **Crystal Aging Rate:** Approx. 10 ppm/ye **Ambient Crystal Stability:** Approx. 10 ppm from +10 +65°C. **Ambient Operating Temperature:** 0°-+40°C. **Am ent Storage Temperature:** —55° to +80°C. **Power Sourc** 120/240 VAC, 50/60 Hz, 10 W. **Dimensions:** 3½" H x 10" x 10" D.

Heathkit SB-102 — the big one on 80-10 — $385.00*



Big in popularity because it's big in performance and value, the SB-102 has what it takes to take you anywhere. Sensitivity better than 0.35 uV for 10 dB S+N/N ratio. Solid-state linear master oscillator with 1 kHz calibration, less than 100 Hz drift per hour after 10 minute warmup, and a dial resettable to 200 Hz with bandspread equal to 10 feet per MHz. Front panel selection of built-in 2.1 kHz SSB filter on optional 400 Hz filter, and upper or lower sideband. Built-in 100 kHz crystal calibrator. 180 watts PEP SSB input, 170 watts CW input; built-in sidetone for monitoring; triple action level control to reduce clipping and distortion; built-in VOX; five-position metering facilities. Easy circuit board and wiring harness construction.

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Kit HP-23A, AC supply **$51.95***
Kit HP-13A, DC supply **$69.95***

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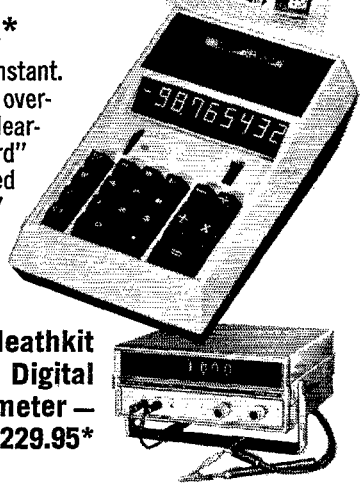
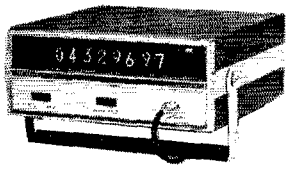
Kit IC-2008, 11 lbs., mailable **$129.95***



NEW Heathkit 8-Digit 120 MHz Counter — $349.95*



Measures from 1 Hz to over 120 MHz with 8-digit readout plus overrange, gate and two range indicators. Pre-assembled TCXO time base. 1 megohm FET input. Automatic triggering level. Sensitivity 50 mV or less to 100 MHz, 125 mV to 120 MHz. Uses latest ECL (emitter coupled logic). Assembles in 15 hours. All ICs mounted on plug-in connectors. Plug-in fiberglass circuit boards. 120/240 VAC.

Kit IB-1102, 12 lbs., mailable **$349.95***

NEW Heathkit Digital Multimeter — $229.95*

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Kit IM-102, 9 lbs., mailable.....**$229.95***

NEW Heathkit Solid-State FET VOM — $79.95*

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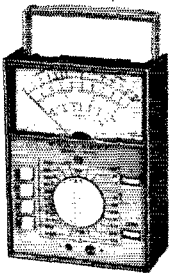
Kit IM-104, less batteries, 4 lbs., mailable **$79.95***



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home and shack were claimed by fire. WB2JLG is active again in WNY after spending three years in 47 countries. W2EED has a new NCX-1000. WB2NRS has a 1000-ft. antenna. W2FSB tries his luck with an HW-12 with one output tube. RAWNY elected W2KX, W2HB, W2PLG and W2TAX as officers and WA2BDD, W2TAX, W2KX and W2HB as dir. We welcome W2EMX back from N.C. K2DXE has a new bride to go with his new QTH. W2RFY returns to WNY from Hawaii. Sorry to hear of the passing of XYL of WA2ANE. The Univ. of Buffalo Club elected WA2EAJ, WB2HDM, WA2CHV and WB2DEI as officers. WA2MUB and WB2AMW qualified for ESS certificates. With W2WS's move to Fayetteville, K2DUB picks up EC chores for Cayuga Co. The Auburn ARA is making big plans for Field Day and reminds Auburn hams of the club's existence. The Glens Falls Area AREC group participated in the White Water Derby. Welcome to WN2DPY, WN2QWF, and WN2ADW to that group. NYS handled 413 messages with 840 check-ins. WA2JEQ has a new HW-101. WB2NSU is a new asst. EC for Herkimer Co. WB2BXZ has a new Drake 2-C and 2-NT. K2FJ recently returned from a DXpedition to VP2VAN and PJ8DX. He now is QSLing the 1112 contacts he made. WN2EDN is on the air with a DX-60. WA2EGO has a new Quad on 2. WB2FAW is testing a horizontal quad for 80! W2CFP reports that so far, he has located 255 AREC members in WNY – are you one of them? June 17 is the date for the RARA Annual Picnic. RAGS and the Syracuse VHF Club are holding a joint hamfest/VHF Roundup on Oct. 7. Sorry to report the passing of W2UXP. W2RQF wants to emphasize to all hams that one does not, repeat DOES NOT have to work for the PO to become active in the Post Office nets. BPLer W2OE is back BPLing again after his vacation in Fla. K2KTK just purchased a new 3 KW rig – for the im station he is Chief Engineer of. (Whew!) Traffic with the * indicating PSHR: (Mar.) WA2ICU* 304, W2OE 302, W2RUF* 214, WA2ELD* 152, W2FR* 147, K2QIW 137, K2JBX 113, W2MTA* 111, W2MSM 84, W2FZK 72, W2BU* 70, K2UIR 62, W2RQF 56, K2KTK* 52, WB2VND 52, WA2SIR 50, W2EAF 43, W2FEB 43, WB2AFS 34, K2OFV 32, WA2EWC 28, WA2MPC 23, WN2SIS 22, K2DNN 17, WA2ITJ 17, WB2EEX 13, WB2AMW 12, W2PVI 12, WA2TLB 12, WB2LQP 11, WA2OMN 9, WA2ICB 8, WA2JEQ 7, W2CFP 6, K2IMI 6, WA2ANE 4, K2BWK 4, WB2FPG 4, W2PNW 4. (Feb.) WA2LCC 4. (Jan.) WB2FAW 46. (Dec.) WB2FAW 2.

WESTERN PENNSYLVANIA – SCM, Robert E. Gawrylu, W3NEM – SEC: W3KPJ. PAM: K3ZNP. RMs: W3LOS, W3KUN, WA3IPU. WPA CW Net meets daily on 3585 kHz at 7:00 P.M. KSSN meets Mon. through Fri. at 6:30 P.M. on 3585 kHz. The Penn State University ARC, WA3HCG, has a newly formed newsletter called "The Unbiased Emitter" with WA3JIH as its editor. They also report their trustee W3LNW passed his Extra Class exam. Congrats to LNW and the PSU ARC. Steel City ARC honored W3UHM as Member of The Month. Two Rivers ARC celebrated their Tenth Anniversary with a dinner dance and banquet. The turnout was so great they had to use a nearby club's facilities to handle the overflow. Closed circuit TV was used to unite everybody. Indiana County ARC reports the following new officers: WA3MHW, pres.; K3SIS, vice-pres.; WA3RYL, secy.-treas.; W3ELZ, W3AEN, W3IYI, WA3KSA, dir. They also report K3ZYK is now overseas. Etna Radio Club reports WA3NWN is teaching blind students code and theory for their General Class exams. Fabulous. WA3OTO, WA3PVC, WN3KEJ, WN3MZD are new General Class licensees. It is with deep regret we record the Silent Keys of W3OC, K3TDB, W3KDL, WA3ELC. The Radio Amateurs of Erie ARC has formed a Mobile Activities Committee to help coordinate activities with AREC and CD. WPA CW Net had 31 sessions in Mar. with 409 stations and 235 messages handled. KSSN had 17 sessions with 62 stations and 15 messages handled. Traffic: W3NEM 184, W3YA 161, W3KUN 160, W3LOS 120, K3ZNP 118, WA3NAZ 115, WA3IPU 91, W3MJ 65, K3HCT 41, WA3HSR 26, WA3MDY 25, K3SMB 21, K3ASI 16, W3SN 14, K3SJN 13, K3VQV 12, W3IDO 10, WA3IYA 8.

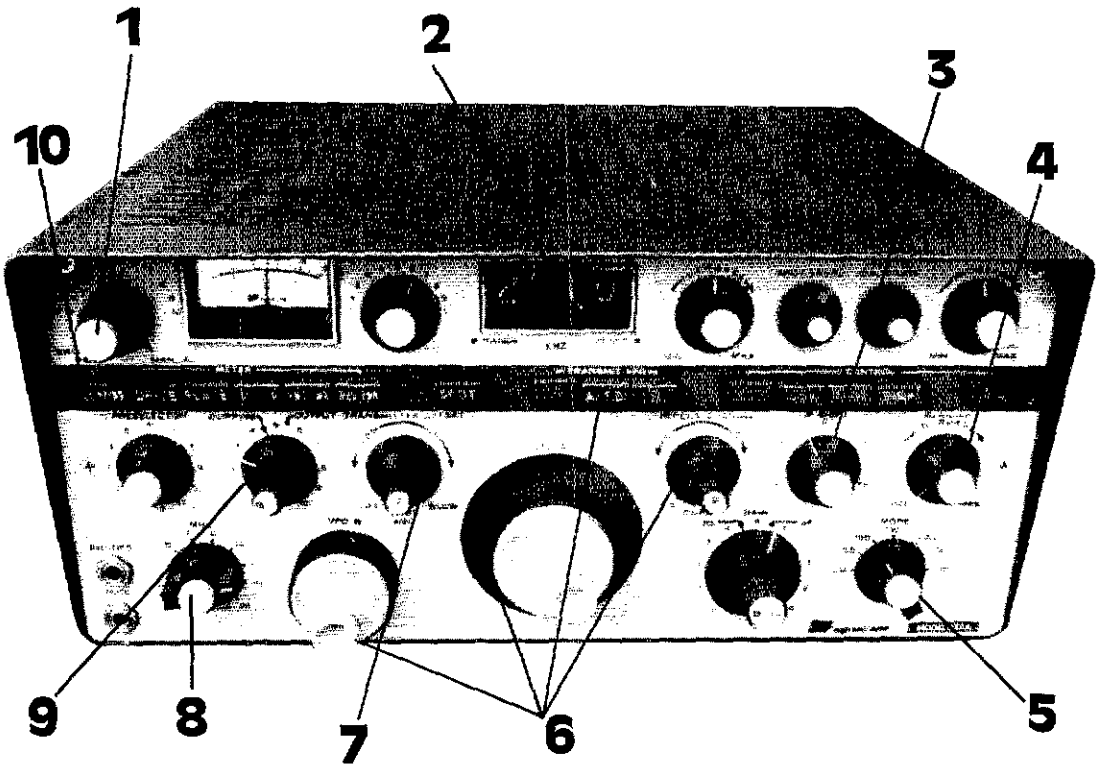
CENTRAL DIVISION

ILLINOIS – SCM, Edmond A. Metzger, W9PRN – SEC: W9RYU. PAMs: WA9CCP and WA9PDI (vhf). RM: WA9ZUE. Cook County EC: W9HPG.

Net	*Freq.*	*GMT/Days*	*Tfc.*
IEN	3940	1400 Su	4
ILN	3690	0030 Dy	130
NCPN	3915	1300 M-S 1800	112
III PON	3915	2245 M-F 1430	674
III PON	145.5	0200 MWF	20
III PON	50.28	0200 M	9

The Chicago FM Club will hold their Radio Expo '72 at the Lake County Fair Grounds on July 8 and 9. Ex-W9GXR would appreciate

Somebody once said there's no price for perfection.



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hearing from old Bloomington-Normal friends – now KØCHE, Box 58, New London, Minn. 56273. The Lincoln Land Community College Amateur Radio Club of Springfield, has been declared a duly affiliated society of ARRL by the League's Executive Committee. The Egyptian Radio Club Picnic and Swap will be held Sun. June 25 at the Egyptian Radio Club Grounds. W9EY is resuming his talks before local radio clubs. The officers of the newly formed Jefferson Jr. High ARC (Mansfield, Ill.) are WN9GHT, WN9HFD, WN9HSA, WN9HSB, WN9HSC, WN9IBC, WN9IEV, WN9IBR and their club station is WB9JFU. WB9HWS is now completing his EE at Northern Ill. Univ. WA9ZLN and WB9CGP are studying flying. WA9UCX is recovering well after an illness. WB9BEK and WB9BEL have moved to Roselle. Hamfesters Radio Club held their Old-Timers Nite with Bill Berner, one of the charter members as guest speaker. WN9IER is a new Novice in the Springfield area. W9PRN has been elected to the Springfield School Board. WB9GAG is a new Tech. from Park Forest. Mark your calendars now – Field Day is June 24 and 25. WB9CYI reports the new officers of the McHenry County ARC are K9KDX, WB9CPT and WB9HPX. K9SND is Argentina bound and will be operating LU2DZ on possibly 15 meters. WN9HEG is leaving for France. New hams in the Hauser Jr. High School Radio Club are WN9IMV, WN9INQ, WN9IUF and WN9JIH. W1ICP of ARRL Hq. was guest of the Wheaton Community Radio Amateurs during their Apr. meeting. The Chicago Amateur Radio Club held their annual party for the Old-Timers on Apr. 11. This column's sympathy to the family and friends of W9ZDQ who passed away in Feb. Our sympathy to W9JSF whose wife also passed away. Traffic: (Mar.) K9AVQ 241, WA9ZUF 187, W9NXG 172, WA9ZLN 106, W9JXV 88, WA9OBR 87, WA9LDC 75, W9LNQ 64, W9DOQ 42, WA9RTB 39, WB9FHJ 37, WB9AWY 33, W9LFD 23, W9TAL 20, W9HOT 19, WA9NZF 15, W9PRN 14, WB9ELP 5, WB9HWS 4. (Feb.) KØZTV 18. (Jan.) K9ZTV 5.

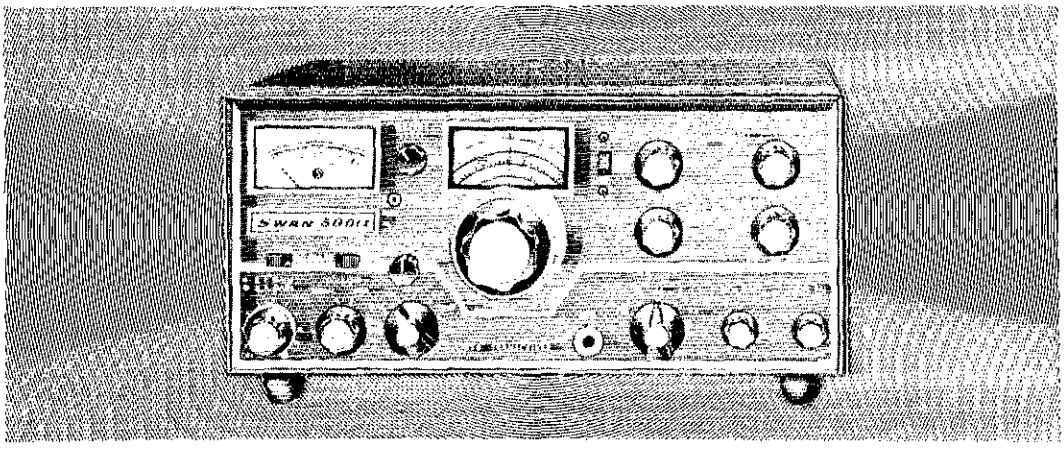
INDIANA – SCM, William C. Johnson, W9BUQ – SEC: W9FC. RMs: WB9ANT, W9FC, W9HRY, WA9ZKX. PAMs: K9CRS, WA9OHX, (vhf) W9HWR, W9PMT.

Nets	*Freq.*	*Time(Z)/Days*	*Tfc.*	*Mgr.*
ItfoN	3910	1330-2300 Dy 2130 M-S	461	WA9OHX
QIN	3656	0000-0400 Dy	139	WB9ANT
PON	3910	1245 Su 1830 S-S	18	WA9UMH
PONVHF	50.7	0200 T-T	65	WA9TJS
Hoosier VHF			56	W9PMT
PON CW	3740	2400 Dy	22	WB9AHJ

Indiana Radio Club Council Hamfest will be at Layfette, Ind., Sun. July 9, 1972 at the Tippecanoe County Fairground. 3910 kHz – 149.94 MHz are talk-in frequencies. Clark County Emergency Net changed to Southern Ind. Emergency Net, 50.7 - 146.34/94 - 146.94/94. K9BPV and WA9ZMZ are proud owners of a TB-101 and B-102 Heath Frequency Counter. W9JBQ is back on the air. WB9GLK has a new Hi-Par 2-meter beam. WA9WUA is back since losing his antenna in Dec. WA9POM has a new transmitter. OMIK Assn. will hold their Spring meeting at the Holiday Inn North in Cincinnati, Ohio June 23, 24, 25. W9BUQ has a Model 15 T-T. Ind traffic nets need more coverage in the NE and SE sections. Counties without ECs are Pike, Spencer, Perry, Dubois, Crawford, Orange, Davies, Martin, Greene, Morgan, Brown, Shelby, Decatur, Rush, Franklin, Union, Blackford, Grant, Miami, Fulton and St. Joseph. Holders of the Hoosier Courtesy award should send in the name of some deserving amateur. Also, the Outstanding Amateur Award for Ind. is to be given to the one who has done the most to foster amateur radio. QIN Honor Roll: W9EI 53, W9QLW 47, K9OPL 43, W9GZT 38, WB9ANT 32. Amateur radio exists because of the service it renders. Traffic: (Mar.) WA9WJA 373, W9QLW 215, WA9OHX 112, WA9TJS 101, WA9GVT 97, W9RUQ 84, W9PMT 64, K9CBY 59, W9FWH 58, WA9WNH 54, W9HRY 47, WB9AHJ 42, W9EI 41, WA9YXA 41, WB9EAY 37, K9JQY 24, K9YBM 24, W9ULH 22, WA9WMF 21, WA9CHY 20, K9RPZ 19, WA9OAD 16, K9DIY 15, WA9AXF 14, K9KFM 14, K9RWQ 14, W9JBQ 12, W9RTH 13, W9DZC 12, WA9GJZ 12, W9IRT 11, W9WWI 1, W9FJI 10, K9ILK 10, W9LG 10, K9YBM 10, W9HWR 9, K9EFY 8, W9EBR 5, K9QVT 5, W9KWB 4, WB9AMB 2, WB9ECP 2, W9BD 1, WA9BVL 1. (Feb.) W9EI 105, WB9GVT 71, WA9YXA 26, WA9BVL 1.

WISCONSIN – SCM, Joseph A. Taylor, W9QMT – SEC: W9NGT. PAMs: K9EHI, WA9OAY, WA9QKP, WA9PKM. RMs: W9KQB, K9KSA, WB9DXK.

Net	*Freq.*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
WSBN	3985	2300 Dy	1401	147	K9EHI
WIN	3662	0115 Dy	220	78	WB9DXK
BEN	3985	1800 Dy	840	104	WA9QKP



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510X Crystal Oscillator	**$ 49**
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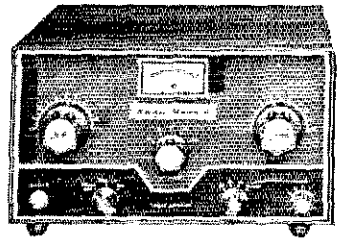
MARK II Linear Amplifier



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SW2RN	145.35	0230 Dy	139	4	WA9PKM
Wi-PON	3925	1801 M-F	599	133	W9EMC

New officers for WNA are K9KSA, chmn.; WA9LRW, secy.; WA9OAY, treas. The WNA picnic will be held at Green Bay's Pamperin Park July 9. The Green Bay VHF Repeater Club held a meeting Mar. 6 and plan on a 28-88 machine 500-Ft. up on a local TV tower. New calls, K7RSQ/9 now W9MMP and K9DKU now W2GUH operating from Schenectady. W9NRP reports Wis. RACES had 54 QNI and Wis. QCWA 92 for Mar. If you have a license dating back 25 years or more contact W9NRP about membership in the QCWA. New board for WVRA are W9GKJ, W9RQM, WA9VLB, K9EYA, K9HJS, K9JPS and K9KSA. K9IXW/ET3USD has returned to Wausau. SEC W9NGT reports that it was not necessary to activate River Level operation this year. He also is planning a severe WX operations plan for all ECs. Check your EC for details. Congrats to W9CXY on BPL, the fourth in a row. Also to the following for new or renewed appointments: W9ZBD EC; WA9SUU and W9GF OOs: WA9SUU and W9ESJ OPSs; WB9BJR, W9NZF and W9UCR ORSs. Traffic: W9CXY 612, K9CPM 406, WA9ZAZ 202, WB9CIL 193, W9DND 187, W9ESJ 135, K9FHI 89, K9KSA 77, W9MMP 77, WB9ABF 66, K9JPS 36, WB9DXK 35, W9KRO 34, WA9OAY 33, W9BCH 31, W9UCR 28, W9AOW 27, WA9BZW 26, WA9LRW 17, WA9PKM 17, W9DXV 16, W9ZBD 13, W9NRP 11, W9JR 8, K9UTQ 7, W9KMF 6, WB9CMD 3.

DAKOTA DIVISION

MINNESOTA – SCM, John H. Halstead, KØMVF – SEC: KØLAV. RMs: WØZHN, WAØYAH. PAMs: KØFLT, WAØHRM. WNØFMR reports that WBØCFF, WBØCNM, WBØDDH and WNØFMR took the Advanced Class exam on Good Fri. and all passed. Congratulations. WAØQIT reports the Arrowhead Radio Amateurs will sponsor a picnic at Chambers Grove Park near Duluth on July 23, 1972. The Park is located on Highway 23 at Fon du Lac. Two meter talk-in on WØGKP 34/94 at noon. KØVPM notes increased activity on Minn. RTTY Net. 15 check-ins in Mar. 3620 kHz Sun. at 8:00 P.M. local time. Minn. net directory as follows:

Net	*Freq.*	*Time/Days for duration of CDST*
MSN 1	3685	2330 Dy
MSN 2	3685	0300 Dy
MJN	3685	0000 Dy except M (Su evening)
MSPN 1	3945	1705 Dy except Su & Holidays 1400 Su & Holidays
MSPN 2	3942	2245 Dy
PAW	3925	1400 to 1700 & 1800 to 2200 1400 to 1700 S (no Su)
Piconet	3925	1800 S/Su
Handi-Ham	3925	1830 S
AREC	3912	2200 Su
Minn. RTTY	3620	0100 M (Su evening)

Traffic:WAØVAS 963, WAØYVT 233, WØZHN 221, WAØGRX 203, KØZRD 191, WBØCNM 122, WBØDZA 107, KØPIZ 100, WAØEPX 91, WAØIAW 88, WAØONE 87, WØWFA 81, KØMVF 67, WAØTFC 66, WAØYAH 44, WAØYWA 44, WBØBRG 40, KØFLT 37, WNØCWC 35, WAØDCQ 35, WBØDYZ 31, WAØSGJ 29, WØBUC 28, WAØHRM 28, WØWAS 27, WAØVYB 26, KØZBI 22, KØWXH 20, WØFHH 19, WAØMMV 18, WNØFMR 17, WAØJPR 15, WBØCFF 13, WAØUWT 12, WAØPZY 10, KØICG 9, WAØNOH 9, WAØYGE 9, WBØATE 8, WØOBB 8, WAØVHX 6, WØUMX 5, WBØDDH 4, KØSXQ 4, WAØWZY 4, WNØGKH 3, KØZXE 2.

NORTH DAKOTA – SCM, Harold L. Sheets, WØDM – SEC: WAØAYL. OBS: WBØATB. RM: WAØMLE. OO: WØBF. Under the leadership of RM WAØMLE and WAØELO the North Dak. CW Traffic Net has been reactivated. The net meets at 10 P.M. CST on Mon., Wed., Fri. and Sat. on 3642 kHz. Here is a chance for all operators to improve their code speed and operating techniques for emergencies. Don't be afraid, they will QRS for you. WAØRWL will represent his district at the State Science Fair at the U. of N. Dak. KØBWZ, WAØREW, and WØNMV were in the hospital. New calls are WBØGXI and WBØHAH. KØPYZ is home from Chicago. KØGGL is making headway with a slow-scan converter. WBØFDT has new antenna up and also lent a hand to WBØBUF to get her antenna up. The repeater station in Grand Forks is progressing in spite of the many problems which developed. Two meter activity is picking up in the Red River Valley. KØAWU has a new rig on 432 MHz ssb and cw. WØDM gave Novice exams and is teaching operating procedure to his class at Valley Jr. High.

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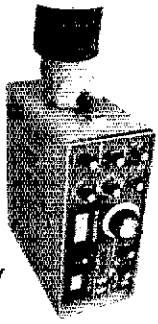

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Nets	*kHz*	*GMT/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
Goose River	1990	0900 Su	4	17		WØCDO
YL Wx	3995	0730 M-F	23	390	329	WAØGRX WAØMND
PON	3996.5	0900 Su 1830 S-S	12	367	28	WAØSJB
RACES	3996.5	1730 M-F 1830 M-F	46	861	81	WBØATJ

The Bismarck RC will sponsor a special QSO party in conjunction with the 100 year Centennial of Bismarck during the week of July 23 to 29. Special QSL cards will be given for all contacts. Suggested frequencies for fone are 3.975, 7.270, 14.320 MHz and cw 3.575, 7.045 and 14.055 MHz. Traffic: WAØMLE 225, WAØKWM 136, WAØELO 105, WAØAAD/Ø 76, WAØSUF 52, WØDM 32, WØWWL 30, WØBHT 26, WØCDO 25, WAØJPT 25, WAØRWK 20, WØMXF 10, WAØSJB 10, WBØBUF 8, WAØIZF 2, WBØEDT 1.

SOUTH DAKOTA – SCM, Ed Gray, WAØCPX – WAØLYO has a new SB-303 Heathkit receiver and hopes to get up a beam at Wood. WAØYRI has a TR-4 for mobile use. WØDNV enjoyed 2-meter fm contacts on their recent trip to the southwest. KØCXL and WØLXH are new stations on the Rapid City repeater. New Novices are WNØGID, WNØHBI; the following Novices will have general calls shortly: WNØEVQ, WNØBDW and WNØBDY. WAØEXZ is a Silent Key. WØIG is back on the air after being in the hospital. All nets report good activity. Traffic: WØZWL 613, WØMZI 336, WØHOJ 164, WAØUEN 64, WAØBZD 34, KØAIE 27, WØOFP 3.

DELTA DIVISION

ARKANSAS – SCM, Jimmie N. Lowrey, WA5VWH – SEC: W5RXU. PAM: WA5OMQ. RM: WA5TLS. Welcome to K6KCB from San Jose; our new ORS appointee who can be heard quite often on OZK. WB5BID runs the Drake 4-line and has worked over 100 countries as a Novice and now as a General. WN5FMJ and WN5FMK have recently worked all states, both have new beams up. WA5EVW runs all Swan equipment with a 500-CX at home and a 500-C with a Swan antenna mobile. K5DKT has a Heath phone patch and watt meter. There were approximately 100 people at the OZK picnic in Apr. Many enjoyed meeting with Delta Division Dir. W4WHN.

Net	*GMT/Day*	*Freq.*	*Mgr.*
Razorback	0030 Dy	3995	WA5QMQ
DX Info	0045 Tu	3995	W5QYH
OZK	0100 Dy	3790	WA5TLS
CAREN	0200 Th	146.34/94	W5RXU
Ark Phone	*1200 M-S*	3937	W5VFW
Ark PON	2130 M-F	3925	W5QEQ
Ozark	2330 Dy	3995	WA5ZKE
Teenage	2130 SS	3978	WA5ZKE

Repeaters: Fayetteville WA5SNO 52.550/53.020; Fort Smith WA5YUT 146.34/94; Forrest City WB5EKF 146.16/76; Jonesboro *W5RHL 146.34/94*; *Little Rock W5DI 146.34/94*; Hot Springs W5ZF 146.28/88. Traffic: W5NND 142, WA5ZKE 119, K6KCB/5 89, WA5EVW 40, K5DKT 4.

LOUISIANA – SCM, J. Allen Swanson, Jr., W5PM – SEC: W5OB. RM: WA5OVE. PAM: WA5NYY. VHF PAM: WA5DXA. Our RM reports traffic is down somewhat on LAN but the number of stations reporting in is increasing week by week. I would like to thank the gang for the many get well cards during my recent problem. The medicos state I'm OK now! W5TVW and W5IUKQ are working on FAX operations. Interested parties write W5TYW with an SASE for more detailed information. We deeply regret to report WA5NYL as a Silent Key. W5MI made BPL with a traffic total of 523! WA5OXK has made DXCC on phone. New officers in LARC are K5OPG, pres.; W5EXI, vice-pres.; WA5QQB, treas.; K5ARH, secy. WA5WWF and WA5WZA are ramrodding the FD activities up Lafayette way. LARC is sponsoring a new Novice class with WA5QQB as instructor. Being SCM has been a very enjoyable experience. I regret that during the last few months illness has prevented me from doing the job properly. Get behind your new SCM and keep him informed of your activities. Without your help the position is almost impossible to handle. And from experience there are so many facets to our radio game it is almost impossible to spend any amount of time with any one activity. And so for now thirty! Traffic: W5MI 523, WA5OVE 95, WA5WBZ 24, WA5OXK 5.

MISSISSIPPI – SCM, Walker J. Coffey, W5NCB – SEC: WA5JWD. RMs: WA5YZW, WB5DEK. PAMs: W5JHS, WA5KLY, K5MDX. The Novice Net needs your interest and participation. Field Day operations from a Federal or State Park may require a permit. Better look into that beforehand.

Net	*Freq.*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
MTN	3665	0045 Dy	155	136	WA5YZW

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MNN	3733	2400 MWF	52	27	WB8DEK
GCSBN	3925	2330 Dy	–	–	W8JHS
CGCHN	3935	0100 Dy	1628	86	WA8LZB
MSPON	3970	2345 M-S	70	10	WA8GVO/5
MSBN	3987.5	0015 Dy	979	201	WA8TWI

Congrats to: WA8IMU upgraded license 3 steps to Extra; WN8AKN now WB8OGH; WB8CAV now W8YX; WN8EJB now WB8EJB. Two new nets in operation are Miss. PO Net, sked above and Purple Martin Net which meets on Sun. at 2200Z with WA8MPQ mgr. Welcome to new hams WN8s: GCO, GCP, GCQ, GCR, GCS, GCT, GCU, GDI, GEK, GEM, GEY, GFD, GGU, GGV, GHA, GHD, GIE, GIS, GKJ. Appointments: ORS and OPS, W8AMZ, K8UBL. The Jackson County ARC is now organized with 15 members. MNN certificates went to WN8CIG and WN8DLW. Traffic: W8SBM 376, WB2KZM/8 253, WA8YZW 146, W8WZ 103, W8NCB 73, W8EDT 69, K8YTA 62, WB8EIN 38, W8AMZ 34, K8YUW/8 33, WB8DEK 28, WB8BKM 23, W8BW 6, WN8EJO 1.

TENNESSEE – SCM, O.D. Keaton, WA4GLS – SEC: WB4ANX. PAMs: W4PFP, K4MQI, WA4EWW. RM: W4ZJY.

Net	*Freq.*	*Time(Z)/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
TPN	3980	1245 M-F 1400 S-Su	31	1787	55	W4PFP
ETPN	3980	1140 M-F	23	529	21	WA4EWW
TCN	3980	0200 Th	5	57	0	WB4MPJ
TN	3635	*0100 Dy*	*31*	291	158	*W4ZJY*
KVHFN	50.7	0200 T	4	18	0	WB4MPJ
MTTMN	28.8	0200 T&F	8	88	0	W4PSN
ETTMN	28.7	0200 W&F	10	79	1	WA4QXC
ETVHFN	50.4	0100 TTh&S	14	100	0	WB4IOB
ETVHFN	145.2	0100 W&F	9	32	0	WB4IOB K4MQI
TSSBN	3980	0030 M-S				WB4BHZ
TNN	3720	0000 Dy	28	149	47	WB4USG
TPON	3980	0030 M				WB4BHZ
THARCN	7288	0130 W&F	9	81	3	WB4QNK

The Music City Hamfest will be held June 18, 1972, near opryland, in Nashville, everyone plan to attend – info from WA4GLS. WA4UAZ is now a DX station – GM5AXO. He is looking for U.S. stations 20 ssb/cw, 15 ssb/cw and 80 cw. Sorry that WB4DAJ had to resign as RM, but want to commend him on a job well done. The TN still is in capable hands with W4ZJY as the new RM, please *support him as you did Walt. Traffic:* W4ZJY 151, W4SQE 132, WB4YCV 66, WB4USG 60, K4AMC 47, WA4GLS 40, WB4KZX 35, W4YAC 35, W4WBK 29, WB4MPJ 24, W4PFP 22, WB4MYZ 19, WB4NEG 19, WA4YEG 17, W4CYL 16, WB4ANX 14, WB4BZC 12, WB4FKI 11, WB4DYJ 9, WB4FEC/4 9, W4YAU 8, WB4EHK 6, K4SJV 4, WB4TPS 3, K4MLC 2.

GREAT LAKES DIVISION

KENTUCKY – SCM, Ted H. Huddle, W4CID – SEC: K4YZU. Appointments: W8HTQ/4, WA4JQS and WA4ZVL as ECs. Endorsements: K4PW as ORS; W4KJP as OPS; K4FPW as OVS and OBS. BPLs: W4OYI and WB4PSP.

Net	*QNI*	*QTC*	*Net*	*QNI*	*QTC*
KRN	406	26	KYN	228	152
MKPN	646	75	KNTN	307	137
KTN	1359	205	KPON	80	20

Hip! Hip! Hip! Hooray! On Mar. 23 Governor Ford signed SB-204 *into law and officially gave Kentucky hams call letter license plates.* The signing climaxed a drive that started last May. All Ky. amateurs are to be congratulated on a fine united effort. Details of when and where to apply will be announced soon. Some hamfest dates to mark down: Somerset July 9 and Louisville Aug. 27. Monitor the nets for others to be announced. W4CDA is trying stir up more activity in Danville. Traffic: W4BAZ 270, WB4PSP 210, WB4UGU 206, WN4WCM 150, WB4KPE 179, WA4JQS 107, W4OXM 99, K4MAN 69, WA4VZZ 68, WB4AUN 67, W4OYI 62, WB4PSJ 61, W4CID 54, WB4EQR 53, K4TRT 46, WB4TPF 40, W4CDA 34, WB4ILF 30, WA4ENH 26, WA4GHQ 20, WB4PVC 17, WB4TTV 17, WA4AVV 16, W4BTA 14, K4TXJ 10, K4AVX 9, W4KJP 9, K4LOL 9, K4YCB 9, WA4FAF 8, W4IOZ 6, WB4GCV 5, WA4AGI 3.

MICHIGAN – SCM, Ivory J. Olinghouse, W8ZBT – Asst. SCM B. Peter Ireml, W8KBZ. SEC: W8MPD. RMs: W8JYA, W8WVL, *W8RTN, K8KMQ, W8GLC. PAMs: WA8TAN, K8MJK, K8PVC* VHF PAMs: K8AEM, WA8WVV.

Net	*Freq.*	*Time/Days*	*QNI*	*QTC*	*Sess.*	*Mgr.*
QMN	3663	2300 Dy	1115	529	93	W8IY/
WSSB	3935	0900 Dy	760	118	31	K8PV(
BR/MFN	3930	2230 S-F	806	70	27	WA8TAI
UPEN	3920	1230 Dy	488	47	31	K8MJI
GLETN	3932	0230 Dy	790	90	30	W8KFI
PON	3955	1600 Dy	980	405	31	K8LN
PON/CW	3645	*2400 M-S*	*138*	*27*	*27*	*VE3DP(
MI-6M	50.7	0000 M-S	351	24	21	WA8LR(

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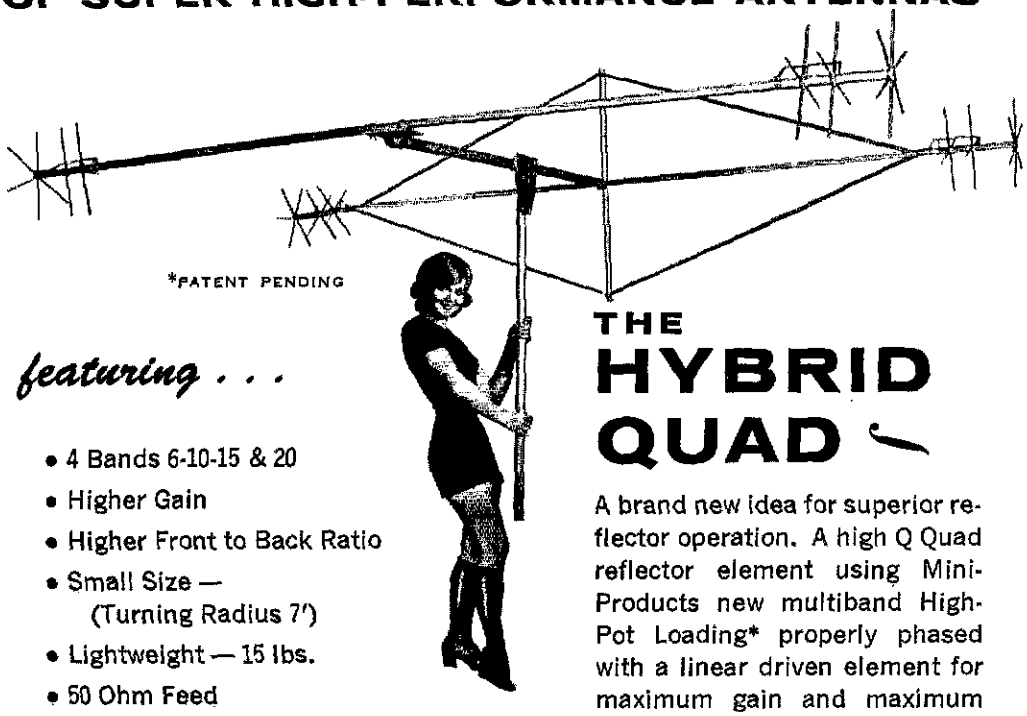

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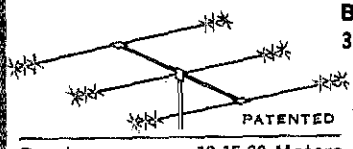

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Bands	10-15-20 Meters
Power Rating	1400 Watts P.E.P.
Total Boom Length	11'
Turning Radius	7'-10"
Total Weight	23 lbs.
Single Feed Line	52 ohm
SWR at Resonance	1.5 to 1.0 max.

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Power Rating	1400 Watts P.E.P.
Total Weight	6 lbs.
Height	11'
Single Feed Line	52 ohm
SWR at Resonance	1.5 to 1.0 max.

Model C4 Net $36.95

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W8MHO reports the Oakland Co. AREC net held 5 sessions with 70 check-ins and 6 pieces of traffic. SW Mich. VHF Net reports 168 QNI, 2 QTC with 12 sessions. With deep regret I report W8LAQ, WA8GLJ, K8MHS, W8DCT, WB8KOR and K8VEB as Silent Keys. The Division Convention at Muskegon was a big success and the club is planning for a bigger one next Mar. 23, 24. The Mich. State ARRL Convention will be Aug. 4, 6 at Sault Ste. Marie. The Delta Co. ARS Club call is K8ZAS and will be powered with new HW-101. W8GLC is the new RM for the QMN late net. At the WSSB net meeting at the Convention the following officers were elected: K8PVC, mgr.; W8MPD, asst. mgr.; WA8PII, secy.-treas. VK5QO (ex-WA8YKO) was elected vice-pres. of the Adelaide Chapter, Wireless Institute of Australia. The DARA sure does get around. W8AP needs only KL7 for WAS for 2 letter calls on 75 ssb between 3800 and 3825 kHz. W8KHU picked up an HW-12 at Livonia S&S and now is on 75. WB8CUO has moved to 6-Land. WA8GCW is moving to Tyndall AFB, Panama City, Fla. Groves High School ARC is interested in starting a High School net; contact WB8HYB. K8NHC is out of the Navy and located in Denver; call is WØOGJ and he is looking for his Mich. friends. WN8III is trying to start Eighth Region Novice net; contact WN8III or WN8IFU. PON amateur of the month and Special Award goes to WB8BJP. WA8LHM is an Advanced Class licensee at Niles. WN8s LSQ, MGB, MDG and MGA are new in the Detroit area. Traffic: WA8WZF 602, K8KMQ 434, WA8PIM 408, W8IBX 364, WB8BPY 243, WA8LXY 195, WA8SQC 184, W8JYA 162, K8DYI 138, K8LNE 101, W8GLC 93, W8NOH 85, W8ZBT 84, WB8IMI 81, WA8ZAV 75, WA8ZCO 72, W8EU 55, WB8HYB 52, K8PVC 49, WA8OJI 39, WB8BJJ 34, WA8KHB 34, WB8DTJ 33, K8MJK 33, WA8VOU 32, WA8ONZ 31, WA8ENW 29, WA8FXR 28, WB8FBG 26, K8IED 26, W8IUC 25, K8SJQ 25, K8KCF 24, W8VWY 24, WB8BJP 23, W8DCN 22, W8NJM 22, W8TZZ 21, W8MO 20, W8UFS 20, K8WRJ 20, W8DT 19, W8FZL 19, WB8EEU 18, K8CPW 16, WB8DJS 16, K8GOU 16, W8ISC 16, K8MXC 16, W8RTN 16, W8TBP 16, K8HGA 15, WA8WVV 13, WB8ICU 12, WN8SWV 12, W8ACW 11, K8JHA 11, W8HKL 10, W8UM 7, K8ZJU 7, WB8DKQ 6, WB8EYM 5, W8FX 5, W8SWF 5, WB8AKS 4, WA8CUP 4, W8CUP 3, K8AEM 2, WB8ANR 2, W8VXM 2.

OHIO – SCM, William E. Clausen, W8IMI – Asst. SCM: Kenneth L. Simpson, WA8ETX. SEC: W8OUU. RM: WA8WAK. PAM: K8UBK. VHF PAM: WA8ADU.

Net	*QNI*	*QTC*	*Sess.*	*Freq.*	*Time(Z)*	*Mgr.*
OSSBN	3422	1242	85	3972.5	1430/2245	K8UBK
BN	738	571	62	3577	2300/0200	WA8WAK
O6MtrN	451	66	62	50.61	2300	WA8ADU
				50.16	0100	
OSN	371	85	31	3577	2225	WA8WAK
BN RTTY	273	304	33	3605	2200	WA8YUB

WA8ETX, WB8GED, K8LMF/8, K8NQW, WB8IEL, K8ONA and W8QCU earned BPLs in Mar. New appointees: W8GRT, WA8MCR, WB8GED, OPSs; K8NQW, ORS and OVS; K8EHU, OO. K8EIO is the new EC for Portage, Medina and Summit Co. New officers of the Ohio Council of ARCs are W8JMD, chmn.; K8UBK, vice-chmn.; W8OUU, secy.; W8EMK, treas. Marion ARC plans to participate in the city's sesquicentennial celebration July 1 through 9 with a special events call. OVS WA8KPN reports a little-noticed aurora opening on 6. EC WA8COA promoting the use of 146.46 MHz as a statewide AREC and emergency simplex frequency. Goodyear ARC's Picnic-Hamfest held June 18 at Goodyear Wingfoot Lake Park. WA2ASM/8 is Buckeye Net statistician. EC WB8DQU reports the formation of a local AREC net on 28.7 MHz for the Wooster area. The Wayne Amateur Radio Technical Society is a new ARRL affiliate – officers WB8DQU, pres.; WB8KKI, vice-pres.; WB8DQV, secy.-treas.; WB8IHE, act. mgr. W8AQ reports the Canton RC auction was a big success. W8QXQ completed 5BDXCC and waiting the last 12 cards. W9LEX/8 now is W8KRP. The Apricot Net provided mobile communications for Cleveland's St. Patrick's Day parade and operated K8LMF/8 at the Cleveland Sportsman's Show, originating 623 messages. K8ONA, WA8ETX, W8KC and WB8IEL appeared on NBC-TV news to promote ARPS activities. The Thunderhead WX Net and Stark Co. Emergency Net held a simulated storm test. Central Ohio AREC/RACES assisted their local American Red Cross chapter in a test of the hospital communications system. SW Ohio AREC provided communications for the Cincinnati St. Patrick's Day parade and Knights of Columbus Relays at Sharonville. Greater Cincinnati ARA's Mike and Key reports the new station call is W8DZ. The Scioto Valley ARC's Hamshack Chatter reports 19 in their Novice class passed the code tests and are awaiting theory tests from FCC. Columbus ARA's Carascope reports the club will operate WJ4ULY from Independence, Ky. on July 4. W1NJM spoke at a special meeting for Toledo area amateurs and then joined W3PS at a special Greater Cincinnati ARA meeting which also included a presentation honoring WLW's

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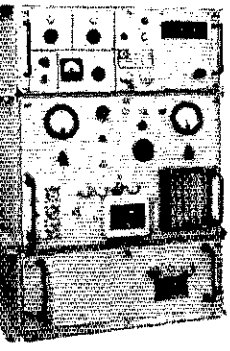

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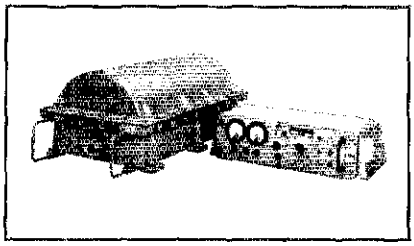

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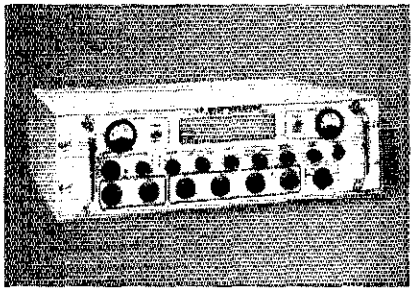

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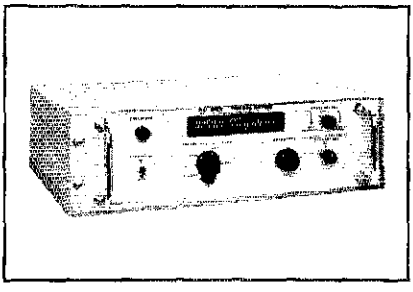

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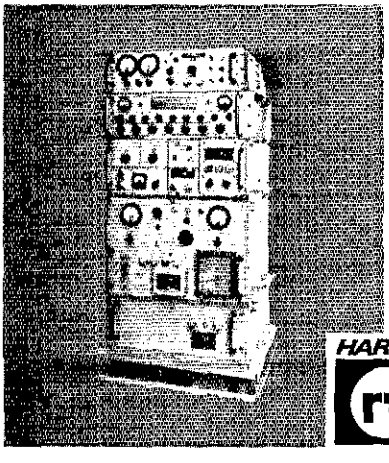

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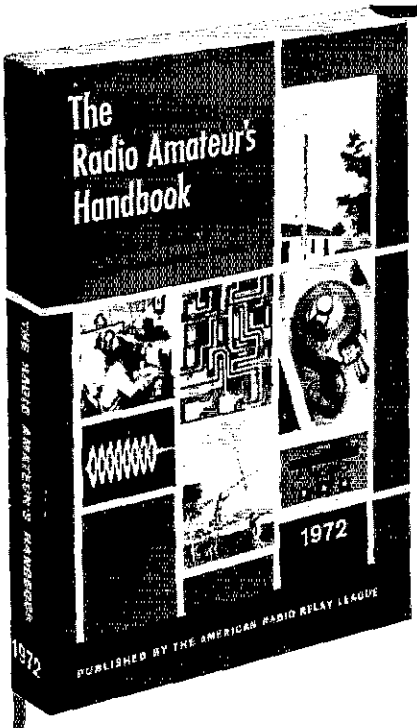

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50th anniversary of broadcasting. A sincere thank you to W8ETU, retiring SCM, for four years of a job expertly done. Traffic: WA8FTX 1058, WB8GID 842, K8LMF 680, K8NQW 565, WB8IEL 515, W8PMJ 461, WA8MCR 409, WB8ALU 317, K8ONA 310, WA8WAK 261, WA8UPI 251, WB8FGI 243, WA8ZUK 241, W8RYP 229, W8JMD 224, WB8DQU 218, W8MOK 214, K8BPX 207, W8IMI 205, W8QCU 199, WA8HGH 198, W8LT 194, W8GVX 166, WA8EIW 137, WA2ASM/8 120, WA8QFK 120, K8CMO 106, WA8AJZ 105, WA8NOQ 104, WB8HUP 101, K8DBK 88, W8QZK 85, K8MZY 82, WB8CWD 80, WA9VZM/8 80, W3EAF/8 78, WA8WPQ 67, W8CUT 65, WB8GVI 65, W8QE 65, WB8FCT 62, WB8FXD 62, WB8BLH 58, W8ID 57, WA8SED 56, WB8DNZ 55, WB8KVU 53, WA8ESX 52, K8LGA 51, WA8ROF 48, WA8DWL 46, WB8KKI 44, K8QYR 43, WA8VWH 43, WB8EEZ 41, WB8INM 41, WB8CLF 39, K8BYR 37, WB8IGW 33, WA8YXB 33, WA8ADU 32, WB8ISJ 32, WA8FCQ 26, K8MLO 26, K8VPM 26, W8GNL 25, W8NAL 25, WA8VKF 24, W8GRT 23, WA8MIB 20, W8ERD 19, WA8LAM 18, W8GOE 17, WA8KPN 17, WB8AJC 15, W8OHU 13, WA8SSI 13, WB8EBD 12, WA8YJB 11, K8BAX 10, WA8JEH 9, W8LZL 9, K8MPR 9, W8FTU 7, W8KRP 7, W8MGC 7, W8WLG 6, K8OHU 5, W8IGW 5, K8RXD 5, WB8AYC 4, K8LRK 4, K8PBE 4, K8BNL 3, K8CKY 3, W8OXQ 3, WA8ZNC 3, K8DHD 22.

HUDSON DIVISION

EASTERN NEW YORK – SCM, Graham G. Berry, K2SJN – Asst. SCM/PAM: Kenneth Kruth, WB2VJB. SEC: W2URP. RM: WA2VYS. VHF PAM: WB2YQU. Nets: ESS 2300Z daily at 3.590 (10 wpm): NYS: 0001Z and 0300Z daily at 3.675 MHz; NYSPT&EN: 2300Z daily on 3.925 MHz. Note: watch for time changes when you read this – EDST in effect will make local time changes operative – not Z. Normal time delay before column hits print means ballots may be out for SCM when you read this. Regardless of how election turns out, at end of second 2-year term your SCM thanks all "staff members" and appointees as well as section members for continuing help since '68. Keep it up for next year's SCM no matter who gets the job. On the club circuit: Harmonic Hills cw theory classes on since Mar. 10 and repeater temporarily off. Westchester Amateur Radio Assn. (WARA) heard K2TTY on Consumer's Union testing of electronics for the home and RF susceptibility of same. Harmonic Hills RC classes also going strong, heard program on ATV in Mar. Albany ARA had a show-and-tell session on TV in business and education with WA2DND and WB2VJB as speakers. Classes there too. Schenectady ARA had visit from new ARRL pres. W2TUK and Hudson Division Dir. K2SJO in Mar., and also a raffle. Communications Club of New Rochelle heard W2JIO on work with the handicapped. Pearl River HS Club acquiring station gear. Spring Valley HS Club also active in cw theory classes. Plan now for HARC Convention at Tarrytown Hilton, Oct. 21, 22 at ARRL National at Waldorf-Astoria in '74 – Division's 50th anniversary. If your club isn't in the Council, it should be! K2SJO for details. Individual station activities: WA2MID new Life League member. WB2AJD has new two-element beam up on 20 meters. Congrats to WA2EAH on placing 3rd in U.S.A. in this year's Russian DX contest. Congrats also to WA2NSM on new call. WA2RAU writing DX column for New Rochelle Club's "Communicator" each month. W2SZ at RPI has 20-meter beam and 2-meter fm both back working. WB2IIV is trustee of new club in Amenia. WB2ISW a new member ESS Net. SEC W2URP licked line noise problem with help of local utility – faulty 4KV feeder six blocks away! Ex-K9DKU/2 now W2GUH with FNY appointment as ORS. Traffic: K2FW 77, WA2VYT 67, W2SZ 49, WA2FBI 27, W2URP 25, WB2AJD 21, K2SJN 14, WB2AEQ 8, WA2EAH 7, K2RKS 4, WB2VJB 4.

NEW YORK CITY AND LONG ISLAND – SCM, Fred J. Brunjes, K2DGI – SEC: K2HTX. RM/PAM: WA2UWA. VHF PAM: WB2ROF.

NLI*	3630 kHz	1915/2200 Nightly	WB2LZN Mgr.
NLI Phone*	3925 kHz	1900 Dy	WA2UWA PAM
Clear House	3925 kHz	1100 Dy	WA2VYT Mgr.
Mic Fared	3925 kHz	1300 Ex. Su	
East U.S.	3686 kHz	0001 Nightly	
All Svc.	3925 kHz	1300 Dy	W2GE Mgr.
NYSPTEN	3925 kHz	1800 Dy	K2VCZ Mgr.

*Section nets; all times local. Congratulations are in order for WA2UJK with a new General Class ticket; WN2DVV on his Novice ticket; WB2GUB as EC for Smithtown; WA2HMM as EC Western Suffolk; WA2UJK for his General ticket; K2JDH on becoming ARRL Life Member; WA2EIO for obtaining his B.S. in Education from N.Y.U.; and WA2UWA for winning a certificate in the last USSR DX Contest. In the travel department, W2EC on the return from a spell in Fla.; WB2DZZ plans on a PI-Land operation in June. One of our section nomads is again back in town for a refresher course at the "Big G", K2ORA! W2PF reports that W2NQR is moving to the sunny clime of Fla. It appears that the group at W2DSC has their "up again down again" quad antenna "up again." They are hoping it will stay up there awhile! For all you TV fans (amateur that is) that are operating or are planning on it may want to contact the Tu-Born RC who have several members on the air. Contact WB2HWI for club information, or the SCM for NLI. The NLS Slow Speed Net seems to be coming along in good fashion. A bi-monthly bulletin is being issued on activities and check-ins are from New Hampshire to West Va. For those who are interested or curious about traffic nets and traffic handling for the non-professional: might give a listen and even QNI (check-in), to get a better idea what traffic handling is all about. The Net operates Mon. through Fri. at 2345 GMT on 3730 kHz and the cw speed is in line with you big foe wigglers! Novices are particularly welcome, so join in the fun! W2ORM reports in the Suffolk County RC Bulletin QTC, that "Ham TV" has many active stations in Nassau and Suffolk Counties. Activity is almost guaranteed on Sun. mornings 1100 around 432.25 MHz. Congratulations to K2RIW for a fine article on Strip Line Techniques for UHF in QST for June! Should be good contender for Cover Plaque Award! Well this is the month of that lost week end, better known as "Field Day." This is supposed to be basically a club activity, though of late it seems to be a "group" activity instead. Many clubs have been forced to drop Field Day as a club function because of lack of support by the members. The radio club seems to be becoming a monthly entertainment center instead of a place where ideas, projects, and club activities are a part of the club function to enhance the amateur fraternity both for the newcomer and the old timer. Field Day is a time for both young and old in amateur radio, and when it is a club activity that last week end every June, a good time is sure to be had by all; so lets make it this year! (Don't forget that Suntan lation – and those umbrellas!) Traffic: WB2LZN 482, WB2WFJ 262, W2EC 159, WB2OYV 101, WA2PLI 42, WB2CHY 19, K2JFE 17, WB2YNK 15, WA2PMW 14, WA2LJS 12, WB2CUN 8, W2PF 8, W2DSC 7, WB2DZZ 6, WB2HWI 4, W2DBQ 3.

NORTHERN NEW JERSEY – SCM, Louis J. Amoroso, W2ZZ – SEC: K2KDQ. RM: WA2BAN. PAMs: K2KDQ and WA2TAF. New appointments: WA2EUO as ORS, WA2NPP as OPS. Renewals: W2CVW and WB2VPR as ORSs, W2CVW and WA2EUO as OPSs. New officers for the GSARA group are W2GHT, pres.; K2CTJ, vice-pres.; W2UEZ, treas.; W2FHS, secy., W2ZLP, chief eng. K2HZP, WN2DSA and WN2DSG joined AREC. WB2KOT is new State Director for Air Force MARS. WB2ZSH passed the First Class Radiotelephone. W2CZM and W2NVZ passed the Extra. K2BB is the new CD Radio Officer for Kenilworth. EC WA2BAT, Springfield, is conducting code/theory classes at the CD center. W2CCS received the OZ-CCA certificate with endorsement for 300 OZ QSOs. WN2BFF, WN2TTG and WN2TSY are new hams in Belleville. WN2CWH is a new ham in Ft. Lee. W2CU received his DXCC. W2FJK reports his XYL is now WN2ESG. Welcome to WB2IKL who moved to our section from Syracuse. K2RXQ had to resign as mgr. of NJN because of the work load at the salt mine. WA2UOO has assumed the mgrship. We wish him luck and hope everyone continues to give him the same cooperation the others received. The NJDXA now have 25 members using their repeater. Your SEC K2KDQ is still looking for ECs in certain parts of the section. Please contact him or the SCM if you are interested in this type of work. Good luck to all in FD drill. We have a lot of fm interest in our section. Is anyone thinking of starting a traffic net using this mode and also include a repeater to extend the range? Let me know. The am gear is slowly being replaced in everyone's shack by fm. Traffic: (Mar.) WA2EUO 275, WA2EPI 250, WB2DDQ 227, WA2QNT 184, W2ZFP 148, WA2UOO 142, W2CU 95, WA2CCF 25, W2CVW 25, WA2NLP 25, WA2CAK 22, WB2NSV 22, WB2WID 13, W2ZZ 12, K2EQP 9, WB2CFT 8, W2CJC 7, WA2EUX 7, WA2FVH 7, WA2FUI 4. (Feb.) WB2YPQ 16, WB2NSV 15.

MIDWEST DIVISION

IOWA – SCM, Al Culbert. KØYVU – SEC: KØLVB. WAØDYZ a new OO appointee. I was quite saddened at the passing of WØG who served many years as our Midwest Director. I must also no the passing of Pop, KØTCZ. I wish to thank those who again so w represented amateur radio at its best in the Annual Pony Expre fund raising drive for Camp Sunnyside. WØLIJ (Zone 9 EC/RO leaving Cedar Rapids for employment at that black box factory Ohio; he has been a most able and effective leader in emergen communications preparedness. The Northeast Iowa ARC Waterloo have been holding simultaneous 2 and 75-meter hidd transmitter hunts. Congratulations to WØBGK upon receiving Extra Class ticket. KØLKH is working on an autopatch system his 2-meter mobile/base rig. Hats off to WAØAUX for making B after many neat misses. WØNLD is now signing K4HDJ from sun

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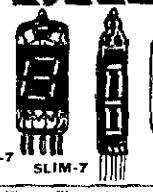

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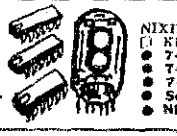

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PIV	SALE
☐ 2000*	1.00
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EPOXY RECTIFIER SPECIAL

10 for $1

☐ 1 AMP 1000 PIV

1 to 70 WATTS POWER AMPLIFIER DRIVER

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By Signetics NE540, 30 transistors, class AB of audio, 0.25% distortion. 50 to 20KHz distortion. 22V supply. With diagrams, instructions.

ALLEN BRADLEY'S 'TRANSISTOR' POTS

Ohms — Type F Screwdriver adjust. **Any 2 for $1**

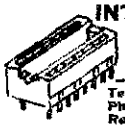
☐ 100	☐ 500	☐ 2.5K	☐ 20K	☐ 100K	☐ 500K
☐ 200	☐ 1.0K	☐ 5.0K	☐ 25K	☐ 200K	☐ 1 Meg.
☐ 250	☐ 2.0K	☐ 10K	☐ 50K	☐ 250K	☐ 2 Meg.

'MICRO-POTS' 2 for $1

Type G. 1/2" dia. x 1/2" high. Mounts 1/4" hole, with shaft, linear, moisture-proof high freq.

Ohms				
☐ 100	☐ 1.0K	☐ 10K	☐ 100K	☐ 1 Meg.
☐ 250	☐ 2.5K	☐ 25K	☐ 250K	☐ 2 Meg.
☐ 500	☐ 5.0K	☐ 50K	☐ 500K	☐ 5 Meg.

INTEGRATED CIRCUIT SOCKETS



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☐ Infra-Red "Invisible"
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69¢ Ea. 3 for 1.50

Fla. Pleased to note two more ARRL affiliated clubs in the section – the Nathan Weeks Junior High School ARC and the Spencer ARC. WAØVDX reports nearing the century mark in his quest for DXCC.

Net	*Local Time*	*MHz*	*QNI*	*QTC*
Ia 75 Meter	1230	3.970	1482	66
Ia 75 Meter	1800	3.970	1231	43
TLCN (cw)	1830	3.560	157	106

Traffic: (Mar.) WØLCX 552, KØDDA 196, WAØAUX 144, KØAZJ 143, WØMOO 49, KØOOD 35, WAØYJW 21, KØYVU 17, WAØVZH 15, WBØAVW 14, KØJGI 12, WØIO 5, WAØODB 5, WØBW 4, KØLKH 4, WØWSV 4. (Feb.) WØWSV 6.

KANSAS – SCM, Robert M. Summers, KØBXF – SEC: KØLPE. RM: KØMRL PAM: KØJMF. VHF PAM: WAØTRO. The hams of Kans. express their sincere sympathy to the family of WØGQ, ex-Midwest Division Dir., who recently passed away. On Mar. 6 the Midwest Mobile Monitor Service got a short workout handling an emergency communication problem. A fire damaged a major telephone cable in Formoso, Kans., leaving both Formoso and Montrose and surrounding farms without service. WAØKDP came to the rescue and contacted WBØBCL in Salina who relayed the information to the right Telephone Co. WØHH has received the Operator of the Year award for being the 1971 Op for ICC Central Area. WAØTKJ and WBØBVC earned OKS net certificates. A new EC for Zone 10-B is WAØDSJ. Kans. Weatherman of the Month a tie between KØOMM and KØKFB. WAØTRO reports lots of activity on 2 meters. MMM tops the list in activity this month with 2141 QNI (2024 fixed stations and 117 mobiles), 127 QTC and 74 calls or phone patches; KSBN QNI 1143 in 27 sessions and 106 QTC; HBN QNI 655, QTC 46 in 23 sessions; KPN 327 QNI, 28 QTC in 18 sessions; QKS 501 QNI, 190 QTC in 62 sessions; KWN 625 QNI, 94 QTC in 31 sessions and Ks EC Net 31 QNI, 3 QTC, 3 sessions. Traffic: (Mar.) WØINH 330, KØMRI 253, WØHH 180, KØJMF 84, WAØLIC 72, WØBGX 58, WØCIH 52, KØBXF 47, WAØTAS 47, WBØBIY 46, WØGCI 41, KØFPC 36, WAØJFC 36, WAØLBB 35, WAØRYX 35, WAØZTW 34, KØZHO 33, WAØUXI 23, WBØCZK 18, KØLPE 15, KØPSD 15, KØGII 14, WAØSKR 13, WØPB 10, WØFDJ 9, WAØOWH 6, WAØTRO 4, KØEXN 3, KØGZP 2, WØMA 2, WAØNXD 2, WØNYG 2. WBØBCL 1. (Feb.) WBØBVC 35, WØSOE 5.

MISSOURI – SCM, Robert J. Peavler, WØBV – SEC: WØENW.

Net	*Freq.*	*Time(Z)/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MNN (Feb)	7040	1800 Dy	29	92	14	WØGBJ
MNN (Mar)	7040	1800 Dy	31	148	48	WØGBJ
MoPON	3963	2200 M-S	26	782	122	WAØTAA
MEN	3963	2230 MWF	14	333	15	KØKUD
MON	3585	0000 Dy	26	134	93	KØAEM
MON2	3585	0245 Dy	28	116	43	KØAEM
MSN	3703	1500 Su 2330 Th	9	44	22	KØHIX
WEN	3980	0030 M	4	13	3	KØBIX
PHD	50.45	0030 T	4	97	7	WAØKUH

I am sorry to report that WØHH has resigned as mgr. of MON and MON2 because of health. My thanks to Don for his excellent work. New officers of the St. Louis Amateur Radio Club are WØKC, pres.; WAØWSS, vice-pres.; WØPOZ, secy.; WØRUR, treas. New officers of the Northeast Missouri Amateur Radio Club are WØBV, pres.; WAØGEU, vice-pres.; KØEMF, secy.-treas.; WAØDHR, act. mgr. KØCHE now is at New London, Minn., and would like to hear from the St. Louis group. KØBIX reports that the amateur radio class at Central State College has 10 students enrolled in the amateur class: one for Extra, two for General and seven for Novice; in addition, Warrensburg Amateur Radio Club has 12 in a Novice class taught evenings on campus. Congratulations to new Generals WBØIFQM and WBØGBZ. WBØHDS in Springfield, ex-W9JXG, has returned to amateur radio after a lapse of over 30 years. Traffic: KØONK 1310, KØAEM 291, WØBV 145, WBØCXN 123, WØGBJ 83, WØOUD 60, WAØTAA 37, KØBIX 34, KØSGI 18, WBØFKY 16, WAØKUH 11, KØPCK 6.

NEBRASKA – SCM, V.A. Cashon, KØOAL – Asst. SCM: Velma Sayer, WAØGHZ. SEC: KØODE. *Renewed appointments: KØIEN as* OO; WAØQGM as EC; WAØQEX and WBØCAU as ORSs; WØHOF *and* WØBFN *as OPSs. New appointments:* WAØULX *as OVS and* OBS.

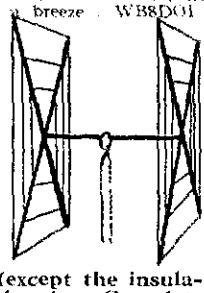
Net	*Freq.*	*GMT/Days*	*QNI*	*QTC*	*Mgr.*
NSN I	3982	0030 Dy	1381	18	WAØLOY
NSN II	3982	0130 Dy	1173	30	WAØLOY
Neb. 160	1998	0130 Dy	455	251	WAØCB
NEB	3590	0300 Dy	122	33	WØTQI
NMN	3982	1330 Dy	1408	46	WAØJUI
WNN	3950	1400 M-S	591	56	WØNIF
AREC	3982	1430 Su	184	1	WØIRC
CHN	3980	1830 Dy	1085	39	WAØGHZ
DEN	3980	2100 M-F	494	9	WAØAUX

AHA! YOU THOUGHT GOTHAM

made ordinary, everyday, run-of-the-mill antennas. No, no, no. We make winners through superior materials and design. WA1JFG won the New England Round-Up championship with our 3-element 15-meter beam by a margin of 5,982 points! In QST since '53.

QUADS

Totally satisfied with quad. Worked DK4VJP, SM7DLH, XE1AB, DM4SEE, FL8SR, F6AUM, HK7YB in few hours. Instructions a breeze. WB8DQI



CUBICAL QUAD ANTENNAS—these two element beams have a full wavelength driven element and a reflector(the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators)—absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a foolproof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16′ square

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10′ × 1¼″ OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Aluminum wire, tempered and plated, .064″ diameter.

X Frameworks: Two 12′ × 1″ OD aluminum 'hi-strength' alloy tubing, with telescoping ⅞″ OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

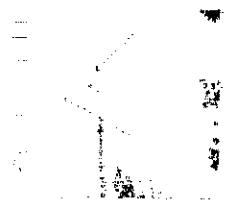
Now check these startling prices—note that they are much lower than even the bamboo-type:

10-15-20 CUBICAL QUAD	$37.00
10-15 CUBICAL QUAD	32.00
15-20 CUBICAL QUAD	34.00
TWENTY METER CUBICAL QUAD	27.00
FIFTEEN METER CUBICAL QUAD	26.00
TEN METER CUBICAL QUAD	25.00

(all use single coax feedline)

BEAMS

"Just a note to let you know that as a Novice, your 3-El. 15 Beam got me R1 Section Winner and New England Division Leader in Novice Round-up. See June QST, p. 57 for picture of ant. (below). Tnx for a fine working piece of gear. 73s, Jay, WA1JFG"



Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36′ of tubing for each 20 meter element for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞″ and 1″ aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 El 20.	$21	4 El 10.	$20
3 El 20.	27*	7 El 10.	34*
4 El 20.	34*	4 El 6.	20
2 El 15.	17	8 El 6.	30*
3 El 15.	21	12 El 2.	27*
4 El 15.	27*	*20-ft. boom	
5 El 15.	30*		

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2-FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1-MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2-KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

***FLASH!* Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1-LC, PY5ASN,FG7XT, XE2I, KP4-AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!**

V40 vertical for 40, 20, 15, 10, 6 meters. $14.95

V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters. $16.95

V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters. . . $18.95

How to order: Send money order only (bank, store, or United States) in full.
We ship immediately by REA Express, charges collect. *DEALERS WRITE!*

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

The Smoke Signal Senders Annual Pow-Wow is scheduled for June 3, 4 and the Pine Ridge ARC Hamfest on June 4 at Chadron State Park, Central Nebr. ARC Steakfry will be held on July 30 at Victoria Springs. Be there on the 29th for some good old eyeball QSOs. WØLCE moved to Sidney from Colo. to instruct electronics at Western Nebr. Tech. New Novice at Kimball is WNØGUH and new Novice at Chadron is WNØGUS. Niobrara Valley ARC officers are WØWRY, pres.; WAØHOQ, vice-pres.; WBØCLP, secy.-treas. KØODI was one of 23 SECs reporting 100% to ARRL for 1971. WAØZCN now on 2 meters. WØLRZ operates a Yaesu FT-101. A new novice net meets Tue. on 3714 kHz at 8 P.M. CST. Box Butte County *AREC 2-meter net QNI 15, QTC 1, Traffic: WAØSCP 105, WAØCBJ* 59, WAØYGZ 47, WØLWS 30, WBØCAU 24, WØVEA 24, WØTQD 23, WØNIK 21, KØFRU 18, KØKJP 18, WØEQB 14, WAØJKN 14, WØDMY 13, WØMW 9, WAØGHZ 8, KØOAL 6, WAØCHN 5, KØECH 5, WAØBOK 4, KØODF 4, WØSWG 4, WØWKP 4, WAØYGI 4, WAØEEJ 3, WØATU 2, KØDGW 2, KØFJT 2, WBØGEK 2, WBØGJL 2, KØHNT 2, WAØJUF 2, WAØPIF 2, WAØVIT 2, WØVYX 2, *WØYFR 2, WAØHOQ 1, WAØLRQ 1, KØWPF 1.*

NEW ENGLAND DIVISION

CONNECTICUT — SCM, John McNassor, W1GVT — SEC: W1BHR. RM: K1EIR. PAM: K1YGS. VHF PAM: K1SXF.

Net	*Freq.*	*Time/Days*	*Sess.*	*QNI*	*QTC*
CN	3640	1900 Dy 2200	62	618	436
CPN	3968	1800 M-S 1000 Su	31	848	153
VHF 2	145.98	2200 M-S	23	130	50
VHF 6	50.6	2100 M-S	23	99	5

High QNI: CN — W1CTI, K1EIR, WA1GFH and W1KV. CPN — W1GVT, WA1KVI, W1MPW, WA1NMZ, K1SXF and K1YGS. SEC W1HHR was guest speaker at the newly reactivated Northern Conn. *ARC — they publish a Monthly Newsletter de/WA1NYU indicating* a full list of activities. Dir. W1QV is interested in your club activities and your own views on subjects of interest to amateur radio — your letters will be appreciated. All ARRL appointees had the opportunity of voting on your expression of opinion covering 10 points of interest in the Apt. *CD Bulletin Poll. I hope you voted on* the issues that concern you. Repeater activity will continue to increase — if you operate this mode, please join at least one Repeater Assn. The cost of this wonderful service should be shared by all who make use of it. MARS members are urged to provide more activity for continued membership. Congratulations to: WA3JSU/1 for Feb. BPL; WA1OPB for Advanced Class; WN1MTZ *for General; to WA1KMP for Worked 1000 Novice Certificate!* Transceivers are the best thing that ever happened to Field Day — bring your own and help your club to its greatest Field Day score on both cw and phone! This is amateur radio's annual outdoor event — don't miss it! Traffic: W1EFW 300, W1MPW 150, WA1GGN 128, *WA3JSU/1 125, WA1NTR 125,* W1CTI 116, WA1GFH 103, *K1SXF* 102, W1AW 55, K1YGS 38, WA1KVI 37, WA1NES 37, W1GVT 34, W1QV 32, W1KV 31, W1RML 29, W1BDI 24, WA1OPG 19, WA1PHF 15, WA1NYU 13, W1CUH 7, WA1JGA 6, WA1OPB 6, W1DGL/1 4, W1YBH 4, WA1JZC 2.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, W1ALP — SEC W1AOG is home from Fla. W1s CTW, OE, MMH, ZTS, ODQ, K1FF, WA1KRN are Silent Keys' Our sympathy to W1LZW on the death of his wife and to W1QVK, his father. W1EMG has been an ORS for 35 years. K1LEK back on 75. K1ETT in Watertown. W1HTJ in Quincy. WB4WIZ is ex-WA1EIN. W1HA has an HW-101. WA1ELV in Attleboro on 2. W1RP back in Mass. W1SR/MTQ moving to Medfield. WA1GXV, WA1NHI, WA1CEO/1 on 2. New YLs: WA1s FWN, QAL, WN1QAB, WN1PXY. WA1PWF has an *NCX-3.* WN1OTE now Advanced Class. K1YKT operating at W1ET and worked YK1OK and Asians on 80. WA1NRV has DXCC. WA1AKR active on nets on 3932. W1NF an OO for 25 years. W1LE on many nets. K1ABR gave a talk on 2-meter repeaters at SEMARA, W1AEC. W1ATI used 2-meter fm to Fla. and back. K1TKI is CD Dir. for Foxboro and EC K1HHN says they are building up again. W1EUJ has rig for 220 MHz. WA1LFS in France *for 18 months with call FØAFF. Officers of Lowell Tech ARC:* WA1KBE, pres.; WA1GFW, vice-pres.; WA1ISF, secy.; WB2YEW, trustee and have rigs for 160-2 meters. W2CXX spoke at the Massasoit ARA on amateur rigs. W1AUU has retired. WA1MPP has WAS and a sked with G3IXH. W1UJF busy in AF MARS. W1MNK working again. T9 Club met at W1ISX's. W1UX has TA-33 beam 50-ft. up. K1OJO, W1AAI, W1BW on 432; K1OJO will be on 220. *Officers of the Boston Repeater Assn.: W1IME, pres.;* K1YVB, vice-pres.; WA1GQY, secy., WA1DRR, treas.; W1JDD, clerk; WIHH, W1YHM, dir.; W1BHD membership comm. K1FFR gave a talk at the Quannapowitt RA. K1VKW/4 in Ga. and is married. WA1MWN

6 METERS

When it comes to 6 Meters, Swan's 250C is "Right On!"

Designed and built by Hams for Hams, the 250C features were developed with care, experience and understanding through hours of specialized research gained in working with the 6 meter band.

Now you can enjoy complete operating coverage from 50 to 54 mHz with deluxe features including a highly stable solid state VFO, a sensitivity of 0.1 microvolt, and a receiver noise figure of better than 3 db. In one small package you get: 240 watts P.E.P., SSB; 180 watts CW; 75 watts AM; metering circuits, a built-in 250 kHz calibrator, and selectable USB and LSB, plus an 8 pole crystal lattice filter for outstanding selectivity.

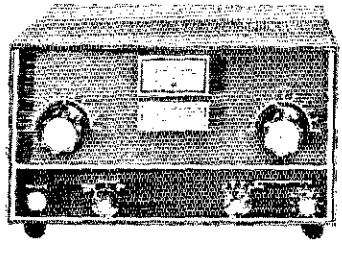
And, if you really want "The Whole Thing" add a MARK 6B Linear Amplifier to your rig for the full 2000 watts P.E.P. legal limit. It's ideal for all forms of extended range communications. The MARK 6B comes complete with power supply and transmit/receive relay control for ease of operation with your transceiver.

Copy the whole band, even the weak signals, with the 250C and for giving your transmission maximum power the MARK 6B is all you need.

USE SWAN'S REVOLVING CREDIT SERVICE PLAN

250C Transceiver	**$429**
117-XC Power Supply	**$ 99**
MARK 6B Linear Amplifier (complete with power supply)	**$599**

MARK 6B Linear Amplifier



See the New Swan 1972 Spring Catalog for complete list of specifications and accessories—it's FREE—just for the asking.

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has a six-element long-john on 6 and an eleven-element beam on 2. WA1s *MAU, NZI* on 6, WA1GZQ has mobile rig and on several bands. W1IBE still busy with NE Weather Net on 3905 from 0545 to 0645. The Waltham, Middlesex, Somerset, Massasoit, Whitman, South Shore Clubs and Southeastern Mass. ARA all had auctions. Murphy's Marauders met at WA1KZE-NRVs QTH. WA1NNL made BPL. W1JKR is in the Brockton VA Hospital. WA1AXK moving to Whitman. WA1MGC has a 460 on 5400. W1MPZ on 6 ssb. WA1LJH *designed a home-brew transceiver on 80 to 10, ssb and am.* W1DC will be on 6 each day around noon and at 5 to 7 P.M. from 50.2 to 50.5. W1LZP on 6 RTTY. Endorsements: K1YHZ, W1s IPZ, RPF, IJE as ECs; W1QD as OBS; W1NF, WA1AKR as OOs; K1YKT as ORS; WA1JYY as OBS, ORS. WA1JUY new OBS, ORS. Capeway RC met at *K1NFZ's QTH. DL2AA/W1, K1HRV, WA1MGO.* WA1OMM are on RTTY. W1VRK and WA1KRI spoke at meetings of Middlesex ARC. 4th Annual Mass. Amateur Radio Week to be held June 11 to 17, sponsored by NAHC, Mass. Chapter, WA1DFL chmn., send logs to WA1FZA. K1BUF working some DX. K1EVT, WA1PBU on 2.

Net	*Freq.*	*Time/Days*	*Mgr.*	*QNI*	*QTC*
EMN	3660	1900 Dy 2200 Dy	W1QYY	447	323
EM2MN	145.8	2000 M-F	WA1DWQ	184	111
6MCBN	50.85	1930 M-F	K1OKE	38	

Traffic: (Mar.) WA1NNL 543, W1OJM 404, WA1FYY 342, W1QYY 342, W1PLX 274, WA1MSK 199, W1CE 176, WA1OWQ 75, K1PRB 70, WA1MYK 57, WA1IFF 52, W1EMG 48, WA1MWN 47, W1DOM 42, W1UX 34, WA1MSB 31, W1AIX 20, K1OJQ 20, W1DKD 11, WA1ENM 7, WA1OTF 6, W1UJE 4, WA1NDM 3, W1MNK 2. (Feb.) WA1NNL 427, K1GNW 252, W1HIN 142, K1PRB 99, W1UX 62, W1PJN 53, K1DAF 30, WA1DJC 12, WA1MHJ 2. (Jan.) W1MNK 13.

MAINE – SCM, Peter F. Sterling, K1TEV – SEC: K1CLF, PAM: WA1FCM. RM: W1BJG. W1SES and XYL had an enjoyable vacation in Ga. W4RO and XYL W4GCP will be in Maine this summer. On Mar. 11 the OOTC, QCWA and Barnyard Net had a luncheon at the Lord Wakefield Hotel, Wakefield, Mass., with 55 *folks attending. Northeast Area Barnyard Net reports 27 sessions,* 702 check-ins, 13 traffic. New hams in Maine are WN1PXE, WN1PXD, WN1PVQ, WN1PWK, WN1PYD, WA1PZG. Congratulations, fellows. It is with deep regret that I report the passing of W1VYA. He was very active in the Sea Gull and Barnyard Nets. He formed the Northeast area in 1953 and held Certificate No. 1. Sea Gull Net certificates have been awarded to W1NND, K1GUP, W1RVV. Want an appointment? Get in touch with your SCM. Traffic: (Mar.) WA1FCM 340, K1GUP 75, K4BSS/1 59, K1TEV 27, WA1PEN 25, WA1JCN 6. (Feb.) K1GUP 51. (Jan.) K1GUP 69.

NEW HAMPSHIRE – SCM, Robert C. Mitchell, W1SWX – SEC: K1RSC. RM: W1UBG. Congratulations to W1FZ, the first NH station to receive the new ARRL 5BDXCC award. Welcome to WN1PXI, WN1PZZ and WN1PZQ. K1YSD will be on 2-meter fm *and also has acquired a 1.5 KW generator for emergency operations.* Welcome to new appointee WA1PTF as ORS. W1IY is vacationing in Fla. and working all kinds of DX while 20-meter mobile. K1VXX, pres. of the Kearsarge RC met with Red Cross officials to plan blood drives. W1UBG's NHVT Net shows 150 check-ins and 162 traffic in *31* sessions. *WA1FSZ is on 75 meters! WA1JSD* welcomes "heard reports" on his 6-meter Official Bulletins. Traffic: W1UBG 169, K1BCS 106, DIEUS/W1 101, K1YMH 61, W1SWX 8, K1ACL 6, WA1JTM 3, W1DXR 2, WN1NBE 1.

VERMONT – SCM, James B. Viele, W1BRG –

Net	*Freq.*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
Vt. PO	3909	2200 Su	76	34	W1BQB
Carrier	3945	1400 M-S	599	19	WA2FAN
VTSB	3909	2300 M-S 1230 Su	307	76	K1YGI
NHVT	3685	2400 Dy	156	162	W1UBG

Congrats to new amateurs WN1PWL, WN1PYA, WN1PYE and WA1QAB. Welcome to WA1PZH, new radio club at J.F. Kennedy Learning Center, Winooski. New officers of Central Vt. ARC are K1NEL, pres.; K1WNU, secy.; Percy Baker, treas. International Field Day will be held Sun. Aug. 13 at the Old Lantern, Charlotte Campsites available. Contact W1DQO for information. Clyde Blake in Ely reports he has gear ready for EME, OSCAR and AMSAT tests. K1QGX reports Carrier Net had all-time record for check-in in Mar. W1ERQ and W1LVL elected to W1KOO repeater committee for three years. Traffic: K1BQB 125, K1OXD 89, K1YGI 36 *WA2COO/1 62.*

WESTERN MASSACHUSETTS – SCM, Percy C. Noble, W1BVI – SEC: *WA1DNB. CW RM: W1DVW. VHF/UHF PAM: W1KZS* Sun. morning WM Emergency Net still going well (3935 kHz 8:3

A.M.). Monthly QNI was 37. WMN (3560 kHz daily at 7:00 P.M.) had QNI of 153 and handled 102 messages. Top five in attendance: W1BVR, W1TM, WA1LNF, WA1OSK, W1STR. W1KZS reports the Sun. 2-meter repeater AREC net still going well (2:00 P.M. through K1FFK 31-91 Mt. Greylock), also on 52-76 and 52-56. A new 100-ft. tower is going up for repeater WA1KFZ; they are on 2 meters 10-70. W1ZPB has a new TT/L-2 RTTY demodulator and a Warrior linear, and has been keeping ssb skeds with EL7B. OO WA1LPR sent 24 discrepancy notices during the month. CMARA reports WA1KRJ gave a talk on 2-meter fm. Two of their Novices let their tickets run out before getting General (take heed!). HCRA reports monthly speaker was Dr. James Voss on the subject of computers. Springfield Gas Light Co. donated over 30 "six-meter" rigs to the club which are now being overhauled and revamped! MARC reports the top 3 prizes for home brew equipment went to W1DPZ, K1DPP and WA1GCY. VARC reports guest speaker was Dr. Taylor of U. of Mass. speaking on Radioastronomy. Mt. Tom Repeater reports guest speaker was WA2INB speaking on space-age AR communications. Mt. Tom repeater is 34-94.4, WA1KGR. The Hampshire County EC reports the West. Mass. AREC Repeater WA1KHC is on 13-73. Northern Berkshire ARC: K2CBA, pres.; W1KSD, vice-pres. & secy.; W1YBT, treas. Traffic: K1SSH 211, W1BVR 122, WA1LPJ 104, W1TM 60, WA1LNF 47, W1KK 24, W1ZPB 15, W1STR 14, WA1MJE 11, WA1DNB 9, WA1FBL 5, K1VPN 4, W1KZS 3.

NORTHWESTERN DIVISION

ALASKA – SCM, Kenneth R. Klopf, KL7EVO – KL7IS is back on QRP along with KL7DG and KL7AG (formerly APO). All are running less than 5 watts. KL7GOY is in there too. WL7HJH and KL7EVO participated in a fifty-mile ski trip, sponsored by the Alpine and Nordic Ski Clubs, to and in the vicinity of the White Mountains maintaining communications with Fairbanks (KL7GBG and KL7AG) via a QRP transmitter-receiver on 3735 kHz. The antenna was a half wave dipole rolled up on a three section reel: center section for transmission line and the other two for the dipole legs. The antenna was about three feet above the snow. WA2CPW/KL7 and KL7HIX and more are operating KL7DAB at the Coast Guard Air Station at Kodiak in case any messages go that-a-way. WL7HLW is very active on 3735 kHz from Eklutna Lake. Remember Sourdough Net 0400Z Tue. through Sat. on 3915 kHz; code practice 0600Z T,Th,Sat. 3735 kHz. 3915 is well monitored. More activity on 3735 will enable a monitoring service on that frequency.

IDAHO – SCM, Donald A. Crisp, W7ZNN – SEC: WA7EWV. The FARM Net meets at 0200 GMT each day on 3935 kHz. The Idaho RACES Net meets week days at 1515 GMT on 3991 kHz. W7IE was awarded certificate No. 25 for Worked All States by contacting Extra Class operators on 75 meters. Kootenai Amateur Radio Society is a new club at Coeur d' Alene. Officers are WA7MMG, pres.; K7ZOK, vice-pres.; Karl Lang, vice-pres.; W7NV, vice-pres.; June Lang, secy.-treas. W7AXL has a new 2-meter fm rig. W7GGH demonstrated his home made SSTV at the Thatuna Club meeting. WA7MIK has been appointed EC for Latah County. FARM Net reports 31 sessions, 982 check-ins, 89 traffic handled. Idaho P.O. Net reports 14 sessions, 120 check-ins, 22 traffic handled. Traffic: W7AXL 306, W7GHT 148, WA7BDD 73, W7ZNN 29, W7IY 24.

MONTANA – SCM, Harry A. Roylance, W7RZY – Asst. SCM: Bertha A. Roylance, K7CHA. SEC: W7TYN. PAM: WA7IZR. WA7NWP has been endorsed as EC and OPS; K7VCA as EC; WA7PDC as OVS; and WA7MUU appointed as OBS. W7LR has worked a WAS on 75-meter Extra Class part of the band with 2 letter calls. He also reports that the W7YB repeater will be back on Bridger Ridge this summer. W7EKB is busy teaching code and theory classes. WA7OZD is on AF MARS. WA7OBH has a new T4-XB and R-4B. WA7MUU also has a class in advanced theory. WA7KMP has been a faithful member of the Mtnn. WX Net. Montana Traffic Net had 1033 check-ins and handled 66 pieces of traffic in 25 sessions. Montana Post Office Net had 509 check-ins and handled 51 pieces of traffic. Remember the Glacier-Waterton Hamfest. Traffic: (Mar.) WA7KMP 240, W7EKB 216, WA7JOS 192, K7EGJ 16, WA7IZR 15, WA7OBH 11, W7LBK 8. (Feb.) W7EKB 213.

OREGON – SCM, Dale E. Justice, K7WWR – SEC: W7HLF. RM: K7GGO. PAM: K7ROZ. Section nets:

Net	*kHz*	*Time(Z)/Days*
BSN	3908	1900-0030 Dy
AREC	*3908*	*0200 Dy*
OSN	3585	0145 Dy
OEN	*3980*	*0100-0200 Dy*

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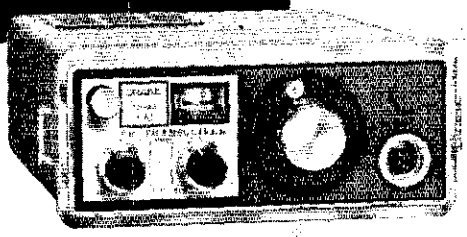

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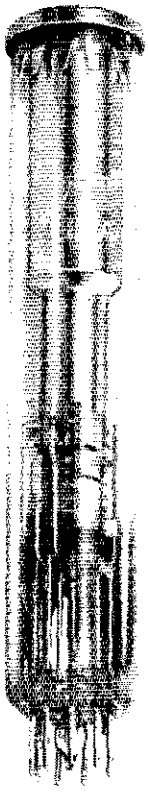

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New appointment: *WA7EUQ* as *LC* for Washington Co. area. W7IWN is a new call in Otis. He is ex-KØMNQ, W6YHL, W1NAU. *WA7FTN handled 805 phone patches to S.E. Asia during Mar.* Two new beams in Hillsboro belong to WA7NYR and WA7OQC. K7OUF *received his appointment as OPS.* Traffic: (Mar.) K7QEG 186, K7NTS 146, K7OUF 112, K7RQZ 100, WA7BYP 41, WA7MQK 18, K7WWR 18, *WA7KRH 7, WA7NWV 7, W7LJ 6, W7IWN 3.* (Feb.) K7RQZ 212.

WASHINGTON – SCM, Arthur Henning, W7PI – SEC: W7UWT. RM: W7GVF. PAMs: W7GVC, W7MCW. VHF PAMs: K7BBO, K7LRD. Regret to report W7QXM became a Silent Key.

Net	Freq.	Time(Z)	QNI	QTC	Sess.	Mgr.
WSN	3590	0145	259	115	31	W7GVF
NSN	3700	0200	335	121	31	WA7OCV
NTN	3970	1830	1314	139	31	K7VAS
NWSSB	3945	0130	1083	36	31	K7KPC

In the Vancouver tornado disaster situation, Clark County ARC station W7AIA played a prominent part in handling health and welfare traffic; outstanding public service was performed by operators WA7KKC, K7SUX and WA7OAS. Northwest Slow Speed (NSN) set new records in Mar. for QNI and QTC. Novices using novice crystal frequencies are welcomed to check into NSN; listen to net control on 3700. W7PWA operating mobile between Arlington and Deming, NMex has checked into NSN faithfully. W7SAB, W7FBN, W7YZZ, SSTV experts, set up a complete SSTV station demonstration at Clallam County ARC meeting with lecture and slides. Under able leadership of W7BQ, Northwest Tech Net had it's seventh birthday in Apr. Wenatchee Hamfest is the week end June 10 and 11. K4ZDK/7 EC for Island County showed ARPSC tape slide show to Oak Harbor Club group – *new* AREC frequency for club is 146.16. Western Wash. DX Club with big turnout ssb and cw on ARRL DX Contest will have aggregate scores in the millions. New Centralia Novices are WN7TAM, WN7TAN, WN7TAO. WA7NRV, WA7PPK and WA7OFE are active on 145.85 FAX. QCWA Northwest Chapter Annual meeting is June 10, 11, Red Lion Motor Inn, Victoria, B.C. W7OUB will be stationed in KH6-Land next three years. Traffic: W7BA 1030, W7PI 329, K7VAS 213, W7BQ 199, K7CTP 142, W7GYF 138, WA7DZU 129, K7OZA 104, WA7OCV 79, W7JEY 67, WA7KNW 65, K7OXL 47, W7MCW 40, W7BUN 38, W7AXT 30, W7FQE 22, W7IFU 17, W7UIM 14, W7AIB 11, W7ZHZ 10, W7APS 9, W7QCV 7, K4ZDK/7 6, WA7AVI 5, WA7GVB 5, WA7HCL 5, W7RXH 5, W7IVU 4, WA7LOV 3, K7BBO 1.

PACIFIC DIVISION

EAST BAY – SCM, Paul J. Parker, WB6DHH – Congrats to WN6PSH, a new Novice in the section. WB6EXB, WN6MZJ and WN6DMX went portable on Mt. Diablo, practicing for Field Day. WB6CPI also helped. WA6CXK has new quad at 70-ft. WA6IYB has new homebrew 813 linear. W6IPW reports band conditions good for UCC schedules. Fight the no-code amateur license. Listen to Pacific Div. Bulletins transmitted by W6ZF, 3580 kHz, 8:00 P.M. local time, first and third Mon. of each month. W6CBF has new receiver counter finally working. W6KPO is busy on 2-meter fm. W6HTD is running Novice class at Newark High School. There are many such classes in this section, it might be fun to get all the instructors together for a meeting. Interested? Drop me a line. W6IID also running phone patches and experimenting with antennas. Traffic: W6IPW 279, WB6VFW 29, WA6IYB 8.

NEVADA – SCM, *Leonard M. Norman, W7PBV* – SEC: L.L. Mike Blain, WA7BFU. Make plans now to attend the Sierra Hamfest, Reno, Nev. on Aug. 5, details from K7ZAU or K7YVN. Pacific Division ARRL convention Oct. 14, details from *W6ZRJ*. W7PRM and K7RBM each have new 4-wheel drive vehicles in which *to mount mobile rigs. WA7RZV is new sec/treas. of SNARS and* WA7LGP is Field Day chmn. K7UGL and K7UGT both fm *repeaters are having problems. K7ZOK is sporting a new HT-220* with 6 frequencies. WA7SNH/K5HMD with USAF has been *transferred to W6-Land for schooling at Wright Patterson. K7JPC* has a new antenna installation for 2 meters. K7YWF in his new *house getting vhf gear operational.* W7OOF *building an auto-patch* repeater for 28/88 to go on high Potosi. W7ILX is PO Net mgr. for Nev. and looking for members to form a Nev. Net. W7JII is back on 2 meters. WA7SOJ is vacationing in W6-Land. W7VYC made a short business trip to W6-Land. Mobiling in the west remember WCARS-7255 and WPSS-5952 plus 34/94 fm. Traffic: W7ILX 39.

SACRAMENTO VALLEY – SCM, John T. Minke, W6KYA – SEC: W6SMU. New appointees are WA6JVD as OO and WA7KZL/6 as *OO and OPS.* Welcome to *new Novices WN6QFC and WN6OLD.* New officers of the Sacramento ARC are WA6CUO, pres.; WB6POQ, secy.; W.36YZD, treas.; *WN6DPL, sgt.-at-arms. The club still meets*

at the Red Cross Bldg., but is looking for a new meeting place. K6YZU of Dunsmuir is active as an NCS for NCN/2 on Tue. nights. The Lassen ARC has become affiliated with the ARRL and meets the 2nd Mon. of each month in Susanville. New officers of the North Hills RC are W6DZK, pres.; K6QCV, vice-pres.; WA6IBJ, secy.; WA6PAB, treas. WA6JVO piled up 338,142 points in the cw portion of the ARRL DX Test and came to the next club meeting with a broken wrist. K6GG reports that the Glenn Co. RACES group has almost folded. New officers of the El Dorado ARC are WB6WBP, pres.; WA6YTB, vice-pres.; K6HDP, secy.-treas. The California Traffic and Training Net (CATT) meets every Wed. at 7:30 P.M. on 3745 kHz. The net is looking for check-ins from the northern part of the section. Contact WN6TTO for details. Field Day is almost here. Traffic: K6KWN 37, K6YZU 20, WA6IBJ 6.

SAN JOAQUIN VALLEY – SCM, Ralph Saroyan, W6JPU – The new EC for Kern County is WA6KZV. The Stockton Radio Club, W6SE is starting again with about ten members. WB6NET is on 6 meters ssb. WB6RSS is chasing DX. WB6IQC is operating on 20 meters on Slow-Scan with good results. WB6WWB is on 75 meters ssb. W6YKS built a new shack and getting ready for the June VHF contest. WA6SZS is conducting hidden transmitter hunts. The Delta Amateur Radio Club meets on the 3rd Thur. of each month at the Daniel Webster School in Stockton. WA6FZV has a T-599 and an R-599. WA6IIG is on 40 ssb. W6OBJ, WB6OGO, W6HYZ, WB4DHA, WB6GVQ, WB6TFU, W6UHN, WB6OSH, WA6WXP, W6JUK, K6RPH and others are active on the W6JPU repeater. The Fresno Amateur Radio Club has a 2-meter fm repeater on .20 and .80. W6DPD moved to a new QTH and has a 71-ft. tower with 6- and 2-meter antennas. W6NRO, WB6DYS and K6PKO are active on 220 MHz. W6FFE also is active on 220 MHz. WB6LAY is on 220. W6DPD worked XE1PY on 6 meters. WA6PXV is experimenting with horizontal antennas on 432 MHz. The West Coast VHF conference was held on May 6, 7 in Santa Clara with W6FZJ as chmn. Traffic: WA6CPP 7.

SANTA CLARA VALLEY – SCM, James A. Hauser, WA6LFA – SEC: WA6RXB. RM: W6BVB. W6AUC had 150 contacts operating portable over one week end from his cabin in the Sierras. W6RFP was heard during the DX Contest and says he bagged a couple of new ones. WA6DKF is QRL with school. W6EJ reports he now has 5BWAS certificate No. 100. Congrats Bob. NCN had 564 QNI and handled 384 in Mar. It meets daily at 7 P.M. local on 3630 kHz and again at 8:30 local. W6ZRJ sends the Pacific Division Bulletin every Thur. night on the following schedule: 7:30 P.M. local cw 3590 kHz and 7129 kHz 20 wpm, 8:30 P.M. local ssb 3815 kHz, 9:00 P.M. local RTTY 3615 kHz 850 Hz shift. Traffic: W6RSY 492, W6YBV 288, W6BVB 226, W6NW 208, W6DEF 122, W6AUC 49, W6RFP 32, WA6IFA 29, W6NLG 10, WA6DKF 6.

ROANOKE DIVISION

NORTH CAROLINA – SCM, Chuck Brydges, W4WXZ – SEC: W4FVN. PAM: WB4JMG. RM: WB4PNY. CNE reports total traffic 133, CNL 82, NCSSBN 51. New ORS and asst. mgr. CNL, WB4SPC is relocated and active in Charlotte. RM WB4PNY is mgr. of CNE. WB4PNY holds skeds with G3KSN/W4. WA4OPI continues fine job as mgr. for NCSSBN/3938. Note the two high traffic totals for the month belong to YLs. A club is forming at WSOC radio/TV in Charlotte and they are applying for the W4CQ call in memoriam; check with WB4ETP for details. EC W4OFO added inverted "V" for 80 and five-elements on 10. W4HWS moved to Raleigh. WA4WZQ reports good E-skip on 6 and WB4UDS worked Calif. for No. 23 on 6. WA4KWC now is a member of 10/10 Club and busy on vhf. W4OTF is asst. EC for Carteret. WA4ICS is testing new GE mobile to hit 2. WB4BGL trickles RF occasionally at W4ATC. Try the new N.C. Novice Net (NCNN) 3725 at 8 P.M. Check WB4TNC for details. The NC FM Repeater Assn. will assist in passing current election results on state level. A new vhf net, Central N.C. Traffic Net, meets nightly at 10 P.M. on 146/in 28/ out 88 on the Salisbury repeater. WB4QQY reports Novice classes by Cape Fear ARS. WB4CES is new EC for Mecklenburg. K4GQS on 2 with Gladding 25. WB4HDS is new OPS and helping prospective Novices in Hamlet. RARS/Raleigh continues very active with 90 members. K4CIA very active with both 5BDXCC and 5BWAS under his belt. RARS/K4MC will be working on election return effort. Traffic: (Mar.) WB4PNY 195, WB4QQY 125, K4GCN 117, W4FVN 108, WB4WZB 104, K4MC 76, K4GBR 44, W4WXZ 36, K4VBG 34, WB4SPC 33, WB4HDS 18, WB4TNC 14, W4ACY 13, W4TYU 12, WA4JCS 8, W4OFO 7, K4TTN 7, WB4HGS 6, WA4KWC 6, WA4WZQ 4, K4ZKQ 4. (Feb.) WB4QZL/4 137, W4PCN 131, W4TYP 23, W4OFO 15. (Jan.) W4UWS 53.

SOUTH CAROLINA – SCM, Elizabeth Y. Miller, WA4EFP – SEC: WA4ECJ. Asst. SEC: W4WQM. PAM: W4MTK. RM: K4LND.

WB4MCI is moving to New Wilmington, Pa. Our loss will be Pennsylvania's gain. K4II went to Japan in May. He hoped to *operate as K4II/KU7/KG6/KH6 on way out and back. He recently* received certificate from Russia - won first USA, first North *America 1971 USSR CW DX Test. He also won 1971 CQ WPX SSB* Test as K4II/DL while on trip to Germany. Welcome to the *Palmetto State K4BZD from Fla., now residing in Columbia. All SC* nets will go to EDT. Net times: SC SSBN 2300Z 3915 kHz daily, *mgr.: W4MTK; CNE 2300Z 3573 kHz daily, mgr.: K4LND; CNL* 0200Z 3573 kHz daily, mgr.: WB4ETF; SCPN 1600Z 3930 kHz Mon. *through Sat., 1230Z and 1930Z on Sun. Traffic: W4NTO* 108, WA4RMZ 13, K4LNJ 11, WB4PDQ 11, W4JA 8, K4II 2.

VIRGINIA — SCM, Robert J. Slagle, K4GR — Asst. SCM: A.E. Martin, Jr., W4THV, SEC: WA4PBG. Asst. SECs: WA4JJF, *WB4CVY.* PAMs: WA4EGC, WA4YXK. RMs: WA4LUL, WB4NNO, K0PIV/4, W4SHJ. WB4FJK double BPL this month. Woodbridge *Wireless Society formed — WB4RDV,* pres.; K4LDR, vice-pres.; W8VDA/4, secy. W4UO barely beat last year's DX Contest score! *K0PIV/4 has daytime job now and can give more leadership to* VRN; VRN doing pretty well with average of 5.4 QNI and 2.4 *messages per session. WB4KSG one short of BPL. WB4RNT diverted* by New Orleans trip and rig troubles. WB4SIK has a job and *threatens less activity. K4FEY "hung up" on RTTY. Your SEC,* WA4PBG, myself, and Alexandria EC, W4HE, met with local CD *and Red Cross officials and Messers Reams and McNeer of the State* CD organization: Bud is to initiate a state-wide plan to merge Civil *Defense and amateur communications. New PVRCers — W8VDA/4,* WB4FUT, K4KA and WB4TBO. K4LKQ getting new hardware — doesn't like ssb stuff on RTTY. Director W4KFC attended NC SSB dinner, QCWA banquet, and ARRL Executive Committee meeting. W4GF taking flying lessons. Move to Eastern Shore pending for W4HIR. WB4RDV, Area 4 EC, met with and established liaison with CBers. WB4FDT has an FM-210. K4MLC hopes to be with us more. WN4WLK nearer to General — worked Hawaii using raingutter. W4DM preparing for spring fever. W4LQO regrets his "zero" report. W4MK hopes to fire up this month. W4JUJ 1st place for Va. in La. QSO Party; has 2545 confirmed counties. WB4PWP has 75-meter dipole fixed. Va. Post Office Net 3908 kHz 2215Z Tue.; Va. Salt Mine Net 3947 kHz 0715 and 1630 Mon.-Fri.; VSBN 3935 kHz 1800 and 2200 daily; VSN 3680 kHz 1830 daily; VPN 3680 kHz 1900 daily; VPN 3947 kHz 1930 daily; VRN 3625 kHz 2000 daily. Traffic: (Mar.) WB4FJK 507, K4KNP 397, W8VDA/4 324, W4UQ 296, WB4KSG 226, K0PIV/4 226, WB4KIT 108, WB4RNT 102, WB4SGV 102, WB4SIK 90, WA4EGC 76, K4KA 73, K4ISS 61, K4FEY 49, K4GR 45, WA4PBG 43, WB4KBJ 40, W4YZC 30, WB4PCK 26, W4TF 26, K4LKQ 20, W4KFC 18, K3VIV/4 15, *W4OKN 13, WA2BEX/4 11, W4HIR 11,* WB4RDV 10, *WB4FDT* 7, K4GTS 6, K4MLC 6, W4KX 4, W4OP 4, W4RZW 2, WN4WLK 2, K4LMB 1. *(Feb.)* WB4FDT 8, *W4OKN 5, W4OP 4. (Jan.)* WB4PWP 9.

WEST VIRGINIA — SCM, Donald B. Morris, W8JM — SEC: WA8NDY. RM: WB8BBG. PAMs: W8DUW, W8IYD, K8CHW. Phone Net Mgr.: WA8POS. CW Net Mgr.: WB8CYB. CW Net, 3570 daily at 0000Z. Phone Net, 3989 at 2300Z. W. Va. State Radio Convention, Assn. and State Radio Council combined into one group. New Council officers are K8OEW, pres.; W8DUV, vice-pres.; WA8OKG, secy.; K8WMX, treas. State ARRL Convention at Jackson's Mill, July 1 and 2 with ARRL pres. Dannals attending. MARA ARC repeater now operating on 28-88. WA8ART now working 0 in Saudi Arabia. WB8BMV made PSHR and has new TR-22. *W8IM and WN8LAI visited Kanawha RC meeting.* WA8NDY, W8DUV, WA8CRW, WA8RQB, K8TPF, K8CFT and W8JM on the committee to pick the 1972 Amateur of the Year. W8WVA will be the Station Convention call again this year. Huntington Tri-State RC held successful Ham-Picnic and the Wheeling club's YL-OM dinner largest ever. WVN CW Net with 105 stations, passed 29 messages and the Phone Net with 315 stations handled 52 messages. WA8PLT building a slow-scan TV receiver. WVN Novice Net in 3 sessions with 8 stations recorded 42 messages. Traffic: WB8CYB 172, WA8POS 153, WN8III 89, WB8BMV 73, WN8IFU 48, W8JM 30, WA8LLW 25, W8DUV 14, WA8KCJ 12, K8QLW 11, WA8NDY 4, WA8OKG 4, WA8WCK 4, WB8DQX 3, WA8THX 3, K8ZDY 3, WB8ABC 2, WA8UNP 2, WB8BMW 1, W8CKX 1, WB8CPU 1, WB8DMS 1, W8LEO 1, W8HZA 1, W8IMX 1, K8VAH 1.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, Clyde O. Penney, WAØHLO — SEC: WAØQOY. RM: WØLRN. PAMs: WBØAWG, WØCXW, WØLRW, WAØWYP. Newly elected officers of RMRL are KØONC, pres.; WBØAWG, vice-pres.; WAØSOV, secy.; WØHYB, treas. Elected to the Board of Dir. for 3-year terms were KØONC, WØHYB and KØLSG;

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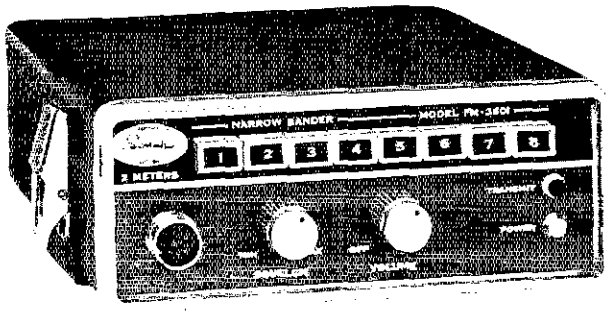

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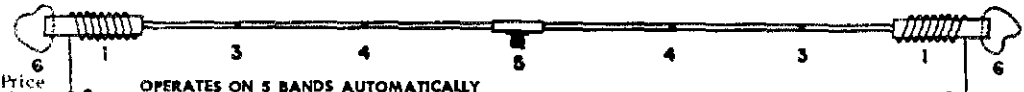

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for 2-year terms were WBØAWG and WAØKUM; for 1-year terms were WAØSOV and WAØGWL. WBØAXW recently received his CW-WAS. He is alternate TWN representative for CCN. WAØYFD operated portable with the CAP for their communications exercise on Mar. 11, 1972. KØSTX, WAØKXD and WAØRLQ provided communications for a rescue operation in San Isabel National Forest, week of Mar. 26. We are sorry to lose WBØBAG who is leaving for two years duty in Germany. Net traffic Mar.: Hi-Noon QNI 1094, QTC 57, informals 110, phone patches 54, time of 949 minutes. CTN QNI 300, informals 45, time of 634 minutes. Columbine QNI 1046, QTC 90, informals 174, time of 1225 minutes. CCN QNI 266, QTC 123, 31 sessions. Net traffic Feb.: SSN QNI 239, QTC 102, informals 55, 29 sessions for 735 minutes. CCN QNI 260, QTC 115, 29 sessions. Traffic: (Mar.) KØZSO 776, KØYFK 530, WØWYX 332, WØLO 141, KØOTH 115, WØLLA 95, KØSPR 86, WØLRN 85, WØLRW 78, W2TPV/Ø 64, WBØCCB 58, WØSIN 55, WAØZWA 48, WØNZL 45, WAØWYP 34, WØIW 33, WBØAXW 31, WØKFH 17, WAØNFO 12, KØGCA 9, WØBY 5, WAØYFD 5 (Feb.) KØYFK 458, WBØIDNY47, KØJSP 42, WAØNFO 18, WBØCQJ 6. (Jan.) WBØCQJ 85.

NEW MEXICO – SCM, James R. Prine, W5NUI – The participation in the Rocky Mountain QSO party was fair with several counties not represented. Scores should be out soon. W5UH has completed construction of new console operating position with all cables neatly out of sight. W5QNQ has progressed to 2-meter fm and would like to know if there is interest in establishing an ORS schedule on 2 meters for the southern portion of the state? How about a bit of recognition for the Field Day winners at the fall Albuquerque Hamfest. W5ALL has been elected mayor-protem of the Village of Cloudcroft. Traffic: W5UH 235, K5MAT 154, K5DAB 143, WB5AXC 85, W5RL 74, W5MYM 52, W5DMG 34, W5PDY 28, W5BWV 8, WA5OHI 8, WA5MLY 7, W5QNQ 1.

UTAH – SCM, Carroll F. Soper, K7SOT – Cache Amateur Radio Club has been organized and application for club affiliation with ARRL has been approved. WA7LFS, pres.; WA7MBL, secy.-treas. WA7SKB is the only active amateur in Garfield County. County hunters take note. DJ9WH spent two days in the Salt Lake area en route to San Francisco. UARC Ladies auxiliary held annual dinner Feb. 11, installed wife of WA7KGG, Marion Finch as new pres. K7BNZ has new Ham-M rotor on tri-band beam and is working considerable DX on 10 and 15 meters. W7HKC has new HW-32. K7SOP has received his Advanced Class license. W7YSO/M witnessed an accident on freeway reported to W7EM on two meters which was reported to Salt Lake City police within one minute after accident. Traffic: W7EM 180, K7HLR 60, W7OCX 49, W7JQV 21, WA7HCQ 18, K7PEB 17, K7CLO 9, WA7LFS 8, K7SOT 8, W7GPN 2, W7HKC 2, WA7MEL 1.

WYOMING – SCM, Wayne M. Moore, W7CQL – S.E.C.: K7NQX. WA7CGK and his wife have a new baby boy – another upcoming prospective ham? A couple of new ones on the air in Wyo.: W7IWG in Laramie and WA7RKC in Lander. We have a group of high school students including their instructor who have taken their Novice tests – maybe we will hear some hams on in Rawlins. W7HFB was released from the hospital in early Apr. K7NQX has also returned from the hospital. Don't forget the Hamfest at Thermopolis on July 15, 16 – it promises to be a very good affair this year. WA7NHP has a new transceiver. W7PVN enjoyed a vacation in Mex. during Mar. A new appointment is W7LVU as OO. Traffic: W7TZK 135, K7VWA 135, W7HNF 108, WA7AUV 86, W7YWW 38, W7SDA 34, W7BHH 32, WA7NHP 19, K7TTH 12, K7WRS 11, K7WNF 7, WA7IFX 5.

SOUTHEASTERN DIVISION

ALABAMA – SCM, James A. Brashear, Jr., WB4FKJ – It is with deep regret that I report the deaths of WB4ITN and W4YFM. Congratulations to the Wiregrass ARC of Dothan on becoming an ARRL affiliate. Officers are K4RMH, pres.; WB4MAL, vice-pres.; WB4JFW, secy., WB4SLW, act. mgr.; W4KGB, trustee; WA4IHL, treas. The Huntsville ARC provided communications for the March of Dimes Walk-A-Thon. About 28 amateurs participated with WA4WRU as chmn. The walk, sponsored by the Jaycees, was over a 15-mile route and about 900 (mostly students) participated. WB4SVH is new Net Mgr. of AFNO replacing WB4OKT who did an FB job. WB4SON is back on ssb and again made BPL. In spite of a hectic month, experiencing rig and antenna problems, WB4WUS worked WA9HWQ on 6 meters on Mar. 3. WB4WUS also reports he has an SB-110A for 6-meter ssb. K4JK reports he missed a lot of hamming – vacation month, trips, etc. but still finds time to work (and help) Novices. If you are not ready for Field Day, you may be too late! Be sure your FD chmn. submits the FD report to ARRL prior to the deadline. The Decatur ARC recently sponsored a "swap-fest" at the Calhoun Jr. College. Sorry to hear that WB4NFV

will be moving to Washington State. Appointed WB4LNM as EC, Lee County. Traffic: (Mar.) WB4SVH 171, WB4SON 150, WB4EKJ 80, K4AOZ 68, WB4KDI 68, WB4JMH 58, WB4WBJ 33, WB4THU 31, WN4YQX 26, WB4NLK 25, WB4SVX 24, WA4VFK 21, K4HJM 19, WB4KSL 17, WA4BDW 5, WB4WUS 2. (Feb.) WB4NLK 60, WB4WUS 1.

EASTERN FLORIDA – SCM, Regis K. Kramer, *W4ILE* – SEC: W4IYT, Asst. SEC: W4SMK. RM: WB4OMG. PAMs: W4SDR 40, W4OGX 75. For ONIs through Feb., TPTN certificates were earned by WB4MIQ, WA4OWG, WB4PNG, W4BCZ, WB4FLW, WB4PTJ, W4SCY and W4SMK. Dade Co. ARPSC has applied for call AD4USA for operation during Democratic Nat'l. Convention at Miami Beach July 9 through 16. WB4AIW is new proxy of Fla. RTTY Society. W2JXK, handicapped newcomer to Fla. is helped back on air by Hollywood ARC. WA4IJH enjoys new SB-401. Contact WA4VZF or W4VLK EC and AEC Duval Co. for AREC net information and Jacksonville area cw training net. W4ILE joined Fla. RTTY Society. New appointees, WB4CKY, W4DO, W4UWP, OVSs, K4SCL, ORS; WB4RLU, Palm Beach Co. EC; K4PMK, Pinellas Co. EC. Renewals: K4KE as ORS; WA4IJH, WB4IJW, WA4SCK, as ORSs and OPSs. W4IYT pushed ARPSC at Red Cross Goals and Objective Meetings South Fla. Division at Lake Placid conclave Mar. 29, 30. WA2AFL/4 was editor of the Middle Atlantic *Region Net (MARNET) Bulletin before moving to* Fla. WB4OMG QTCd over 200 radiograms reminding out-of-staters re Florida Skip QSO Party. WB4OMG will feature RM oriented topics as new OPN columnist in Fla. Skip. The ARRL forum was one of the highlights at Orlando Hamfest. The EMTN dinner was an outstanding affair. Crystal-Pool for OPTN Novice members got off the ground at Orlando OPN meeting. Emergency power was also a topic of discussion. WA4ZZG reports over 335 phone patches by group of 15 operators in South Fla. to/from Caribbean plus Central and South America. Included were WB4EMU, WB4JSS, WB4SNC, WB4RDD, WB4PWR, WB4TED, K4YOI, YV5DAP/W4, YN1AE/W4, TG9CK/W4, HI8OC/W4, HK3CJD/W4 and HK3CLM-HK3CAB/W4. WB4HKP is back after antenna problems. WB4QFI-Jacksonville repeater doing great with new auto-phone-patch. Welcome to K4EXC, ex-PAM from Ill. WB4SMU, Ga. will soon be moving to Orlando. Also, WA3LRV will be coming down to Fla. from Delaware. 103 Eastern Fla. operators reported Mar. *traffic* totaling 10,246. Traffic with * indicating BPL and/or PSHR: (Mar.) W3CUL/4* 3845, W3VR/4* 654, WB4OMG* 403, K4SCL 343, WB4AIW 339, WB4NCH* 329, WA4IJH 271, W4FFF 258, W4EPC 244, W4ILE* 221, WB4PNG* 220, WB4VOS* 168, W8BZY/4 165, WA4NBT 176, WA2AFL/4* 167, WB4PTH* 141, W4SDR 136, WB4HJW 131, WB4ISK 116, K4FAC* 111, W4UWP 104, WA4WBM 84, WA4SCK 79, WB4GHD 76, W4IAD 62, K4JWM 60, W4YPA 51, W4IYT 49, W4SMK 48, WB4AID 47, W4IA 47, W4NGR 46, W4BM 45, W4DQS 43, K4BLM 40, K4WXS 40, WA4IIDH 37, WB2NGI/4 37, WA4CIO 31, W4DVO 31, WB4HML 30, WB4SQA 29, K4PYN 28, K4LEC 28, WB4SKJ 28, W4OOH 22, W4TJM 22, WA4RUF 22, WB4UOC* 22, WA5BRJ/4 21, WA4IILD 20, K4IEX 20, W4GDK 19, W4OT 19, K4QG 19, WB4RLU 19, WB4BNH 18, W4LDM 18, WA4JSX/4 18, W4GUJ 17, WA4BGW 16, W4BCZ 15, K4GJ 15, W4EH 14, W4OGX 14, WB4MIQ 13, WN4UNV 13, K4LPS 12, WB4ICD 11, W4KRC 11, K4OER 11, W4OVF 10, *WA4VZF 10, W4LSR 9, WB4OAA 9, W4DO 8*, K4EZE 8, W4YPX 8, K4EBE 7, W4NTE 7, WA4BMG 6, K4EJW 6, W4IXH 6, WN4RGQ 6, W4SCY 6, WA5ALN/4 5, W4LK 5, W4VLK 5, W4VME 5, WN4WBI 5, W2JI/4 4, WB4HKP 4, WB4HPR 4, WB4ONR 4, W4ZF 4, WB4NTH 3, WB4FLW 2, K4EXC 2, W4KGJ 2, K4SHC 1, WA4YRU 1, KØLCG/4 1. (Feb.) WB4BNH 20, WB4TAF 15, K4GEW 10, (Mar.) K4FLV 4.

WEST INDIES – SCM, Pedro J. Piza, Jr., KP4AST – PRARC held their annual meeting on Mar. 26, 1972 where a Life Membership was granted to KP4WT. KP4s BMZ, DKZ, DHD, DDO, DKY, are among the KP4s that can be found daily on 14205 chasing DX. KP4BJM joined the QRP group. KP4DHW is active daily on 21380. KP4BSH bought an SV linear. KP4AKB/W8 is heard on 20 meters from Dayton. KP4CO started construction of a new QTH. KP4CLB graduated with a BSEE. KP4AET and KP4BNP join SSTV. KV4s FZ, FC, AM, AA, YP2LZ, 9Y4VT and others can be heard on 7214 at 1100 GMT daily. Anyone interested in any appointment please contact me by mail or on the air. Traffic: KP4WT 95.

WESTERN FLORIDA – SCM, Frank M. Butler, Jr., W4RKH – SEC: W4IKB. RM: K4LAN. RTTY: W4WEB. PAM: WA4IZM. VHF PAM: WB4KGW. Pensacola: W4NOG is recovering at NAS Hospital from severe burns. WA4IZM is the new NM for the W. Fla. Phone Net, and also PAM. WB4KGW was appointed VHF PAM. WN4UKG passed his General Class exam. WB4DVM is installing antennas at new QTH. K4LAN operated /4 in Jacksonville while attending

school, but continued to send out OO notices. K4FKV, WB4PKW and WB4KGW have started a new vhf newsletter called the VHF Ragchewer. WA3ODA/4 picked up several new states and an LU3 on 6 meters. WB4BSZ has a new Clegg 99er. K8VCP/4 is a newcomer to 6 meters. Fort Walton: WB4NHH renewed ORS. New PARC officers are WB4KOX, pres., plus WB4EQU, W4MTD, W4UXW and K4CLM. K4UBR was presented "Ham of the Year" award at the 2nd annual Swapfest. K4CLM and W3ZRW have joined QFN. Bonifay: WA4GTA moved to Dothan. Blountstown: K4DHK and K4NKE returned here and are active on 2 meters. Chipley: WA4ZFK has an HR-2MS mobile rig. W4IKB is building an emergency comm. station into a 20-ft. trailer. Tallahassee: The TARC now meets at the Red Cross Bldg. 1st Thur. of each month. WB4PNJ put together an HW-16; first contact was Poland! Traffic: K4VFY 266, K4CLM 91, KØBAD/4 49, WB9FUZ/4 25, W4RKH 19, WA5GTJ/4 3.

SOUTHWESTERN DIVISION

ARIZONA – SCM, Gary M. Hamman, W7CAF – SEC: K7GPZ. RM: K7NHL. PAM: W7UXZ. Field Day plans have been made by most clubs and many individuals for the June 24, 25 event. The next Hamfest is the annual Ft. Tuthill Hamfest in Flagstaff on July 29, 30. ARCA is sponsoring the annual hamfest which again will be held at the Coconino County Fairgrounds. The annual Phoenix versus Tucson softball game was held on Mar. 19 with Phoenix coming out on the short end of the score for the second year in a row. The weather was good and the pot-luck lunch was good, as always. Explorer Post 710, sponsored by the AARC, provided communications for two Explorer sports car rallies with the help of the ARA. K7JWB was appointed an EC for Maricopa County. WA7JCK was appointed by K7NTG (EC Pim County) as an asst. EC. K7MTZ is an OBS and gives bulletins ten minutes prior to ATEN, PON and IWN. Section net certificates were earned by K7EMM, WA7HIT, WA7KQE, W7OUE, K7MTZ, K7RLT and K7UOK. Traffic: K7MTZ 201, K7NHL 178, K7EMM 64, W7DQS 52, K7RLT 32, WA7TFU 31, W7CAF 23, W7PG 18, K7RDH 18, K7UOK 11, W7OUE 8, WA7IXC 2, W7LLO 2, WA7NQA 2, W7WGW 2.

LOS ANGELES – SCM, Eugene H. Violino, W6INH – SEC: WA6QZY. RM: W6LYY. The winner of a recent transmitter hunt at the Antelope Valley Radio Club was W6MYH. K6GXO is mobile via motorcycle. The QCWA had a farewell luncheon for W6IL who is going to Spain. WA6AII QRL college. W6HUJ recovering from a cataract operation. The Crescenta Valley Club had an installation of officers dinner at Sunland; entertainment by W6MAB. W6OIL was in the hospital a few days and is now back at work. W6BHG home from hospital but still recovering. W6FQ active 2 meters QRP and big antennas. W6IPN has retired and plans to be active on 7 MHz. WA6KRA has been looking at new beam towers. The QCWA Spring Dinner arrangements were handled by K6BA and W6PG. The San Fernando Valley Club has their repeater going. WB6YIZ active in traffic net and school. WA6QQI and W6USY both busy on SCN. It was suggested by some that the 2-meter band be sectionalized into FM, RTTY, AM and Repeater areas. The San Gabriel Club held "Ham Day in the Park" May 21, chmn. was WA6CBJ. The Associated Radio Amateurs of Long Beach had a pot luck, St. Pat's day at residence of W6LAE. Santa Clarita Club has had a very busy month filled with events. K6CL is liaison between the PARC and Dir. John Griggs. W6BZN gave a talk on "The Early Days of Sound" at the PARC. JPL radio club has many projects in the future – such as a 220-MHz repeater on Mt. Wilson. I would appreciate more Public Service Honor Roll monthly reports. WB6JJN building new linear. WB6YSG active WESCARS and Mission Trail Net. K6UYK looking hard at 2-meter fm rigs and repairing phone patch. W6IVC back on RTTY with h new unit; works great. W6OAW and WB6YFT handled emergency medical traffic between Baja, Calif. and San Diego. W6MYR has been receiving QSL cards for ZK2AU who is an illegal station. K6EA moved his station downstairs and now has a new resonant circuit; the lights go on when he gets on the air. WA6AAW now has 5BWAS. Congrats Dave. W6MST had vacation in KH-Land. K6CL going to VE-Land on trip, may operate 2 meters. W6RCV OBS on 7055 and 3740 kHz. New 11th Naval District MARS Dir. is WB6SOI. We wish him the best. W6BXR gave an excellent discussion on his homebrew electronic key-board keyer at the San Fernando RC. Traffic: K6UYK 414, W6INH 402, W6MLF 230, WB6ZVC 158, W6QAE 127, WB6BBO 120, W6IVC 86, W6LYY 81, W6USY 62, WA6ZKI 53, WB6KGK 32, WA6AAW 28, K6KSG 27, K6EA 18, K6CL 15, WB6ZFT 14, W6HUJ 11, W6JPH 8, WB6YIZ 8, WA6DHM 7, W6AM 6, K6ASK 5, W6DGH 4.

ORANGE – SCM, Jerry L. VerDuft, W6MNY – Asst. SCM: Richard W. Birbeck, K6CID. SEC: WB6CQR. RMs: WB6AKR, W6BNX. WA6TVH is a new OPS from the L.A. section who moved

to Wrightwood. WB6CQR has been reelected chmn. of the Orange County Council of Amateur Radio Organizations and the new secy. is W6NT. The Council has planned a joint club picnic to be held July 30. We regret the passing of W6GB. He was a long time OPS and devoted amateur. W6FB worked W3TOS on his 80-meter "1931" homebrew rig. WA6YWS is handling messages via SCN for the Inyo County Museum. WB6FSL, WB6RIV, WB6RAL and WB6ASR joined together to win the So. Cal. VHF Club Mar. transmitter hunt. K6YNB has completed his 220 and 432 MHz high power homebrew station and ready for the vhf contest. New officers of the Barstow ARC are WA6CMZ, pres.; WB6IOE, vice-pres.; W6ZGC, secy. Your SCM was guest speaker at their Mar. meeting accompanied by W6CPB, K6GGS, W6BAD. A new cw training net is the Calif. Traffic and Training Net (CATT) which meets every Wed. at 1930 local on 3745 kHz. In addition to training in handling traffic, it is to help Novices prepare for their General ticket. Check in or contact the NCS WN6UTO, 3235 Throm Ave., Merced, Ca. 95340. W6MNY won a new foreign call book at the joint meeting of Orange Co. and San Diego Co. DX club dinner in Oceanside. WB6AKR is new Sat. night liaison from Southern Calif. Net to Mission Trail Net. W6CPB spent three weeks visiting back east. W6WRJ is looking for a new mobile mount. WB6JOT has a new 80-ft. tower and should have no problem being heard for Official Bulletins. PSHR: WA6FVA 43, W6MNY 42, WB6AKR 32. Traffic: W6ISC 260, W6MNY 84, WB6AKR 62, WA6TVA 38, WA6YWS 34, K6GGS 30, W6QBD 15, W6WRJ 8, W6CPB 4.

SAN DIEGO – SCM, Paul C. Thompson, W6SRS – Asst. SCM: Art Smith, W6INL. SEC: W6TAI. With summer coming up you can help your NTS by filling in on some of the vacation spots. Those of you who have had experience in traffic and also those who are just starting can use this time to "get back into the swing" of things. For the beginner the SCN training net and the Calif. Traffic and Training Net are available. Contact your SCM for details. Club activities: The Palomar ARC's new meeting place is just dandy; Mar. meeting was about "our Mr. Sun." El Cajon ARC speaker in Apr. was K6DS on homebrew PC boards with that professional look. North Shores held their annual auction with many items going on the block. IVARA had a program of electronics manufacture. San Diego FM had discussion on the repeater operation. SDDX Club meets at Convair Gun Club. SOBARS took a slide trip with W3MKS/6 through Pakistan, Greece and Cyprus looking for DX. Station activities: WA6KJK walked in the 22 mile Amigos Jaunt. A new call is WN6PHJ, congrats. WB6KSA is retiring as CDRO. New RO is WB6SEZ. New Extra Class is W6FPY. WB6HMY is busy handling traffic. WA6HLA working on SBWAS. W6VNQ again is back to his PAN and ECC skeds. W6DEY ex-Orange SCM has passed the Extra Class exam. K6BIO looking for new contacts on 1296. PSHR: WB6VKV 34. Traffic: W6VNQ 334, WB6VKV 303, W6IOE 104, WB6HMY 90, WA6AMK 80, W6BGE 70, W6DFY 31, K6PM 7, W6SRS 4, WA6HLA 3, W6IAL 1.

SANTA BARBARA – SCM, D. Paul Gagnon, WA6DFI – SEC: W6JTA. RM: W6UI. PAM: K6EVQ. We have a good group of PCs and a growing number in the AREC. The section AREC Net on Wed. on 3935 at 8 P.M. continues to grow. WA6FIR heads up the W6AB Field Day effort for the Satellite ARC. WA6DCZ made WAS. The Satellite Club saw slides and heard a tape by VR6TC on Pitcairn Island at the Apr. meeting. WA6WWY is a new Advanced Class licensee and WA6FOR passed his General Class exam. WB6LDW has been elected pres. of the new Central Coast ARC. WA6LBO has a new Tempo 1 and a Quad to QSO his son in Thailand. The Cuneio Valley ARC held its annual installation dinner/dance in Mar. WA6MLI passed the Third Class Radio Telegraph test and working on 2nd. WA6KRA and W6UI are working with the Lompoc CD to revitalize the Lompoc AREC and RACES. We regret to note the passing of WA6AAX. The Santa Barbara AREC meets at 1930 PST on 145.8 each Mon. They had 48 ONI in Mar. WB6WKC took a trip to Oregon during Easter and worked through numerous repeaters. WA6WYD is active with the Navy MARS on RTTY. W6MUL helping the Explorer Post 2902 in getting on 2-meter fm through repeater WA6SIN and in preparing for Field Day. The Slow Speed So. Cal CW net meets on week ends at 1630 local on 3600. PSHR: WA6DEL, WB6MXM. Traffic: (Mar.) W6JTA 321, WA6DBI 213, WB6MXM 65, K6EVQ 35, WA6WYD 32, WA6FUA 8, WA6PEF 6, W6IDU 4, W6MOF 2, WB6WKC 1. (Feb.) WA6KRA 2.

WEST GULF DIVISION

NORTHERN TEXAS – SCM, L.E. Gene Harrison, W5LR – Asst. SCM: Frank A. Sewell, Sr., W5IZU. SEC: WA5VJW. RM: W5QGZ. PAM: W5BOO. Thanks for FB reports this month. What do you think about this new "CD" poll. Are you for daytime nets? Does anyone have answer to minute No. 18 of fan. board meeting re: film footage of an Amateur Emergency? Please let me know.

Midland Swapfest and UHF Conference – 500 + attending. Your SCM visited the Caprock ARC and met with an enthusiastic group. TEX Traffic Net EB. WA5KHE suggests we push for greater use of 10 meters and more on 2 and 10. Lone Star MARS bulletin promoting purchase of offset press. WA5JUJ appreciative of ARRL services. Temple ARC meeting Mar. 9; 21 present. Chief Brumley Navy MARS advises 1000 stations WAR, NSS, NPG and AIR will work cross-band Armed Forces Day. Asst. SCM W5IZU's grandson passed away Jan. 11, our sympathy to family. SEC NoTEX WA5VJW made BPL. Looks like 94/88 reporters got mixed up at Midland gathering. Sorry folks, WA5UGR plus K5HNL did swell job in recent NoTex emergencies. Arlington ARC announced nominations for station trustee – K5GMY, WA5FWC, W5EJ, W5YPI new EC Parker Co. K5BI thanks "OT" reports. PAM W5BOO advises he was elected pres. CenTex RC plus 2-Meter Repeater Assn. 21 signed for code class and 14 passed exam. Weather Bureau met with combined group discussed hurricanes and tornadoes. Your SCM mailed 1750 copies of Newsletter No. 2 to NTEX members. Asst. SCM W5IZU reports W5HT has new 26-ft. "Silver Streak" and W5LJ interested in old call books. W5ARV and son K5PCW active in QSO work. W5ARV was relief operator on SS VA Fogg (KV1P) before it sank. W5KYD, K5ABV, W5TT submit good QO reports. W5TT new Kilocycle Club pres. Pappy Spinks gave club new facilities at Oak Grove airport including clubhouse, bills paid, his and hers, 40-ft. tilt-over tower, rotator for 2 and 6 meters plus Mosley Tri-Bander. Garland ARC elects new officers, 42 attended last meeting. WB5EBC wants OBS. Dallas ARC recent meeting featured FCC Inspector Howard, subject "TVI" interference. All TV stations and news media invited. Traffic: (Mar.) WA5VJW 675, W5QV 228, W5TT 170, WB5AQI 38, W5LR 11, K5ARV 10, K5QKM 6, WB5BFX 5, WB5EBC 5. (Dec.) W5TT 5.

OKLAHOMA – SCM, Cecil C. Cash, W5PML – Asst. SCM: Joseph M. Schlosser, WA5IMO. SEC: WA5FSN. RM: W5RB. PAMs: W5MFX, WA5WHV, K5DLF and WA5ZRU. The Okla. City American Red Cross has become so versed in what the amateurs can do for them they called a special emergency drill on Mar. 19 in the Okla. City area, after which they served a meal of emergency rations. Very successful. The Ardmore club got back their HW-12 that had been stolen. W5EW and W5PWN spent a week with their grandchildren in Houston. W5JJ working with 1929 model Hartley no ew needs a UX-210 if anyone remembers what that is). Says he'll fire up the receiver using 3 UX-230s soon as he can find 2 No. 6 dry cells and a 45 V "B" battery. The Tulsa repeater group W5LVT conducted an emergency weather watch drill on Mar. 20, they have also applied for ARRL affiliation. The O.U. club W5FC made a big splash with their SSTV display during the engineering day open house. Congrats to WN5DBJ, WN5DOH and WN5ERV for going from Novice all the way to Advanced.

Net	*kHz*	*Local Time*	*Sess.*	*QNI*	*QTC*	*BX*
OPEN	3915	0800 Su	4	207	17	
OPON	3913	1700 M-F	23	603	187	
SPN	3850	1730 M-S	27	501	47	
OTWXN	3913	1745 M-S	26	446	18	299
OLZ	3682.5	1900 Dy	31	146	55	

Traffic: K5TEY 521, W5PML 80, W5RB 55, W5FW 42, WA5ZOO 40, WB5AXH 38, W5MFX 35, W5FKL 30, WA5FSN 14, WB5CWX 13, WB5AZS 12, WA5OUV 11, K5OCX 10, K5WPP 10, WA5QQP 8, W5SUG 8, W5SNP 5, W5HXL 4, WA5WRC 4.

SOUTHERN TEXAS – SCM, L. Lee Ulrey, K5HZR – SEC: K5HXR. PAM: W5KLV. RM: W5SSE. Congratulations to new EC WA5MUM. Renewed appointments: W5TFW as EC; WA5CBI as OPS. Houston ARC elected K5DFZ, pres.; WB5DDL, vice-pres.; WB5BER, treas.; WA5WYD, secy. EC W5ZPJ advises Shriners Nobility net formed to allow parents to talk to their children in hospitals. Austin ARC reports new radio classes now in session. Meeting held at Houston to organize Red Cross Coordination Net in conjunction with Red Cross Hurricane Watch Plan. K5CWS has quite elaborate antenna system for 6 meters. WA5YKL reports putting up antenna for the handicapped while en route to Canada in May. EC WA5ABA reports a large number of ARPSC members involved in recovery action during flash flooding Mar. 20. ORS WA5GZX having trouble with apartment type antenna. OO K5HGB has new rig on 2 meters. Former RM W5EZY now operational from new QTH on lake with new antenna. RM W5SSE off the air with equipment trouble. OO reports received from K5EJL, WA5MIN, W5NGW, W5RIY and W5VW. K5ROZ again made PSHR.

Net	*kHz*	*Sess.*	*QNI*	*QTC*
TTN*	3961	31	1646	134
7290 Ute	7290	45	2043	628

*NTS. Traffic: (Mar.) W5SSE 354, WB5BWV 177, WB5CUR 146, W5KLV 118, K5HZR 111, K5ROZ 101, W5ABQ 90, WA5YEA 69, WA5YXS 67, WA5TJI 52, W5VW 50, K5GDH 48, WA5ZJY 45.

WSRBB 41, WSBGF 36, WSIIWY 31, WA5LNV 28, WA5IPZ 27, WA5PJN 24, WSQO 23, WSZDU 20, K5RVF 18, K5HVI 17, WSTBW 17, K5EIE 15, WA5MKV 11, WA5MUM 10, WA5CTJ 9, WSUKN 9, WSLZY 8, W7WAH/5 8, WB5BGV 4, K5HUA 2. (Feb.) WA5MKV 15

CANADIAN DIVISION

ALBERTA – SCM, Don Sutherland, VE6IK – Asst. SCM: Donez Booth, VE6YL. SEC: VE6XC. EC VE6PM worked on communications plan for the Miles for Millions walk held in May. VE6QY and VE6AGZ are home from the hospital recovering from heart attacks. VE6ARQ and many others in the south are quite active on 2 meters. VE6AVV has done some nice liaison work for us plus his AREC work with VE6AGZ. VE6XC would like another EC for the Lethbridge area. VE6ABX is running a ham radio class in Pincher Creek. VE6PM has been instructing a few in ham radio and hasn't gotten over the shock of finding that one of his students held a commercial ticket. PAM VE6ALQ is preparing to move to a new antenna farm, he continues with net reports and records. CARA cooperated nicely with Calgary Cable TV in presenting a ham radio show. VE6FK Mont. PO Net Mgr. operator of the month. Traffic: VE6YL 105, VE6FK 37, VE6AGU 32, VE6IV 10, VE6SS 5, VE6VS 4, VE6PLL.

BRITISH COLUMBIA – SCM, H.E. Savage, VE7ER – VE7AKE is our official VHF appointee. PAM VE7SE is active on the Pollution Control Board. RM VE7OQ reports schedules: BCEN 3650 kHz 0300Z to 0315Z or until traffic is cleared. BCSN 3650 kHz 0345Z to 0400Z Mon. to Fri. The Slow Speed Net has been a good advantage to those interested in learning traffic handling and would like to see more. Totem ARC officers are VE7BRB, pres.; VE7EN, vice-pres.; VE7BNA, secy. We are sorry to report the Royal City ARA has folded after all the years. The custodian is holding the club's call VE7FY. VE7FV was the founder of the Association way back when (!). VE7BZF has his class "A." Golden City ARC is active on "green keys" out of Rossland. VE7QT CD coordinator reports good activity VSWC is fitting out a van for radio emergency communications. Good news. VE7BVU has been out walking(heart attack)! Traffic: (Mar.) VE7BLO 114, VE7LL 63, VE7QQ 44, VE7BLS 32, VE7AXI 24. (Feb.) VE7BLS 33.

MANITOBA – SCM, Steve Link, VE4EQ – With summer drawing near there should be lots of mobile operation, but drive safely. Set aside July 8, 9 for the Peace Garden Hamfest – it should be a big do. VE4KF operated in the DX test and doubled last year's score. VE4CR reports the Phone Net is handling several patches, so there's the place to look. With regret we record the passing of VE4BC. VE4OU has left for Trenton, Ont., while VE4s LO and QU have QSYd to Grand Rapids. VE4ST is the new CLARA editor, and VE4CW is a new call from Carman. Don't forget those FD messages to your SCM; don't forget FD either! Traffic: VE4RO 56, VE4EA 42, VE4KE 42, VE4XN 11, VE4CR 6, VE4HR 6, VE4YC 6, VE4LN 5, VE4BA 4, VE4IA 4, VE4QU 4, VE4FU 2, VE4IE 2, VE4IF 2, VE4YP 2, VE4DQ 1, VE4WZ 1.

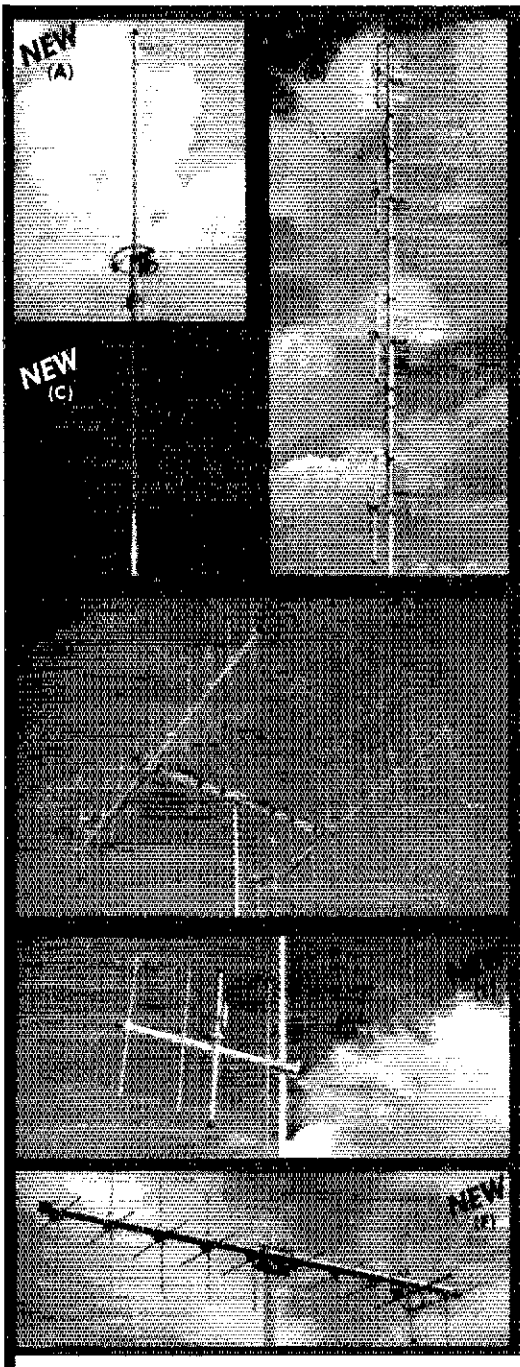
MARITIME – SCM, W.D. Jones, VO1AMR – Asst. SCM: Clarence Mitchell, VO1AW. SEC: VE1HL. It is with regret we report VE1VE has become a Silent Key. I wish you all fine weather and good operating on Field Day '72. The St. John Club plan using special call VA1LC on Field Day. VE1XG has been issued for use by the White Cane Club with VE1ZY, White Cane Net Mgr. as custodian of the club call. Congratulations to VE1BY who celebrated 50 years in both amateur and commerical radio last Mar. 25. LOLA contest winners were VE1AKO and VE1ADV. Our congratulations to both. VE1 contest winners were VE1ADV for the phone section and VE1AMR the cw section. ARCON has started an outgoing QSL Bureau for VO1 and VO2 amateurs. The new executive for SONRA includes VO1FX, pres.; VO1JN, vice-pres.; VO1CR, treas.; VO1CK, secy. VO1FN is now Asst. Dir. for the VO call area. VO1BV is enjoying 20-meter DX with a new antenna. Welcome to VO1JS, a new amateur from the St. John's area. APN reports ONI 96, OTC 123, in 31 sessions. Traffic: VE1ARB 153, VE1RO 103, VE1AMR 98, VO1CA 71.

ONTARIO – SCM, Holland H. Shepherd, VE3DV – Asst. SCM: Ed W. Doyle, VE3BWD. On Mar. 14 I was informed by ARRL Hq. that I was reelected your SCM for another term of two years. I appreciate the vote of confidence and will do my best. Congratulations to VE3ASZ, Ontario's only XYL ORS, on making BPL for Mar. Betty's only comment, "it was a long month." Now let's see some more BPLs. Asst. SCM VE3EWD will take over as Net Mgr. of OPN immediately. Ed does an outstanding job for the OPN by providing liaison to the Interstate SSB Traffic Net on 3985 kHz. VE3UFN also has been showing up but Ed would like to have more so that Ont. SSBers can experience what a real ssb traffic net sounds

like. Windsor ARC is in the midst of putting a second repeater on the air. Call is VE3WIN. I recommend to all organizations who sponsor repeaters that they consider a daily ten minute traffic net with liaison to the OPN, GBN, CJN or OQN. If interested write to VE3OZ, pres. Champlain Regional Repeater Assn., who runs the Champlain Minimet on Repeater VE3STP. The RSO sponsored ONTARS is averaging 2700 check-ins weekly – makes it probably the most active spot on 80 meters. Under the expert control of VE3CGO, the OVMRC and the OARC once again provided the communications for the St. John's Ambulance Corps during the Ottawa March for Millions. Traffic: (Mar.) VE3SB 174, VE3ASZ 138, VE3DPO 120, VE3AWE 110, VE3GFN 106, VE3FRU 86, VE3EHE 57, VE3EWD 57, VE3DQZ 40, VE3EXI 39, VE3AIA 35, VE3BPC 31, VE3NO 30, VE3GBR 23, VE3ATR 21, VE3GJG 19, VE3EHL 16, VE3FGV 15, VE3FRG 13, W3BIZ/VE3 12, VE3GT 8, VE3DVB 7, VE3DH 6. (Feb.) VE3AIA 36, VE3DOC 14, VE3CRW 12, VE3APL 9.

QUEBEC – SCM, Joe Unsworth, VE2ALE – New appointments: VE2APF as PAM and VE2UY as ORS. Endorsement of BC for VE2AJD. Please look for the "Golden Digger" at NOQ during Field Day this year under leadership of VE2AHU, Val D'Or Que., 1250 feet above sea level. The response of stations checking into the QR Net very good. Don't forget about the RAQI convention at Vaudreuil this summer. N'oubliez pas le congres de RAQI cette le 30 juin et 1 et 2 juillette a vaudreuil. VE2UN opere avec l' indicatif VA2UN au moins jusqu'au mois de juin. La mosaique des YL et XYL est disponible. Vous adressez a VE2DKC. VE2RWL nous est revenu sur L'air apres une longue absence. RAQI sera bientot en mesure de vous offrir de L'equipment surplus VHF en fm des information bientot. VE2BDM a un HW-12 et actif sur 80 metres. Beaucoup de station ont participe cette annee au concours VE2. VE2FN required by the Doctors of C.P. Rail to take his pension early because of medical grounds was honored at a party given by VE2RM Inc., and gifted with a digital readout clock. Good luck George from all the VE2s on HF, VHF, and UHF. More new calls heard on 2 meters. BPL: VA2UN. PSHR: VE2APT 28. Where are all other form 1 reports de VE2s? Traffic: VA2UN 134, VE2DR 80, VE2BP 52, VE2FC 42, VE2ALE 21, VE2APT 19, VE2AJD 6, VE2DLG 4.

SASKATCHEWAN – SCM, Barry Ogden, VE5BO – PAM VE5DN reports that VE5s FQ, IM, FX have taken over NCS duties from VE5s FM, HU, HZ. SEC VE5CU reports extension of 40-meter tests on 7175 and 1900Z. Results are encouraging! VE5HP is to be congratulated for his tireless efforts as both pres. of SARL and his other full time job as editor of QSO. FB! I have made it known that because of eyesight problems, I am forced to step down as SCM and leave the way clear for someone who will provide the effort and drive that is necessary in this very busy office. Boy was this a tough decision to make! Thanks gang! Remember the Fest in Moose Jaw! Traffic: VE5GL 106, VE5QS 71, VE5SC 41, VE5BO 33, VE5DN 12, VE5HP 10, VE5PD 9, VE5OH 7, VE5TT 7, VE5OJ 6, VE5EX 4, VE5SN 4, VE5DR 3, VE5UT 2, VE5EQ 1, VE5GF 1. QST



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A147-11	1000 watts	146-148 MHz	$17.95
A449-11	1000 watts	440-450 MHz	13.95

(D) POWER PACK: A 22 element, high performance, vertically polarized FM array, complete with all hardware, mounting boom, harness and 2 antennas.

A147-22	1000 watts	146-148 MHz	$49.50

(E) 4 ELEMENT YAGI: A special side mount 4 element FM yagi can be fixed or rotated—good gain and directivity.

A144-4	1000 watts	146-148 MHz	$ 9.95

(F) FM TWIST: A Cush Craft exclusive — it's two antennas in one. Horizontal elements cut at 144.5 MHz, vertical elements cut at 147 MHz, two feed lines.

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QCWA Quarter Century Wireless Association is an international non-profit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information. Q.C.W.A. Inc., Box 394, Mamaroneck, NY 10543.

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.

A.W.A. National Historical Radio Conference, Smithsonian Institution, Washington, D.C., Sept. 23. Further details in August QST.

EDITING a club paper? Need public relations help? You should belong to Amateur Radio News Service. For information contact Rose Ellen Bills, WA2FGS, Secretary, 17 Craig Pl., Pennsville, NJ 08070

FREE sample copy Long Island DX Assn. bulletin. Latest DX news. Business size s.a.s.e. to K2AFY, Box 532, West Hempstead, NY 11552

WARREN, Ohio ARA's Family Hamfest — Aug. 20. Giant fleamart, swimming, picknicking, all free. Displays, mobile checkin. Camping available. Yankee Lake, Rt. 7 near I-80. Details: QSL W8VTD

SRRC Hamfest: June 4 — same site as last year. Near Ottawa, Illinois. Registration — advance, $1.50, $2.00 at the gate. For details write: G. E. Keith, W9QLZ, RFD No. 1, Box 171, Oglesby, IL 61348

EARLY vacation? Then tear up that ticket to Tahiti. There'll be more fun at the ARRL Hudson Division Convention, October 21-22, Hilton Motor Inn, Tarrytown, N.Y. Exhibits, lectures, 2-meter fm, RTTY, contests, gabfests, New York sightseeing. Fun! No charge for a suntan. Info: Dave Popkin, WA2CCF, 303 Tenafly Rd., Englewood, NJ 07631

IRCC picnic/hamfest! Try it! You'll like it! July 9, fairgrounds, Lafayette. Advance $1.50, gate $2.00. Order: s.a.s.e. to W9YIP, 477 Robinson, West Lafayette, IN

WE buy electron tubes, diodes, transistors, integrated circuits, semiconductors and resistors. Astral Electronics, 150 Miller St., Elizabeth NJ 07207. Tel. 201-354-2420

WANTED: Teletype machines, parts Models No. 28, 32, 33, 35, 37. Cash or trade for Drake equipment. Altronics-Howard Co., Box 19, Boston MA 02101. (Tel: day or night 617-742-0048)

VERY in-ter-est-ing! Next 6 big issues $1. "The Ham Trader," Sycamore, IL 60178

QSL??? Samples 35c. With DeLuxe 50c. Religious 35c. Sakkers, W8OED, Box 218, Holland, MI 49423

TRAVEL-PAK QSL Kit — Send call and 10c; receive your Call sample kit in return. Sameo, Box 203, Wynantskill, NY 12198

QSLS. Second to none. Same day service. Samples 25c. Ray, K7HLR, Box 331, Clearfield, UT 84015

PICTURE QSL cards of your shack, etc. from your photograph. 500, $12.50. 1000, $16.25. Also unusual non-picture designs. Generous sample pack 25c. Half pound of samples 50c. Raum's, 4154 Fifth St. Philadelphia PA 19140.

QSLs, samples 10c. Fred Leyden W1NZJ 454 Proctor Av. Revere MA 02151.

CREATIVE QSL cards. Personal attention. Imaginative new designs. Send 25c. Receive catalog, samples and refund coupon. Wilkins Printing Box 787-1, Atascadero CA 93422.

SAMPLES 20c. Harry Sims, 3227 Missouri Ave. St. Louis MO. 63118.

QSLs 3-color glossy 100, $4.50. Rutgers Van-Typing Service. Free samples. Thomas St. Riegel Ridge, Milford, NJ 08848.

QSLs 300 for $4.65, samples dime, W9SKR, Ingleside, IL 60041

RUBBER stamps $1.50 includes tax and postage. Clint's Radio, W2UDO, 32 Cumberland Ave., Verona, NJ 07044.

QSLs "Brownie," W3CJI, 3111 Lehigh, Allentown PA 18103. Samples 10c. Catalog 25c.

DELUXE QSLs, Petty, W2HAZ, PO Box 5237, Trenton NJ 08638. Samples 10c.

3-D QSLs — Increased returns assure users' satisfaction. Samples 25c (refundable). 3-D QSL Co., Monson 2, Mass. 01057

COMPLETE QSL catalog! 300 cuts, 10 report forms, ink and stock samples, plus ten sample QSLs. 25c. Cornelison's Quality QSLs, 321 Warren St., N. Babylon, NY 11704

DON'T buy QSL cards until you see my free samples. Fast service, economical prices. Bolles, Little Print Shop, Box 9848, Austin TX 78757.

QSL, SWL, WPE cards. Samples 25c. Log books, file cards, decals. Malgo Press, Box 375 Toledo OH 43601.

QSLs, SWLs, WPE samples 15c. Nicholas & Son Printery, PO Box 11184, Phoenix AZ 85017

FRAME Display, and protect your QSLs with 20 pocket plastic holders. 3 for $1, 10 for $3, prepaid and guaranteed. Tepabco Box 198T Gallatin TN 37066.

QSLs — Thin dime brings samples. Alkanprint, Box 3494, Papago Station, Scottsdale, AZ 85257

QSL, SWL cards that are different. Quality card stock samples, 20c. Home Print, 2416 Elmo Ave., Hamilton, OH 45015

Excellent QSLs, reasonable, Samples 25c, W9CL Press, R.R. 1 Box 81T, Carmel, IN 46032

QSLs, 3 color glossy, globe, eagle, straight key, ham with earphones on front, report form on back, 100 - $4.75 postpaid, fluspunt, Box 7575, Kansas City, MO 64116

BEAUTIFUL QSL - SWL cards from the plates of the late Warren Rogers, K9AAB. Samples 25c. Write Jim Patterson, 3013 North Victoria St., St. Paul, MN 55113

1000 adr labels, 4 lines, $1.25. L. M. Hamilton, 19509 Flavian Ave., Torrance, CA 90503

QSLs 300 for $5.00. Free samples. Mark, WB6NKO, 2534 Eltonas Way, Carmichael, CA 95608

QSLs 300 for $4.35! Samples 10c. Colourcard, Box 326, Topanga, CA 90290

QSLs — custom QSLs, brochure 25c. W1FLX QSL Designs, 20 Britton St., Pittsfield, MA 01201

GORGEOUS QSLs. Rainbows, etc. Top quality! Low prices! Samples 10c. Refundable. Joe Harms, W4BLQ, Box 158, Edgewater, FL 32032

WANTED: All types of tubes. Top prices paid for Varian and Eimac. P.O. Box 414, Orlando, FL 32802. Jaro Electronics Corp.

WE buy tubes. Maritime International, 834 Hemlock St., Franklin Square, NY 11010

CASH paid for your unused tubes and good ham and commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, NY 10012.

WIRELESS sets, parts, catalogs, bought, traded. Laverty, 118 N. Wycombe, Lansdowne PA 19050.

AMATEUR museum buying old radios, books, magazines, catalogs, parts. Selling QST's and CQs. Erv Rasmussen, 164 Lowell, Redwood City, CA 94062

WANTED: An opportunity to quote your ham needs. 33 years a ham gear dealer. Collins, Drake, Galaxy, Tempo, Kenwood, Ten-Tec, Hy-Gain, and all others. Also $25,000 inventory used gear. Request list. Chuck, W8UCG, Electronic Distributors, Inc. 1960 Peck St. Muskegon MI 49441. Tel: 616-726-3198

HAM ticket - Amateur radio license course for Novice, General, Advanced, Extra Class. Write for information. Clayton Radio Co. 220 Mira Mar Av. Long Beach CA 90803.

SPIDERS for boomless quads. Heliarc welded aluminum. Al's Antennas, 1339 So. Washington St., Kennewick, WSN 99336

TRANSFORMERS rewound. Jess Price, W4CLJ, 507 Raehn, Orlando, FL 32806

WANT wireless (early) magazines and equipment for W4AA historical library. Wayne Nelson, Concord, NC 28025

CAPACITORS – Brand new aluminum electrolytics, 275ufd at 500wvDC. Ten for $19.50. K4IHP, 6835 Sunnybrook Ln., NE, Atlanta 30328

TV camera kits, plans, parts. Go ham TV the easy, economical way. Catalog 25c. ATV Research, Box 453-Q, Dakota City, NE 68731

CASH or trade for pre-1925 radios for personal collection. Carl Osborn, W6RXP, 13816 Calvert St., Van Nuys, CA 91401

NOVICE Crystals. Free flyer. Nat Stinette Electronics, Umatilla, FL 32784

TELETYPEWRITER machines, parts, bought, sold. S.a.s.e. for list. Typetronics, Box 8873, Ft. Lauderdale, FL 33310

NOVICES: Need help for General ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, PO Box 6015, Norfolk VA 23508.

WANTED: tubes, transistors, equipment, what have you? Bernard Goldstein, W2MNP, Box 257, Canal Station, New York, NY 10013

TOWER climbing safety belt/lanyard $21.50, prop pitch rotor $65, T/S 175 frequency meters $45, 2M handitalki $50, coax rf switches multiposition $16-$48. Free list. Link, 1000 Monroe Tpk., Monroe, CT 06468

1000 PIV @ 1 amp, diodes, new, epoxy, includes disc bypass and bndgng resistors, 10 for $2.50. 7/8 x 1/4 ceramic slug tuned coil forms, 5 for $1. Ferrite and powdered iron cores, slugs, rods, etc., sample package 1/2 lb. $1. Postpaid U.S.A. East Coast Electronics, 123 St. Boniface Rd., Cheektowaga, NY 14225

WANTED: SB303, SB401, SB220, HM102, SB610, Hy-Gain TH6DXX. W2UGM, 66 Columbus Ave., Closter, NJ 07624. 201-768-1884.

HAMMARLUND HX50 A transmitter 10-80 meters. Write WA3GPA, 295 W. Prospect Ave., Pittsburgh, PA 15205

SELL: 308I $800, NC200 with pwr sup $250, Hy-Gain 2 ele quad $60. John Dwyer, 2285 Holly Ct., Northbrook, IL 60062. Phone: 312-272-2443

SELLING my entire station, plus test equipment and many components. Send s.a.s.e. for list and prices. K5KDL, 2212 NW 40th, Lawton, OK 73501

CHICAGOLAND hams! We have your needs. KM Electronics, 7622 Belmont, Chicago, IL

NOVICES: Drake 2-NT transmitter $100, Hallicrafters SX-101 Mark III receiver w/5xtal filters, 160-10+WWV coverage, $120, 350+ Texas crystals FT-243 unused, perfect $40! Call after 6:00, Peter Priestman, WA2IPG, 150 Overlook Ave., Great Neck, NY 11021

WANTED: Collins mechanical filter F 455 J-21. Frank Mcdannet, 11557 Evanston N, Seattle, WA 98133

MINT condition guaranteed: TR-3 $345; AC-3 $50; NCX-500 and AC-500, $295; SR-150 $265; AC $55; DC $50; MB-150 $15; 32V3 $175. Prices firm. Elvin Miller, Box 869, Marion, IN 46952

SELL: Heath SB401 $250, SB301 $250, SB600 spk. $10, Millen transmatch jr., $50, DX60B break in cw $50. All postage paid. Paul Kubik, 402 Fourth St., Rochester, MI 48063

SUMMER OX special: Vacation in New York near Adirondacks, Berkshires, and Saratoga on highest hill in Schenectady County overlooking beautiful lake. Cottage with all conveniences available for two-week periods July and August. Antennas and ssb rigs 160 meters to 432 mc. included. Best vhf and DX location in East. Write for complete information. Allens, W2CRS, Mariaville, NY 12053

LEARN Morse Code the fast, easy way with "Codette." One hour of convenient, easy to use practice material on cassette tape. Instructions included. $3.50 postpaid. "Codette," Route 3, Box 278, Arkadelphia, AR 71923

COLLINS: Instruction manuals for all current models, $5 each plus 75c 1st. Class or $1 Airmail. Ham Radio Center, 8342 Olive Bl., St. Louis, MO 63132

WANTED: Collins 136A-1 noise blanker. Excellent condition with manual. Joe Patterson, W7MG, 8011 North Washburne Ave., Portland, OR 97217. Telephone: (503)285-3477

TEKTRONIX 545-CA-2 trace & scopemobile $1200, teletype 32ASR $400, Mite $250, H-P test equipment, counters, DVM, RCA computer at junk prices. Free list. Perers, 410 Riverside Dr., NYC 10025

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GROUNDED grid filament chokes, 30 amps $5. Plate chokes 800mA $3. 3-30MCS, PPUSA 48 William Deane, 8831 Sovereign Rd., San Diego, CA 92123

DISCOUNTS! Standard, Sonar, Clegg, Robyn, Mosley, Gush Craft, others. Also Marine gear. Write stating needs. Arena Communications, Dept. C, 1169 N. Military Hwy., Norfolk, VA 23502

AMATEUR paradise vacation, Livingstone Lodge, Mascoma Lake, N.H. Cosy cabin for two weekly $55. Swimming, fishing, boats, sports, ham radio, hot showers, fireplaces, light housekeeping, children half, camp sites, literature. A. Q. Livingstone, W2LA

2-meter fm, brand new, inoue IC-20, 1&10 watts, 12 channels, w/mike, cable, mobile mount. $259.50. Bob Brunkow, 15112 S.E. 44th, Bellevue, WA 98006. Phone: 206-747-8421

KILOWATT Heath station. SB-101, cw filter, HP-23A supply, SB-600, HD-10 keyer, Turner +2 mic, Waters coax switch, SB-200, TA-33 Sr., Ham-M rotor, plenty of cables and coax. Complete $750. Mark Kramer, WB9AHQ, 1140 Grant, Kenmore, WI 53809

CASH for ssb gear in need of repair. State condition and price. W9HF, 5005 Indiana, Ft. Wayne, IN 46807

WANTED: Collins 32S3; Wanted Collins 32S3; Wanted Collins 32S3. Chas. Henry, 39 Beaconsfield Blvd., Beaconsfield, Quebec, Canada. 514-695-6442

FANTASTIC DX-vhf QTH — LI 20 miles east NYC. 40-20 beams 365 ft above sea level. Nearly 5 acres, 5 bedrooms. Nearest house 400 ft away. Florida bound. Ray, W2BK, 516-626-1584

COLLINS: 32S3 transmitter w/pwr supply — $650; 75S3 receiver — $450; 312B4 control unit w/phone patch — $100; Aermotor tower No. MP-5, 70'-9" triangular free standing — orig. $670 for $300; Mosley TA-33 10-15-20M beam — $75; Ham-M rotor w/control — $80; B&W L.P. filter, 75 ohm, Mod. 426 — $12; 10M gnd. plane w/pole ant. — $25. All above in like new condition complete with manuals and installation drawings. Pickup only. K9BQD, 120 W. 3rd St., Roxana, IL 62084. 618-254-0087

MECHANICAL filters: 455 kHz, 2.1 kHz $18.95, 300 Hz $22.95. J. A. Fredricks, 314 South 13th Ave., Yakima, WA 98902

DRAKE R-4B — MS-4 — mint condition; Drake SC-6 6 meter converter, Drake CPS-1 power supply never used; 10 extra crystals, $875. Edward Cholerton, 770 Kings Highway, Cape May Court House, NJ 08210. 609-263-8533

MOVING, must sell Standard CUA64 free standing crankup tower with winched hinged base, custom powered crankup winch, rotor shelf $400. Cliff Dweller 40-75 $60. SBR 34 $80. Call 312-835-1045. Jack Weiss, WA9TBZ, 341 W. Elm Ct., Glencoe, IL 60022

"HOSS Trader Ed Moory" says he will not be undersold on cash deals! Shop around for your best price and then call or write the "Hoss" before you buy! New Regency HR-2A two meter fm transceiver, 15 watts, immediate shipment, amateur net, $229; in stock, new Drake, Galaxy, National, Robyn Digital, Hy-Gain, and more. New Rohn 50 ft foldover tower, prepaid, $239; New Mosley TA-33 and demo Ham-M rotor, $199.95. Used equipment: HQ-180C, $229; HT-37, $185; ZB, $179; Cygnet 260, $289; Ham-M, $85; TR-4, $429; T4-XB, $365; R4-B, $349. Write for used list. Moory Electronics Co., P.O. Box 505, DeWitt, AR 72042. Tel: 501-946-2820

ALLIED A-2516 receiver, 8 months old. Perfect condition with speaker, $95. Send C.O.D. Robert Zerrenner, 18 Fawn Ln., Westbury, NY 11590

WANTED: Hallicrafters AN/GRR-2, BC-787, EP-132, S-27C receivers. Also want early Hallicrafters receivers such as SX-4, S-8A, etc. Please state price and condition in first letter. Howard Hoagland, 639 North Sierra Bonita, Los Angeles, CA 90036

CANADIANS NCL 2000 amplifier like new with set of spare tubes worked over 300 countries $500. VE6TP

SELLING: HT-44 xmtr with ac supply $175, Clegg-99er $65, 75 meter Hustler resonator $6. Bill Gloia, WB2DZZ, 14-04 154 St., Whitestone, NY 11357

FOR SALE: Hammarlund HQ-170AC and matching speaker $150, Heath SB-401 with crystal pack $225. Both in excellent condition, with manuals. Will ship. K6DNY, Dave Chambers, 3626 W. Cambridge Dr., Visalia, CA 93277. (209)732-9239

SWAN 500C, 117XC power supply, 508 VFO, all for $450. Excellent condition. W. J. Miller, 1075 Second, Troy, MO 63379. Phone: 314-528-7362

YAESU FL-2500 2kW PEP, 1.5kW cw new from Japan. Also SBE-33, tuic, SWR bridge. Both $400. WA2OSB, 212-873-6532 evenings.

FOR SALE: Hammarlund HQ-170 receiver, 160-6 meter coverage. Make offer to: Marty Frank, 23 Teakwood Ln., Roslyn, NY 11576. Phone: (516)MA1-5730

COLLINS 75A-4 with 3 filters and vernier dial. Excellent condition. Asking $425. Call 203-889-7578, Charles Jollicoeur, 1 Graham Terrace, Lisbon, CT 06351

2 METER fm gear for sale: Motorola L43 base on 146.58 $135, Motorola T43 trunk mtg 2 freq tuned and xtals $125. GE MA36W trunk mtg 4 freq on 2 M $175. FDFM-2 10W on 2M transistorized 6 channels 12vdc w/ac power supply $150. W7YHS, 319 N 26th St., Billings MT 59101

TECH manuals for govt surplus gear, only $6.50 each: R-388/URR, R-390/URR, R-390A/URR, R-220/URR, R-220/URR, R-274/FRR. Hundreds of others available. W3HD, 4905 Roanne Dr., Washington, DC 20021

CONTACT us for new or reconditioned Collins, Kenwood, Tempo-One, Drake, Galaxy, Hy-Gain, Mosley, Henry linear, towers, antennas, rotators, other equipment. We try to meet any deal and to give you the best service, best price, best terms, top tradeins. Write for price lists. Try us. Henry Radio, Butler, MO 64730

CANADIANS: For sale — NCL 2000 series 71 with new 8122W tubes. *Terry Keim, Box 270, Fort Smith, NWT Canada*

514.4 3 filters $375 (W6RQZ) 1330 Curtis, Berkeley, CA 94702. (415)526-7345

SELL: Heathkit HW-100 with HP-23A supply. $275. WA1JMO, 45-303 Success Park, Bridgeport, CT 06610. 203-368-6234

SB-610 Monitor scope like new $50. Will mail. A. Wilson, Box 392, East Brewster, MA 02640

FOR SALE: Hallicrafters SX-99 receiver, good condition, $50, pick up only. Les Jeffries, 30617 Oceanaire, Palos Verdes, CA 90274. (213)377-4623

VHF-UHF ssb station: 1000wts ssb on 432, 220, 144, 50 giving up everything: Drake line, equipment, antennas, much test gear, parts, tubes. S.a.s.e., WA1LNJ, D. Schier, 6 Tremont St., Cos Cob, CT 06807

GREATER Washington D.C. area Foundation for Amateur Radio offers an information/hospitality service. Special consideration is given to visiting foreign amateurs and a volunteer staff of linguists is available. Contact Hospitality Chairman Bill Parrott, W4URL, 8548 Georgetown Pike, McLean,VA 22101. Phone: (703)893-8383 between 8 A.M. and 8 P.M.

COMPLETE station factory checked Amateur Electronics Milwaukee January 1972 Galaxy 300 transceiver 80/40/20 cw/phone $126 matching PSA 300 console, clock, speaker $34 Turner 254C mike $13 Archer SWR $11 key $3 complete sale only. Also Heath HW-32A transceiver late model $87 20 meter gamma matched two element beam $15. This apparatus not same advertised QST March. WA5PBX, 5011 "F" St., Little Rock, AR 72205. (501)666-7504

HEATHKITS — HW-101 with cw filter, HP-23A, GH12A, HD-10, HX-31, HM-102, Hy-Gain 18AVT/WB antenna $350. Also HW-16 and HG10B $90 or make offer for any or all. David Howe, 282 N. Franklin St., Apt. C, Delaware, OH 43015

WON as door prizes. Brand new Heath DX-60B professionally wired and tested, $60. Brand new Electro Voice 619TR mike w/dynamic compressor, $30. WB8HRQ, 4908 La Chene Ct., Warren, MI 48092

GOING fm: selling Galaxy V, MK 2, with ac and dc pwr supplies, $260 or trade for fm transceiver. WA2RUT, 10011 Greenbelt Rd., Apt. 304, Lanham, MD 20801

HW-100 with ac dc supplies, mike, speaker, mobile mount. Mint condition. $300. Bill Coals, Box 304, Manitowoc, WI 54220

GALAXY 300, matching ac supply and vox. Good condition, $175. W5BCF, 115-5th St., Nederland, TX 77627

GOING overseas. Must sell new, mint condition HW-101, cw filter, ac supply $200 firm. WA7OKF, 458 North 3rd West, Brigham City, UT 84302

WANTED: Noise blanker for HQ-170. R. Brearley, 805 Wake, Arvida, PQ Canada

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TESTED UX120 swap ten for gooseneck speaker. W2BU, Oneonta, NY 13820

WANTED: malfunctioning Heathkit linear SB200. State price and condition. Bill, WA9VKL, 2502 Cedar, Rolling Meadows, IL 60008

CLEGG Thor, six meter transceiver, a-m/cw, VFO, mint condition, original owner, $115. K2RPZ, Rocky Point, NY 11778. 516-744-6260

WANTED to buy or borrow, schematic and alignment for RME 50. Dale Errington, WN8JKH, 3546 Mapleway Dr., Toledo, OH 43614

HELP! Need schematic or tube placement diagram for Star SR-550 receiver. WB4GNT, Box 30627, Atlanta, GA 30332

SALE QSTs 1956 1957 1959 1961 thru 1970. 2.50 per year plus postage. W2UPJ, 20 Ash Dr., Neptune, NJ 07753

SELL: astatic 10D microphone, plain stand $17.50. LM-4 Navy wavemeter (Bendix) with book $25.00. HA-1 TO keyer (Hallicrafter) & Vibro-keyer paddle $49. FOB Bayside, NY. W2TB. 212-229-3260

SELL: TR4 MS4 Johnson LP filter mic 500 watt dummy load new 15M Delta ant coax rf wattmeter $450. Millen dipper $60. Collins mech filter $10. Chas. Dene, 1104 Sunset Ln., Cornwell Hgts., PA 19020

FOR SALE: excellent R388/URR(51S3) receiver, includes product detector, xtal BFO, separate upper & lower sideband Collins filters, Vernier tuning, dust cover, cabinet, manual. Newly finished in Collins gray. Price $400. M. J. Boho, W3ZB, P.O. Box 414, Edinboro, PA 16412

SELL: Central Electronics multiphase exciter model 10-A. Good condition with 10-20-40 coils and manuals. Best offer plus shipping. WA9REF, 7127 N. Ozark, Chicago 60631

SALE of the century. Sell Memory-Matic 500 keyer for only $150; Vibroplex Vibrokeyer Deluxe for $20; both for $155. Sell TR-44 rotor for $40. DuKane 7A81 microphone for $15. International SW bands Collins Sline xtals, $2 each. Write only. Many Thanks. Paul Kluwe, Edmore, MI 48829

FOR SALE: SB300 all filters $225, SB401 $225, SB220 $325, Hy-Gain quad $75, 4x10ft sections Rohn tower with TR44 and indicator $75. All mint condition. WB2NDH, 66 Bay Ave., Atlantic Highlands, NJ 07716

TURN count dials. Brand new Johnson 116-208-5. $5.50 each postpaid U.S. W0ME, 857 Plaza Dr., Salina, KS 67401

WANTED: Collins mechanical filter F455-N20. Loyal King, K4ST, Rt 2, Box 127, Adamsville, AL 35005

SWAP Graflex 35mm camera f2.8 lens complete with case, flash, filters, & tripod, RCA-8506B Manne receiver, rack mount, 85 to 25 MHz — for Heath HR-10B receiver and DX60B xmtr or Heath Single-Bander for 20 or 40. Conrad Proft, W0DIM, 8966 Lindenhurst Dr., Crestwood, MO 63126

SELL almost new Robyn digital 500 transceiver, nixie tube read out an excellent rig $650. Tristao heavy duty 60 ft crank up tower, Hy-Gain rotor brake, Hy-Gain TH6DXX beam, outfit complete $550. Almost new Hammarlund 2 meter tm, model FM 50A exciter 2 frequency 94/94, 34/94. Also control head for mobile operation and matching 150 watt FM 500C linear complete $300. Might accept trades. Richard Schark, 417 North Ferry, Ottumwa, IA 52501. Ph: 515-682-5741

COLLINS 75A-2 receiver w/Heath HD-11, Heath DX-60 transmitter w/Matchbox, 4 ctals. Excellent condition. $160. WA2ANH, (516)473-2957, 16 Laurel Dr., Port Jefferson, NY 11777

QST/CQ old. S.a.s.e. W4ATF. Any callbook.

75A-4 filters. 500 cycle $49. 2100 cycle $39. W2AEB.

SELL: HW32A perfect with ac and dc supplies $150. Drake 2-C and 2-CQ Q-mult/speaker $195. SB10 $40. Tom, WB4IZU, 104 Mar-Kan Dr., Northport, NY 11768. 516-757-7135

WANTED: Collins 328-3, AI, WA7ECT, 424 Arnold St., Las Vegas, NV 89106. Tel: 702-382-8433

CW/A-M/SSB rig with cw/a-m exciter. Parallel 4-400As; Pi network output. 1000W cw; 500W a-m; 750W ssb when using 10-20Wssb exciter. Twelve 3-1/2" meters monitor all important parameters. Modulator: push-pull 811As. Antenna coupler: built-in monomatch/SWR indicator; low-pass filter. Rig operational over wide range of power levels (power supplies have continuously variable outputs). Cw/a-m exciter: 6146 output tube. Rig in two 42" Bud racks. $1500 rig...will sell for best offer. Rev. Earl Newell, Source of Light Mission, Box 8, Madison, GA 30650. 404-342-0397

SWAN 500 + ac supply $360; Hustler 10-15-40-80 coils $6 ea; Mosley 2 element tribander $50; Eico scope No. 460 all probes $100. Gary Kleinerman, 289 Conn Blvd., Oakdale, CT 06370. Tel: 203-859-1445

HEATH HW101 with cw filter factory aligned and HP32 supply $300; Hallicrafters HA6 and ac like new $125. Philip Schwebler, W9UCG, 4538 N 50 St., Milwaukee, WI 53218

FOR SALE: RTTY console RO28 3 speed years xlnt condx $110. Will ship. WA4OPW, Rt. 1, Box 434, Ashland, VA 23005

NC-300 converters, Johnson TR-switch $15; Heath SB-10 $40; HW-32 & HP-13 $100; HT-37 $140. You ship; consider trade for cht gear, etc. All in good condition. W7TVF

STOLEN from Amateur Radio Supply Co., 5213 13th Ave. South, Seattle, WA 98108: Regency HR-2As serial 04-06485 & 04-03863, Regency Sprint 23 serial 101-1516, Drake TR-4 serial 28454, DRake AC-4 Serial 35970, Drake MC-2 serial 10448. Reward paid for recovery of item and identity of thief.

SELL: HA170, HX30, 913A linear, CB6 converter & PV preamp. For $350 or best offer. 1 - 6 mtr converter 14 MHz with supply, 1 - 6 mtr Gonset 1132 linear, 1 - 6 mtr 6 el Hy-Gain ant., 1 - 6 mtr BC 312D recvr w/supply. Edward Miller, 1449 Brooklyn Blvd., Bayshore, NY 11706. MO5-8529

FLEXOWRITER w/standard RTTY keyboard. Built-in dc loop, punched tape reader, tape punch. Input/output jacks for TU and FSK — not supplied. Ideal, compact one-piece, all-in-one ham RTTY system. Bargain price $160. NIRE, Pompton Lakes, NJ 07442. Tel:201/694-9100

HAM and a-m radio counselor for co-ed camp, Poconos. Reply to Kittatinny Camp, 119 S. Easton Rd., Glenside, PA 19038

Hunter Bandit 2000A 2 kW amplifier, $199. Globe Champion, $19. WA0KKA, 11655 Logan, Denver 80233. 303-466-8246

SELL: Wheatstone perforator, McElroy keying head and amplifier. W0LCX, 609 21st, West Des Moines, IA 50265

SELL: R-4B, T-4X, ac, MS4, W-4, — $600. HQ-170 — $100. Henry 2K-3 — $500. Will ship. Wayne Bailey, K5ZJK, 3731 Vanness Ln., Dallas, TX 75220. A.C. 214-351-6104

NCX-5, ac-dc supplies, remote VFO, walnut cabinets. Waters mobile antenna with 10, 15, 20M coils. Package $600. Scotty, WA2DFI, 112 Walworth Ave., Scarsdale, NY 10583. Tel: 914-472-3148

HW-16 has chirp. $69. K3JFV, 18 W. Front St., Media, PA 19063

SELL: Heathkit SB301 with cw/a-m filters $190. Will ship. George Blair, 5039 N. 61st St., Milwaukee, WI 53218

SWAN-250C, ac-dc power supply, mike, all new, used approx 30 hrs. Bargain $395. Certified ck. Will ship FOB. W. Perkins, Kan. Terrace, St. Albans 25177

DRAKE L-4B linear perfect mint condx. Sole owner, bought new. Light use 14 mos. Caront, manual $675. (new $826). No shipping. Changing QTH. Want Heath IO-10 scope. W2NXS, Box 4006, Jersey City, NJ 07304. (201)433-4440 8:30 A.M.

DRAKE TR-4 (serial No. 34490) $450, AC-4 $60, RV-4 $60. Bob Vana, 105 Hessian Hill Dr., Pennington, NJ 08534. Telephone: (609)737-3068

QST April 1943 to March 1963, perfect. $100 plus shipping. Free bookcase, imperfect, if picked up. W2ORG

GALAXY and beam. Galaxy V Mark II transceiver, with speaker, ac supply, and crystal calibrator, in original factory cartons, excellent condition. Hy-Gain TH-3 10-15-20 meter beam, TR-44 rotor, 20 foot tower. Will sell together or separately. Tom Wood, WA2DSL, 516-767-4461, 24 Roxbury Rd., Port Washington, NY 11050

SELL: SB-300 with cw and a-m filters, 7 spare tubes. $195 FOB. W9GR, V. Mills, 521 Cumberland, Park Ridge, IL 60068

SB 303: 400 Hz filter and SB600 $320. HD-15 $12. HP-23A $25. Will ship. W9LDN, 1242 N. Kennedy Dr., Streamwood, IL 60103

TOWER E-Z Way RBS-40 with ground post, Mosley CL-33 antenna, located in Mt. Vernon, New York. Ansel, 5 Eklof Ct., Croton-on-Hudson, NY 10019

FOR SALE: Mini-Products three element mini beam $40. Also Heath phone patch wired & unused $15. WA2BSI, Box 2323, So. Hackensack, NJ 07606

ECO 717 electronic keyer, factory wired, immaculate. Paid $80, will sell for $40. Like new Vibrokeyer paddle $12. Joe K. Winner, WB8AST, 101 Sigmund St., Beckley, WV 25801

SELL: Drake 2-A receiver with Q-multiplier speaker console, calibrator, noise blanker, 10 meter crystals plus WWV. Excellent condition, recently aligned. $160. Marty Deneroff, WA2NOO, 10 Melrose Dr., Livingston, NJ 07039. Tel: (201)992-7085

SELL or trade: general coverage receivers, Hallicrafters SX-99, $65. Hammarlund HQ-129X, $85. KW amplifier chassis, all parts, $45. IBM executive typewriter, $300. Want: 2MFM, ssb transceiver. K4GVW, 2816 Broadview, Huntsville, AL 35810

"DON and Bob" guaranteed buys. Ham-M $99; TR44 59.95; AR22R 31.95; Motorola HEP170 epoxy diode 2.5A/1000PIV 39¢; Mosley CL33 114.00; CL36 134.00; TA33 105.00; SBE144 2MFM 199.95; Gladding 25, AC 255.00; Hy-Gain TH6DXX 139.00; Hyquad 99.00; 400 rotor 148.00; Collins 75A4 (clean) 345.00; No. 14 antenna wire 1.95/C; MOT MC1709CG Op amp 50c; Write quote Drake, Robot, Rohn. Prices collect. *Mastercharge, BAC, Warranty guaranteed. Madison Electronics*, 1508 McKinney, Houston, TX 77002. (713)2242668

LOOKING for a business with great potential? One requiring hard work and a willingness to experiment not your money! I'm searching for five ambitious people from the ham community to form a nucleus for building a business. Want independence? Start part-time. Management experience helpful but not required. Drop me a brief note telling why you are the person I seek. Jim Herndon, K6SXA, Box 692, Burbank, CA 91503

COLLINS 32S-1, $325; Collins 75S-1 with 2.1 and 0.8 kHz filters and Collins noise blanker installed, $250; 516F-2 in speaker cabinet, $115. All mint condition, sell as a package for $650 prepaid in US. Individual units FOB. WA5TNW 73036

SWAN TV-2, 6M v-f, $165. WB6NKM, 2534 El Tonas Wy., Carmichael, CA 95608

SWAN 270 ac/dc with mike, excellent condition $300. Ray Conway, W6WNA, 2012 N. 6th St., Burbank, CA 91504

SELL: HT-40 $35. SX140 $50. NC 183 D matching spkr. $85. HG10 VFO $25. Valiant I $125. All items gud. U-ship. M. Allen, Summersville, MO 65571

FOR SALE: Heath O-10 scope $50, precision apparatus tube *checker $50, new Heath twoer with xtal $35.* WA5QCW, 12910 Westella Dr., Houston, TX 77077. 713-497-1660

SELL: Collins, s-line 75S3B $525, 516F-2 $100, 312B-4 $125. All in excellent condition. Henry Samplin, P.O. Box 147, Rockaway Park, NY 11694. Tel: 212-634-7191

CLEANING shack, all units on air, HW-100, HP-23, HP-13, SBA-100-1, HS-24, SB-600, SB-630, HT-37, SX-100MKII, TR switch; also surplus RTTY, distortion measuring equip, vhf xmtr, uhf xcvr, much more. S.a.s.e. for list, best offers. WB0CCW, 23 North Fordham, Topeka, KS 66619

75A4 serial 3701 with 2.1 and 0.5 kHz filters, excellent $300. Bob Ensminger, 11388 Campus, Loma Linda, CA 92354

FOR SALE: Novice and 6 meter equipment. Los cost. Lost on request. K4JCX, Box 132, Oak Ridge, TN 37830

HRO 60 receiver ABCDE&F coils — speaker looks and performs like new — less than 100 hours total use. Make offer. W. F. Fox, 369 Portland Way North, Galion, OH 44833. Tel: 419-468-5285

RTTY & fm: 2-freq HT-200, Universal complete, with 6/12 volt vehicular charger, $350. D33AAT, $75, T33BAT, $75. Model 14 TD * RO typing reperf set, $75. Model 15, model 28 parts. S.a.s.e. for list. C. Pfleger, 15000 W. Cleveland Ave., Apt. 225, New Berlin, WI 53151

ALUMINUM mast sections: 9-1/2' x 3" OD, 20 lbs, ea. Extremely strong and rigid. Use as mast, boom, lamp/fence-post. $5.75 ea. Model 14 reperf, $15. Aircraft emergency horn (loud!), $32. 28LPR (typing reperf), unused, in original sealed carton, $75. Unused, unboxed: 4CX250K, $19; 4CX300A, $19; RCA4500 vidicon, SSTV, ($480 catalog), $65; 3BGP1, $22. B&W 850A, $35. IBM standard electric typewriter, $135. K3MNJ, 8361 Langdon St., Phila., PA 19152

MODEL 19, complete, reconditioned, excellent, $110; 2 Wilcox 96D rf units, $35 each. Sorry, can't ship. Paul Beavin, WB6NLT, 1 Adams Ct., Novato, CA 94947. 415-897-8843

HEATH HW100, HP23A supply ssb/cw filters, with front panel switching. Recently factory aligned, $285 firm. Pickup sale preferred. Dave Lambert, WA1JSD, RFD No.3, Derry, NH 03038. Tel: 603-432-8194

SWAN 500-CX, 117-CX supply, VOX and Shure mike; all new. *Cost $589. Sell for $450, plus shipping, or arrange trade* for 250-C. Peter Stevenson, W4DUL, 11346 172 St., Miami, FL 33157

BEAT rust-corrosion! Fine stainless, brass, other, threaded, washer, hardware fasteners. Guying accessories! Turnbuckles! Cable clamps! Thimbles, insulators! Guying anchors! Lag screws. Lists 20¢! Walt Straesser, W8BLR, 29716 Briarbank, Southfield, Mich. 48076

WANTED: Signal/One cw filters; 3 inch hub spiders. K1VTM

COLLINS mechanical filters, 455 kHz, 2.4 kHz bandwidth. $11 postpaid. V. Mozarowski, VE3AIA, 1 Belgrove Dr., Islington, Ontario, Canada

WANT: 2 M fm. Selling twoer, Gonset ssb communicator, ac supply. Gabe, WA1GFJ, 17 Whitney, E. Hartford, CT 06118. (203)569-2266

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AVAILABLE, back issues QST 65c; radio & television news dating back to the thirties $1.50. M. Spielberg, 16 Stites St., Elizabeth, NJ 07208

WANTED: Yaesu FT-101, new or mint. State price, condition, and if under warranty. Neil Friedman, WA2VOR, 88 Carthage Rd., Scarsdale, NY 10583

SWAN 500CX, 117XC, VX2, $450; Ham-M rotor w/cables $65; Ely 674 $40; 20M Collins exp quad $25; Hy-Gain 15 ele 2 mtr $10. Misc. cables, SWR, patch, etc. Call Joe Bechtold, 430 El Modena Ave., Newport Beach, CA 92660. Ph: (714)548-7072

FREQUENCY meter, International model 6024 for CB radio service. Like new $225. Will ship. WB5AJG, Bill Brown, Orange, TX 77630

CRYSTALS airmailed: June QST "Novice Special," "Run from QRM" with plenty crystals. Do it economically with active-accurate FT-243 C-W Crystals. Five or more (Band mix OK) — *our frequency choice (scattered)* 40M-15M $1.25 each, 80M $1.65. Your choice 40M-15M $1.39, 80M $1.69. Less than five 40M-15M $1.50, 80M $1.75. Postage airmail: 15c/crystal, 1st-cl. 10c. General purpose: FT-243 .01% 3500-8600 kilocycles $1.90 (five @ $1.75 each), (nets, ten same $1.45). 1700-3499 $2.95. .005% add 50c/crystal. MARS etc. — Free listings. "Crystals since 1933." Bob Woods, W0LPS, C-W Crystals, Marshfield, MO 65706.

COLLINS 75S3B $485. Mint condition with extra filters. Gilson, 145 Randall Dr., Suffield, CT 06078

KWM2 w/ac $599. R4B, T4XB, ac/MS4 as new $695. Japanese KWM2 $395. QSTs by year @ $5. WØBNF

AMECO 54 kHz-54 MHz R & rcvr $65 mint; Ameco preamp PCL-P $20; spkr $5. John Schaefer, WA2FDW, 93-23-204 St. Hollis, Queens, N.Y., NY 11423

SALE: DX60-B, Harvey Wells R9A receiver and Bandmaster transmitter, TB7E beam, RME45 receiver call: (703)280-1522, 3307 Parkside Terr., Fairfax, VA 22030. John Newman (WB4YLM0)

SWAN 250 with 117XC power supply, mint condition $275. You pay freight. Certified check or money order. WA5UAJ, Earl Montgomery, Box 403, Vivian, LA 71082

FOR SALE: cleaning shack — Drake TR-6 with lsb & cw filters, Shure 444 mic, Raytrack Horizon 6 2kW linear — all mint. Cush-Craft 5 ele 6M beam — good. Amphenol "Millivolt Commander" FETVM — excellent. Knight KG-690 signal tracer with probe — good. Knight TEN-2 CB checker — excellent. All items complete with manuals. Andy Mueller, WB9GAC, Germantown, WI 53022

WANTED: good used or new Allied ssb transceiver model A2517. Write WB5AKO, 1208 Murray, Rockdale, TX 76567, or call collect (512)446-2163

SIGNAL/Ones: CX7 factory modified to CX7A $1395. Mint CX7A, three months old $1595. New $2195. Brochures, big trades. Payne Radio, Box 525, Springfield, TN. Days (615)384-5573; Nites, Sundays (615)384-5643

WANT elements for Bird 43 wattmeter. Any frequency-watt range. K9DHD, 1006 Wilson, Wheaton, IL 60187

COLLINS 30S-1 linear, excellent, $800. Pick up only. W9JQD, 54712 Mernfield, Mishawaka, IN 46544

SWAP: GPR90 rcvr & MSR4 ssb adapt. for Nikon F2 or Nikkor 50 to 300 MM zoom. A Bruno, 24 Buttermut Dr., New City, NY 10956

WANTED: 2.1 or 3 kHz mechanical filter 75A4. For Sale: Hallicrafters SX101 $125. W8EW, 741 San Jose, Grand Rapids, MI 49506

SALE: 22er like new, $150. WA2QHI

WANT Drake T4X, Adler, 765 Mount Vernon Ave., Haddonfield, NJ 08033

FOR SALE: HRO-60 $200. Viking Ranger II $100. Will ship, you pay freight. W5NEU, 127 Lakeshore Dr., Texarkana, TX 75501

SWAN 500C, 117XC, VOX, excellent $365; trade(?) Want: FT-101, good receiver, Bernstein, 2411 East 3rd St., Brooklyn, NY 11223. (212)998-7369

INOUE IC700 receiver, transmitter, supply, mike, 5 band ssb/a-m/cw pair 6146s, 4 tubes in transmitter otherwise transistorized. Receiver goes on 117 volts or battery. 3 xtal positions, WWV band, *RIT control, VOX, very compact.* $250. USM24A scope 8 megs, trigger, delay, calibrator, Z-mod $75. All good condition and working, you ship. Richard (203)666-2879

CARDWELL variable condenser 1800mmfd split stator 900mmfd per/sec 3000VDC 14"L 4"W rare item. $15. K2EGI, 5 Stratford Pl., N. Babylon, NY 11703

2-meter a-m rigs, only 50 hours use, (CD). Heathkit HW-17 $125, Knightkit TR-108 $75. Five HW-30s $20 to $30. Antennas and converters. Will dicker. Charles Wicker, Charlotte, VT 05445

SALE: HRO sxtv, triode front end, Collins mechanical filter, product detector and audio AGC. Coils A, B, C, D, AC, AD, E, F, G, H with instruction book. $200. FOB. Don Hall, W5OBS, *Box 186, DeKalb*, TX 75559

HALLICRAFTERS deluxe HA-20 VFO for SR-400 or SR-2000 transceivers, has SWR bridge and built in power supply. Excellent condition, $135. K1PNL

LAFAYETTE HA-800 receiver and speaker, perfect condition, $55; Hallicrafters CRX-105 high band police receiver, fair condition, $20. Shipping extra. Henry Gac, 1715 Holden, Detroit, MI 48208

CLEANING shack: Collins 75A1 $125, matching speaker $15; S-line speaker $25; 516 F-2 $100; Collins SB-1 mike $25; Drake 1A $100; GPR 90 $250; GPR sideband adaptor $50; Hallicrafters S36 (27-140 MHz) $100; SX101A $150; HT37 $175; 840, $30; PH 6-150 (50 MHz ssb) $125; Heathkit SB620 $85; HG10 VFO $25; Ameco CN144 $25; CN50 $25; PS-1 $10; Waters 2M and 6M $75; Sonar fm 3601 2M fm $225. Prefer cash and carry. Ed Blair, Bound Brook, NJ (201)469-6765

SELL Drake 2C/2CQ, Heath HW-12A, Hallicrafters HT-40. WB2HJH, 201-566-6531 after 6

TEMPO 2000 warranty $350; Poly-Com 6 $65. K5OST, 4133 E. 43rd St., Tulsa, OK 749-1100

SELL: Ten-Tec RX 10 receiver with external amplifier. New $55. Steve Grotell, 10 Yates Ln., Jericho, NY 11753. 516-822-1092, WN2FFF

FTdx400 $475; HT32A $175; transceiver power supply $50; E.F. Johnson 150ED30 dual condenser $7.50; 12V/420V Dynamotor $7.50; 30" steel cabinet free. K6RS, 1324 Buckingham, Thousand Oaks, CA 91360

HY-GAIN 20M beam and AR-22 rotor, $40. Best offer: SB-600, 4CX250s, 50-200 MHz rcvr (a-m/fm/cw). Also freq meters. R. Benjamin, W2GTE, Mt. Zoar Rd., Pine City, NY 14871

AIRBORNE Instruments Laboratory model 74 automatic noise figure indicator capable 10MHz-40GHz $125; Jones (Bendix) 0-120W vhf/uhf terminal wattmeter $55; Swap vhf/uhf gear, Bst S.a.s.e. W4API, Box 4095, Arlington, VA 22204

DRAKE TR-4, AC3/MS3, recently factory re-aligned, SB-200 linear, $600, Rohn 40 ft tower, MP-33 tri-bander, Ham-M, $150. Will not ship. WB2OQR, 25 Burnett Ter., W. Orange, NJ 07052. 201-731-5033

GONSET 903Mk.2 500w a-m/fm/cw/ssb 2mtr. linear perfect - mint condition w/manuals, 15 dB pad, transfer relay. $300 + shipping: cert. check or m.o. Pete Michaelson, WB2HQV, 744 Birchwood Ct., Westbury, NY 11590. Eve: 516-333-1475

NAVY teletypes with tables and loop supplies, Model 15, $60; Model 19, $125. C.V. Kimball, 8441 SW 142 St., Miami, FL 33158

FOR SALE: National NC-303 receiver matching speaker and calibrator, Johnson Pacemaker ssb xmtr. $200 takes both. Lakeshore ssb xmtr $15. Lakeshore VFO for 9 MHz. exciter $15. BC-610 modulation xfmr $15. K3HLB, Roy Smoker, R No.2, New Holland, PA 17557, 717-354-7154

KWM-2 with Waters rejection tuning and 516F2, 30L-1 linear. HA-1 keyer, SB610 monitor scope, SB630 station console. Electrovoice 664 mike. All latest models and mint condition with less than 20 hrs use. K8TSH, Richard H. Pierce, 2165 Oemington Rd., Cleveland Hts., OH 44106. Phone: 216-321-4518

COLLEGE calls: Selling entire station. Drake 2-C rcvr, spkr, Eico 723 xmtr, stals, Dig-Keyer, key, T-R switch, SWR & FS mtr, coax switch, all cables, balun, and 500 ft unused No. 12 copperweld (one piece!). Many xtra goodies. All equip vy gd condx; bn studying, not hamming. Package deal only, pse. $245 or best offer. You ship. Also, Hallicrafters S-40 rcvr $25. Dennis Webber, WA6DMU, 5271 Almar St., Riverside, CA 92505

WANTED: National SW-3 receiver; QST magazines 1922 or older. W3QII, 5899 Barnes Ave., Bethel Park, PA 15102

COLLINS KWM-2, with noise blanker and Waters notch filter, $645; 516F-2 power supply, $95; 30L-1 linear $350; 312B-5 station control $225. All in mint condx. W3MQ/W3JNH, Harris J. Nadler, 1024 Lindsay Ln., Rydal, PA 19046

COLLINS KWS-1 (1296), 75A4 (2048) three filters, mint condx, $1000. W2FXE 201-379-5553

WANTED: used & recorded audio, visual theory instructions for amateur General license. Kenneth Hand, Bridgehampton, L.I., NY 11932

DRAKE T4X, R4A, MS4, excellent appearance and operating. First $600. Keyer mike and phones free. Also best offer homebrew 4-400s. W4DUQ, Ron, 904-744-3413

NEED money, sell Valiant xmtr, Lafayette HA-350 rcvr. Pse pse make offer. WA7QCC, RT1, Box 352, Beavercreek, OR 97004. Ph: 632-3188

FOR SALE: National 200 xcvr, AC200, $250. Gonset G-28 $140. W2GMA, 1762 Larkspur Rd., Cherry Hill, NJ 08003. (609)795-3294

HW16 perfect like new, $95. Auto Mate K 5/50 electronic keyer $60. S. Derlighter, 10617 Debra, Granada Hills, CA 91344. 213-360-3643, W6NFT

SALE: Galaxy FM-210 VY gd condx, 3 sets crystals and mike $125. W0MZC, 26 Princeton Circle, Longmont, CO 80501

SELL: Collins 75A4 with three filters $290. KWS-1 $375. Both excellent. Estate W6CAA. No shipping. W6HHN, 3467 Rambow, Palo Alto, CA

FOR SALE: Central Electronics 200V $350. Central Electronics model MM-2 rf analyzer $55. Johnson Ranger $55. Heath VF-1 VFO $15. George H. Rancourt, 78 Williston Ave., Easthampton, MA 01027. K1ANX

FOR SALE: Broken 4 track stereo tape recorder, Lafayette RK825; trouble in amp.; cheap deal for handy individual. $45. WA2FDW, John Schaefer, 93-23-204 St., Hollis, Queens, NY 11423

SB-200 like new $180 guaranteed; you pay packing & shipping. Bill Ellis, WB4DXA, 5688 Oakhurst Dr., Largo, FL 33542. Ph: 813-392-8609

COLLINS "S" line. Low serials but excellent condition, not a scratch! 75S1 recr. All crystals. 500 Hz filter. Waters Q multiplier-Notch filter with integral extra i-f stage. 32S1 exciter. All crystals. 312B-3 speaker with 516F-2 power supply. 30L1 linear. All instruction books and cables. Johnson low pass filter. Heath HO13 panadaptor, matching HO10 monitor scope. DI04 mike with PTT stand. Will not ship. Deliver radius 100 miles on receipt of certified check for $1000. Firm. No trades. Sell as unit only. Age forces sale. W3WS, 707 Edge Moor Rd., Wilmington, DE 19809. 302-764-1660

OSCILLOSCOPES, triggered sweep, dc to 1.5 MHz, 3" lightweight. $129. Bedford Electronics, 7741 Fir, Toledo, OH 43612

GLASS epoxy pc board. Type G10 1/16 in. Single sided 1 oz, double sided 1 oz. or 2 oz. Your choice $2sq/ft. P.P.D. WA0TXV, 5331 Cherryview, St. Louis, MO 63128

DX60-B, HG 10B with Dow-Key relay, microphone, $25 worth of crystals PTT modified hardly used $100. Drake 2B & 2BQ brand new $200 or $280 takes all. I pay postage. Laurence Whited, Rt. 2, Box 242, Rising Fawn, GA 30738

HEATH DX100B, Hallicrafters S-76 working daily both $120. Gene Christian, 5 Paul Holly Dr., Loudonville, NY 12211

SELL all or part: highest offer or trade for Klystron power supplies: 814, 955, 829B, 4X100, 2K25, 2K28, 35T, 3KP1, 3BP1, 4-400, 6146W, 10 GHz waveguide. W. T. Adams, 9707 Hausford Dr., Austin, TX 78753

TRADE Matniya C330 TLR, 80mm f2.8, 180mm f4.5, cases; for ssb xcvr, vhf gear or? WB6BFI, 13501 Montague, Pacoima, CA 91331

WANTED: Millen grid-dip meter. State price and condition first letter. Sell: Mosley TA-36 $85 and Hy-Gain TH-4 $70. F.O.B. Jerry Vanaskey, 4540 Foster Dr., N.E., Louisville, OH 44641

IRE/IEEE Transactions wanted. Vechicular communications volumes PGVC-1, -2, -3, -4, -6, -7, -8, -11. Vehicular technology volume VC-10, No. 1. WA5WGO, 4911 Western St., N.O., LA 70122

WANTED: working SWR bridge for under $10. Contact Jay Jenkins, 1153 Ridge Rd., Homewood, IL 60430

SB301: excellent condition, two years old. $180. WB4NMY, 4803 Russell St., Richmond, VA 23222

WOULD like to contact anyone interested in Printed Circuit Board manufacture, electroplating, chemistry, metallurgy, and glass technology. K1PJW, L. A. Lucas, 332 Concord Rd., Bedford, MA 01730

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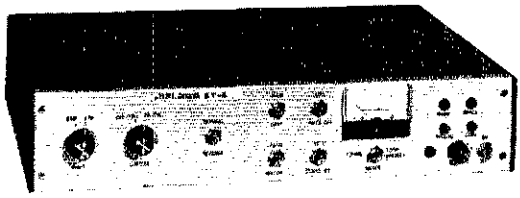

TOP QUALITY RTTY...WITH THE HAL MAINLINE ST-6 TU. Only 7 HAL circuit boards (drilled G10 glass) for all features, plug-in IC sockets, and custom Thordarson transformer for both supplies. 115/230 V, 50-60 Hz. Kit without cabinet, only $135.00; screened, punched cabinet with pre-drilled connector rails, $35.00; boards and complete manual, $19.50; wired and tested units, only $280.00 (with AK-1, $320.00).*

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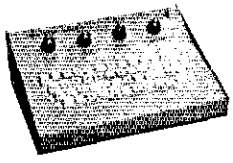
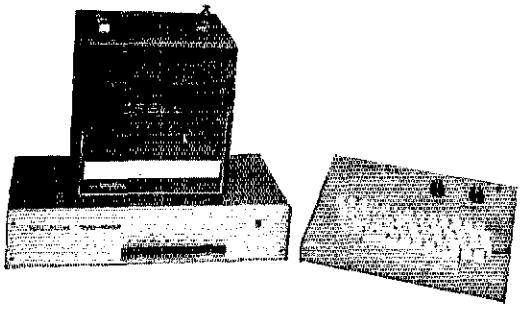
Mainline AK-1 AFSK Kit	$ 27.50*
HAL RT-1 TU/AFSK Kit	$ 51.50*



TOP QUALITY... WITH THE HAL MKB-1 MORSE KEYBOARD. As easy as typing a letter—you get automatic CW with variable speed and weight, internal audio oscillator with volume and tone controls, internal speaker, and audio output jack. Smooth operation; completely solid-state, TTL circuitry using G10 glass boards, regulated power supplies, and high voltage transistor switch. Optional automatic ID available. Assembled MKB-1, $275.00; in kit form, $175.00.*



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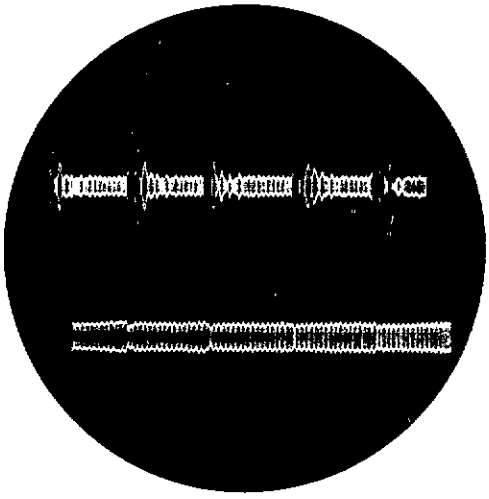
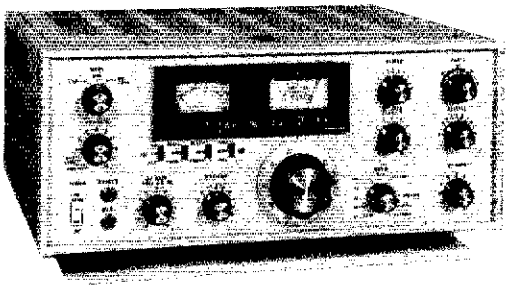


Is the FTdx 570's noise blanker reason enough to spend $550 for this new rig?

You bet it is. Here's a complete rig, including a noise blanker — on other rigs you pay about $100 extra for the blanker alone. On other rigs, you read the glowing specs and they sound fine. Of course, to get them on the air you pay extra for such essentials as a power supply.



Well, the FTdx 570 includes a built-in power supply and 25 and 100 KHz calibrator. And built-in VOX. Plus a special WWV receive band on 10 — 10.5 MHz. And a clarifer — a receiver-offset tuning feature that lets you move ±5 KHz from a preset transmitter frequency. There's even a built-in cooling fan and a built-in speaker.

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We have a brochure on the 570 that really gets down to the nitty-gritty on the subject. Send for it. Better yet, send for the rig itself. Don't you owe yourself a bargain?

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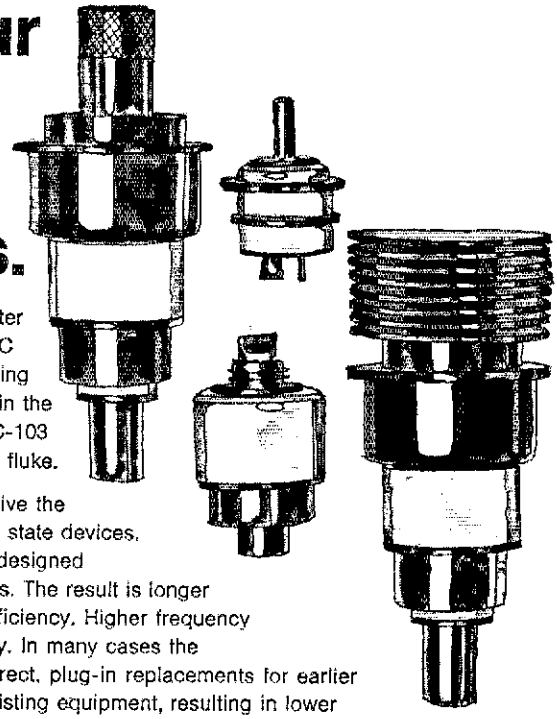
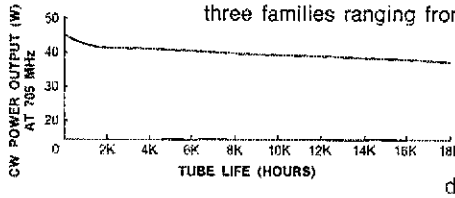


To make a long story short, after 18,000 hours of life test EIMAC improved 7211's were still delivering over 35 watts CW at 705 MHz in the r-f cavities for the Army's GRC-103 Radio Set. And that's no fluke.

Several design improvements give the 7211 life comparable to solid state devices. These improvements have been designed into all EIMAC planar triodes. The result is longer life. Higher power and efficiency. Higher frequency operation. And better linearity. In many cases the improved tubes are direct, plug-in replacements for earlier models in existing equipment, resulting in lower cost per operating hour to the user.



Right now EIMAC has more than 70 planar triode types in three families ranging from the 2C39A types through the latest miniature planar triodes. In CW, EIMAC frequency capability goes up to 5 GHz and powers to 450 watts. For pulse applications, EIMAC has models capable of delivering up to 1 kilowatt peak at 6 GHz.

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