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# QST

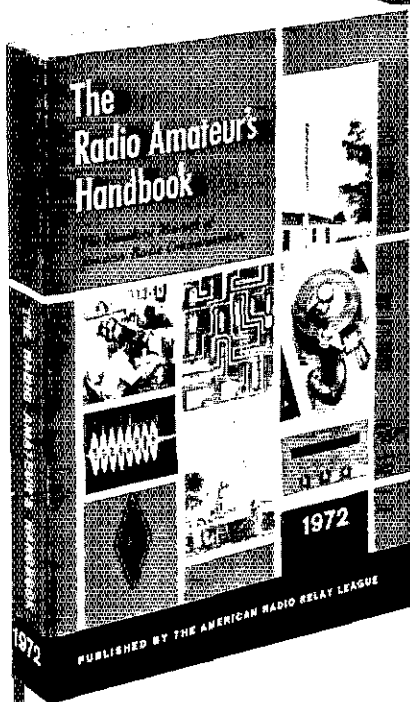
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# amateur radio



OFFICIAL JOURNAL OF THE ARRL





# 1972 EDITION



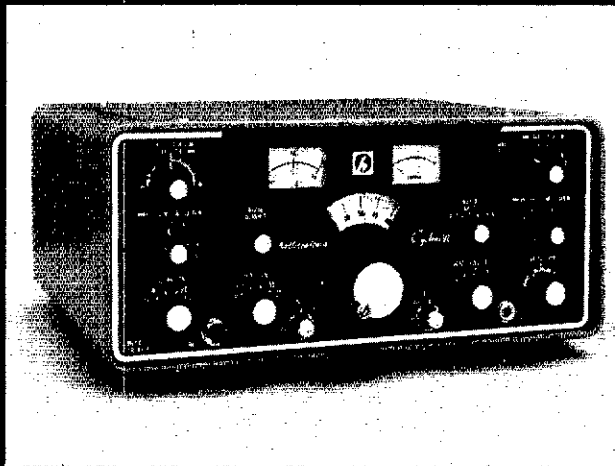
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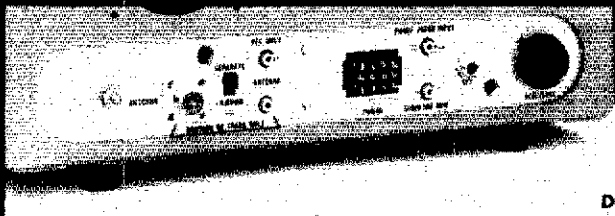
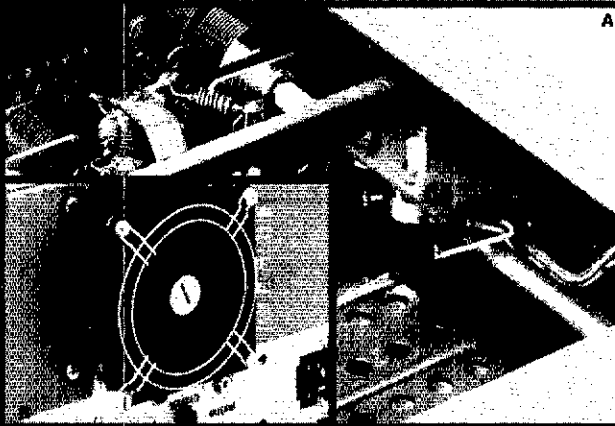
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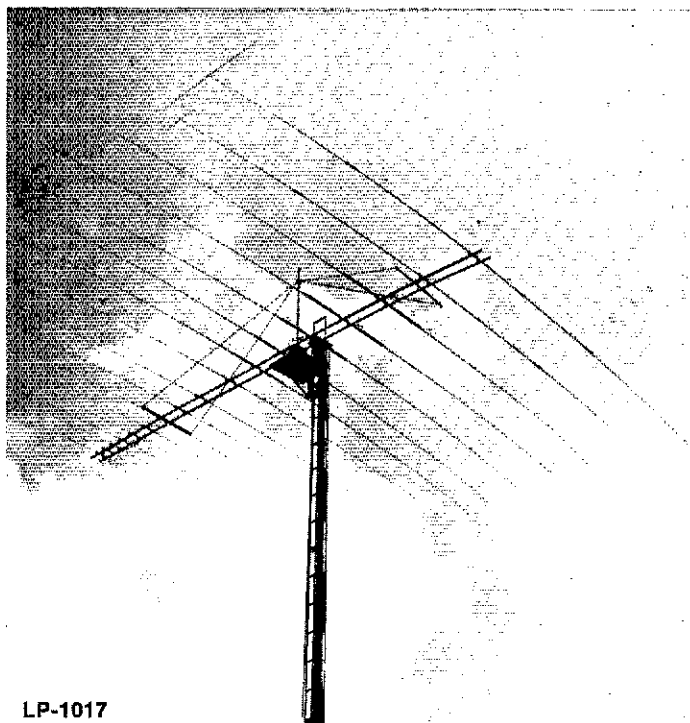
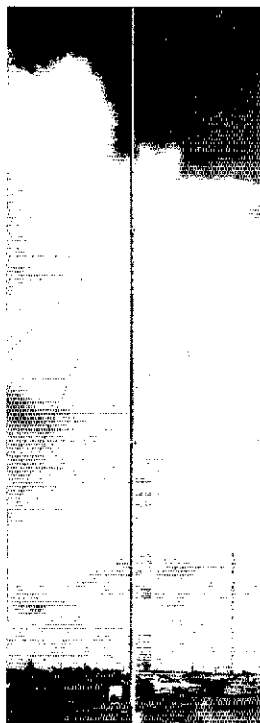
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## —CONTENTS—

### TECHNICAL —

An Ssb and Cw Transmitting Converter for 220 MHz <i>Don V. Watters, VE2HW</i>	11
High-Frequency Propagation Estimations for the Radio Amateur . . . . . <i>Jerry Hall, K1PLP</i>	14
A Dual-Voltage Medium-Current Power Supply for Repeaters <i>Robert M. Myers, W1FBY</i>	20
Dual-Polarization DX Antennas . . . . . <i>Walter J. Stiles, W7NYO</i>	22
The VE2HN Digital CQer . . . . . <i>H. H. Rugg, VE2HN</i>	24
The Renter's Delight . . . . . <i>Robert T. Hatter, K7RDH, and David P. Weik, WN7PDW</i>	30
Broadband Solid-State Power Amplifiers for Ssb Service <i>Roy C. Hejhall, K7QWR</i>	36
Noise Generators . . . . . <i>Ronald E. Guentzler, W8BBB</i>	44
Recent Equipment:	
The Curtis EK-402 Electronic Keyer . . . . .	52
Sonar 2307 Transistorized Portable Radiotelephone . . . . .	54
Technical Correspondence . . . . .	56

### BEGINNER AND NOVICE —

Questions, Questions, Questions . . . . . <i>Lewis G. McCoy, W1ICP</i>	33
--	----

### OPERATING —

Results, 11th RTTY DX Sweepstakes <i>Gwen Burnett, VE3AYL</i>	70
Got an EC? . . . . .	64

### GENERAL —

Are You Ready . . . . . ? <i>William I. Dunkerley, Jr., WA2INB</i>	58
The Growing Use of Foreign Languages by American Amateurs <i>C. J. Sletten, W1YLV</i>	60
So You Want to . . . . . <i>John G. Troster, W6ISQ</i>	62
Comments by FCC's Amateur Chief . . . . .	71

ARPS . . . . .	64	"It Seems to Us . . ."	9
ARRL QSL Bureau . . . . .	73	League Lines . . . . .	10
Coming Conventions . . . . .	63	Operating Events . . . . .	110
Correspondence . . . . .	88	Operating News . . . . .	105
Feedback . . . . .	57	Silent Keys . . . . .	87
Hamfest Calendar . . . . .	63	Station Activities . . . . .	111
Happenings of the Month . . . . .	74	World Above 50 Mc. . . . .	100
Hints & Kinks . . . . .	50	YL News & Views . . . . .	98
How's DX? . . . . .	93	W1AW Schedule . . . . .	107
IARU News . . . . .	90	25 and 50 Years Ago in QST	32



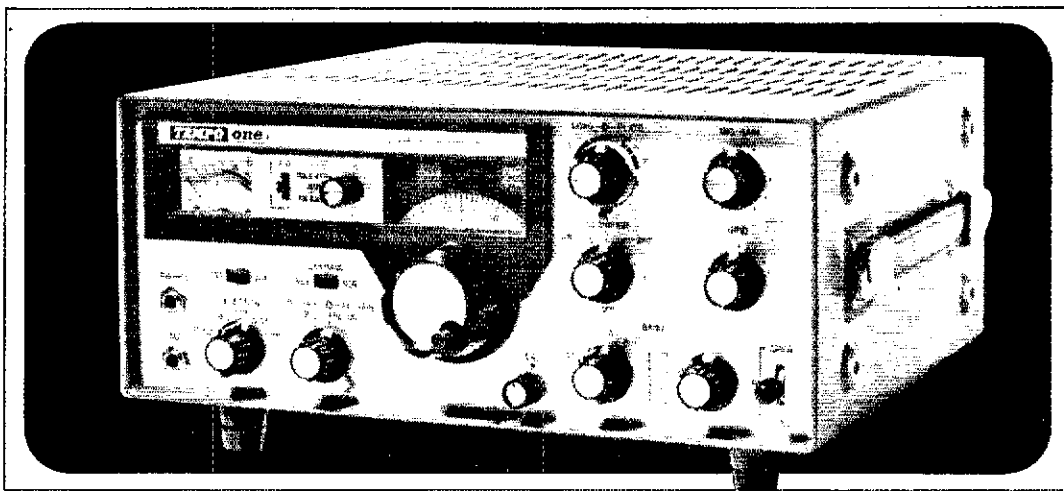
#### OUR COVER

New power transistors and new circuit techniques for a "third generation" of side-band gear are described starting on page 36.



# the proven 'ONE'

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**MORE THAN A YEAR AGO THE TEMPO 'ONE' WAS INTRODUCED TO THE AMATEUR WORLD AS THE NEW 'ONE'. NOW WITH THOUSANDS IN USE IT'S THE PROVEN 'ONE'. LOOK AT ITS PRICE AND THEN LOOK AT ITS SPECIFICATIONS. ADD TO THIS ITS RECORD OF RELIABILITY AND THE RESULT CAN BE SUMMED UP IN ONE WORD... VALUE.**

## **SPECIFICATIONS**

**FREQUENCY RANGE:** All amateur bands 80 through 10 meters, in five 500 khz. ranges: 3.5-4 mhz., 7-7.5 mhz., 14-14.5 mhz., 21-21.5 mhz., 28.5-29 mhz. (Crystals optionally available for ranges 28-28.5, 29-29.5, 29.5-30 mhz.)

**SOLID STATE VFO:** Very stable Colpitts circuit with transistor buffer provides linear tuning over the range 5-5.5 mhz. A passband filter at output is tuned to pass the 5-5.5 mhz. range.

**RECEIVER OFFSET TUNING (CLARIFIER):** Provides  $\pm 5$  khz. variation of receiver tuning when switched ON.

**DIAL CALIBRATION:** Vernier scale marked with one kilohertz divisions. Main tuning dial calibrated 0-500 with 50 khz. points.

**FREQUENCY STABILITY:** 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.

**INPUT POWER:** 300 watts PEP, 240 watts CW

**ANTENNA IMPEDANCE:** 50-75 ohms

**CARRIER SUPPRESSION:** -40 dB or better

**SIDEBAND SUPPRESSION:** -50 dB at 1000 CPS

**THIRD ORDER INTERMODULATION PRODUCTS:** -30 dB (PEP)

**AF BANDWIDTH:** 300-2700 cps

**RECEIVER SENSITIVITY:**  $1/2 \mu\text{v}$  input S/N 10 dB

**AGC:** Fast attack slow decay for SSB and CW.

**SELECTIVITY:** 2.3 khz. (-6 dB), 4 khz. (-60 dB)

**IMAGE REJECTION:** More than 50 dB.

**AUDIO OUTPUT:** 1 watt at 10% distortion.

**AUDIO OUTPUT IMPEDANCE:** 8 ohms and 600 ohms

**POWER SUPPLY:** Separate AC or DC required. See AC "ONE" and DC "ONE" below.

**TUBES AND SEMICONDUCTORS:** 16 tubes, 15 diodes, 7 transistors

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Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (or 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 OBS, OVS, OPS, OO and OBS Technicians may be appointed OVS, OBS or V.H.F. PAM. Novices may be appointed OVS. W/Ms desire application leadership posts of S.I.C., EC, RM and PAM where vacancies exist.

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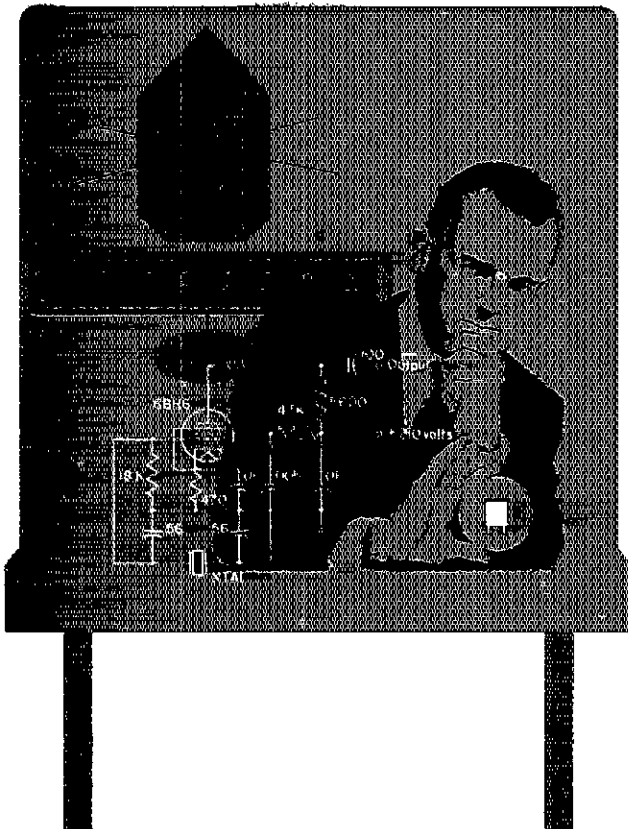
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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. 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.

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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.

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STAN ZAK . . . . . R2SJO  
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Vice-Director: George A. Diehl . . . . . W2LHA  
20 Wilson Ave., Chatham, NJ 07928  
Midwest Division  
RALPH V. ANDERSON . . . . . K0NL  
528 Montana Ave., Holton, KS 66436  
Vice-Director: Paul Grauer . . . . . WA0LLC  
Box 190, Wilson, KS 67490  
New England Division  
ROBERT YORK CHAPMAN . . . . . W1QV  
28 South Road, Groton, CT 06340  
Vice-Director: Roger E. Corey . . . . . W1AX  
60 Warwick Drive, Westwood, MA 02090  
Northwestern Division  
ROBERT B. THURSTON\* . . . . . W7PGY  
7700 31st Ave., N.E., Seattle, WA 98115  
Vice-Director: David O. Bennett . . . . . W7QLE  
Box 455, St. Helens, OR 97051  
Pacific Division  
J. A. "DOC" GMELIN . . . . . W8CRJ  
10835 Willowbrook Way, Cupertino, CA 95014  
Vice-Director: Albert F. Gaetano . . . . . W6VZI  
115 Old Adobe Road, Los Gatos, CA 95030  
Roanoke Division  
VICTOR C. CLARK\* . . . . . W4KFC  
12927 Popes Head Road, Clifton, VA 22024  
Vice-Director: L. Phil Wicker . . . . . W4ACY  
4821 Hill Top Road, Greensboro, NC 27407  
Rocky Mountain Division  
CHARLES M. COTTERELL . . . . . W9SIN  
430 S. Swadley St., Lakewood, CO 80228  
Vice-Director: Allen C. Auten . . . . . W0ECN  
2575 South Dahlia St., Denver, CO 80222  
Southeastern Division  
H. DALE STRIETER . . . . . W4DQS  
928 Trinidad, Cocoa Beach, FL 32931  
Vice-Director: Larry E. Price . . . . . W4DQD  
P.O. Box 2067, Georgia Southern Branch  
Statesboro, GA 30458  
Southwestern Division  
JOHN R. GRIGGS . . . . . W6KW  
1273 13th St., Baywood Park, San Luis Obispo  
CA 93401  
Vice-Director: Arnold Dahman . . . . . W6UEI  
14940 Hartland St., Van Nuys, CA 91405  
West Gulf Division  
ROY L. ALBRIGHT . . . . . W9EYB  
107 Rosemary, San Antonio, TX 78209  
Vice-Director: Leon Vice . . . . . WA9C/WA0BC  
2652 1/2 Campbell, Houston, TX 77055

\* Member Executive Committee

## "It Seems to Us..."



### TWO BIG JOBS

**I**N 1928, the International Amateur Radio Union (founded in 1925) was re-oriented to be a liaison of national amateur societies rather than individuals. The IARU Constitution was revamped to provide that one society shall act as the Headquarters; a further amendment was that the president, first vice-president and secretary of said society shall hold similar office in the Union. ARRL was chosen as Hq. society, and has so served since that time; thus its presidents have automatically been presidents of IARU.

In later years the functions of our international body in amateur affairs worldwide have grown substantially in importance. This trend was sparked, perhaps as much as anything, by the Radio Society of Great Britain's coalition of European-African societies in a "Region I Division" to give more attention to special geographical situations. Under the guidance of the late Herbert Hoover, jr., W6ZH — and even more so when Robert W. Denniston, W0DX, succeeded him as ARRL/IARU chief activity by the Hq. society and its officers has grown to notable dimensions. Regional groups in the Americas (II) and in Asia-Oceania (III) have been formed and are actively promoting amateur radio's cause. IARU is, indeed, a dynamic — and vital — force in our overall interests.

At the ARRL Board meeting in January, where officer elections were on the agenda, there was considerable discussion about the growing demands on the personal time of the individual holding the joint office of IARU/ARRL president, and what might be done to ease the burden — yet still protect and advance the best interests of both organizations. President W0DX expressed the view that the dual responsibilities have grown beyond the reasonable capabilities of one man, particularly an unsalaried volunteer, and that as indicated by the Geneva Space Conference as an example, they will be even more demanding in the future. Accordingly, he announced he would not be

a candidate for re-election as ARRL president. At the same time he called attention to a section of the IARU Constitution which provides that a national officer of the member-society chosen as IARU Hq. has the option of declining to serve in a similar capacity for the Union, whereupon said member-society is obliged to nominate another qualified and responsible official of its society for the post. Mr. Denniston indicated he would be willing to stand as a candidate for the presidency of IARU under these provisions if that were a suitable solution. The Board of Directors was much impressed with this philosophy, and later elected him a vice-president of ARRL.

As reported in more detail in "Happenings" this month, Harry J. Dannals, W2TUK, was chosen as the new ARRL president. He promptly stated to the Board his similar belief that the offices of president of both organizations are each so important and so demanding of time and energy that they should be held by separate individuals. He thereupon chose not to accept the parallel IARU office, and immediately nominated W0DX as the ARRL official to be recommended for the post of IARU president — a motion which was unanimously adopted.

This does not entirely firm up the matter; the real decision must come from the 86 member-societies of IARU — a voting procedure now under way. We feel reasonably certain, however, that foreign society officers will quickly appreciate the problem, from their own participation in IARU activities, and we hope for their approval of the proposed solution. The nominee is, we believe, ideal for the post; these past six years, in particular, he has devoted immense energy to the advancement of IARU. The Union's growth, both in numbers and effectiveness, is a tribute to that effort. The need for its continuing growth and effectiveness is the best argument for support of the Board's course of action.

QST

## League Lines . . .

As documented in the minutes, reproduced in "Happenings" this month, the Board of Directors raised membership dues to \$7.50 in the U.S., \$8.50 in Canada; the figure is \$9 elsewhere. But this does not take effect until July 1, 1972. You have the opportunity of paying multiple years in advance at the current rate, if you wish. Or the greater opportunity of a Life Membership, \$130 in U.S. and Canada until July 1, \$150 (Canada \$170) thereafter. The domestic plan of eight quarterly payments (\$16.25 each) will still apply at the old rate if commenced before July 1 and completed within two years.

League membership grew more than 5% during 1971. Which means that (except for "Ham Radio," a comparative newcomer still growing rapidly) QST increased its circulation a much greater percentage than any other magazine exclusively in the field.

These "other" circulation figures are sometimes fascinating. One of QST's "competitors" was listed in "Standard Rate & Data," the bible of advertisers and ad agencies as having a paid monthly circulation of 101,275 -- at about the same time he affirmed to the U.S. Post Office that he printed only 69,527 copies (average) of each issue!

League emblem lapel pins denoting 25 and 50 years of membership have been available for some time, but only for a continuous, unbroken record. Now, by Board action, it is the total number of years which governs. No charge; if you qualify for either a 25 or 50, drop the Secretary a line. But note: if any lapse was six years or longer, we will have discarded earlier records, so you'll have to dig up certificates or something else to document the case.

A note on this page nearly a year ago warned hams to avoid involvement as communicators with an outfit called "Liberty Lobby," which was said to be organizing a ham network for their use. Current newspaper reports indicate a recent meeting of the group called for fund raising of, among other things, "\$28,000 to support the lobby's emergency communication network of ham radio operators." Choose your political preferences as you will, but avoid like the plague any proposal to furnish communication via ham radio for such groups!

Want to know what's cooking on the operating scene in 1972? There's a handy chart of ARRL-sponsored events on page 57 of the January issue, covering the whole year. Each month's activities are also covered in greater detail in "Operating Events."

Any thoughts on special ways U.S. amateurs could help their country celebrate its 200th anniversary four years from now? Send your suggestions to Box 1776, ARRL, Newington, Conn. 06111.

Think you're the only one with problems? WIAW has drastically reduced power on 2 meters because of TVI/RFI! The problem is inadequate shielding of solid-state circuitry in TV receivers, but we hope to maintain continued excellent neighborhood relations and so have compromised -- at least temporarily. Reports of reception of our 10-20 watts would be appreciated!

Cw, sideband, a-m, mcw -- and now FAX for ARRL bulletins! W7QCV puts 'em on 2 meters each Monday evening, and says there's considerable interest in getting gear going to join the group.

Planning to take an FCC exam? The 1972 sked was in February QST, page 68.

Quote-of-the-Month ("CB Magazine"): "It is obvious that the FCC can't stop hobby-type CB operations. The FCC can't prevent skip transmission. So why try?" Grrrr!



# An SSB and CW Transmitting Converter for 220 MHz

BY DON V. WATTERS,\* VE2HW

IN THE AUTHOR'S opinion, the easiest approach to vhf cw and single-sideband operation is by the heterodyne method. The exciter described here mixes an injection signal of 28 MHz, obtained from an ssb exciter, with the output of a crystal-controlled 192-MHz multiplier chain to produce a sum frequency of 220 MHz. A choice of 28-MHz for the injection frequency was made some years ago when a two-meter ssb transverter was constructed. It is the "standard" frequency used for all of my transverters from 50 through 432 MHz. This mixing frequency is readily available in many single-sideband exciters. When sufficient precautions are included in the design, 28 MHz is high enough in frequency to give good image rejection in the output of the mixer.

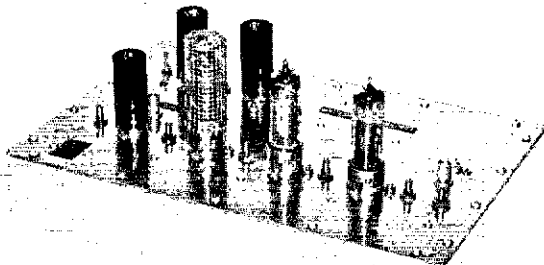
## Circuit Description

The oscillator-multiplier chain uses a 48-MHz third-overtone crystal oscillator, doubles in the second triode section of a 6J6 tube to 96 MHz, and doubles again in a 6J6 to 192 MHz. The use of a push-push doubler is an efficient way to obtain 192-MHz energy at high output.

Mixing is done in a push-pull 6J6 stage. The 192-MHz drive is supplied to the mixer grids via link coupling. A 28-MHz ssb or cw signal is capacitance coupled to the mixer cathode. The plate circuit of V3 is tuned to 220 MHz. Output from the mixer is amplified by a 6360 stage. The tube runs at a low level (Class A) to provide an additional stage of isolation, and protection from unwanted mixing products. A second 6360 provides the necessary drive to the output amplifier, another 6360. This additional stage may not be required for driving the output 6360, but it was included mainly for purity of emissions.

Long wire leads at 220 MHz must be avoided. Plate leads from the 6J6 mixer and 6360 stages to their respective tuning capacitors are made of 1/8-inch-wide flexible copper strip to provide short, low-inductance connections. The plate and grid coils are hairpin loops of No. 18 wire. The grid coils are adjusted by stretching or squeezing the

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The transmitting converter is assembled on a brass plate cut to fit an inverted chassis. Part of a tube shield was fitted with wire-mesh screening to make a ventilated shield for the first 6360 amplifier. The output jack, J2, is on the right.

turns for optimum grid current in the following stage. Proper interstage coupling is obtained by experimentally positioning the plate and grid inductances in relation to one another.

Shields on the 6360 tubes are not required for electrical stability, however, wire mesh is used on the first amplifier to prevent the radiation of unwanted mixing products. The assembly was made of 1/4-inch mesh hardware cloth and a sawed-off tube shield. The compression spring from the original shield was reused.

Ferrite beads and decoupling capacitors on voltage supply leads are used in the interest of stability. The beads are standard types used in commercially made gear, reclaimed from discarded units.<sup>1</sup>

## Mechanical Details

Construction of the exciter is straightforward. It is assembled on a 12 x 10-inch piece of .040-inch-thick sheet brass. An inverted 12 x 10 x 2-inch aluminum chassis is used as a base. Brass partitions provide shielding between stages. Each partition is fitted over its related tube socket to isolate the input from the output tuned circuits. The shield along the length of the chassis separates the rf and power sections of the circuit. Feed-through capacitors are soldered to this partition to provide rf-decoupled voltage to the various stages.

<sup>1</sup> [EDITOR'S NOTE: Ferrite beads are available from Amidon Assoc. See QST ads.]

*The inherent stability and selectivity found in many ssb transceivers used on 28 MHz has been a factor in the development of transmitting converters for 50 and 144 MHz. Applying the same technique to equipment built for 220 MHz will result in great ease of operation on that frequency. The author describes a heterodyne type of exciter that he has used for many years. A power amplifier that is compatible with this unit will be described in a subsequent issue of QST.*

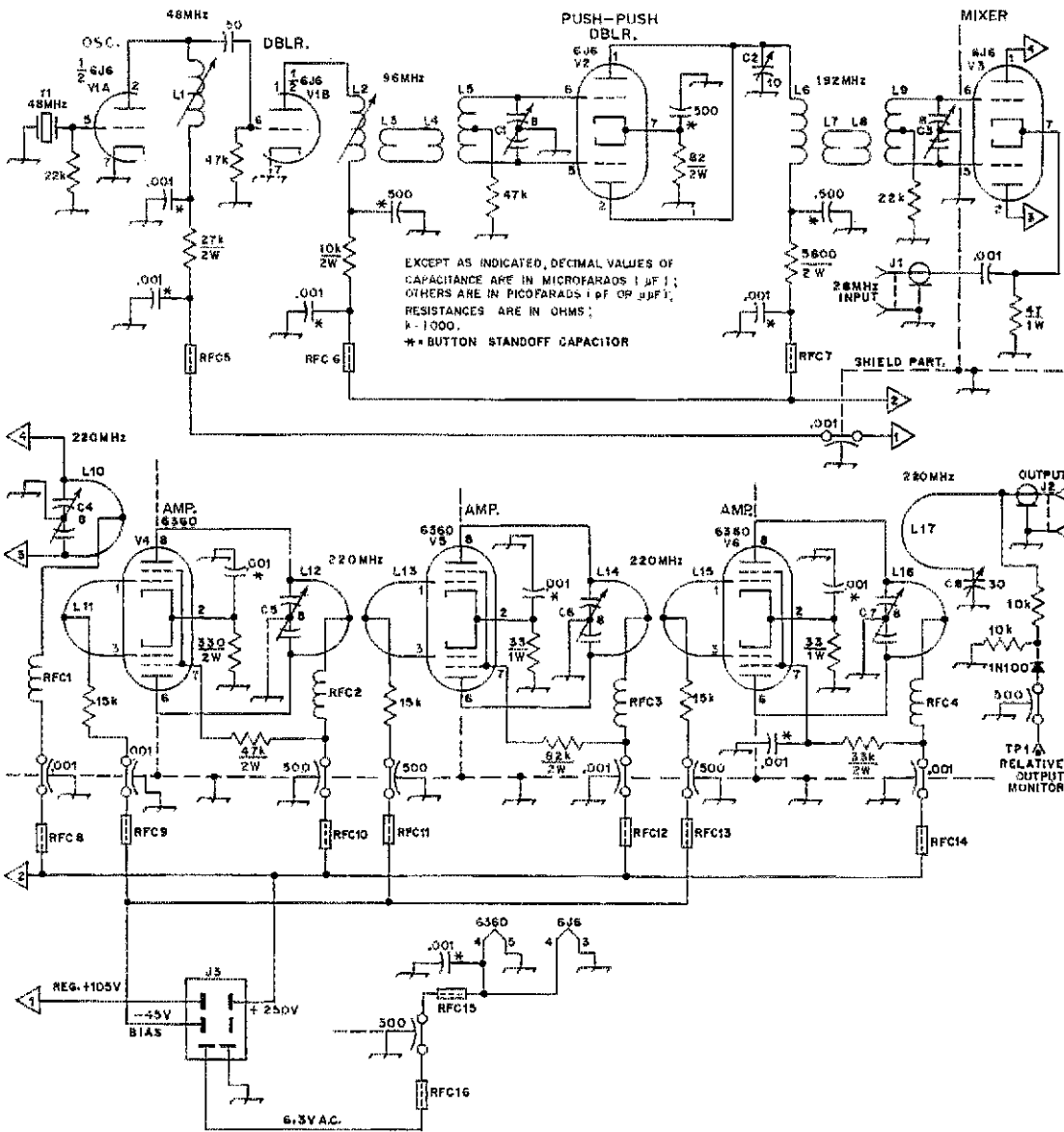


Fig. 1 - Schematic diagram of the 220-MHz transmitting converter. Capacitor values less than .001 μF are in pF or μμF. Resistances are in ohms. C1, C3, C4, C5, C6, C7 - 8 pF miniature air variable (E. F. Johnson 160-208).

C2 - Glass piston trimmer, 1.5 to 10 pF.  
C8 - 32-pF miniature air variable (E. F. Johnson 160-130).

J1, J2 - Coax chassis connector, BNC.

J3 - 6-pin male power connector.

L1 - 15 turns No. 22 enam. on 1/4-inch dia slug-tuned form.

L2 - 7 turns No. 18 enam. on 1/4-inch dia slug-tuned form, spaced one wire diameter.

L3 - 2 turns No. 22 enam. wound over cold end of L2.

L4 - 2 turns No. 22 enam. inserted in the center of L5.

L5 - 8 turns No. 18 enam., 1/2-inch ID x 5/8-inch long, center tapped.

L6 - 1-1/2 turns No. 16 enam., 1/2-inch ID, spaced one wire diameter.

L7 - 1 turn No. 18 enam., 1/2-inch ID, spaced one wire diameter from L6.

L8 - 2 turns No. 20 insulated hookup wire, 1/2-inch ID, inserted in the center of L9.

L9 - 4 turns No. 14 enam., 3/8-inch ID x 1/2-inch long, center tapped.

L10-L17, incl. Hairpin loops of No. 18 enam., see Fig. 2.

RFC1-RFC4, incl. - Ohmite Z-220 or 22 turns No. 22 enam., 1/8-inch ID, close wound.

RFC5-RFC16, incl. - Two ferrite beads slipped over wiring near point of connection.

Y1 - 48-MHz 3rd-overtone crystal.

A set of hairpin loops made from the dimensions given by the author. The ends have been cleaned and tinned for ease in connecting them to the plate and grid-tuning capacitors.

The power connector shown in the photographs should be changed to a male type for safety reasons. The female connector was available in the author's junkbox and has since been replaced.

### Alignment and Operation

Plate voltage should be 250 to 280. The regulator tube for the oscillator plate voltage is mounted on the chassis but will not be needed if a regulated 105 volts is available externally. Standby protective bias for the amplifier stages is obtained from the ssb exciter used at VE2HW. This bias is removed when drive is applied to the converter. Any bias supply that provides -45 to -60 volts may be used.

Adjustment should be done one stage at a time, with the plate and screen voltages removed from the succeeding stages. Drive to the stage following the one being adjusted should be monitored. This can be done by temporarily disconnecting the grid-circuit resistor at the cold end and connecting a low-range milliammeter between the resistor and ground, or the bias supply. A grid-dip meter or wavemeter should be used to check the output frequency of each stage.

Oscillator starting capability and frequency of operation can be checked with a receiver tuned to 48 MHz, or by listening to the third harmonic at 144 MHz. Both doubler stages should be tuned for correct frequency and maximum drive to the next stage. A small amount of 28-MHz drive (2 watts or less) can be applied to the mixer through J1. The mixer output should be tuned for maximum drive to the first amplifier stage. The output frequency should be on 220 MHz. Each amplifier should be adjusted for maximum output.

The output jack, J2, should be terminated with a 50-ohm load capable of dissipating 20 watts. A diode is connected to a voltage divider across J2 to provide a test point for checking relative output. The exposed terminal of the feedthrough capacitor is a convenient point at which a meter can be connected between the 1N100 diode and ground.

This transmitting converter was designed to drive a final amplifier that uses a tube from the 4X150/4CX250 family. Output from the converter is adequate for exciting such a tube. A description of the amplifier used at VE2HW will be given in a subsequent issue.

QST

Good isolation between stages is the result of using partitions and feedthrough capacitors. A 6J6 mixer and three 6360 amplifier stages are in a row just below the center of the chassis. A regulator tube and its voltage-dropping resistor are just to the left of the power connector.

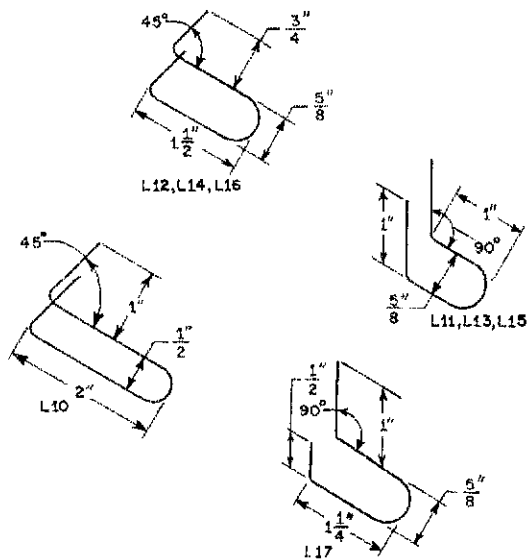
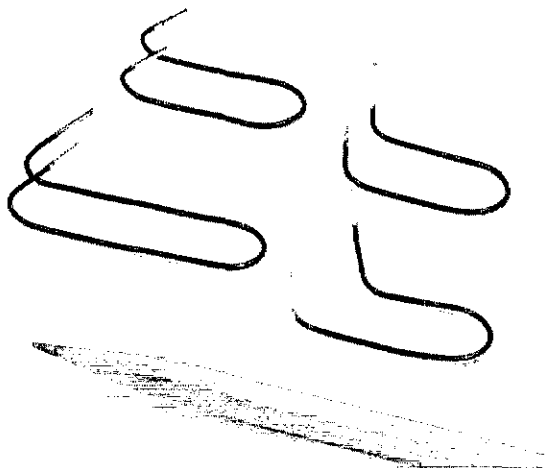
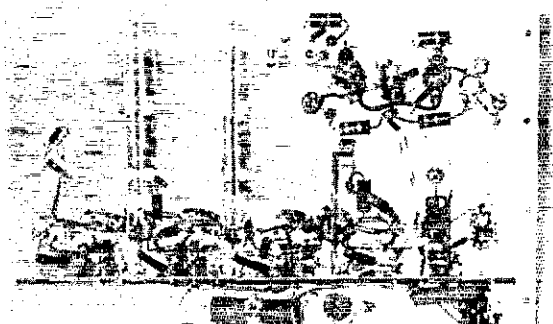
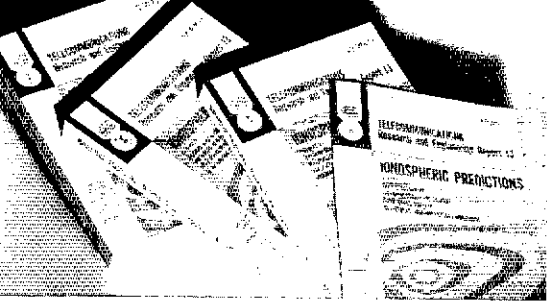


Fig. 2 — Hairpin loop dimensions for the plate and grid circuits of the mixer and amplifier stages. L10 is made from a 6-inch length of wire, L11, L13, L15 are each a 4-inch length, and L12, L14, L16 are each 4-1/2 inches long before bending.





With these four volumes, frequency estimations for sky-wave signals can be made manually for any month of any year. The only other information required is the Zurich smoothed relative sunspot number for the period of interest.

# High-Frequency Propagation Estimations for the Radio Amateur

Using *Telecommunications Research and Engineering Report 13 (OT/TRER 13)*

BY JERRY HALL,\* KIPL

**F**REQUENCY-PREDICTION information has been available in the form of U.S. Government publications ever since the years immediately following WW-II. Until recently, monthly booklets, issued three months in advance, were available as an aid in determining the best sky-wave frequencies for use at any given time over a given great-circle path. The appropriate issue for the month and year, together with a handbook containing instructions and basic data, enabled the frequency estimations to be made manually by graphic means.<sup>1</sup>

There has been a continual effort on the part of the issuing agencies of these publications to improve the accuracy of the prediction information. Major changes in the prediction techniques have resulted in changes in the publications. The latest change has replaced the monthly issues with a set of four "permanent" volumes, shown in the title photograph. The method of using these volumes is similar in many respects to using the monthly predictions. However, the complete set of these volumes enables estimations to be made for any month of any year, if the 12-month moving-average sunspot number (or the moving-average 10.7-cm solar radio-noise-flux number) is known. The obvious advantage of these volumes over

earlier publications is that it is not necessary to maintain a library of monthly prediction booklets in order to review propagation conditions for past periods, nor is it necessary to wait for the appropriate advance issue in order to make future estimations. With these volumes, right now, you can begin planning your schedule of operation by frequency bands for the next November Sweepstakes, or even for next year's ARRL International DX Competition.

### About the Four Volumes

Volume 1 of the set bears the impressive title, *The Estimation of Maximum Usable Frequencies from World Maps of MUF(Zero)F2, MUF(4000)F2 and MUF(2000)E*. This booklet contains 18 pages of introductory and basic information, along with nomograms, graphs, and instructions for estimating maximum usable frequencies (mufs) with information available from Volumes 2, 3, and 4. At first glance, these remaining three volumes appear to be identical to each other, as each one contains 432 pages of world maps upon which are superimposed frequency-contour lines. However, each volume covers a different level of solar activity. Volume 2, titled *Maximum Usable Frequencies MUF(Zero)F2, MUF(4000)F2, MUF(2000)E for a Period of Minimum Solar Activity,  $R_{12} = 10$* , presents maps for a Zurich smoothed relative sunspot number of 10 (a typical value for the closing months of an 11-year cycle). Volume 3 presents ionospheric predictions for  $R_{12} = 110$  (representative of activity during the peak of an average solar cycle), and Volume 4 for 160 (peak activity during an above-average cycle). In making

\* Asst. Technical Editor, *QST*.

<sup>1</sup> See, for example, Moore, "Homebrew DX Prediction," *QST*, August, 1971.

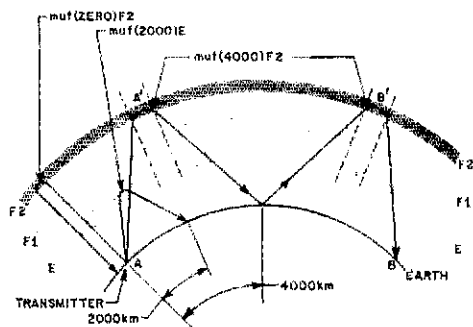
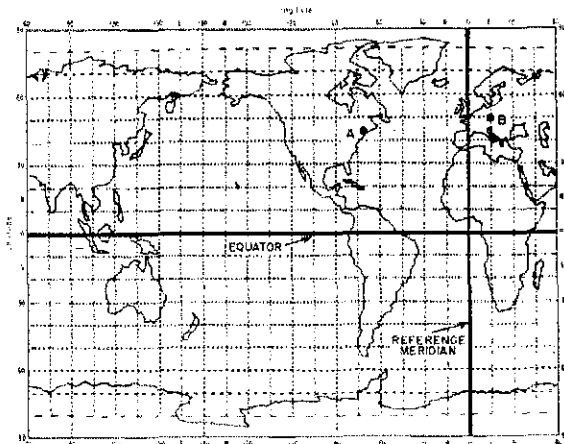


Fig. 1 — The three types of ionospheric refraction of radio waves for which maximum usable frequencies are predicted in volumes of report OT/TRER 13; not drawn to scale. Control areas, marked as A' and B', are used for actual frequency estimations over the great-circle path between points A and B on the earth's surface. Each control area includes all three layers of the ionosphere, the E, F1, and F2 regions.

Fig. 2 -- World map modified cylindrical projection, as presented in Fig. 3 of Volume 1, Report OT/TRER 13. The beginning markings of an overlay transparency for the path from New England to Central Europe are shown here. The equator and reference meridian lines have been added, as well as the two terminal points, identified as A and B.



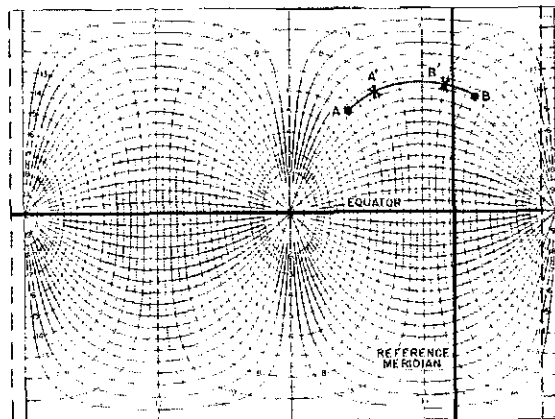
muf estimations, the appropriate one of the three volumes is used - that one which applies to the known (or predicted) sunspot number for the period of interest. For periods of activity between those covered by these volumes, a linear interpolation of data from two volumes is made. For example, for the present level of solar activity, with  $R_{12}$  numbers running at approximately 50, interpolation is necessary for data from Volume 2 ( $R_{12} = 10$ ) and from Volume 3 ( $R_{12} = 110$ ). (The technique is described in later sections of this article.)

The number of maps in a given volume, 432, may seem at first like an incredible amount. However, once the breakdown of this number is understood, one can appreciate the rather fine degree of resolution in both radio frequency and time of day which is available from these maps. In any one volume, the maps are presented month by month, 36 maps for each month. These 36 maps contain data for all days of the month, there being no distinction made from day to day, as presently it is not possible to predict such variations far in advance. The maps cover twelve time periods at 2-hour intervals, beginning with 0000 UT (GMT) and ending with 2200 UT, with three maps for each time period. Information is obtained from these three maps on vertical-incidence propagation (such as when you work a local amateur via a sky-wave signal), oblique-incidence propagation, and E-layer propagation. Information from each of the three maps for a given time period is considered if one desires the most accurate estimations of muf.

### Wave Propagation

It isn't necessary to have a detailed knowledge of the mechanics of ionospheric propagation in order to use the volumes, but a general idea, such

Fig. 3 -- Great-circle chart, presented in Fig. 4 of Volume 1, Report OT/TRER 13. The transparency started in Fig. 2 is transferred to this chart for completion. The overlay is adjusted so the equators are aligned, and so the two terminal points fall on the same great-circle line or are at proportionally equal distances from adjacent lines. The locations of control areas A' and B', indicated by Xs, are then determined as explained in the text and marked on the overlay.



as may be obtained from the Wave Propagation chapters of other League publications,<sup>2</sup> may be helpful. For the individual desiring more detailed information on the physics of the ionosphere and the theory of radio propagation, including such problems as absorption and field intensity, a text written by K. Davies is suggested.<sup>3</sup>

Fig. 1 portrays the three types of ray paths covered by the three maps for a given even hour of the UT day. The MUF(ZERO)F2 map contains contour lines running throughout the world, indicating the highest frequency which will be reflected vertically (zero horizontal distance) from the F2 layer. The MUF(4000)F2 map contains contour lines showing the highest frequencies for which propagation will be supported by the F2 layer at an oblique incidence angle to yield a hop length of 4000 km (approximately 2500 miles). This is about the maximum distance which can be covered in a single hop under normal conditions, and requires that the radiation angle of the wave be very low, less than approximately three degrees.

<sup>2</sup> *The Radio Amateur's Handbook*; also *The A. R. L. Antenna Book*.

<sup>3</sup> *Davies, Ionospheric Radio Propagation*, NBS Monograph 80 (1965). (Available from the U.S. Government Printing Office, Washington, DC 20402; price: \$2.75.)

For higher wave angles and resulting hop lengths which are shorter than 4000 km, an interpolation between the MUF(ZERO)F2 and the MUF(4000)F2 values for a given point in the ionosphere may be made from a nomogram in Volume 1. The MUF(2000)E map contains lines showing the highest frequencies for which propagation will be supported by the E' layer at an oblique incidence angle yielding a hop length of 2000 km (1250 miles). This distance, too, for E-layer propagation, requires very low wave angles, and a nomogram in Volume 1 may be used to convert this information into muf<sub>E</sub> values for shorter distances. This same nomogram, for distances greater than 2000 km, takes the F1 layer into account for the converted muf data.

### Locating the Signal Path and the Ionospheric Control Areas

In order to determine the frequency estimations for communications between two particular points, an overlay transparency must first be prepared to indicate the ionospheric control areas along the great-circle path. Once an overlay is completed, it is used for extracting all frequency information from the muf maps for communications between these two points, for any time of day, any month, and any level of solar activity. This overlay may be made from thin paper (onionskin or manifold), although some difficulty may be experienced later in trying to read frequency values of contour lines through this type of material. Many individuals will prefer to use transparent plastic sheets. Such sheets are available at stationers as page protectors; when cut along the fold, each protector will yield material for two page-size transparencies. Marks may be made on the surface of the plastic with a china-marking pencil, a wax crayon, or a nylon-tipped pen, and can be erased easily with a cloth moistened in isopropyl or denatured alcohol or a similar solvent.

Beginning steps in the preparation of the overlay are performed with the aid of Fig. 3 of Volume 1, shown here as Fig. 2. The equator is drawn on the overlay as a reference line, and the two terminal points of the path are marked as dots.

These points may be determined from the latitude and longitude lines, or from the outlines of the landmass areas. Their placement does not demand great accuracy. A reference meridian is then drawn between the terminal locations. As an example, let's assume that we wish to determine the muf between New England and Central Europe for July, with a sunspot number of 10, for 1800 UT. Fig. 2 shows the initial markings of an overlay for this path. One terminal point is identified as A, and the other as B.

Next, the transparency is transferred to Fig. 4 of Volume 1, shown here as Fig. 3. This chart is used to determine the great-circle path as represented on the world map, the length of this path, and the locations of the ionospheric control areas. The equatorial line of the transparency is aligned with the equator of the chart, and the overlay is then moved right or left until both points, A and B, fall on the same great-circle (solid) line, or are the same proportional distance between two adjacent lines. The line representing the great-circle path is then drawn on the overlay. The path length is determined from the dotted and dot-dash lines, which are identified in increments of thousands of kilometers. In this example, the path length is 6300 km (3900 miles). Knowing that the maximum hop length that can occur is 4000 km, it is easy to realize that this distance can be covered in not less than two hops, each being 3150 km in length. This reference hop length, distance D, is divided by two to obtain the ionospheric control area distance from each terminal. The distance D/2, 1575 km in this example, is measured along the path from each terminal point and marked. The control area nearer point A is identified as A', and that nearer point B as B'. It is at these points along the great-circle path that the signals will be in the ionosphere during their travel between points A and B. Fig. 1 gives a cross-section indication of this signal path, except the hop distance in this example is 3150 km, rather than the 4000 km shown there.

This completes the preparation of the overlay. If the path had been 4000 km or shorter in length, control areas A' and B' would have been coincident, located midway between points A and B.

If the path had been longer than 8000 km, there would have been three or more "control" areas. However, consideration of only the terminal-point control areas, A' and B', is usually necessary

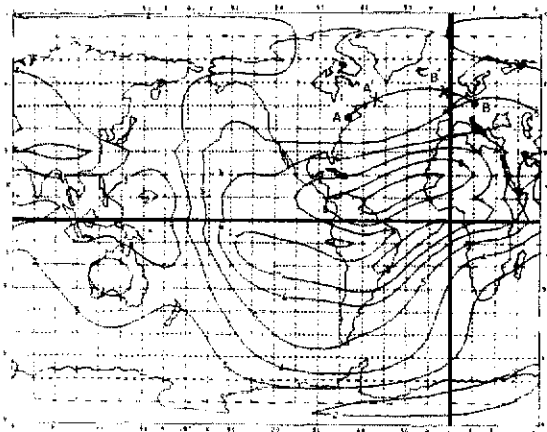


Fig. 4 - Frequency-contour map for R<sub>12</sub> 10, July, UT 18, Monthly Median MUF(Zero)F2 MHz, from page 236 of Volume 2, Report OT/TRER 13. The overlay as prepared in Figs. 2 and 3 is placed over the map, and the equators and reference meridians aligned. The frequency information is then read from the contour lines under points A' and B'. In many cases, as is necessary here, interpolation must be made. The MUF(ZERO)F2 for A' is near 4.6 MHz, and that for B' is near 4.7 MHz.

for such distances, and details of propagation between these control areas can be ignored. Muf's for such intermediate propagation tend to be higher than those frequencies estimated in terms of an integral number of hops, and the terminal control areas are those which limit the muf.

For relatively long paths, more than 10,000 or 12,000 km, it may be worthwhile to check the "long path" in addition to the usual "short path." The long path is the longer arc of the complete great circle. Contacts via the long-path mode are those such as often occur on 15 or 20 meters between the U.S. and Japan in the wee hours of the morning (U.S. time), with the antenna pointed in a southerly direction. The most likely times for long-path contacts to occur are when the control areas of the usual short path are in darkness, whereas daylight covers most of the long-path route.

### Using the Maps

With the overlay transparency completed, we may begin to extract frequency information from the maps. This information should be recorded on a sheet of paper, as later reference will be necessary. Fig. 5 shows a format suggested in the instructional material of Volume 1, although the typewritten information of Fig. 5 is for another example problem discussed later. Table I shows the data for this example.

In the appropriate volume (Volume 2,  $R_{12} = 10$ , for our present example), we first locate the MUF(ZERO)F2 map for July at 1800 UT. The transparency is placed over the map, and the equators and reference meridians are aligned, as shown in Fig. 4. The muf is read at points A' and B', and recorded in column 3 of the form (Table I), opposite UT 18. In this example, the readings are 4.6 and 4.7 MHz respectively for A' and B'. The overlay is then transferred to the MUF(4000)F2 map for July at 1800 UT. The frequencies read from this map, 16.8 and 17.5 MHz respectively for A' and B', are recorded in column 4 of the form. We now have both the MUF(ZERO)F2 and MUF(4000)F2 values for both control areas, A' and B'. However, what we really desire to know for the New England-Europe path are the "MUF(3150)F2" values, as the length of each hop is 3150 km. These frequencies will lie somewhere between the F2-layer mufZERO and muf4000 values, and may be determined with a straightedge and the nomogram of Fig. 5, Volume 1. These values, MUF(D)F2, are found to be 15.3 MHz for point A', and 16.3 MHz for B', and are recorded in column 5.

Next, the E' layer is taken into account. The overlay is transferred to the MUF(2000)E map for July at 1800 UT, and the values of 15.9 and 12.0 MHz are read for A' and B' respectively. These frequencies are recorded in column 6 of the form.

UT	CONTROL AREA	MUF(ZERO)F2	MUF(4000)F2	MUF(D)F2	MUF(2000)E	MUF(3000)F1	MUF(3000)F2	PATH MUF(M)F2
18	A'	4.6	16.8	15.3	15.9	16.0	16.0	16.0
	B'	4.7	17.5	16.3	12.0	12.1	16.3	16.0

Table I — Recorded data from frequency-contour maps and nomographs for the path between New England and Central Europe,  $R_{12} = 10$ , 1800 UT, July.

Should the value for distance D be less than 4000 km, as it is in our example, a conversion is necessary for the mufE values obtained from the map. The converted values are determined with a straightedge and the nomogram of Fig. 6 in Volume 1. From this nomogram, the value of 16.0 MHz for MUF(D)E is obtained for A', and 12.1 for B'. These values are recorded in column 7.

With the E- and F-layer mufs known for each control area, we are now able to determine which layer supports the highest frequency for propagation of communications signals. For each control area separately, we inspect the values written in columns 5 and 7. The higher of these values is the maximum usable frequency for that control area, and this value is recorded in column 8. For control area A', Table I, we find the E layer supports the higher frequency, 16.0 MHz, and for control area B', we find it is the F layer, 16.3 MHz.

Next we determine the muf for the total path. This value is the lower of the two values written in column 8. (Even though control area B' will support frequencies up to 16.3 MHz, control area A' will support nothing above 16.0 MHz at this time of day, so 16.3-MHz signals will not propagate between points A and B.) The path muf is that of control area A', 16.0 MHz. This value is written in column 9, completing the estimations for this

### INTERPOLATION OF BASIC MUF DATA

NEW ENGLAND			CENTRAL EUROPE		
TXR	LAT & LONG	TO	RECEIVER	LAT & LONG	FROM
	FEBRUARY, 1971				
	MONTH				$R_{12}$

UT	AREA	MUF(1000)F2			MUF(2000)F2			MUF(3000)F2		
		f <sub>10</sub>	f <sub>11</sub>	f <sub>12</sub>	f <sub>10</sub>	f <sub>11</sub>	f <sub>12</sub>	f <sub>10</sub>	f <sub>11</sub>	f <sub>12</sub>
00	A'	3.7	5.0	4.7	11.3	22.0	17.1	2.0	3.9	2.7
	B'	3.0	4.1	3.5	9.5	14.8	12.4	2.0	3.0	2.7
02	A'	3.9	4.8	4.1	9.8	16.9	14.5	2.0	3.9	2.7
	B'	3.4	3.9	3.4	9.9	14.8	12.4	2.0	3.0	2.7
04	A'	3.9	4.6	4.2	9.7	16.8	13.8	2.0	3.9	2.7
	B'	3.0	3.6	3.2	8.9	14.8	12.4	2.0	3.0	2.7
06	A'	3.9	4.0	3.8	8.9	14.0	11.2	2.0	3.0	2.7
	B'	3.0	3.2	3.2	8.1	12.0	10.1	1.0	1.0	1.0
08	A'	3.8	3.2	3.7	9.5	12.0	11.2	3.0	1.0	3.7
	B'	3.2	3.0	3.1	11.2	20.5	11.5	3.0	1.0	9.7
10	A'	3.7	4.0	3.8	11.3	16.0	11.4	6.0	7.0	6.7
	B'	3.4	3.3	3.0	11.6	31.0	21.0	12.0	11.0	13.4
12	A'	3.7	3.8	3.6	11.6	26.5	23.3	10.0	12.0	11.4
	B'	3.1	3.9	3.3	11.2	39.0	30.5	13.0	16.0	15.0
14	A'	4.8	9.2	7.8	20.5	39.0	29.5	14.0	15.0	15.4
	B'	3.0	10.0	8.4	21.1	35.0	30.5	13.0	16.0	15.0
16	A'	4.9	10.0	8.3	20.9	35.0	30.4	13.0	17.0	16.0
	B'	3.6	9.4	7.8	19.9	31.2	26.5	12.0	12.0	11.4
18	A'	3.9	7.8	6.5	17.0	31.0	24.0	12.0	15.0	11.0
	B'	3.4	7.4	6.2	16.0	27.0	21.0	11.0	15.0	7.4
20	A'	3.2	6.6	4.2	14.0	31.0	25.8	9.0	11.0	10.4
	B'	3.7	5.0	4.5	12.2	19.0	15.0	4.0	4.0	4.0
22	A'	3.3	4.1	3.9	11.4	22.0	21.8	6.0	5.0	6.0
	B'	2.2	4.2	3.6	9.9	14.0	13.2	3.0	3.0	3.0

Fig. 5 — Estimations of mufs for the path between New England and Central Europe for February, 1971.

MONTH	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1964										9.6	10.2	11.0
1965	11.7	12.0	12.5	13.6	14.6	15.0	15.5	16.4	17.4	19.7	22.5	24.5
1966	27.7	31.5	34.5	37.4	40.7	44.6	50.3	56.4	63.1	67.6	72.2	72.7
1967	76.2	79.0	82.2	84.6	87.4	91.5	94.1	95.3	95.9	95.0	97.1	100.6
1968	102.6	102.9	104.7	107.2	107.6	106.6	105.2	104.8	107.0	109.9	110.6	110.1
1969	111.0	109.6	108.9	106.4	106.2	106.1	105.8	106.4	105.4	104.1	104.6	104.9
1970	105.6	106.0	106.2	106.1	105.8	105.5	105.3	99.5	96.2	91.9	88.6	84.9
1971	81.1	77.5	74.0	71.7	69.3	65.7	64.2	62.9	64.2	67.0	66.2	64.6
1972	59.0	52.0	54.0	49.7	48.5	46.9	44.4	41.6	39.0	38.9	37.9	36.6
1973	35.4	34.4	35.2	31.7	30.5	29.5	28.6	28.1	27.4	26.1	25.0	23.9
1974	22.8	21.6	24.5	19.8	19.3	18.6	17.5	16.4	15.1	13.9	12.8	12.0
1975	11.9	11.9										

Table II - Observed and predicted Zurich smoothed relative sunspot numbers, from the monthly publication for October, 1971. For each month, the upper figure is the observed or predicted number. The lower figure in parentheses is the percent of uncertainty above and below the predicted number. (The uncertainty percentage is zero for observed numbers.)

equation given above, we can now determine the *F*-layer *muf*<sub>4000</sub> value for *R*<sub>12</sub> = 78. This value will be between 14.2 and 20.5.

$$\begin{aligned} \text{MUF} &= 14.2 + 0.01(20.5 - 14.2)(78 - 10) \\ &= 14.2 + 0.01(6.3)(68) = 14.2 + 4.3 = 18.5. \end{aligned}$$

This value is then entered in column 4 of the form for estimation of control-area and path mufs. This same technique and equation are used for other ionospheric layers and other times. Initially, it seems that this method requires a great deal of map reading, but once the various basic values are obtained and recorded, they are then readily available for the same month but different solar activity levels, such as a year later.

### Obtaining Sunspot-Number Information

The Institute for Telecommunication Sciences (ITS) issues a weekly radio telecommunication forecast which contains effective solar activity indices (12-month moving-average Zurich sunspot numbers) for use with these volumes. The following information for 1972 was obtained from the January 5 forecast.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
50	49	48	47	46	45	43	40	38	37	36	35

Table II gives a longer range forecast. Information is given in Volume 1 for obtaining this data from ITS, but for many amateurs a more likely source might be the Propagation Forecast Bulletins transmitted by WIAW (see the transmission schedule in the "Operating News" section of this issue) and by other Official Bulletin stations. These forecasts are revised weekly, containing a summary of the information of the ITS forecasts.

### How Reliable Are These Estimations?

In a set of notes accompanying an earlier series of prediction publications, a comprehensive paragraph gives some quite useful information which still applies today.

"It is believed that these predictions are reasonably accurate for vertical incidence and for one-hop *F*2 transmission for average layer height for 4000-km distance over a great circle path. In practice, the picture is often more complicated. The effective antenna-radiated power at low angles of departure may not be sufficient for maximum single-hop distance. Also, for a given distance various modes, or combinations of modes, of propagation are often possible, including combinations of *E*- and *F*-layer single or multiple hops. Ionospheric forward scatter, backscatter, off-great-circle transmission, and sporadic *E* may increase

example. If it was desired to establish contact via amateur frequencies, the 20-meter band, 14.0 to 14.35 MHz, would provide usable communications.

Very often it is desirable to know the path *muf* for a complete 24-hour period, such as during a contest or to plan scheduled contacts with an emphasis on a particular frequency band, rather than on the time of day. This may be accomplished by performing the same steps as indicated here for all other even-hour times of the UT day. The various values from column 9 may then be plotted on graph paper, with time assigned to the abscissa, and frequency to the ordinate. The points may then be connected with a smooth curve, allowing interpolation to be made in times to the nearest half hour or so. An example of this type of plot is given in Fig. 7, about which more later.

### Intermediate Levels of Sunspot Activity

For intermediate levels of sunspot activity, such as between *R*<sub>12</sub> values of 10 and 110, the procedure is not greatly different. Before determining the control-area mufs, an interpolation of the *F*2-layer *muf*<sub>ZERO</sub>, *muf*<sub>4000</sub>, and *E*-layer *muf*<sub>2000</sub> data obtained from Volumes 2 and 3 is made. A form for recording this information is also suggested in the instructional material of Volume 1, and is shown in Fig. 6. The interpolation is linear, and may be made graphically or with a simple equation included in the instructions. For *R*<sub>12</sub> values between 10 and 110,

$$\text{MUF} = \text{MUF}_{10} + 0.01(\text{MUF}_{110} - \text{MUF}_{10})(\text{R}_{12} - 10).$$

Let's suppose we are making estimations for a period when the sunspot number is 78. To determine the *B'* *F*-layer *muf*<sub>4000</sub> for February at 0800 UT, for example, we consult the *MUF*(4000)*F*2 map for February, 08 UT, in Volume 2, *R*<sub>12</sub> = 10, with our overlay transparency. From this map, we obtain an *muf* value of 14.2 MHz for *B'*. Next, we consult the *MUF*(4000)*F*2 map for February, 08 UT, in Volume 3, *R*<sub>12</sub> = 110. From this map, we obtain an *muf* value of 20.5 for *B'*. With the



Fig. 6 — Interpolation of basic frequency information for a level of sunspot activity intermediate to that covered by maps of Report OT/TRER 13. Data is for the path between New England and Central Europe for February, 1971. The results recorded in columns 5, 8, and 11 are transferred to columns 3, 4, and 6, respectively, of the form shown in Fig. 5.

the actual MUF for a given circuit over that expected for the simplest great circle mode. Sporadic E may be particularly important during night hours in auroral zones, and during the middle of the day in the summer in temperate zones. Ionospheric layer tilt, horizontal ionization gradients, meteoric or auroral propagation may play an important part."

As a matter of interest, the author made a direct comparison of estimations obtained from the formerly available monthly publications against the estimations obtained from Report OT/TRER 13. The path for which this comparison was made was between New England and Central Europe, for February, 1971. The sunspot number used for the determinations from the 4-volume set was 77.5, a value obtained from Table II. Fig. 6 shows the muf values extracted from the maps and their interpolation for the  $R_{12}$  value of 77.5. Fig. 5 shows the estimations obtained from these interpolated muf values. A plot of these mufs for a February 1971 day is shown in Fig. 7. The predicted frequencies obtained from the monthly publication for that month were in quite close agreement, especially during daylight hours across the path; the nighttime frequencies obtained from Report OT/TRER 13 were generally higher. This is attributed mainly to the fact that the monthly publication was prepared for a lower predicted sunspot number than the 77.5 used for the OT/TRER estimations — a value of 74.2.

It was then decided to give these frequency estimations an "acid test," by comparing them against actual contacts made over this path during the 1971 ARRL International DX Competition.

Fig. 7 — Predicted mufs between New England and Central Europe for February, 1971, from Report OT/TRER 13, indicated by the smooth curve. The heavy horizontal lines or dots indicate times and frequencies when contacts were actually made over this path, as determined from logs submitted for the ARRL International DX Competition. See text for discussion of contacts shown above the curve. The short breaks in the lines for 80 and 40 meters, and the 2-hour gap in the line for 20 meters do not necessarily indicate that these frequencies were not propagating, but probably mean that operation was taking place on different bands, where more contest score multipliers could be gained.

ESTIMATION OF MAXIMUM USABLE FREQUENCY

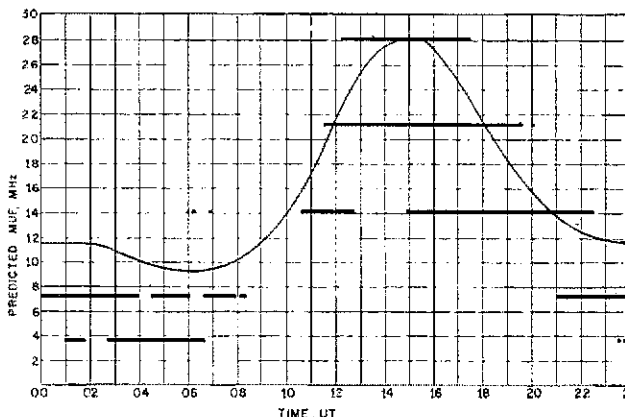
New England LAI LONG RECEIVER LAI LONG  
 MUF 77.5 TO 77.5  
 February, 1971 MONTH 1575 Km  
 3150 Km REFERENCE HOP LENGTH (D) CONTROL AREA DISTANCE (D,2)

UT	CIRCUIT AREA	MUF (R12)	MUF (R10)	MUF (R9)	MUF (R8)	MUF (R7)	MUF (R6)	MUF (R5)	MUF (R4)	MUF (R3)	MUF (R2)	MUF (R1)	Path MUF (R12)
00	A	4.7	17.1	15.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	11.5
	B	2.5	12.4	13.5	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	11.5
02	A	4.7	18.5	18.2	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	11.5
	B	2.5	12.4	13.5	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	11.5
04	A	7.0	13.8	13.1	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	10.0
	B	2.5	10.8	10.0	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	10.0
06	A	3.3	12.3	11.4	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	9.3
	B	2.5	10.1	9.3	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	9.3
08	A	5.7	11.2	10.3	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	10.3
	B	2.5	10.1	9.3	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	10.3
10	A	3.5	11.4	11.2	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	13.2
	B	2.5	10.1	9.3	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	13.2
12	A	6.1	25.3	21.5	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	21.5
	B	2.5	10.1	9.3	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	21.5
14	A	7.0	29.6	27.3	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	27.3
	B	2.5	10.1	9.3	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	27.3
16	A	8.3	30.5	28.0	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	28.0
	B	2.5	10.1	9.3	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	28.0
18	A	8.2	30.1	27.8	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	27.8
	B	2.5	10.1	9.3	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	27.8
20	A	7.2	26.8	24.7	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	24.7
	B	2.5	10.1	9.3	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	24.7
22	A	6.9	21.8	20.1	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	20.1
	B	2.5	10.1	9.3	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	20.1

The first phone weekend of the contest was held on February 6 and 7, and the first cw weekend on February 20 and 21. The first step was to review the propagation summaries for these two weekend periods, from which it was determined that there was no unusual solar activity. Next, several contest logs, both phone and cw, which were submitted to ARRL Headquarters by New England stations, were reviewed. Each log was searched for every contact made with Central Europe. For each contact, a dot was placed on the worksheet used in making up Fig. 7, for the proper time and frequency. At times of really good band openings, the dots formed themselves into a solid bar. The results of plotting these dots are also shown in Fig. 7.

The most significant facet of this comparison is that a 10-meter opening apparently occurred where none was predicted. However, a closer look at the logs revealed that exchanged signal reports were not of the RS 5-8 or 5-9 variety to be expected on a direct-path 10-meter opening, but, instead, ran in

(Continued on page 43)



# A Dual-Voltage Medium-Current Power

## Supply for Repeaters

BY ROBERT M. MYERS,\* W1FBY

**F**RM ACTIVITY, through the use of repeaters on the vhf bands, has become one of the most popular modes of phone operation. Many repeater committees have assembled conglomerates of surplus land-mobile service transmitting and receiving equipment in order to realize maximum efficiency and effectiveness from available gear. The merging of many individual units into a properly functioning repeater system can create some *unique* power-supply requirements. The device shown in the photographs may be easily adapted to individual needs for *odd* voltages encountered in some setups.

### The Circuit

A full-wave bridge rectifier is connected to the secondary of a 24-volt step-down transformer, T1, shown in Fig. 1. The power supply is protected against voltage transient spikes by a 120-volt Thyrector, VR2. A three-wire ac line cord is necessary to assure a proper ground connection for the chassis (safety first!). Since this power supply is part of a hill-top outdoor installation, it is essential that all of the chassis in the system be

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properly grounded to eliminate a shock hazard for anyone performing maintenance on the system (especially while standing on wet ground!).

The output of the bridge rectifier delivers 28-volts dc to four of the panel-mounted jacks, and to the series regulator transistor, Q1, whose base bias is determined by the value of VR1. This bias level establishes a reference for the regulated-voltage output appearing at the 12-volt terminals. If a different regulated voltage is desired, the value of VR1 may be changed. Zener-diode voltage ratings of 6 through 18 may be used without any other circuit changes. The value of R2 is chosen to allow a suitable Zener-diode current. R3 is a bleeder resistor and C3 is an rf bypass capacitor which is connected from the emitter of Q1 to ground. L1 and L2, along with the associated bypass capacitors, prevent rf energy from entering the supply and upsetting the regulator. VR3 protects the 28-volt line from spikes generated by the relay coils in a repeater control system.

### Construction

A Bud aluminum chassis, 5 X 10 X 3 inches, contains all of the components. The large computer-grade electrolytic capacitors are mounted on 1/4-inch diameter rubber grommets to insulate the positive terminal from chassis ground. A bottom cover is used to protect the internally mounted components against the dirt and moisture usually encountered in an outdoor installation.

There are no special wiring techniques or precautions needed. Bus wire interconnects all of the grounded binding posts and then is attached to the negative terminal of each electrolytic capacitor. The chassis can be used as a ground return for all of the negative leads if the unit is not subjected to an outdoor environment.

All of the jacks are mounted on the front of the chassis. There are four sets of connectors for 28 volts and two sets for 12 volts regulated. Two fuse holders are included; one contains a spare 1-ampere fuse. Although a power-indicator lamp is not

Bottom view of the power supply. RFC1 and RFC2 are located at the upper left.

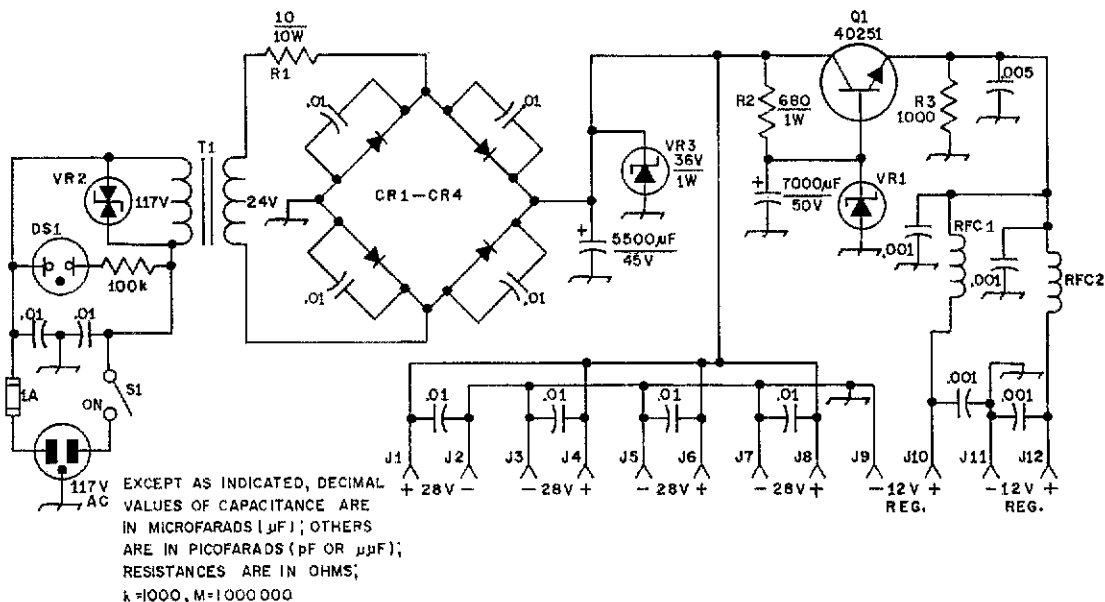


Fig. 1 - Circuit diagram of the dual-voltage power supply. Capacitances are in  $\mu$ F; capacitors marked with polarity are electrolytic. Component designations not listed below are for text reference. CR1-CR4, incl. - 1000 PRV, 2.5 A (Mallory M2.5A or equiv.). DS1 - Neon indicator lamp, 117-volt (Leecraft 32-211 or equiv.). RFC1, RFC2 - 2.8  $\mu$ H; 10 turns No. 20 enam. wire, 1/4-inch OD.

- S1 - Spst toggle.  
 T1 - 117-volt primary; secondary 24 V at 2 A (Knight 54 D 4140, Hammond 165 M 25, or equiv.).  
 VR1 - Zener Diode, 13 V, 1 W (Motorola 1N3023 or equiv.).  
 VR2 - Transient voltage suppressor, 120-volt rating (General Electric 6RS20SP4B4).  
 VR3 - Zener diode, 36 V, 1 W (Motorola 1N4753 or equiv.).

necessary for an unmanned remote transmitter, it does provide a quick visual indication of the fuse status when station maintenance is necessary.


The series regulator, Q1, must be mounted on the chassis with insulating hardware. A thin layer of silicone grease on both sides of the mica washer will aid in the transfer of heat to the chassis. During normal operation, the transistor does not get hot.

### Installation and Operation

Connections to the three-way binding posts may be made in any convenient manner. **Caution:** A short circuit at the regulated-voltage output terminals could damage Q1. The builder may wish to add a current-limiting resistor in the output line of pass transistor Q1. The ohmic and wattage values will depend upon the current taken from the supply. By adding the resistance between the emitter of Q1 and RFC2 one can prevent destruction of Q1 during overcurrent periods.

This supply is rated at 1 ampere for continuous operation. Of course, this design could be enlarged upon by increasing the current rating of the transformer and diodes.

### In Conclusion

The power supply described here is used to provide operating voltage for several pieces of repeater equipment - a solid-state preamplifier, timing relays, and various control relays. The emphasis has been placed on good filtering, transient protection, and long life. All of the foregoing considerations are of paramount importance if reliable operation is expected from that fm repeater system you are building. 

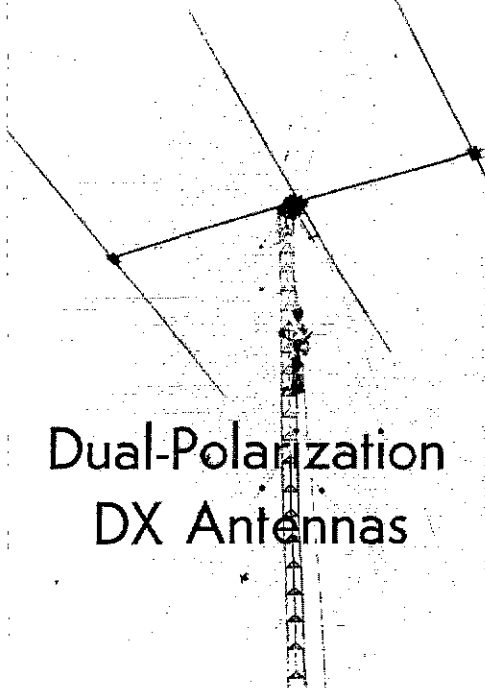


### Stolen Equipment:

Aerotone mobile unit, model 6M 355 LT, SN 685064. Anyone with information is requested to contact the Penn Central RR Police Dept., Room 1750, Grand Central Terminal, 15 Vanderbilt Ave., New York, NY 10017.

Stolen on January 25, a 2-meter fm Standard transmitter, SRC-806M, SN 102703. Clem Mathias, 3134 Coronado Ave., Imperial Beach, CA 92032.

Lafayette HA-410 10-meter transceiver, model 10014. The unit has modifications inside that owner can identify. Reward. Gerald A. Macari, WA2KDB, 29 Carriage Dr., Kings Park, NY 11754.



# Dual-Polarization DX Antennas

BY WALTER J. STILES,\* W7NYO

**T**HE SUPERIORITY OF the backyard constructed, horizontally polarized multielement rotary beam antenna for amateur DX transmissions and reception on the hf bands has for many years remained relatively unchallenged. There are, however, a considerable number of knowledgeable DXers who insist that on certain occasions, and over certain distances, the vertical half-wave dipole sometimes gets through when all else fails. Recently the author decided to investigate the merits of using both the horizontally polarized beam and the vertically polarized dipole (simultaneously) in an attempt to profit from the combined advantages of each. Such dual polarization has been long accepted as standard operating practice for fm broadcasting stations to intensify their coverage.

The antenna "test farm" was located atop a 400-unit high-rise apartment building and consisted of an unobstructed 70 x 100-foot flat, copper-backed roof surface, 200 feet above ground, almost completely free of any pattern-distorting or power-absorbing objects. The horizontal beam antenna used in the tests was a Mosley TA-33 mounted on a 40-foot guyed Rohn tower, while the vertical dipole was a New-Tronics 4BTV mounted on a similar tower 28 feet above the roof, with two cut-to-length insulated sloping radials for each band. Dual polarization as used by some fm broadcasting stations permits the use of two final amplifiers, driven by a common exciter, with one amplifier feeding the horizontal array and the second amplifier feeding the vertical antenna. This procedure was decided upon for the antenna evaluation described here.

\* Communications Consultant, Suite 1624 Tucson House, Tucson, AZ 85705.

## The Test Setup

The in-shack equipment consisted of two 500-watt (average dc input) Collins 30L-1 linear amplifiers, each driving a separate antenna. Both amplifiers were excited through an impedance matching network by a single 500-watt PEP input Hallicrafters SR-400 exciter, see Fig. 1. Two identical T-R switches were employed for test purposes so that the 75S-3B receiver could be switched to the horizontal beam, the vertical dipole, or to both antennas, together. See Fig. 2.<sup>1</sup> The two antenna supports were physically separated as far apart as practical (80 feet), and each was driven through its own 100-foot-long transmission line (RG-8/U).

All tests on which data were recorded were conducted over distances of at least 2500 miles. It was assumed that these skip signals, after traveling such distances, were relatively devoid of any well-defined polarization characteristics. Initial tests indicated immediately that the noise pick up of the vertical dipole was a major disadvantage during reception, particularly when mounted atop an appliance-filled apartment house. The apparent advantages of the dual polarization on transmission, however, appeared to justify a more sophisticated investigation. The vertical dipole was therefore replaced with a second TA-33 beam, vertically side-mounted on the second tower with the bottom end of its longest element approximately 6 feet above the roof. This directional vertical beam significantly lowered the noise pick up that had been experienced with the

<sup>1</sup>The signal attenuation produced by the resistive matching network during reception has proved to be insignificant.

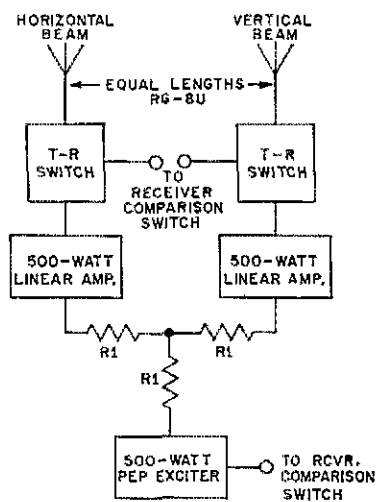
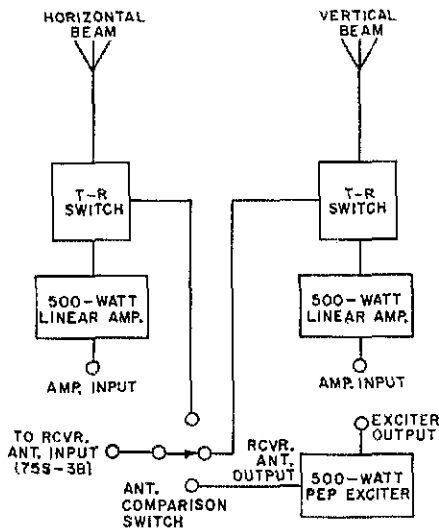


Fig. 1 — Block diagram showing connection arrangement for driving two amplifiers from a common exciter. R1 is equal to 16.67 ohms. It is made by connecting three 50-ohm noninductive resistors in parallel. Ohmite Koolohm type 459E are suitable.



omnidirectional vertical dipole, reduced the signal interference from undesired directions and provided on-beam gain in the vertical plane.

### Advantages of Dual Polarization

On-the-air tests were conducted principally at 21 MHz in the interest of avoiding around-the-clock interference so much a part of 14-MHz operation. During the test period, band conditions were somewhat less than outstanding. Nevertheless, four distinct advantages of the dual-polarization system were apparent.

1) All DX signals copied were at least as strong, and collectively averaged nearly one S-unit stronger, using both antennas together as compared with either antenna by itself. Likewise, the dual-polarized, two-amplifier transmitted signal was reported in all cases (where a direct comparison was made) to be equal to, or better than a horizontally polarized signal of the same total effective power (1000-watt dc input).

2) Incoming DX signals, arriving with heavy QSB (such as USSR signals via the North Pole path), reflected the greatest improvement in both signal strength and stability. Readability improvements from R2 to R5 were not uncommon, even in cases where the S-meter reading of the signal improved very slightly.

3) The reported effectiveness of dual polarization during transmission was more obvious than during reception, due in part to the deteriorating effect of the noise product of the vertical beam.

Fig. 2 - The antenna comparison switch selects either the vertical array, the horizontal beam, or the combined system.

Both the transmitting and receiving improvements, however, were considered worthwhile.<sup>2</sup>

4) Transmitting effectiveness with dual polarization in the few "pileups" that could be found during the test was excellent.

No conclusive example was recorded of the vaunted spot superiority of the vertical antenna by itself. Conversely, neither was the vertical beam ever left out of the running.

### Transmitting Power

The apparent economic advantages of using two low-cost 500-watt amplifiers (such as Heath HA-14s) instead of a single 1000-watt amplifier for reaching maximum legal power are deserving of a little in-depth study. Most important is the fact that the conventional 100-watt output exciter won't fully drive two such amplifiers. A third 500-watt linear amplifier, operating at a conservative power level, could be driven by a conventional exciter and, in turn, could easily drive the two linear amplifiers to their maximum capability. With the recent active market in 1000-watt amplifiers, a "3-pack" of used, low-cost 500-watt linear amplifiers, possibly all operating from a common power supply, could represent an interesting and economically satisfying investment.

Those who might think in terms of two 1000-watt amplifiers, used with separate transmitting antennas simply to break through the power barrier, are missing the point completely. Such an arrangement is easily put together, but the transmitting advantage is of a magnitude of only 3 dB (1/2 an S-unit), while the receiving advantage is nil.<sup>3</sup> Even if the two linear amplifiers were diplexed into a common antenna, several of the assets of the dual-polarization concept would be lost.<sup>4</sup> An example of these fringe benefits which came to light during the test, translated into Madison Avenue lingo, was the "so round, so firm, so fully packed" signal reports from DX stations.

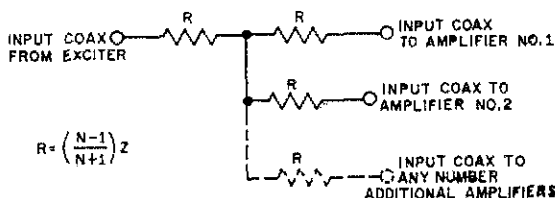
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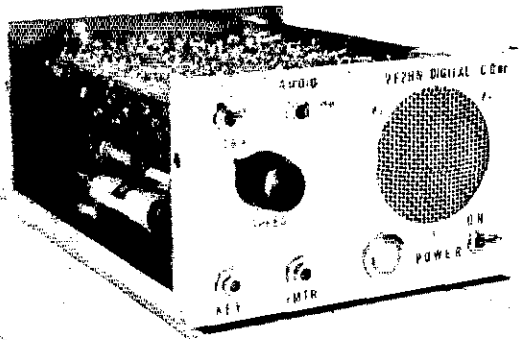
<sup>2</sup> The measured average increase in signal pickup with both beams operating was greater than the increase in noise pickup introduced by the vertically mounted beam.

<sup>3</sup> [EDITOR'S NOTE: In addition to the points mentioned above, operating full power with two 1-kw amplifiers on the same frequency is against FCC regulations.]

<sup>4</sup> Kuhnert and Collins, "2000 Watts PEP at 10 Cents Per Watt," *CQ*, October, 1966.

Fig. 3 - Any number of amplifiers can be driven with one exciter providing suitable noninductive resistors are used to assure a proper load for the exciter.  $R$  is the value of each noninductive leg;  $Z$  is the source impedance of the coax in ohms; and  $N$  is the number of amplifiers in the system.





# The VE2HN Digital CQer

In Two Parts

## Part II - Construction Notes, Programming, and Testing†

BY H. H. RUGG,\* VE2HN

FULL CONSTRUCTIONAL details are not provided here since each user will have his own message, and the use of more recent IC types would invalidate any such information. However, the following is presented as a general guide.

As described in Part I, circuit components are located on three circuit boards. Board No. 1 contains the circuitry presented in Figs. 5 and 6 (Part I of this article) and Board No. 3 contains the power supply and output circuits of Fig. 7 (also Part I). Board No. 2, described later, contains the NAND gates for decoding the message CQ CQ CQ DE VE2HN VE2HN.

Commercial Vero board was used for IC boards Nos. 1 and 2. This board has holes on 0.1-in. centers, and printed conductors on one side only. These conductors were very useful for interconnecting flip-flops and gates, and running in +3.6 V and ground busses. The No. 3 board (power supply and output circuits) is plain perforated board, interwired as required.

† Part I of this article appeared in *QST* for February, 1971.  
\* 16 Lakebreeze Ave., Pointe Claire, PQ, Canada.

The 900 series ICs have 8 pins on a 0.2-in.-dia circle. The leads had to be bent to accommodate the rectangular hole pattern of the Vero board, as shown in Fig. 8. Leads 2 and 6 are left in their original positions, and leads 1, 3, 5, and 7 bent only slightly out of normal position. Leads 4 and 8 are the only ones requiring appreciable shaping.

The conductors running through pins 4 and 8 are left solid for distribution of ground and +3.6-V connections, respectively. See Fig. 9. In most cases, the conductors were cut between pins 1 and 7, 2 and 6, and 3 and 5; however, in a few cases, the circuit connections required that these conductors be left intact. Individual ICs were spaced 0.7 inches apart (center to center) leaving four sets of blank holes between ICs for jumpers. Conductors were cut and jumpered between ICs as required. ICs were mounted on the plain side of the boards. Above and below each row of ICs, 3 or 4 conductors were allotted for routing signals between stages. Wire jumpers on the plain side of the board were run at right angles to these conductors as required, and the conductors were cut whenever necessary.

Fig. 9 shows a section of a typical circuit as laid out on the board (schematically it appears in Fig. 5, Part I). It is almost essential to prepare large-scale layout sheets to plan the wiring beforehand. This writer found 1/4-inch-squared paper quite suitable (2.5 times scale).

### Packaging

The photographs show the general construction used by the writer. A Hammond (Canada) Handy Case, 7 × 5 × 3 inches (1411Q) was used.<sup>4</sup> Board No. 3, containing the power supply and output circuits (Fig. 7, Part I), is fixed mounted and wired to front-panel components.

The two logic boards were assembled to each other at right angles and connected to the "outside

<sup>4</sup> Hammond Manufacturing Co., Ltd., 394 Edinburgh Rd. North, Guelph, Ont., Canada. Products are available through authorized distributors or may be ordered directly from the factory.

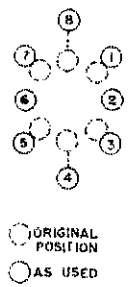


Fig. 8 - IC pin positions to mate with Vero board (bottom view). Wires from pins 2 and 6 retain their original positions; all others are bent as required. Foil strips on the board run horizontally, i.e., through pins 1 and 7, 2 and 6, and so on. The foil is broken as required and jumpered for the necessary connections. See Fig. 9.

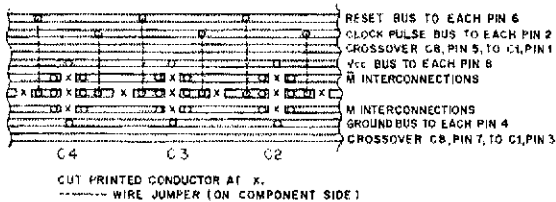


Fig. 9 - Sample wiring layout using Veroboard (printed conductor side of board). This layout is for a portion of the X-axis Johnson counter of Fig. 5 (Part I of this article). Alphanumeric designations C2 through C4 refer to semiconductor component locations as described in the text. These numbers also appear in Fig. 5.

world" via a miniature 7-pin connector for convenient removal. When mounted in final position, the wiring sides of the two logic boards are completely exposed for ease in signal tracing. In effect, the three circuit boards constitute three sides of a rectangular box, enclosing the power transformer and the 7-pin connector. Insulating sheet was glued to the inner surfaces of the cover, because of the relatively close fit and proximity to live logic circuitry.

### Message Encoding

Fig. 10 shows the actual coding used for the message CQ CQ CQ DE VE2HN VE2HN and Fig. 11 shows the NAND circuits involved.<sup>5</sup> As briefly described earlier, we will select the following separately, and then combine them in an OR gate:

- 1) Long pulses for each Y gate.
- 2) Short pulses for each Y gate. These are selected as either mark pulses actually required, defined as "enabled," or pulses to be deleted, i.e., spaces in the message, defined as "inhibit." In the VE2HN message, a combination of both enable and inhibit pulses is used. For the DE portion of the message (Y = 3) four enable short pulses are selected (X = 2, 3, 4, and 6), rather than the space or inhibit pulses which number 5 (X = 0, 5, 7, 8, and 9). For all other Y time slots or gates, space or inhibit pulses are selected. In addition, all short pulses must be gated to the short-pulse time duration, or first half of the basic 100-millisecond X-pulse duration.

### Long-Pulse Selection

From Fig. 10, it may be seen that we require the basic OR function, e.g., during gate  $Y_0 + Y_1 + Y_2$  (CQ CQ CQ) we want a long-pulse output if the X counter is  $X_0$  or  $X_3$  or  $X_7$  or  $X_9$  or  $X_{12}$ . As shown in the appendix at the end of this article, we must have inverted input functions to generate the OR output. For this reason all X gates are

<sup>5</sup> EDITOR'S NOTE: In this presentation the author uses logic equations and logic identities extensively to describe circuit operation. A brief description and additional references for this treatment of logic data are provided in the appendix appearing at the end of this article.]

Fig. 10 - Detailed message program for the digital CQer. Selection of long and short pulses, as appropriate, is described in the text. The "deleted" portions of the message are skipped, following the generation of a reset pulse as described in Part I of this article.

generated in inverted form. NAND gates E1, Fig. 11 (both sections), and E3 (pin 7), with all outputs wired in parallel, receive from the X decoder (Fig. 5, Part I) the CQ-sequence inverted X gates 0, 3, 7, 9, and 12. The output to F3, pin 2, is therefore:

$$X_0 + X_3 + X_7 + X_9 + X_{12}$$

The (true) Y gate for this sequence ( $Y_0 + Y_1 + Y_2$ ) is fed from the output of U26B (Fig. 6, Part I) to the other F3 input, pin 1. Hence, on F3 pin 7 we have the inverted function:

$$(Y_0 + Y_1 + Y_2) \cdot (X_0 + X_3 + X_7 + X_9 + X_{12})$$

which is the required CQ long-pulse selection.

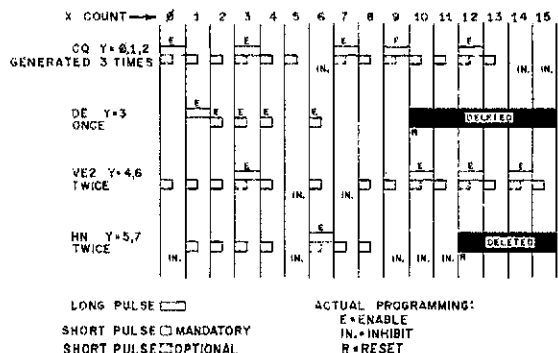
A similar system is followed for the other Y gates to generate the other long-pulse functions as follows:

F3, pin 6	$Y_3 \cdot X_1$	DE (1 pulse only)
F6, pin 6	$(Y_4 + Y_6) \cdot (X_3 + X_{10} + X_{12} + X_{14})$	VE2 (4 pulses)
F6, pin 7	$(Y_5 + Y_7) \cdot X_6$	HN (1 pulse only)

These four (inverted) signals are combined in F4 (pin 7) and F7 (pin 7), outputs connected in parallel, which function as an OR gate because of the inverted inputs, providing a "true" output. U41A inverts, so that the inverted long-pulse function is delivered to F1 to be combined with short pulses.

### Short-Pulse Selection

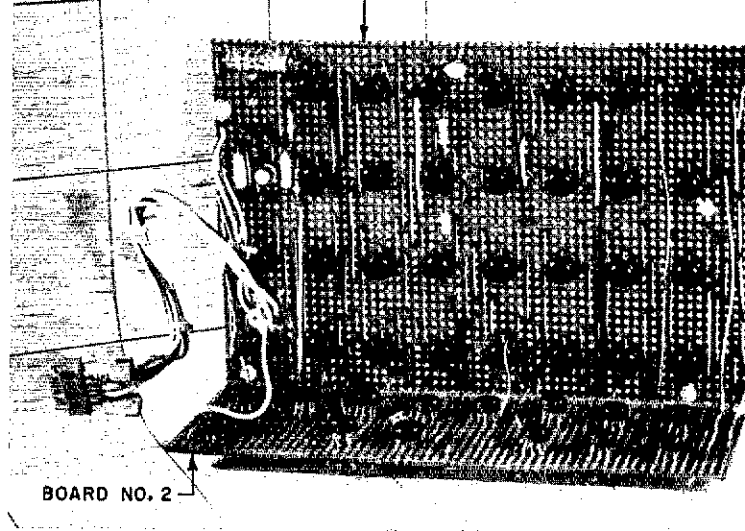
Short-pulse selection for the four Y gates is done in NAND gates shown at the left in Fig. 11. Except for the DE (Y = 3) sequence, it is the "not-required" short pulses which are programmed (inhibited), as shown in Fig. 10. This allows additional short pulses to be generated at the same time as certain long pulses, but this is permissible and reduces the number of short-pulse inhibits to be programmed.







Circuit boards 1 and 2 containing the circuitry shown in Figs. 5, 6, and 11. In operation, these two boards do the necessary counting and gating of the various digital signals to form the VE2HN message.



of F8, the pulses generated are still "long pulses," 100 milliseconds long. Now they are gated in U39A with the basic 10-Hz clock square wave from buffer B3 (Fig. 5). An inverted 50-millisecond short-pulse signal pattern is generated at F1, pin 6.

The final step is to combine long and short pulses in U39B. With both inputs being inverted, this circuit functions as an OR gate. The final code pattern appearing at F1, pin 7, is therefore a "true" (logic 1, zero voltage) polarity signal, fed to Q2 of Fig. 7.

### Summary of Programming Procedure

First prepare a chart similar to Fig. 2, Part I, with 16 X divisions and 8 (or 16, if desired) Y divisions. Lay out the Morse-code characters, paying special attention to the letter and group spacings. Use three half divisions between letters, and either five or seven half divisions between groups. Particularly check that all dots and short pulses are in the first half only of X divisions. When words are to be repeated, try to locate them in identical X positions, remembering that the reset function is available to skip any desired group of X intervals.

Next determine how many different word patterns are actually required, and which values of Y apply to each. Inspect the Y logic to determine the simplest way to generate each Y gate, similar to the method described under "Y-Axis Counter," Part I. With suitable NAND or OR circuits and inverters, generate the "true" function for each Y-gate required, following the idea of the Y Decoder, Fig. 6, and referring to Table II and the summary on gates in the appendix.

For each different Y-gate word pattern, determine which long pulses are required (see long-pulse selection in Figs. 10, 11, and 12). Provide as many NAND-gate inputs as required for each of the long pulses, and connect each of the appropriate inverted X-gate signals to this NAND circuit. Three or four 2-input NAND gates will generally suffice. Their outputs should be paralleled; if the outputs of more than 2 NAND gates are to be so

paralleled, the +3.6-V input should be opened to all but two of them (see appendix). The output of this multiple NAND gate is then fed to another NAND gate which also receives the appropriate "true" Y-gate signal. When this has been provided for all of the Y gates, these NAND outputs are themselves combined (OR gated, actually) in still another multiple gate, and inverted. This provides the inverted composite long-pulse signal (designated  $\bar{L}$  in Fig. 12).

For short-pulse encoding, the inhibit method is recommended, i.e., program only those short pulses which must definitely be eliminated (see Figs. 10, 11, and 12). For each Y-gate code pattern, determine only the short pulses *not* required, remembering that short pulses may be allowed at all long-pulse X positions, and in all skipped X counts. For each Y gate, provide a quantity of NAND inputs equal to the total inhibit count, plus one. Again the NAND outputs are paralleled as required, to make one multiple-input NAND gate. Feed this multiple NAND gate with each of the inverted X gates required, plus the "true" Y gate. Another multiple NAND gate is required for combining the various short-pulse patterns, with the same number of inputs as there are Y gates. Remember that this pattern is still of the full (100-millisecond) X-gate duration at this point, and it must be shortened to the short-pulse (50-millisecond) duration. This is done in another NAND gate which receives the clock flip-flop 10-Hz wave form (short-pulse gate) from the clock buffer. The short-pulse pattern is inverted at the output, designated  $\bar{S}$  in Fig. 12.

Short and long pulses are combined in a single 2-input NAND gate receiving the long-pulse and short-pulse signals ( $\bar{L}$  and  $\bar{S}$ , both inverted) in separate inputs. This gate functions as an OR, i.e., gives a "true" output whenever the long- or the short-pulse pattern is active. Thus, the code signal finally generated is  $L + S$ , logic "true," voltage zero, as required by the pnp driver transistor, Q2 of board No. 3 (Fig. 7).

Reset pulses must also be generated (see Figs. 6, 10, and 13). Determine which Y gates require a

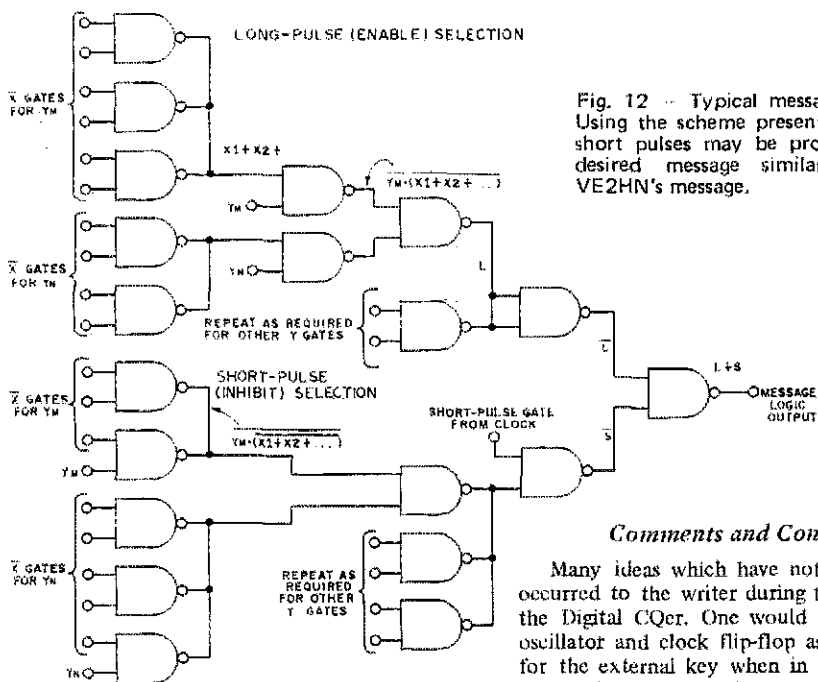


Fig. 12 -- Typical message-encoding logic. Using the scheme presented here, long and short pulses may be programmed for any desired message similar in format to VE2HN's message.

### Comments and Conclusions

Many ideas which have not yet been pursued occurred to the writer during the development of the Digital CQer. One would be to use the UJT oscillator and clock flip-flop as the dot-generator for the external key when in the standby mode. Although features such as variable weighting and self-completing operation might be more difficult to implement, the basic capability of generating 50-percent duty-cycle dots, at the same speed as the automatic CQ should be simple to incorporate and should prove quite useful.

Another area for investigation would be to see if an even more versatile and perhaps cheaper unit could be designed using the preprogrammed X-Y matrix concept of the VE2HN unit, and combining it with diode encoding. A further suggestion has been made that a plug-in program could be provided by bringing all the message NAND inputs to a socket, and then plugging in a jumper board, suitably programmed, and consisting only of wire jumpers. Addition of the stop feature of the KIPLP design<sup>6</sup> could also be added to the CQer.

By use of IC flip-flops having both preset and preclear inputs (e.g., Fairchild 926), the Y-axis flip-flops could be set individually to either 0 or 1. Thus, a switch could be provided to have the Y counter stop (on standby) at any selected position, providing, for example, the additional capability of using the CQer to sign the station call once, and then stop. By adding still another feature, Y skip (not incorporated in the present design), along with a full 16-position Y-axis generator, a very flexible selectable program could be provided. For example, a complete basic sequence such as the following might be incorporated (14-position Y axis).

CQ TEST CQ TEST CQ TEST DE VE2HN VE2HN VE2HN K

By switch selection, any of the following could then be produced.

CQ CQ CQ DE VE2HN VE2HN (repeatedly)

<sup>6</sup> Hall, "A Digital Morse-Code Message Generator," *QST*, June, 1970.

reset pulse in order to skip certain X counts. Use the (inverted) X gate which occurs first in the group of X counts to be skipped, invert it with a single NAND gate, then combine it in another NAND gate with the appropriate "true" Y gate. Provide a multiple-input NAND gate to accommodate all such Y-gated reset signals, plus one additional signal, the (inverted) X gate. This NAND-gate output is fed to the Y counter as a clock pulse, and also is capacitance coupled to the X-reset driver, which also receives the (inverted) dc reset signal from the standby switch, as described earlier. The load, 8 Johnson-counter flip-flop reset inputs, requires a heavy driver capability; therefore two NAND sections should be paralleled.

### Checkout

No detailed checkout procedure is given, but the reader is reminded that initial debugging will be considerably simplified by opening the UJT shorting link referred to earlier, thus increasing the clock frequency to approximately 500 Hz, and allowing a conventional oscilloscope to be used to check most logic functions. The normal clock frequency need be used only in checking reed-relay and audio-oscillator performance. If spurious triggering is encountered, check to be sure that power-supply bypass capacitors are provided liberally throughout the logic boards, and that ground-loop coupling is avoided. In the VE2HN unit, no particular RFI problems were encountered, but some ground wiring rerouting was required, particularly in the input/output keying-jack circuits.



# The Renter's Delight

## Another Solution to an Antenna Problem

BY ROBERT T. HATTER,\* K7RDH, AND DAVID P. WEIK,\*\* WN7PDW

IN TODAY'S society, many amateurs live in apartments and condominiums. Although this type of living has many advantages, it does pose problems with regard to the ham-antenna installation. Unless you own the building that you live in, it becomes difficult to mount antennas without encouraging ruffled feelings on the part of the management.

This article describes an antenna mount that is simple, inexpensive, and capable of handling beams containing up to six elements. It will do so without the need for any holes or damage to the building. The Renter's Delight is sturdy and can quickly and easily be disassembled in the case of moving - another characteristic of today's cliff-dwelling society. The "Delight" is a clean installation which should satisfy the pickiest of apartment managers or owners. The materials used are readily available, and the total cost for the Renter's Delight (less antenna and rotator) was under \$20. The assembly is straightforward and requires few tools and little time.

### Securing Permission for Installation

One of the first steps to obtaining installation permission should be the careful reading of the lease or rental agreement that was signed prior to moving in. This will help you to determine the objections, if any, to installing an antenna and will aid you in preparing a defense in support of your request. The lease on my apartment states in part:

\* 340 N. 5th Ave., Apt. 66, Phoenix, AZ 85003.

\*\* 5437 S. 47th Place, Phoenix, AZ 85040.

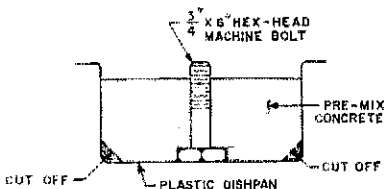
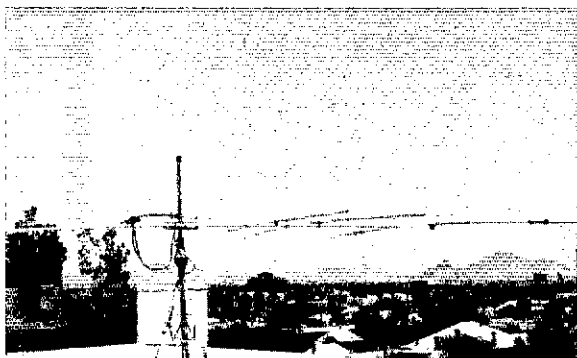


Fig. 1 - One of the three plastic dishpan forms with hex-head machine bolt imbedded in the concrete for one leg of the tower. Each pan measures 7 x 11 x 13 inches. After curing, corners are removed to allow drainage, as shown.

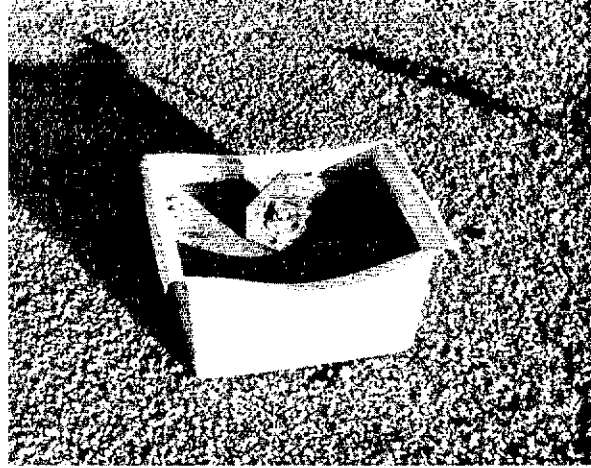
"Television antennae may not be placed on the roof without the written consent of Lessor; and must be installed and removed only by a licensed television installer. Upon removal of (television) antenna, tenant will be held liable for any damage to the building." This is typical of rental-apartment lease contracts in force today. The term "licensed television installer" implies that there is a form of licensing for TV servicemen locally. Although proposed, no such licensing is in force for the local area. An FCC radiotelephone license appeared to be of some value in reassuring the manager that what I was requesting would not result in the demolition of the building, nor would the roof blow away. Diplomacy will be an asset you would do well to brush up on prior to meeting your manager to "make the pitch."

After the installation "go-ahead" is given, the next step is to purchase the materials. (See parts list.) The materials are suggested sizes, as the technique described can be adapted to almost any building and antenna/rotor/tower combination.

The completed Renter's Delight, with the lower mast in the fourth concrete block. The coax and rotator cables have been laced together. The tower has a four-point guy system installed.



The cured 60-pound concrete block with the tower angle bracket ready to receive one leg of the tripod tower.



### Concrete Blocks

First prepare the machine bolts for casting in the concrete base blocks. (See Fig. 1.) Plastic sandwich bags are fine for protecting the threads. Place one bag over the threads of each bolt, covering the first inch of thread. Secure the bags with a turn of hookup wire or masking tape, which keeps the concrete off the threads when casting the blocks.

Next place one bolt in each plastic dish pan (head down), center it, and slowly pour in the mixed concrete. We mixed the concrete one bucket full at a time, but if a large container is available, it would be easier and faster to mix sufficient concrete for all three base blocks at the same time. We used one 60-pound sack of concrete for each block. When pouring, be sure to keep the bolts vertical and in the approximate center of the block. Fill the forms to within one inch of the top; make certain the threads of the bolts extend into the concrete. In this way, the feet of the tower can be snugly fastened to the concrete block on each form, no matter what the final dimensions of the finished block are.

After a cure period of about two weeks for the precast blocks remove the plastic protectors from the exposed bolt threads. (A longer cure period might be required in moist areas.) With a knife or hack saw, cut two bottom corners off each bucket to provide a drain for any moisture present from around the block.

### The Tripod

Assemble the tripod tower according to the manufacturer's instruction sheet. Most towers of this type are uncomplicated, and this step will only take a few minutes.

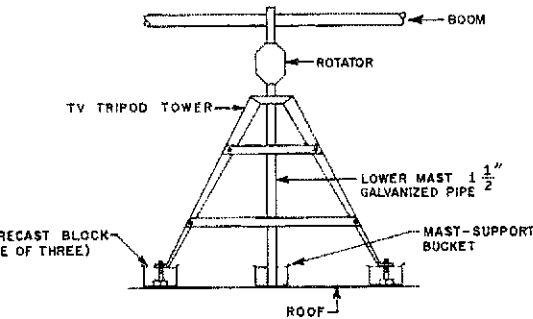


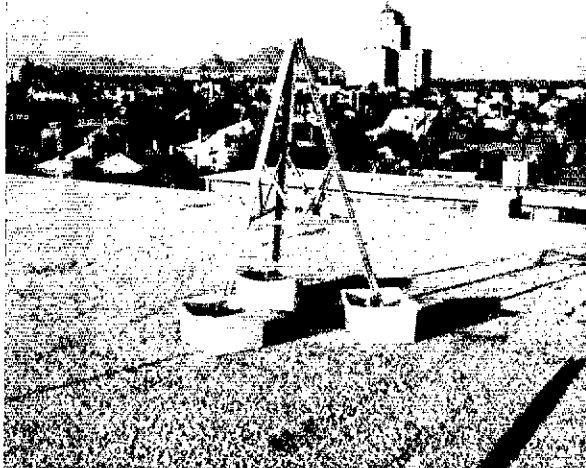
Fig. 2 - The completed TV tower resting on the three precast blocks and the mast-support block.

Next, check the turning radius of the beam selected, from the instructions on assembly, and position the three base blocks in such a way that the beam will clear all roof obstructions when turned to the rotator limits. Install the tripod tower in place on the three blocks and position them for an even footing on the roof surface. Loosely bolt the feet of the tower to the protruding studs, using a small washer above and a large washer below each foot. See Fig. 2. Slip a section of 1-1/2-inch-diameter galvanized pipe (lower mast section) down through the tower bearing and center this pipe in the fourth plastic form, which up to now was empty. Be sure that this pipe is perfectly vertical and is long enough to set in the mast support pan and extend far enough above the tripod for the rotator to be attached. Attach the rotator and bolt into place. Mix the last 60-pound sack of concrete and pour it into the center form around the pipe.

During the cure period, install the coax and rotator cable, which should be laced together, and routed as inconspicuously as possible to the rig. A little searching might be required, along with some ingenuity, to find a way to bring the coax and rotor cable into the shack. Most apartments will have some way of getting them in without drilling. Remember, the manager frowns on holes in his building. Also be careful to provide a drip loop at all locations where cables enter the apartment . . . it's the owner's rug, too!

### Final Assembly and Guying

The remaining steps should require little explanation. Install and secure the top mast to the rotator. Assemble the beam. Mount the antenna, orient the boom with the rotator control unit, and connect the coax. Tighten the bolts while holding the tower feet to the base blocks, after installing the beam. Lightning protection is a must. A coaxial in-line arrester was inserted in the coax where it entered the building. It was attached to a neatly installed No. 12 solid-copper wire that was routed down the side of the wall to a ground rod. If the building has an existing lightning-protection system, you could connect to it, with the manager's permission.



The tower is resting on three blocks, thus providing a sturdy installation.

With regard to guying the installation, two factors will determine the type of guys that are needed. First consider the beam size. (Single-handers and small beams might not require any guys, but the larger arrays will.) The other factor is the wind in your location; experience and knowledge of the wind velocity should tell you if guy wires will be needed. The height of the structure on which you mount the "Delight" also enters into the guy-no-guy decision. If the building is five floors or more high, it would be a good idea to install guys, no matter what the beam size. Four anchor points usually can be located for attaching guy wires to most apartment roofs.

All that is left now is the fun. Fire up the rig and join the fray. If you move to another QTH in a rental structure, the Renter's Delight can be disassembled in about an hour and moved along with the rest of your belongings. The four base blocks can easily be carried by one person, one at a time, of course. The manager of the apartment building just might be as pleased as you are with the "Delight" . . . no holes, and no damage, either to the building or to *your* security deposit.

#### Renter's Delight Parts List:

- 1 - Television-type tripod tower. 1-1/2-inch-diameter galvanized pipe stock (top and bottom masts).
- 2 - Ham-type antenna rotator.
- 3 - Beam antenna.
- 4 - 4 heavy-duty plastic dishpans, HWD 7 X 11 X 13, approximate.
- 5 - 4 60-pound sacks ready-mixed concrete.
- 6 - 3 hex-head machine bolts (sometimes called cap screws), 6 inches long X 3/4 inch with nuts.
- 7 - 3 3/4-inch flat washers about 3 inches in diameter.
- 8 - 3 3/4-inch flat washers about 2 inches in diameter.
- 9 - Lightning arrester.
- 10 - Guy wire and insulators.
- 11 - No. 12 or larger copper wire for ground connections. Length to be determined by installation.



March 1922

. . . We are now setting our sights across the Pacific, having conquered the Atlantic. In fact, our cover shows a lad with a couple of topless Hula girls sitting on the beach listening to music from the States — which appears to originate from a ham station with a mike right in front of a phonograph horn.

. . . Factually, Clifford J. Dow, 6ZAC, in Hawaii, has been hearing lots of American hams, both spark and cw stations — some as far east as Wisconsin. Dow says that 6ZR, Los Angeles, is the loudest of the bunch, even surpassing KPH! It won't be long now until two-way communication is established.

. . . John Reinartz, 1QP, not being satisfied with the success of his original tuner, has his "improved model." Photos and detailed instructions for building same are given. It was a great tuner. Talk about smooth regeneration control, it had it.

. . . Some of the successful transatlantic stations in the recent contest are described. The picture of 2BML shows a couple of tubes said to be 250 watters. Actually they are UV206s, but power line limitations made it necessary to use only one. It proved ample. As a standby there was a P tube which Godley subsequently told us was much more readable due to its better note. 2EH was used with the P tube. Incidentally we have a list of American stations heard during the test by European listeners.



March 1947

. . . A Proposal is being bandied about concerning the advisability of petitioning the FCC for issuance of a new class of amateur license, presently called "Class D," without any code examination, such licensees being permitted to operate only in the microwave region above 1215 Mc. K. B. Warner mulls it over at length, presenting the pros and cons. Also in this issue is a postcard to be clipped and sent in to Headquarters expressing the opinion pro or con of League members. Class D people would have distinctive calls but would have no vote in League affairs.

. . . Vernon Chambers, WJEO, describes his "Low Cost Six-Meter Phone" rig which uses all receiving-type tubes and is inexpensive. It should enable a lot of hams to get going on six even with, say, 15-watts. Our cover shows Vern in the lab putting the final touches on it.

. . . As a follow-up to a previous article, W. W. Smith, W6BCX, tells us a lot more about speech clipping, giving practical design data and circuit information. He also discusses the pitfalls and the limitations involved.

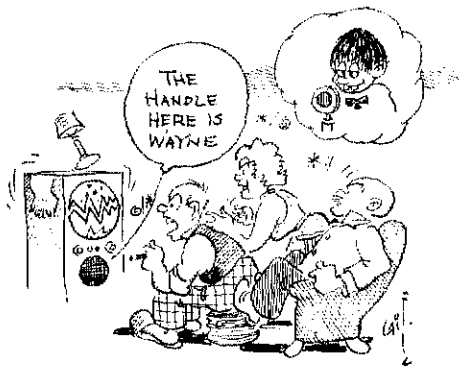
. . . In an article on "Clean-Cut Break-in Keying," Harry G. Burnett, W1LZ, employs primary keying and yet achieves a T9 note. Since primary keying is recognized as the type least likely to cause BCL, all cw men are enjoined to read this one. Maybe he has something! — *W1ANA*

# Questions, Questions, Questions . . .

BY LEWIS G. McCOY,\* W1ICP

I HAVE A TVI problem. My neighbor has a color set and I have been getting bad interference on all vhf channels. The TV manufacturer installed a high-pass filter on the TV set. I installed a low-pass filter on my rig. This cleaned up most of the interference, but when I key my rig there is still some dimming or changing of the color when operating on 15 meters. This happens on all channels. Got any ideas to help?

First, let's make one point clear. Very few, if any, commercially built transmitters have adequate shielding to prevent harmonic radiation, particularly when the transmitter is operated in a fringe, or weak-TV-signal area. Most manufacturers put a



This cleaned up most of the interference —!?

metal enclosure around the final amplifier circuitry, but that isn't enough. Meter holes, inadequate filtering of leads entering and leaving the transmitter, open spaces on the cabinet, and lack of clean metal-to-metal bonding are all possibilities for the escape of harmonic energy. Even though a low-pass filter is installed, harmonics can reach the antenna to be radiated and cause interference.

In the case mentioned above, it is quite possible that there is a second harmonic from 21 MHz (around 42 MHz) getting out of the rig. The high-pass filter on the TV set has a cut-off of about 30 MHz, so it cannot stop a harmonic or signal above the cut-off frequency from getting into the set. Most of the TV receivers have an i-f in the 40-MHz region, so the harmonic could get into the i-f circuitry and cause the interference. The answer to the problem is better shielding of the transmitter. A study of the TVI chapter of *The Radio Amateur's Handbook* will provide the necessary

*Here we go again with the answers to some frequently asked questions about amateur radio operating. The solution to one of your problems may be found in this article.*

information. You must get the harmonic radiation down to a point where there will be no interference.

*I have a bunch of old variable capacitors and don't know their capacitance values. Is there any simple method of finding out what value they are?*

Yes, but you need two tools to do the job. First, a grid-dip meter is required (and every ham should have one), and also an ARRL Lightning Calculator, type A. The next step is to make a couple of coils of known inductance value. This is simple with the Calculator. Let's say we want a coil inductance of 10  $\mu$ H. From the Calculator we find that a coil close wound with No. 18 wire will be 1 inch in diameter and 1 inch long. We wind the coil and then connect it across the capacitor of unknown value as shown in Fig. 1. Set the capacitor at maximum capacitance (plates fully meshed), and then couple the grid-dip meter to the coil as shown in Fig. 2. Next, find the frequency by observing a dip on the meter. Let's say that the

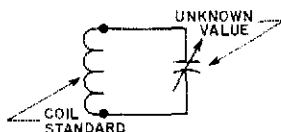


Fig. 1

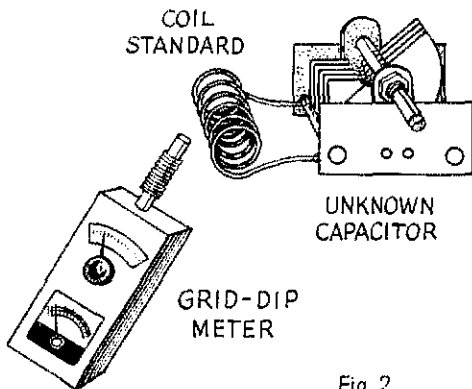


Fig. 2

\* Novice Editor, *QST*.

frequency is 4000 kHz. From the Calculator, we find that an inductance of 10- $\mu$ H requires 160 pF of capacitance to resonate at 4000 kHz. We have thus learned that the maximum value of our capacitor is 160 pF. Set the capacitor at minimum capacitance and make another grid-dip check. Then use the Calculator to determine the capacitor's minimum value. It is a good idea to make up several coil "standards." These can be 1-, 5-, 10-, and 20  $\mu$ H. Of course this method can be used to find fixed-values of capacitance as well as that of variables. Also, the same system can be used to find the values of unknown coils such as slug-tuned inductors, using a known value of capacitance as the standard.

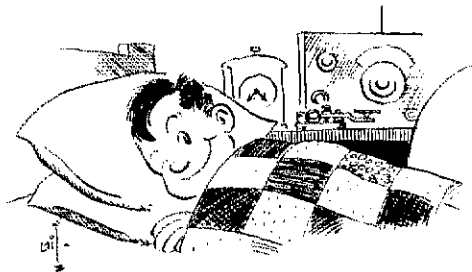
*Frankly, I am completely confused. I don't know what you mean when you say code practice from W1AW is at 1400 GMT. What is 1400 and what is GMT and why?*

This is very understandable if you are new to ham radio. First, GMT stands for Greenwich Mean Time and is based on the 0-degree longitudinal meridian which intersects Greenwich, England. GMT is divided into 24 segments (hours). In England, 2400 (or 0000) GMT is local midnight and 1200 GMT is local noon.

To show you the beauty of using GMT in radio let's suppose you are on the East Coast of the U.S. working a buddy in California. You want to make a schedule with him for the next day, so you tell him that you'll meet him at seven o'clock. Question — seven his time or your time? Seven in the morning or at night? But if we have a standard that is the same for everyone, it becomes quite simple. You tell him that you'll meet him at 0200 GMT and you both know exactly when it will be because 0200 GMT is the same for both locations.

It is quite simple to convert your time to GMT (but can be confusing until you get familiar with it). For Eastern Standard Time (EST) subtract five hours from GMT. For example, 1400 GMT would be 0900 EST, or nine in the morning. For CST subtract six hours, seven hours for MST, and eight hours for PST.

You should train yourself to use GMT, and one of the best ways is to do all your log keeping in GMT. Nearly all foreign amateurs keep their logs in GMT, so if you are looking for that rare QSL, the foreign ham will want your QSL to state the contact time in GMT. One other point: GMT is sometimes referred to as ZULU time.



My clock is all set for W1AW 1400 GMT code practice!



"Ssb signals — they all sound like cats squealing."

*My general coverage receiver tunes 80 and 40 meters quite well. However, for the life of me, I can't seem to tune in ssb signals — they all sound like cats squealing. How does one go about it?*

Turn off the avc, turn the audio gain nearly full on, reduce the rf gain to a point where signals are just audible, and then tune across an ssb signal. If you cannot get good copy try moving the BFO pitch control. You'll find a setting of the BFO that will give excellent copy. Once you become familiar with the setting of the BFO and rf gain controls, you'll find the process quite simple. Of course, in ssb there is little or no carrier transmitted. The object is to use the BFO signal to supply the missing carrier and to set it in the right place in relationship to the incoming ssb signal, approximately 1 kHz above or below the center of the i-f passband. Whether the BFO is set above or below center frequency will depend upon which sideband is being transmitted — upper or lower.

*I have just gotten back into ham radio after being away for a few years. I am confused about what bands and sub-bands I can operate — can you help me?*

We sure can. However, the details would be a little too much for this article. If you send a self-addressed, stamped envelope (business size) to ARRL Headquarters, we'll send you a handy chart (Form S-15) showing the information for all amateur frequencies (no charge).

*I have a large supply of pnp transistors and I would like to use them in some circuits I have seen that call for npn types. I find my pnp types are similar in characteristics to the npn units called for. Can I substitute?*

Yes you can. It is merely necessary to rearrange the circuit ground-return connections to suit the power-supply polarity. Recent editions of *The Radio Amateur's Handbook* treat this subject in Chapter 4.

*I just got on the air a few weeks ago and already I have problems. Yesterday I received a notice from the FCC that I have a strong second harmonic from my 80-meter signal. I wired my rig from a kit, and another ham checked it over for me and said that I did a good job. The rig seems to work OK because I am making lots of contacts. One old timer told me the reason for the harmonic was that I didn't have enough drive to my 6146 final. I have nearly 5 mA of drive, how do I get more?*

Either you misunderstood that old timer or he gave you the wrong information. Excessive grid drive is the worst possible way to run the rig if you want to keep harmonics radiation at a minimum.



Never, never run more than the required drive. In fact, the best way for a Novice to tune up a rig is to use an output indicator (such as a Monimatch, rf ammeter, or rf voltmeter) in the feed line. Tune the rig for maximum output (staying within the 75-watt limit of course). Once you have the rig tuned up this way, reduce the grid drive to the final while observing the output indicator. At some point the output will start to drop off. This is the point where you should set your drive. And, this is the point that will give you the least amount of harmonic output.

It should be pointed out that even with this condition you could still have harmonics reaching the antenna to be radiated. The ideal thing to do is to install a Transmatch and a low-pass filter in the feed line. The Transmatch will provide additional selectivity to assure harmonic attenuation, and the low-pass filter will attenuate harmonic energy above approximately 40 MHz to reduce TVI. Only then can you feel safe from FCC notices.

*How can a multiband antenna generate harmonics?*

It can't. This is a mistaken assumption that many amateurs make. Any antenna can accept and radiate harmonics, though some types will do a better job of it than others. A single-band half-wave dipole, under normal conditions, is resonant for only one band and would tend to discriminate against any harmonic frequencies. There are exceptions, but this is generally the rule. On the other hand, a multiband trap dipole is designed to be resonant on several bands. Such an antenna will accept and radiate harmonics with little or no discrimination. The best precaution with such a system is to install additional selectivity between the transmitter and the antenna. This is usually done by using a Transmatch. Such a device will help to provide the necessary harmonic attenuation.



The insulation has no effect on the radiation!

*In April, 1971, QST Hints and Kinks you have an article about Sears Neoprene-jacketed wire for antennas and ground radials. I thought antenna wire was supposed to be bare and non-insulated for the best radiation of rf.*

Not so, the insulation on wire has no effect on radiation from the antenna at hf and vhf. However, the type of insulation can have effects when the wire is used in transformers, particularly baluns because of eddy currents. When using insulated wire in a balun, the dissipation factor of the insulating material becomes important. Depending on the frequency, power, and load characteristics, it is quite easy to overheat a balun if a poor dielectric material is used on the wire.

*I have a QRP transmitter that I would like to use with a random-length antenna. Is it possible to use a Transmatch that is built for medium or high power with the QRP transmitter?*

Certainly. Simply because the Transmatch is built with high-power components doesn't mean that it won't work with a low-power rig. In fact, the high-power unit would probably work better simply because there is less ohmic loss than with small components.

**QST**

## Digital CQer

(Continued from page 29)

pulse on clock pin 2 to be triggered. A positive voltage on reset pin 6 will set it to a "zero" output state, overriding all other inputs. The J-K input pins are Nos. 1 and 3 respectively. With negative logic, output pins No. 5 and No. 7 are the "true" (Q) and "false" ( $\bar{Q}$ ) outputs respectively. Resetting on pin 6 forces pin 5 (Q) to logic 0 (+ voltage), and pin 7 ( $\bar{Q}$ ) to logic 1 (0 voltage); in this sense, the reset is considered to zero the flip-flop.

[EDITOR'S NOTE: With negative-logic terminology, the preceding statements are correct, although there appears to be a conflict with information contained in the schematic diagrams, Figs. 5 and 6. For the J-K flip-flops of those diagrams, the Q and  $\bar{Q}$  outputs are identified in accordance with the "conventional" positive-logic custom, to conform to various manufacturers' literature.]

Each IC input loads its driver, and each driver has an output resistance. Therefore, loading effects must be considered when several loads are driven from the same source. The following table, based on Fairchild data, shows input loading and output drive capabilities in "load units." If a given source must drive more loads than its rating allows, then it should be paralleled with another driver, or the loads split between two drivers, or a buffer

provided, as appropriate. These loadings should be checked in any proposed design, especially the X-gates, since each is rated to drive only 5 type 914 NAND inputs.

IC Type	Input Load Per Terminal	Output Rating	Remarks
914 (NAND)	3	16	(Reduce output rating by 2 for each paralleled gate, i.e., two parallel 914 sections have output rating of 30, not 32)
900 Buffer	6	80	
923 Flip Flop			
J (or S)	3		
K (or T)	3		
Clock	5		
Reset (or CD)	3		
Q and $\bar{Q}$		10	

Information on digital logic ICs, digital equations and identities, has appeared briefly in past issues of QST, as listed below. For further information, the reader may refer to one of several books which are available, some of which are listed. Hall, "Digital ICs — A Family Portrait," QST, November, 1971.

Hoernes and Heilweil, *Introduction to Boolean Algebra and Logic Design*, McGraw-Hill, 1964.

Maley, *Manual of Logic Circuits*, Prentice-Hall, 1970.

Pos, "Digital Logic Devices," QST, July, 1968. **QST**

# Broadband

## Solid-State Power Amplifiers for SSB Service

### 160 Watts PEP Input with a Single Transistor

BY ROY C. HEJHALL,\* K7QWR

THE FIRST generation of ssb transmitters used tubes throughout. The PA stage usually provided 20 to 100 watts PEP of output power. More recently a number of hybrid rigs, which employ transistors in the ssb generator stages and tubes in the final amplifier, have been marketed to amateurs.

During 1971, several manufacturers have introduced bipolar transistors intended for medium-power ssb amplifier service. Such transistors will be the basis of a third generation of ssb gear which will be entirely solid state. Devices capable of 160-watts PEP input are already available. As volume production of such transistors is achieved, prices may drop to the point where experimenters and manufacturers of amateur equipment can retire their 6146s and sweep tubes to a spot on the shelf beside other old favorites such as the 210 and 35T.

#### Transistors for Linear Power Amplifiers

The solid-state linear power amplifier normally consists of one or more transistors plus associated passive components. Passive components do not contribute to the production of distortion. The

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*The next major change in our ssb transmitters and transceivers will be the use of solid-state power amplifier stages. Medium-power rf tubes such as the 6146 may become museum curiosities. Here, for the amateur who wishes to learn about and to experiment with the latest techniques, K7QWR, an applications engineer for Motorola, describes the devices and circuits which will be used in "third-generation" ssb gear.*

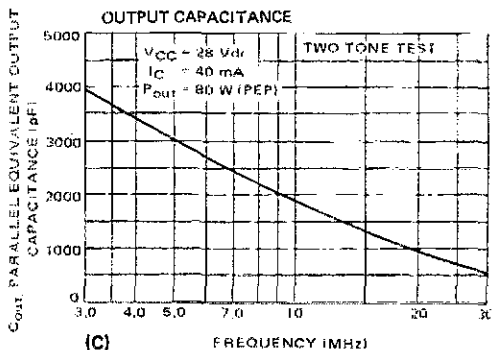
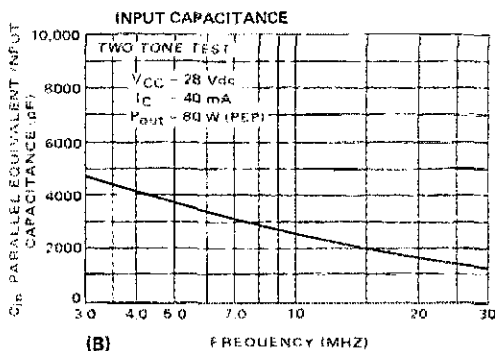
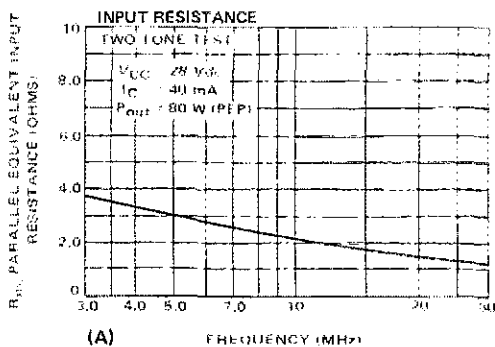


Fig. 1 - Characteristics of the 2N5942 transistor.

problem of obtaining linear operation, therefore, rests with the choice of a suitable transistor and the selection of proper operating conditions for the device chosen. A number of problems face the designer who wishes to use a bipolar power transistor for ssb service. Parameters such as base rf input voltage may vary widely with the input and output tuning because of the very low input impedances and large collector-base feedback capacitances exhibited by transistors in the 10- to 100-watt class. Probably the most significant transistor characteristic to check when selecting a device for linear-amplifier operation is current-gain linearity at high collector currents. A semiconductor manufacturer must take special care when designing a transistor for linear-amplifier applications to assure that  $h_{FE}$  (forward-current transfer ratio) does not drop off at high collector current. A transistor with a rapid  $h_{FE}$  decrease at high collector current will generally be a poor performer when it is used as a linear amplifier. Besides  $h_{FE}$  linearity, other important transistor characteristics include a low and uniform operating temperature for the many junctions that make up a power transistor and the ability to survive mismatched loads.

Two rf power transistors which have been designed specifically for hf linear-power-amplifier applications are the 2N5941 and 2N5942. These devices are rated at 40 watts and 80 watts PEP output, respectively, at 30 MHz with IMD at 30 dB below a single-tone test. Somewhat greater power outputs can be realized at the expense of a lower

IMD ratio, or improved IMD performance can be realized at reduced power output with these devices. These figures compare favorably with those of vacuum tubes. Tubes have IMD on the order of -25 dB at 70 percent to 100 percent of their maximum power levels, and an rf feedback scheme is generally required to realize IMD in the -30- to -40-dB range.

### Linear Amplifier Performance Versus Dc Supply Voltages

Operating a linear-power-amplifier transistor at reduced dc supply voltage drastically reduces the maximum power output for a given degree of linearity. This effect is because of the difficulty of maintaining  $h_{FE}$  linearity at high collector current. When the supply voltage is reduced, the transistor must deliver correspondingly higher collector-current peaks for a given power output.

Typical performance data for the 2N5942 transistor illustrate this point. Operating with a collector supply of 28 V dc, the 2N5942 will deliver 100 watts PEP output with IMD of -30 dB.<sup>1</sup> The same transistor at 12.5 V dc typically delivers 30 watts PEP for the same IMD level.

Thus, the 2N5941, which has only half the active chip area of the 2N5942, will deliver almost

**EDITOR'S NOTE:** The distortion figures noted in this article are the ratio of one distortion product to one of the two tones, the distortion rating system used by tube and transistor manufacturers. Most producers of amateur equipment use both tones of the test signal as the reference, which gives the test result an apparent improvement of 6 dB in the distortion ratio.]

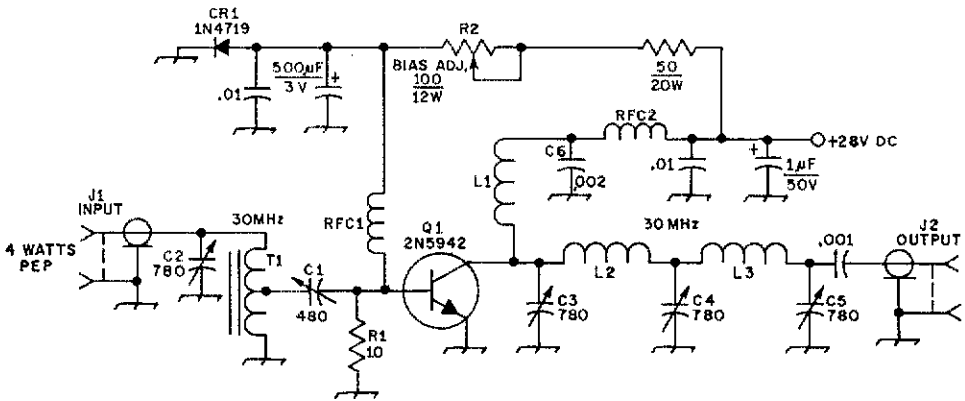


Fig. 2 - Schematic diagram of the 30-MHz amplifier. Unless otherwise noted, capacitors are disk ceramic, except for those with polarity marked, which are electrolytic. Resistors are wire wound, except for R1 which is a 1/2-watt composition type. R2 is set for a resting collector current of 40 mA.

C1 - 80- to 480-pF mica trimmer (Arco 466 or equiv.).

C2-C5, incl. - 170- to 780-pF mica trimmer (Arco 469 or equiv.).

C6 - Button bypass capacitor.

CR1 - Silicon diode, 50 PRV, 3 A (1N4719 or equiv.).

J1, J2 - BNC connector, panel mount.

L1, L2 - Approx. 54 nH, 2 1/2 turns, No. 14 tinned wire, 1/4 in. ID, 3/8 in. long.

L3 - Approx. 100 µH, 4 1/2 turns, No. 14 tinned wire, 1/4 in. ID, 1/2 in. long.

Q1 - Motorola power transistor.

R1 - Text reference.

R2 - Wire wound, adjustable tap.

RFC1 - Solenoid-wound rf choke.

RFC2 - Ferrite choke (Ferroxcube VK200 19/4B, available from Elma Ferrite Laboratories, Woodstock, NY 12498).

T1 - 20 turns, No. 20 enam. wire wound on Amidon T-47-6 toroid core, center tapped (Amidon Associates, 12033 Otsego St., North Hollywood, CA 91607).

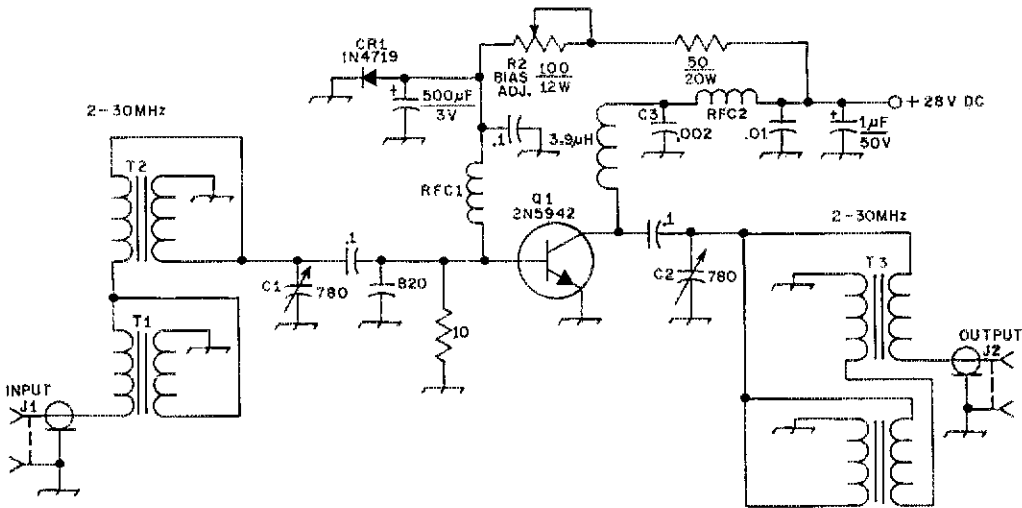


Fig. 3 — Diagram of the broadband amplifier. Unless otherwise noted, capacitors are disk ceramic, except those with polarity marked, which are electrolytic. Resistors are wire wound, except R1 which is a 1/2-watt composition type. Adjust R2 for 40 mA of collector resting current with no drive applied.

C1, C2 — 170- to 780-pF mica trimmer (Arco 469 or equiv.).

C3 — Button bypass capacitor.

CR1 — Silicon diode, 50 PRV, 3A (1N4719 or equiv.).

J1, J2 — BNC connector, panel mount.

Q1 — Motorola power transistor.

R1 — Text reference.

R2 — Wire wound, adjustable tap.

RFC1 — Solenoid-wound rf choke.

RFC2 — Ferrite choke (Ferroxcube VK200 19/4B).

T1 — 4:1 broadband transformer; 6 turns of 2 twisted pairs of No. 26 enam. wire (6 turns per inch) wound on Stackpole 57-9322 No. 11 toroid core (Amidon T-44-3 core also suitable).

T2 — 4:1 broadband transformer; 4 turns of 4 twisted pairs of No. 26 enam. wire (6 turns per inch) wound on Stackpole 57-9322 No. 11 toroid core (Amidon T-44-3 core also suitable).

T3 — 9:1 broadband transformer; 10 turns of 3 twisted pairs of No. 28 enam. wire (8 turns per inch) wound on Stackpole 57-9074 No. 11 toroid core (Amidon T-80-3 also suitable). Two transformers, connected as shown in the diagram above are required for the 9:1 impedance transformation.

twice the linear power output at 28 V dc as the 2N5942 will at 12.5 V dc. The linear amplifier designer should, therefore, utilize the highest dc supply voltage he can (while remaining within the ratings of the transistor).

### Linear-Power-Amplifier Design

Linear-power-amplifier design using transistors has two major problems which must be solved — dc bias and impedance matching. Neither the input rf-matching-network configuration nor the input tuning significantly affects linearity. Therefore, the designer is free to concentrate on the major problem of any input network — getting the rf drive power into the low-impedance transistor base. For broadband power amplifiers, this is a difficult task.

The impedance-matching design for an ssb stage is similar to that of the Class C amplifier, except that linearity places additional restrictions on the values of transistor collector-load impedance that can be employed. See reference 4 for a general discussion of rf power-amplifier network design. The linear-amplifier output network must present the collector with the proper complex load impedance.

Of particular importance in the output-network design procedure is the selection of the correct power level to use in the network calculations. Average power output varies widely, depending on the nature of an ssb signal (single tone, multiple tone, or voice). Linear-amplifier design is based on a particular value of peak-envelope power, not average power. Average power has no bearing on the design, except for thermal considerations.

The complex collector-load impedance should be the conjugate of the transistor parallel output capacitance and the parallel load resistance,  $R_L$ , computed from the expression:

$$R_L = \frac{V_{CC}^2}{2P}$$

where  $V_{CC}$  = dc collector supply voltage  
 $P$  = rf power output

In the case of the linear amplifier, the desired value of peak-envelope power is used to compute the load resistance. Thus, the collector load impedance ideally should be the conjugate of  $R_L$  in parallel with  $C_{out}$ . Fig. 1 shows the large-signal impedances for the 2N5942 when operating in a linear-amplifier circuit. The bias-network design for linear power amplifiers is critical if minimum IMD is to be achieved and is completely different from the

The 2N5070 transistor amplifier receives drive through the BNC connector at the center left. Two broadband impedance-matching transformers are employed in the base circuit. The collector circuit is to the center right. The large wire-wound resistor is part of the base-bias network. The heat sink for the transistor is located on the reverse side of the circuit board.

procedure for a Class C amplifier. The typical Class C amplifier is operated with both the base and emitter connected to dc ground. Thus, the transistor is completely off when no driving signal is applied.

The linearity of a solid-state power amplifier may be greatly improved by operation with forward bias. Forward bias is the term which refers to the voltage applied to the base of a transistor for operation with a finite no-signal collector current. The extreme case of forward bias is, of course, Class A operation. Class A operation provides the least distortion, but at an extreme sacrifice in efficiency. As power output is increased, practical transistor-dissipation limitations make Class B operation attractive. Optimum no-signal collector currents for 10- to 100-watt transistors are in the 5- to 50-mA range.

Class B bias-circuit design is complicated by thermal runaway problems and large variations in base current as the rf-drive level is varied. For best linearity, the dc base voltage should remain constant as the drive level is varied. This situation is in conflict with the conditions required to prevent thermal runaway.

Some rather exotic schemes with multistage dc amplifiers have been developed for linear-power-amplifier biasing, and such schemes are limited only by the designer's imagination. It is also possible, however, to achieve excellent results without the use of gain elements in the bias circuit. All of the linear amplifiers described in this article use only a few passive components to provide bias voltage.

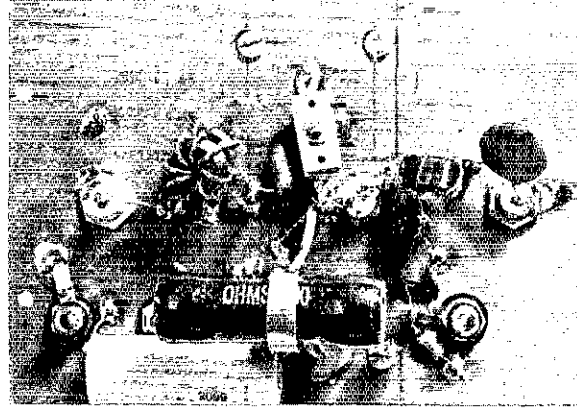
### An 80-Watt-Output Linear Amplifier

Fig. 2 shows a 30-MHz linear amplifier using a 2N5942 transistor. This amplifier will deliver 80 watts PEP output with the following typical performance characteristics:

- Power gain — 13 dB
- Intermodulation distortion — -34 dB
- Collector efficiency — 40 percent
- Dc supply voltage — 28 V dc

This amplifier was designed to see what performance could be obtained at a single frequency with wide-range impedance-matching networks. The output network is a double pi section designed for 80 watts PEP output. The input network uses a

Fig. 4 — This is T2 of Fig. 3, which consists of a number of twisted pairs of enam. wire wound on a toroid core.



center-tapped transformer. The circuit provides an excellent match to a 50-ohm-output driver stage.

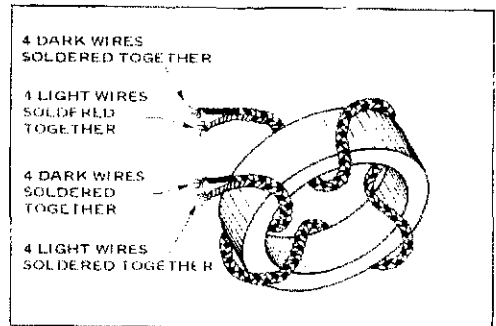
There is more than is readily apparent to the dc-bias network. The emitter is grounded for dc and a forward bias voltage is applied to the base of the transistor through RFC1. The bias network is fed from the 28-V dc collector supply. The bias network for a Class B amplifier stage should meet several requirements. It must:

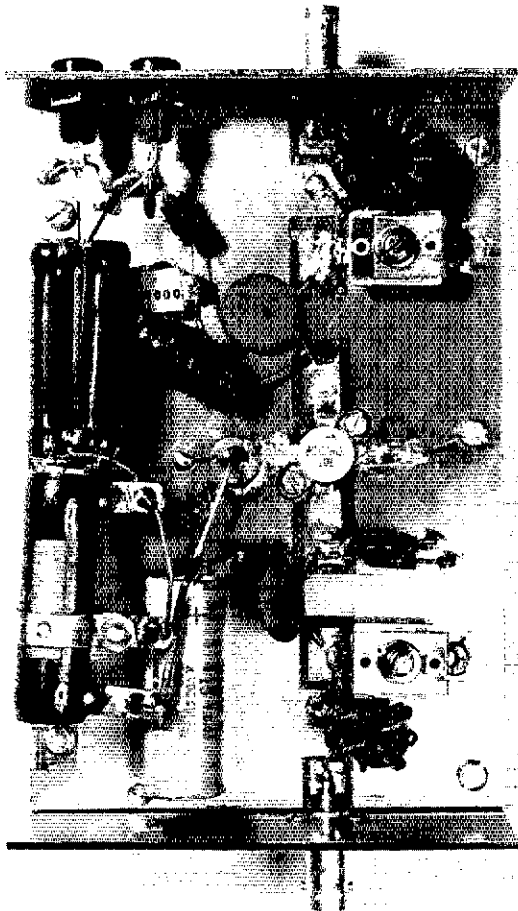
- 1) Permit the transistor to operate with a no-signal collector current with reasonable collector efficiency and low IMD.
- 2) Provide bias conditions which yield a reasonable value of IMD over the full dynamic range of the amplifier.
- 3) Prevent thermal runaway in the transistor.

The bias network in this amplifier has some unique features to meet the above requirements without using gain elements.

Requirement 1 is best met by not permitting the dc base voltage to change more than about 0.1 V dc as the rf drive level is varied from zero to full input. Requirement 2 is best met by increasing the no-signal collector current. A no-signal collector current of 40 mA was selected as a good compromise value for the 2N5942. This selection will be discussed later in more detail. Requirement 3 calls for some means of reducing base voltage with increasing temperature.

The need to maintain an almost constant base voltage requires a low-impedance dc bias source. With zero rf drive, the 2N5942 base current is about 3 mA. When driven to 80-watts PEP output with a two-tone signal, the average dc base current increases to approximately 200 mA. Therefore, the base-bias supply must be capable of furnishing base currents from 3 to 200 mA with a negligible shift





Here is a breadboard version of the broadband amplifier using a 2N5942 transistor. The input circuit is at the lower right, and the components for the base-bias circuit are mounted along the left side of the circuit board. The broadband output transformer is located at the upper right. A large finned heat sink covers the entire bottom side of the circuit board.

higher than  $V_{BE}$ , causing CR1 to draw more current than it would if there were no dc resistance between the diode and the base of the transistor.

The current through CR1 at the no-signal condition is about 260 mA, and this is the source of dc base current for Q1 at full power.

If there were no dc resistance between CR1 and the base of the transistor, the no-signal current through the diode would be only about 120 mA. Under these conditions, the transistor would steal all of the diode current at full power. CR1 then would shut off and the additional base current could only come from the bias source by reducing the current through R1 as the base voltage shifts downward. The net result of all this would be a dc base-voltage shift of more than 0.5 V from zero to full power, which would severely degrade the linearity of the amplifier.

There is an additional benefit derived from the base-bias circuit. The reduction of current through CR1 with rf drive results in additional temperature compensation beyond the reduction of forward-voltage drop with temperature. The voltage across CR1 drops with rf drive level for two reasons - the heating of the diode and a reduction in its current. Excellent temperature compensation results, and the amplifier has no tendencies toward thermal runaway at full power input with a heat-sink temperature in excess of 110 degrees centigrade.

Resistor R1 has a dual function. First, it causes current flow through RFC1 when no rf driving signal is present. This is the key to the difference in voltage between the anode of CR1 and the 2N5942 base. Second, R1 reduces the total rf impedance from base to ground which improves the stability of the amplifier.

As stated above in biasing requirement 2, maintaining linearity in an amplifier over the entire dynamic range of the amplifier presents a biasing problem. At practical levels of quiescent collector currents in Class B amplifiers, IMD generally increases at low power-output levels. Thus, a typical plot of the IMD for an amplifier may show -30 dB at full power, -35 dB at half power, -31 dB at one-tenth power, rising to perhaps -25 dB at less than one-tenth power. About the only solution to low distortion at low power input for a power amplifier is to increase the quiescent collector current. However, if one wishes to prevent the IMD from ever being worse than it is at full power, bias currents approaching Class A operation may be required.

A practical solution can be achieved by determining the absolute magnitude of the distortion products, and assuring that they remain below

in voltage. The bias problem is further complicated if there is no separate low-voltage source available so that the bias potential must be obtained from the 28-V dc collector supply.

The key item in the development of a suitable bias circuit is diode CR1. The function of CR1 could be loosely described as a low-voltage Zener device which also temperature compensates the transistor. CR1 is forward biased and is the component responsible for the dc voltage level at the transistor base. The diode is thermally coupled to the transistor by mounting it on the same heat sink, providing temperature compensation because of the decrease in forward voltage of CR1 with increasing temperature. When rf drive is applied, the transistor receives its additional base current by diverting current from the diode. The diode can provide this additional base current without significantly changing the dc base voltage. Thus the transistor "robs" the additional base current it needs from the diode.

The functions of RFC1 and R1 are not so obvious. RFC1 is a molded choke with a dc resistance of 0.47 ohms. With no rf drive,  $V_{BE}$  of Q1 is approximately 0.68 V dc, and 68 mA flow through R1. The total current through RFC1 is 71 mA, causing a voltage drop of 33.4 mV across RFC1. Therefore, the voltage across CR1 is slightly

what would be generated at full power-output levels. For example, if an amplifier which has an IMD level of  $-30$  dB at full power exhibits IMD of  $-25$  dB when the power output is reduced by 15 dB, the distortion products are still 10 dB below what they were at full-power output. This is despite the fact that the IMD ratio has been degraded. The criterion for low-power IMD used in the design of the amplifiers described in this article is that the full-power IMD ratio rating shall be maintained for power-output levels from full power output to 10 dB below full power.

### 80-Watt-Output Broadband Linear Amplifier

Fig. 3 shows a 2- to 30-MHz broadband 80-watt-PEP-output linear amplifier. The bias circuit is identical to the 80-watt linear amplifier described above. The key to broadband operation of this second amplifier lies with the use of transformers T1, T2, and T3. These transformers are the transmission-line broadband type described by Ruthroff (reference 5) and Pitzalis (reference 6). They consist of combinations of conductors which approximate a transmission line wound on a toroid core. They have a much wider frequency response than conventional core-coupled or air-coupled transformers because of the utilization of transmission-line techniques.

To design a transmission-line broadband transformer, an engineer must select the desired impedance step up/step down ratio, usually 4:1 or 9:1. Although a 16:1 ratio was attempted by the author, better results were obtained with two series-connected 4:1 transformers. The twisted-wire transmission line is prepared first. This winding is nothing more than the name indicates — a transmission line consisting of twisted wires. When preparing the twisted-wire lines it is convenient to use enameled wire of two different colors. The required number of wire pairs, as stated on the schematic diagrams in this article, such as three twisted pairs, means 3 wires of each color are then twisted to achieve the required number of turns per inch. An electric drill makes a convenient "wire twister." A single turn is formed by a full twist of all the wires of one color.

The key parameters for the transmission line are characteristic impedance ( $Z_0$ ) and line length. These parameters are optimized for a desired transformer bandwidth. The characteristic impedance of the twisted wires of a transmission line transformer is given by the following expression:

$$Z_0 = \sqrt{R1 R2}$$

where  $R1$  and  $R2$  are the two impedances to be matched. The optimum length for the winding is somewhat shorter than an eighth wavelength at the highest frequency of operation. The variables affecting  $Z_0$  include wire size, tightness of the twist which can be designated in turns per inch, and number of wires. In general, the  $Z_0$  may be decreased by using larger wire, a tighter twist (more turns per inch), or increasing the number of wires.

The impedance of the twisted-wire lines may be measured prior to winding the lines on the cores.

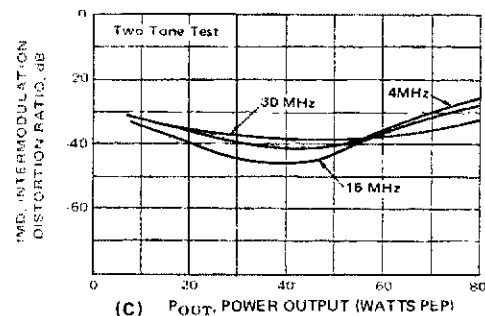
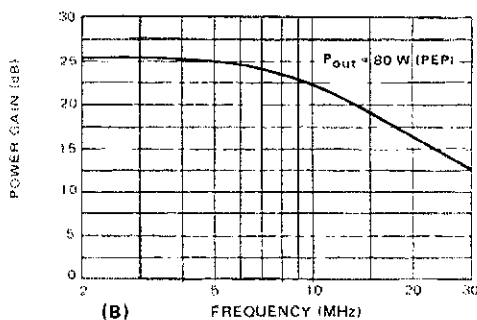
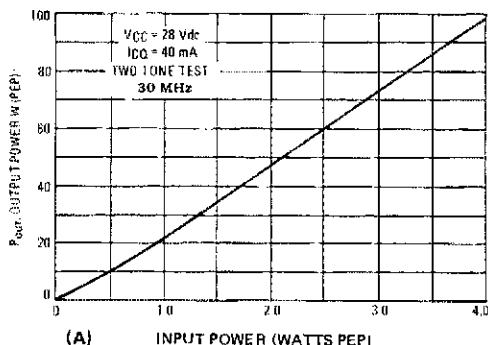
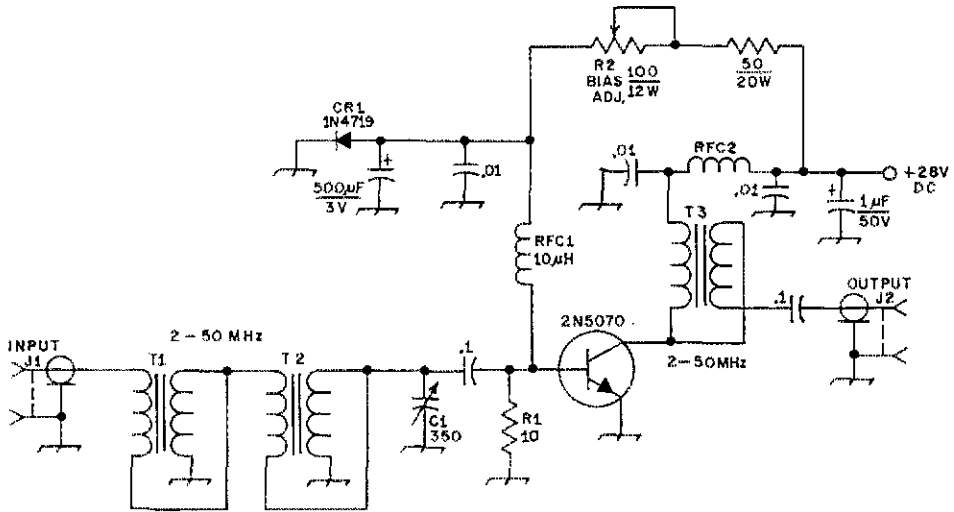


Fig. 5 — Performance characteristics of the 80-watt-output broadband amplifier.

Any convenient method of measuring  $Z_0$  may be employed, depending on the equipment available. The twisted-wire-line  $Z_0$  measurements for the amplifiers described in this article were made with a Hewlett-Packard model 4815 vector impedance meter.

The cores selected for the transformers of this amplifier are of ferrite material usually used at frequencies below 10 MHz. Optimum performance over the hf range was achieved with a low-frequency core, since the transformers are not core coupled. The primary function of the core is to increase winding inductances to improve performance at the low end of the frequency range.<sup>2</sup>

<sup>2</sup> EDITOR'S NOTE: The Stackpole toroid cores and ferrite beads noted in the parts lists may not be available in many areas. Amtson Associates offers cores and beads which, while not exact replacements, are usable. See Fig. 3 and Fig. 6.]



T1 and T2 of Fig. 3 are series connected 4:1 transformers for a theoretical step-down ratio of 16 to 1. Note that T2 is wound differently because it is transforming lower impedance levels. The optimum characteristic impedances for T1 and T2 have been computed as 25 and 6.25 ohms, respectively. An impedance of 25 ohms can be readily achieved in practice, but 6.25 ohms is more difficult. The actual characteristic impedance achieved with T2 was 8 ohms. The optimum characteristic impedance for output transformer T3 is 16.7 ohms. This value was achieved with the design shown in Fig. 3. Fig. 5B shows a plot of power gain versus frequency for 80 watts PEP of output. The typical efficiency at 30 MHz with 80 watts PEP of output is 43 percent.

The amplifier was mismatch tested at 80 watts output with a two-tone test signal by subjecting the unit to an infinite VSWR load at all phase angles. The 2N5942 transistor was not damaged.

Another critical design problem is the amplifier output network, since the complex collector-load impedance has a significant effect on the linearity of the stage. Therefore, a network which provides a satisfactory load from a gain standpoint may cause difficulties when trying to achieve optimum linearity. The networks of the amplifier shown in Fig. 3 achieved a decade of bandwidth at the expense of some increase in IMD. At 80 watts PEP output, the IMD at 30 MHz is typically -32 dB, while at lower frequencies the IMD is slightly worse, -25 to -30 dB.

Fig. 5C shows a plot of IMD versus power output at 4, 15, and 30 MHz. IMD performance of -30 dB can be achieved over the entire operating frequency range of the amplifier, if power output is limited to 70 watts PEP.

Note that feedback has not been used and that no attempt has been made to make the gain of this amplifier flat with respect to frequency. If constant gain is desired, a compensation network such as described by Lowe should be employed.<sup>3</sup>

<sup>3</sup> Lowe, "A 15-Watt Output Solid-State Linear Amplifier for 3.5 to 30 MHz," *QST*, December, 1971.

Fig. 6 - Schematic diagram of the amplifier designed to deliver 25 W PEP of output. Unless otherwise noted, capacitors are disk ceramic, except those with polarity marked, which are electrolytic. Resistors are wire wound, except R1 which is a composition type. Adjust R2 for 20 mA of collector current with no drive applied. C1 - 70- to 350-pF mica trimmer (Arco 428 or equiv.).

CR1 - Silicon diode, 50 PRV, 3 A (1N4719 or equiv.).

J1, J2 - BNC connector, panel mount.

Q1 - Motorola power transistor.

R1 - Text reference.

R2 - Wire wound, adjustable tap.

RFC1 - Solenoid-wound rf choke.

RFC2 - Ferrite choke (Ferroxcube VK200 19/4B).

T1, T3 - Same as T1, Fig. 3.

T2 - Same as T2, Fig. 3.

### 25-Watt-Output Broadband Linear Amplifier

Fig. 6 shows a 2- to 50-MHz broadband 25-watt-PEP-output linear amplifier using the 2N5070 transistor. Again, the key components in this amplifier are the broadband transformers, T1, T2, and T3, all of which are wound to provide a 4:1 impedance ratio. This amplifier also illustrates the practicality of developing a number of standard broadband transformer "building blocks" for general use. T1 and T2 are identical, respectively, to T1 and T2 in the input circuit of the 2N5942 amplifier described above. The output transformer, T3, is identical to T1 of Fig. 3. The bias network is the same as the one described earlier. Note that again the bias voltage is obtained from the 28-V dc collector supply. Typical collector efficiency for this circuit is 45 percent with an output of 25 watts PEP at 30 MHz. As in the case of 2N5942 broadband amplifier, feedback was not employed. The amplifier therefore has a gain versus frequency characteristic which approximates that of the transistor over the frequency range of 2 to 50 MHz.

When used in an amateur transmitter, a broadband amplifier must be followed by a filter to reduce the level of second- and higher order



Oscillograph display of the output spectrum from the 2N5942 linear amplifier. Drive from the two-tone test generator has been set for 80 watts PEP output from the amplifier.

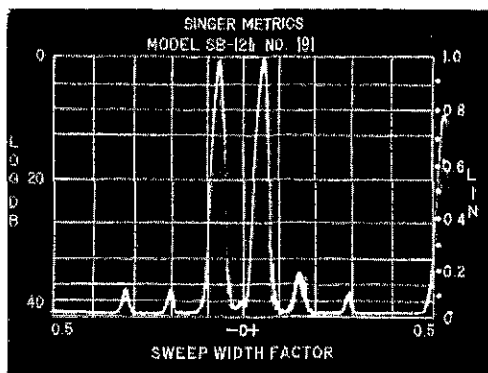
harmonic output. Suitable filters for the 80- to 10-meter bands were described by Lowe in *QST* for December, 1971. Band changing may be accomplished by switching in the appropriate filter for the desired frequency range.

### Acknowledgment

The wishes to acknowledge the contributions of Edward Loupe, who constructed the amplifiers, performed all of the impedance measurements, and provided many excellent suggestions about both the amplifier designs and the preparation of this article.

### References:

- 1) Pappenfus, Bruene, and Schoenike, *Single Sideband Principles and Circuits*, McGraw-Hill, 1963.
- 2) Honey and Weaver, "An Introduction to Single Sideband Communications," *Proc. IRE*, December, 1956.
- 3) "Intermodulation Distortion in Vacuum



- 4) Tubes," *Single Sideband for the Radio Amateur*, 5th edition, American Radio Relay League, 1970.
- 4) "Systemizing RF Power Amplifier Design," Motorola, Inc., Application Note AN-282.
- 5) Ruthroff, "Some Broadband Transformers," *Proc. IRE*, August, 1959.
- 6) Pitzalis, Horn, and Baranello, "Broadband 60-W Hf Linear Amplifier," *IEEE Journal of Solid State Circuits*, June, 1971.
- 7) Heihall, "Solid-State Linear Power Amplifier Design," Motorola, Inc., Application Note AN-546.

[51-]

## Hf Propagation

(Continued from page 19)

the 5-5 and 5-6 category. Of course some operators are not known for their accuracy in giving contest signal reports, and this logged information probably is not totally reliable. However, the fluctuation in reports sent by several operators indicates that some attempts were made to give them meaning, rather than just being contest-format numbers, and it was these reports which were scrutinized. In discussing this apparent opening, some of the local high-scoring contesters seemed to think signals at that time were arriving off the normal great-circle path, from a more southerly direction. Ionospheric tilt or perhaps sidescatter propagation, from some area in the Atlantic Ocean, might be the explanation. Whatever the reason may be, it probably also explains why the 15- and 20-meter bands remained open longer than predicted. The few 20-meter contacts occurring between 0600 and 0700 UT are believed to have been via the long-path mode. A check of the muf's for this mode at these times indicated that frequencies as high as 15.2 MHz would be supported.

In conclusion, it appears as if the estimations using the OT/TRER report are quite reliable, and perhaps somewhat conservative in muf values. If the estimations indicate a 10-meter opening for the next contest you plan to operate, then you'd best have your 10-meter beam all pruned and tuned to make a lot of contacts!

[51-]

## DX Antennas

(Continued from page 23)

These unsolicited reports were obtained without any form of transmitter voice processing. Similarly, numerous incoming signals appeared to exhibit a

greater density (and readability) for a given signal strength with both antennas than was present with either antenna by itself.

The two linear amplifiers, when operated under dual-polarization conditions as outlined herein, do not need to be identical, nor do they need to be operated at the same power level. A 30L-1 and a 30S-1 have been used together with good results. The higher power amplifier would normally feed the horizontal beam. During this type of operation, the combined power input must be closely monitored to avoid exceeding the FCC legal limit.

### Exciter Matching

The noninductive resistive matching network, while not absolutely necessary, is ideal for maintaining the system's overall stability and represents a stable nonfrequency-sensitive impedance termination for the exciter. The network circuitry also provides for a single exciter feeding any number of amplifiers (see Fig. 3) should such a configuration be desired:

$$R = \left( \frac{N-1}{N+1} \right) Z$$

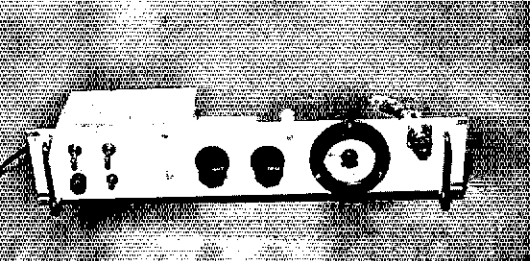
where,  $R$  = value of each noninductive resistive leg

$N$  = number of amplifiers

$Z$  = source impedance in ohms

Currently, tests are being conducted on multi-element beams, with each element fed individually by its own linear amplifier. The phase and current ratios are controlled at the operating position, at a relatively low power level, between the resistive matching network and each amplifier input. Although no specific conclusions can be drawn from these experiments, the results are certainly thought provoking!

[51-]



A Noise generator using the 5722 temperature-limited diode. The output connector is at the right. Two controls near the center are for adjusting filament voltage. Diode current is indicated on the meter.

# Noise Generators

BY RONALD E. GUENTZLER,\* W8BBB

**I**N THE LAST four years I have undertaken a study of noise generators. In the process of this study some heretofore unknown things about them have been discovered, and some errors or oversights in work done by others have been revealed. The purpose of this article is to summarize previous information and to add some recent findings. The specific process of using a noise generator will not be presented here because it has been well covered elsewhere.<sup>1,2</sup>

The most common use of a noise generator is to test receivers during development or routine maintenance. The value of this method of receiver-performance testing has become so great that many radar receivers are now equipped with built-in noise generators. This will enable either continuous or instantaneous monitoring of the noise figure without taking the receiver out of service. There is also much effort being expended on development and construction of laboratory-standard noise generators for calibration of other noise sources.<sup>3,4</sup>

## Terminology

In order to facilitate later discussion, certain terms will be defined before the actual generators are discussed. Although from different origins, the noise generated within transmission lines, receivers, and noise generators has certain electrical and mathematical characteristics that are similar. If such a noise voltage is sampled at many intervals and a graph of amplitude versus the number of occurrences of given amplitudes is plotted, the resulting curve will have a significant mathematical shape known as the "normal law of error" or Gaussian distribution.<sup>5</sup> This is the same curve that would be obtained if some random process were sampled and analyzed. A noise voltage (or current) having such a distribution is known as Gaussian noise.

When the frequency content of a noise voltage is determined, it is found that a wide range of frequencies is present. If all frequencies of the spectrum from dc to some frequency beyond the microwave region are included, and if all fre-

quencies are present in equal amounts, the noise is called "white noise." The extremely wide frequency requirement in the definition of white noise can be relaxed considerably in many practical applications, so long as the spectrum of the noise is flat over a bandwidth that is wider than the bandwidth of the receiver or amplifier being tested.<sup>6</sup> The noise obtained from noise generators of the types to be discussed is both white and Gaussian.

## Resistor Noise

In 1928, Johnson<sup>7</sup> and Nyquist<sup>8</sup> showed that any resistor operating at a temperature above zero degrees Kelvin (absolute zero) will generate a noise voltage that has a uniform spectrum extending over a wide range of frequencies, decreasing above the microwave region. Therefore resistor noise is truly white. The noise voltage from a resistor is usually given in the form:

$$\overline{e^2} = 4kTBR$$

where  $\overline{e^2}$  = mean square value of noise voltage in volts squared.

$k$  = Boltzmann's constant ( $1.38 \times 10^{-23}$  joules/degree Kelvin).

$T$  = temperature of resistor in degrees Kelvin.

$B$  = bandwidth in hertz.

$R$  = resistance in ohms.

The voltage is given as a mean-square value in volts squared, rather than in volts. If noise voltages from independent sources (such as a group of resistors) are to be added, they add on a power or square rather than on a voltage basis.

## Noise Temperature

Although many noise generators do not use a resistor as a noise source, the simplicity of the formula for calculating the noise developed in a resistor is so appealing that the term "noise temperature" may be used even though nothing in the noise source is hot in the ordinary sense. The procedure for determining the noise temperature is to measure the noise voltage from a given source and calculate the temperature that a resistor would need to have in order to produce that same noise voltage.

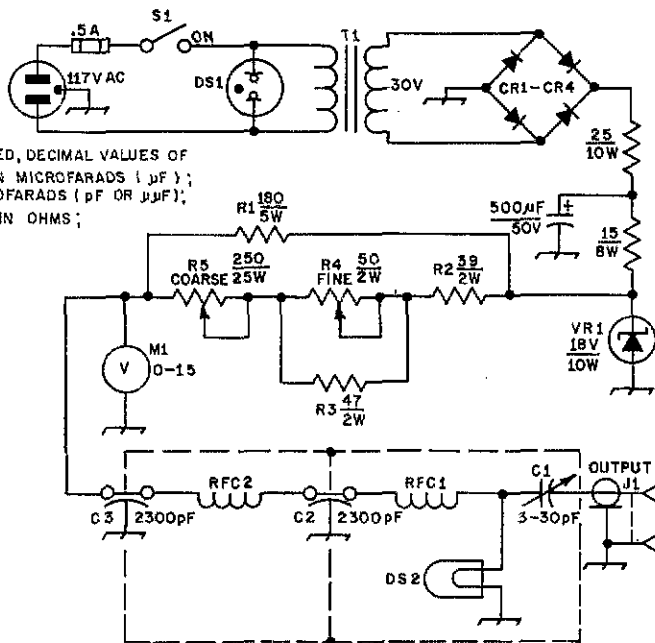
When using noise generators to test receivers, the excess noise is often convenient to use. Excess noise is defined as:

$$\text{Excess Noise} = (T - 290)/290$$

where  $T$  = noise temperature in degrees Kelvin. The temperature 290 degrees K is considered to be the

\* Route 1, Box 30, Ada, OH 45810

1,2 These and all other footnotes refer to the bibliography at the end of the article.



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS ( $\mu\text{F}$ ); OTHERS ARE IN PICO FARADS ( $\text{pF}$  OR  $\mu\mu\text{F}$ ); RESISTANCES ARE IN OHMS;  $k = 1000$ .

Fig. 1 - Circuit diagram of the Monode noise generator. Designated parts not listed below are for text reference.

- C1 - Ceramic trimmer, 3-30 pF (Centralab 822-EN or equiv.).
- C2, C3 - Feedthrough capacitors, 2300 pF (Centralab FT-2300).
- CR1-CR4, incl. - Silicon diodes, 500 mA, 100 PIV (1N4002).
- DS1 - Neon pilot-lamp assembly.
- DS2 - No. 12 lamp (see text).
- J1 - Chassis-mounting coaxial connector (see text).

- M1 - 15-V dc.
- R4 - 50-ohm, 2-watt composition control (Ohmite CU5001).
- R5 - 250-ohm, 25-watt wire-wound control.
- RFC1, RFC2 - 1.8  $\mu\text{H}$ , 1-A choke (Ohmite Z-144).
- S1 - Toggle switch, spst.
- T1 - 117 volt primary; 30-volt, 2-A secondary. (A 24-volt transformer can be substituted by adding an electrolytic capacitor from the bridge output to ground.)
- VR1 - Zener diode, 10 watt, 18 volt (1N1819).

standard temperature against which noise comparisons are made. The excess noise may be expressed in decibels as:

$$E.N. \text{ dB} = 10 \log_{10} [(T - 290)/290]$$

Many of the fundamentals of noise can be found in Mumford and Scheibe's book,<sup>9</sup> and the articles by Nelson<sup>10</sup> and Hyder.<sup>11</sup>

There are three types of noise generators in common use by radio amateurs. These are solid-state devices, hot or cold resistors, and temperature-limited diodes. Gas-discharge noise generators are also used but will not be covered here.\*\*

### Solid-State Generators

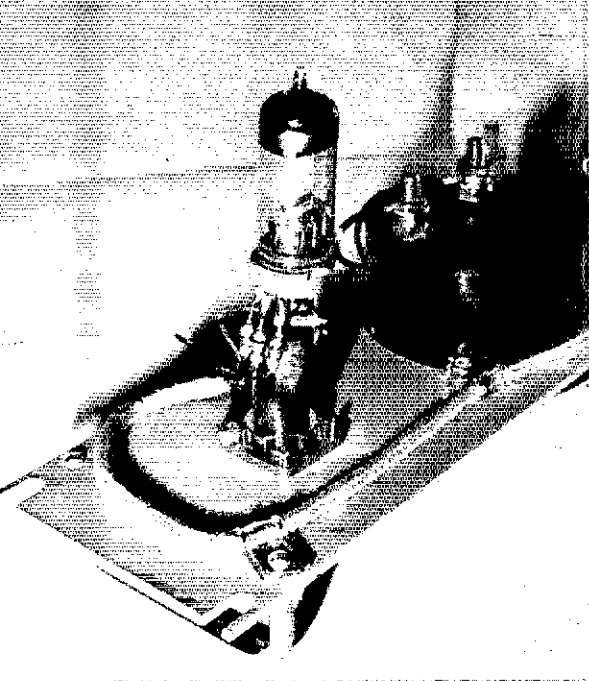
A solid-state noise generator suitable for amateur use consists of a point-contact diode operated with a reverse bias.<sup>12</sup> Complete construction details can be found in any of the more recent editions of *The Radio Amateur's Handbook*.

\*\* [EDITOR'S NOTE: Most noise generators used by radio amateurs are of the simpler variety discussed in this article. Gaseous-discharge-tube noise generators find their main application in testing radar and microwave-receiver front ends as well as comparison measurements of other noise sources. See Bibliography under Gas-Discharge Noise Generators for further reference.]

The principal advantages of this generator are that it is small (therefore, completely portable), inexpensive, and easy to build. A disadvantage is that the noise output is not known without calibration. Recently, several commercially made solid-state noise generators have become available. They cover the frequency range from 1 Hz to 30 GHz. Their advertised advantages are small size, low voltage and power requirements, and high noise output. The high noise output, typically 30 dB E.N., is valuable when used with a high-loss directional coupler on a microwave receiver.

### Thermal-Noise Generators

There has been some research done on the subject of practical thermal-resistor noise generators, especially in the last ten years.<sup>13,14,15</sup> This type of noise generator is an absolute standard, therefore it is useful for the calibration of other sources. Modern ultralow-noise receivers used for space communications and radio-astronomy purposes require noise generators with very low output for calibration. Cold resistors and room-temperature resistors are considered very desirable for this use.



One thermal-noise generator that is especially suitable for amateur use is the filament of an incandescent lamp.<sup>16,17,18,19</sup> The advantages of this generator include a noise output compatible with many receivers, simplicity, excellent stability, and precise calibration. A thermal-noise generator using the filament of an incandescent lamp, called the Monode noise generator, was described in *QST* several years ago;<sup>16</sup> a correction to the output circuitry was described recently.<sup>20</sup> In the four years that I have been using the Monode noise generator, I have made only two significant modifications. These modifications are the rheostat that was added in the lamp filament supply in order to obtain finer control over filament voltage, and a better output connector that is compatible with other portions of the measurement system.

The circuit I am presently using is shown in Fig. 1. The filament voltage control circuit consists of R1 through R5, with R4 providing a fine adjustment. This particular combination of resistors permits variation of the lamp voltage over a range of 6 to 9.

The SO-239 connector was used on most of my original noise generators because they matched the connectors on the receivers. I discovered later that these connectors do not have a 50-ohm impedance, therefore precision measurements could not be made. As a result, all connectors in the system were converted to the General Radio 874-BBL series. Other suitable connectors are the "Precision type N," General Radio 900-series, and Amphenol APC-7.

The "noise head," consisting of J1, C1, R-C1, and the No. 12 lamp, requires great care in construction. The one described is for use on the two-meter band. Lead lengths must be kept as short as possible. Inductance and stray capacitance are not particularly important, but any loss will cause an error in the noise output voltage. The two really critical elements with regard to loss are the rf

connections from the socket of the 5722 are made as short as possible. The output connector and tube socket were modified as explained in the text. Feedthrough capacitors in the filament circuit are soldered to the side of the connector extension.

chokes feeding dc to the lamp, and the series-tuning capacitor, C1. An Ohmite Z-144 choke is recommended for RFC1. A small ceramic trimmer was used for C1. However, a small variable capacitor shunted by a fixed-value silver-mica unit might be better. The lamp and C1 should be mounted on the back of the coaxial connector, J1.

After the generator has been completed, the lamp should be operated for about 10 hours at 7 volts before it is used. After this aging period, C1 and the lamp voltage are adjusted until the impedance at the connector is  $50 \pm 10$  ohms. The noise temperature is determined from the empirical formula:

$$T_N = 1187.52 + 188.24V - 5.4281V^2$$

where  $T_N$  = Noise temperature in degrees Kelvin.  
 $V$  = Dc voltage at lamp terminals.

The filament voltage must be measured at the lamp terminals because there is a small but significant voltage drop across the Z-144 rf chokes. The panel meter can be calibrated in terms of the actual dc voltage at the lamp terminals. In my generator the lamp voltage is 8.4 when the output impedance is 50 ohms. The noise temperature at 8.4 volts is 2386 degrees K. If other impedances are desired, the No. 19 lamp appears to be a good choice. It has the same miniature bipin base as does the No. 12, and its rating is 0.10 ampere at 14.4 volts. The hot resistance is found to be 144 ohms. Two No. 19 lamps in series would be desirable for a 300-ohm balanced system because of the inherent symmetry of such an arrangement.

### Temperature-Limited Diode Noise Generators

All vacuum tubes produce noise that is caused by action of the individual electrons. When a simple diode with a pure tungsten filament is used in a temperature-limited mode (no space charge present), the noise output is predictable so long as transit time is short compared with a cycle at the frequency at which the tube is being used, and so long as stray inductance and capacitance are unimportant, or are at least compensated.<sup>21,22,23</sup>

A temperature-limited diode is normally connected in parallel with a resistor. The mean-square noise voltage of the combination is:

$$\bar{e}^2 = 2qIBR^2 + 4kTB$$

where  $q = 1.6 \times 10^{-19}$  coulombs.

$I$  = dc plate current in amperes.

$R$  = terminating resistance in ohms.

$k$  = Boltzmann's constant ( $1.38 \times 10^{-23}$  joules/degree Kelvin).

$T$  = temperature of resistor in degrees Kelvin.

$B$  = bandwidth of interest in Hz.

The first term on the right of the equal sign is the contribution of the diode. The second term is the

noise contribution of the resistor. The noise temperature in degrees Kelvin of the combination is:

$$T_N = \frac{2qR}{4k} + T.$$

If  $T = 290$  degrees K, the excess noise is:

$$E.N. = \frac{2qR}{4k \times 290}$$

Some of the temperature-limited diodes available are the Sylvania 5722, the Philips 10-M, 10-P, and K81A, Signalite 6144/TT-1, and RCA R-6212A.<sup>23,24</sup> The Signalite and RCA diodes are constructed for use within a 50-ohm coaxial transmission line. The CV2171 and CV2398 are temperature-limited diodes manufactured by the M-O Valve Co., Ltd.<sup>25</sup> An SD-1022 is the equivalent of the 5722.<sup>26</sup> Several articles have appeared in *QST* describing the use of the 5722.<sup>27,28</sup> The

*Radio Amateur's Handbook* carried information about a noise generator using this tube for several years.<sup>29</sup>

I built a 5722 noise generator utilizing the information in the *Handbook* as well as that in Huie's article.<sup>27</sup> After many modifications, the circuit shown in Fig. 2 was evolved. The nature of the changes concerns two specific points: precise adjustment of the filament voltage was very difficult, and the rf circuitry was unsatisfactory.

The plate current in the 5722 (and similar diodes) is extremely sensitive to changes in filament voltage. In order to permit accurate control of the plate current, very fine control of the filament voltage is required. Because the 5722 has a high-current, low-voltage filament, the increments in filament-circuit-control resistance must be extremely small. For this reason filament control

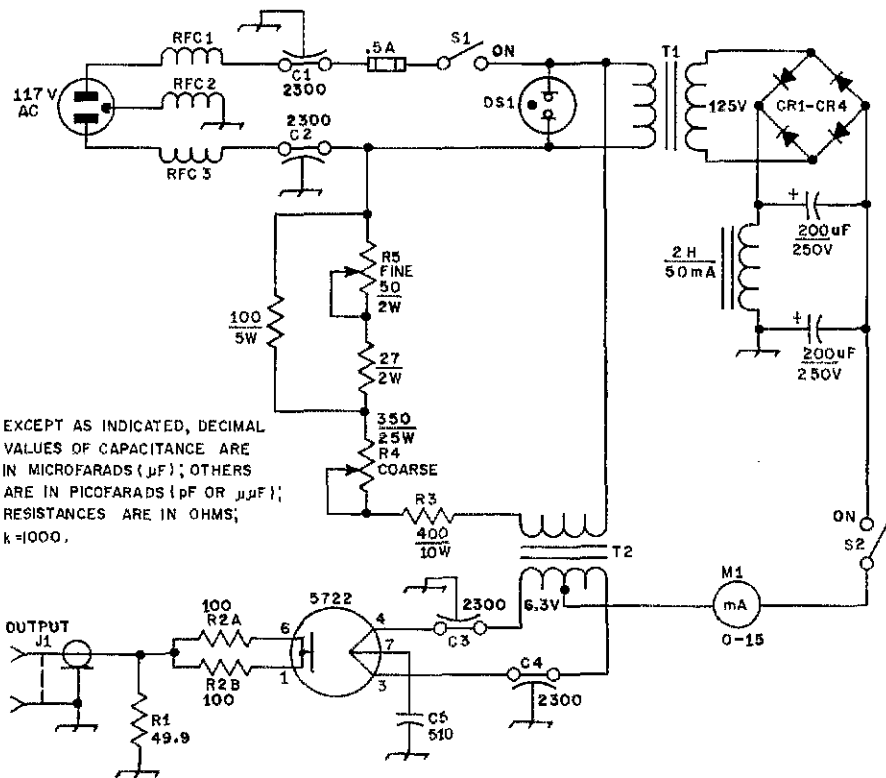


Fig. 2 — Schematic diagram for a noise generator using a 5722 diode.

- C1-C4, incl. — Feedthrough capacitors, 2300 pF (Centralab FT-2300).
- C5 — Dipped silver-mica capacitor (C-D 15FD511JN3).
- CR1-CR4, incl. — 400-PIV, 750-mA silicon diodes (1N4004).
- DS1 — Neon pilot-light assembly.
- J1 — Panel-mounting coaxial connector. See text.
- M1 — 15-mA dc.
- R1 — 49.9-ohm, 1/4-watt metal-film resistor (IRC CCA T-O or equiv.). Must be stable and nonreactive.

- R2a, R2b. — 100-ohm, 1/2-watt composition (Ohmite "Little Devil" or equiv.). Must be noncapacitive.
- R3 — See text.
- R4 — 350-ohm, 25-watt wire-wound control.
- R5 — 50-ohm, 2-watt composition control (Ohmite CU5001).
- RFC1-RFC3, incl. —  $1.8 \mu H$ , 1 A (Ohmite Z-144).
- S1, S2 — Toggle switch, spst.
- T1 — 125-volt, 50-mA plate transformer.
- T2 — 6.3-volt, center-tapped, 3-ampere filament transformer.

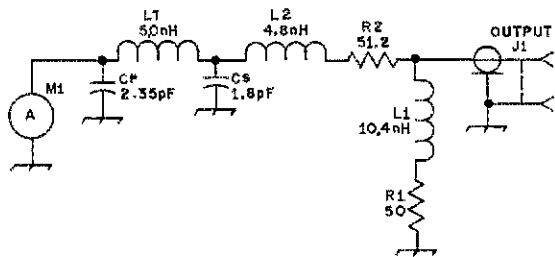


Fig. 3 - Rf equivalent circuit of the noise-generating portion of the 5722 diode circuit. CP is the plate-to-filament capacitance, LT is the series inductance of the tube leads. R1 and R2 are the same as shown in Fig. 2.

should be applied to the primary of the transformer. This requires the use of a separate filament transformer. The reason for improvement is obvious when the filament transformer is viewed as an impedance-matching device. The 20:1 turns ratio provides a 400:1 impedance ratio and therefore a change in resistance in the primary side is the equivalent of 1/400 as much in the secondary. Since the current in the primary is only 5 percent of the current in the secondary, a carbon potentiometer with its fine resolution can be used. To gain maximum "fineness" of control from R4 and R5, the maximum filament voltage should be limited to the highest value desired when R4 and R5 are at minimum resistance. R3 is used to set this maximum value of filament voltage. The actual resistance of R3 will be dependent upon such things as line voltage, the transformer used for T2, and lead resistance between T2 and V1.

One of the major problems with the rf circuitry is that stray inductance and capacitance within and near the tube cause the noise output to be higher than expected.<sup>26,29</sup> This effect is especially prevalent at 144 MHz and above. I am using the circuit Huie proposed, but have refined the equivalent circuit and its analysis. Fig. 3 shows the equivalent circuit of the rf portion of the noise generator. Capacitors C3 and C4 do not appear in the equivalent circuit because their reactances are 0.5 ohm each at 147 MHz. The compensation circuit is composed of R2 and the lead inductance of R1, labeled L1. CP is the plate-filament capacitance of the diode. LT is the series inductance of the tube leads between the midpoint of the tube socket and the tube elements. CS is the shunt capacitance of the tube socket. The remainder of the series inductance between the midpoint of the socket

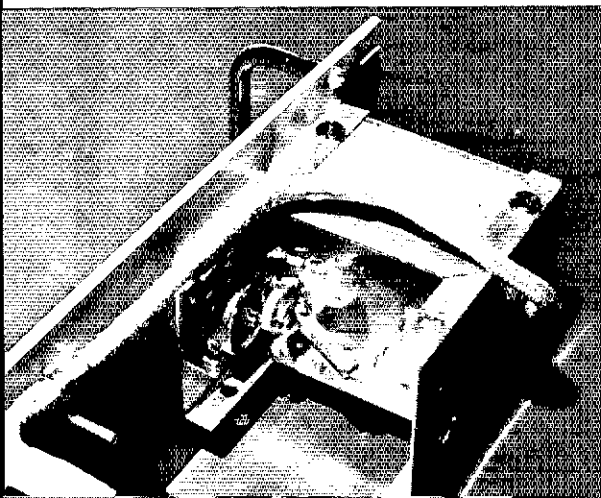
and the connector, including the lead inductance of R2, is called L2.

In order for the generator to give the proper noise output, the following conditions must be satisfied: the output impedance must be exactly  $50 + j0$  ohms, and, when the output connector is shorted, the current flowing through that short must be exactly the same, numerically, as the shot-noise current present at the diode plate. If the compensation circuit, R2 and L1, were not present, the short-circuit output current would be approximately 10 percent high at 144 MHz. The current increase is the result of an impedance transforming effect of the stray inductance and capacitance. By the proper choice of the series lead inductance of R1 and the series compensating resistor, R2, it is possible to achieve a unity current transformation from the tube plate to the output connector and to provide the correct output impedance simultaneously.

The values for the stray inductance and capacitance were determined by building mock-ups of the tube and mount, and then measuring the actual values of the stray inductances and capacitances. The required values of L1 and R2 were calculated, and the mount was built. The value of L1 was obtained by making the leads on R1 "too long" so that a series inductance was present. The impedance of the generator at the output connector was measured and the length of the leads on R1 was adjusted until the output impedance was of the correct value.

In order to facilitate impedance measurements, the connector used in the final version was a General Radio 874-PL8A with the cable-tapering sections removed and copper tubing and rod substituted to extend the 50-ohm impedance of the connector to the rear by 5 cm. Then the mount could be assembled and soldered before the connector was assembled. No shield was used on the tube, in order to lower the plate-to-ground capacitance. The socket used to mount the tube was a mica-filled bakelite unit. It was modified by removing the shield base, the center metal shielding sleeve, and pins 2 and 5. The socket was supported by the leads only. In addition, the top of the socket was filed to permit the tube to seat farther into the socket, thereby slightly reducing the lead inductance.

Resistor R1 is an IRC CCA T-O with a nominal value of 49.9 ohms, and with 1-percent tolerance. This IRC resistor is inherently nonreactive. Or-



Output section of the author's Monode noise generator. A small ceramic trimmer, C1, is connected between the lamp and the output coax fitting. Meter calibration should allow for the voltage drop across the rf choke.

ginally, 1/2-watt composition resistors were used, but their resistance values shifted too much (and in an unpredictable manner) when applying heat during soldering.

### In Summary

The three principal Gaussian white-noise generators, solid-state diodes, hot resistors, and temperature-limited diodes, have been discussed. Construction information was presented for all but the solid-state diode generator. The construction data given were adequate, but the interested reader is urged to consult the references cited here for more information.

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QST



# Hints and Kinks

## For the Experimenter



### AN OSCILLOSCOPE CAMERA ADAPTER

Do you need an adapter to fasten your camera to a scope? Here's one of welded steel strap for attaching a Pentax SP-500 35-mm camera to an EICO Model 435, 3-inch scope.

The adapter, made from  $3/4 \times 1/8$ -inch steel strap, is attached to the scope case by four 10-32 screws. The screws enter drilled and tapped plates which are mounted permanently in the scope case by pop-rivets. The camera rests on the adapter cross bar, a 1-inch-wide steel strap, and is attached by a 1/4-20 short wing-nut assembly. The attaching devices permit rapid assembly and disassembly as the need occurs.

The author (after experimenting with different close-up lenses) uses a +2 close-up lens mounted by a retaining ring and lens hood at the front of the camera's 55-mm lens. The +2 lens enables reasonable camera-to-scope distance while permitting maximum scope image size on 35-mm format. In this case, the 3-inch scope bezel's outer surface is just visible on the film. Good photos have been obtained with the following settings:

Scope brilliance control:	Visible waveshape to just below blooming.
Lens opening:	$f/2$ .
Shutter speed:	1/8 second.
Film:	Plus-X (ASA-125).
Developing:	D-76 (diluted 1:1) 6 min. at 72 degrees Fahrenheit. Kodak variable contrast paper (No. 3-1/2 filter at 6 seconds).

These settings are approximate, but do represent a starting point.

If bright light is not permitted to fall on the front of the scope, a light-excluding tube from the scope bezel to the camera lens is not necessary for good photos. On the other hand, excessive scope brilliance that causes blooming will cause rather poor exposures.

Different cameras, films, and scopes will require slightly different design approaches. For any particular application, the design and use should emphasize low cost, rigidity, reasonable size, avoidance of stray light, minimum usable scope brilliance, and proper exposure obtained by experiment. In addition,

View of the scope-to-camera adapter in place on the EICO oscilloscope.

tion, the adapter should be designed so that the optical axis of the camera is centered on the scope tube and the camera-to-tube distance is such that a little focusing ability remains in the camera lens (don't rack the lens all the way in or out when establishing lens-to-scope distance).

For your adapter, mock it up on a bench, check image size, take a few photos, check dimensions, then design and build it. Lots of luck. — C. A. Stiles, Jr., ex-KSMRK

### SOME PIP-SQUEAK MODIFICATIONS

Some builders of the FM Pip-Squeak described in *QST* for March, 1971, have encountered minor problems with their units. Some of the trouble results from the use of pc-board materials whose dielectric properties differ from that used in the *QST* model. Some materials cause the capacitance between circuit-board foils to be greater or less than that of the glass-epoxy board used in the author's version. The result is a change in resonant frequency for some of the networks, and in some instances, instability caused by excessive coupling between points that should be isolated from one another.

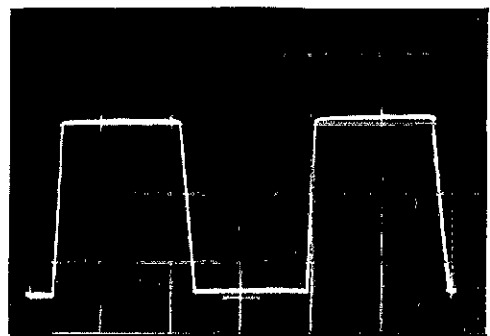
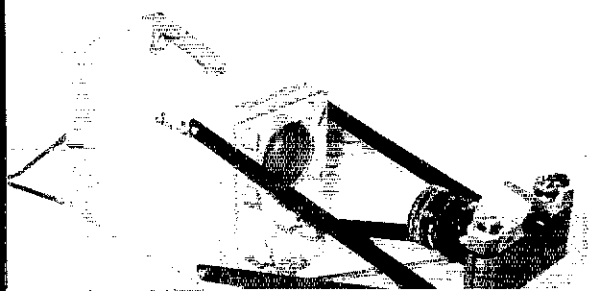
Others have reported difficulty in obtaining sufficient drive to obtain the rated 1-1/2 to 2 watts output at 13.6 volts. Still another complaint is that of being unable to get some crystals to hit frequency. The following modifications may be helpful if you are experiencing problems of the foregoing kind.

1) To increase drive through better impedance matching to the input of Q3 (see March, 1971, *QST*, Fig. 1, page 22) replace C11 with a 1.5- to 7-pF trimmer and adjust for maximum rf output from Q4.

2) Improved stability can be obtained by replacing RFC9 with four ferrite beads, close spaced, on a 1/2-inch length of No. 22 wire. This provides a low-Q base impedance at Q4.

3) Greater range of frequency adjustment can be effected by removing C27 and placing a jumper across its connection points on the pc board. Then, replace L1

Photographic results of camera and adapter properly built and focused.





through L4 with miniature 5- to 25-pF ceramic trimmers.

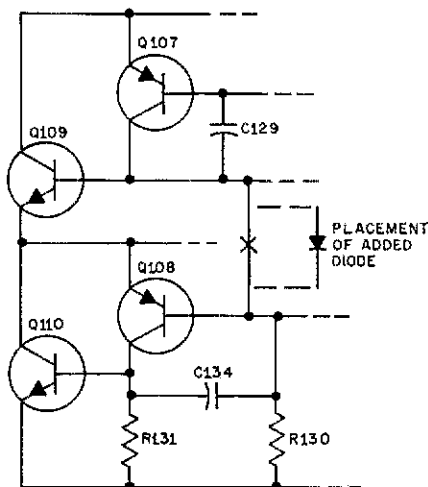
4) Those having difficulty locating RCA 40637 transistors may substitute Motorola MPS3563s at Q1 and Q2. Q3 may be replaced by a 2N3866.

5) If difficulty is experienced in obtaining good deviation linearity, apply 3 to 4 volts of positive reverse bias to CR1 through a resistive divider consisting of a 10,000-ohm resistor from the high (cathode) side of CR1 to the junction of R5 and CR2. Then, connect a 3300-ohm resistor from the high side of CR1 to chassis ground.

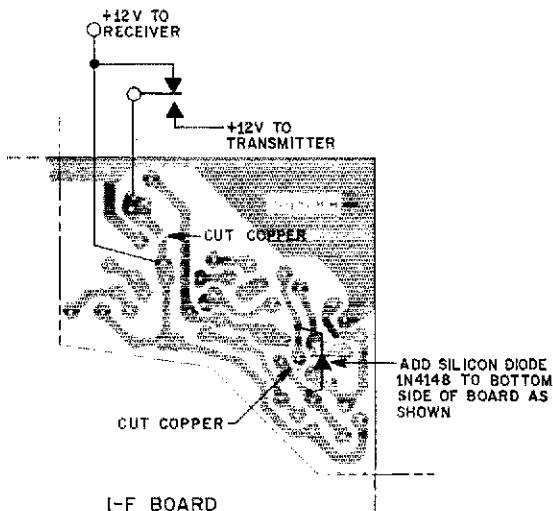
Some builders have reported that the 2N5913 is easier to drive than is the 40290 specified for use at Q4. The gains of the transistors used from Q1 through Q4 will depend, of course, on the beta of each transistor, and few from various production runs exhibit identical characteristics. Therefore, the power output from a particular Pip-Squeak may be anywhere between 1 and 2 watts. — *WICER*

### CONTACT FITTING ON HR-2 RELAY

The relay sticking problem that was mentioned in the Recent Equipment review of the Regency HR-2 in August '71 *QST* is not caused by a bad relay per se. The main problem is that a large capacitor (250  $\mu$ F) is in the circuit on the receiver side of the relay contacts on the +12-V source. This capacitor is used for receiver filtering, and when transmissions are made is allowed to discharge. Upon returning to receive, the +12-volt source is applied to the capacitor through the normally closed set of relay contacts; this large instantaneous current flow causes the contacts to weld together.



A portion of the i-f circuit diagram of the Regency HR-2 receiver showing the correct placement of the added 1N4148 or HEP134 diode. The cathode goes to the base of Q108 and anode to base of Q109. The diode addition corrects the crossover distortion of the receiver af amplifier — a problem common to some models of the HR-2.



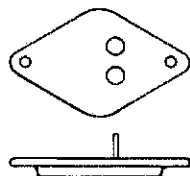
The i-f circuit board of the Regency HR-2 receiver showing the points of the copper foil that need to be cut. Remove the red wire from the receive side (NC) of the transmit-receive relay to the armature. Add a wire from the receive-contacts lug to the indicated area of foil.

The manufacturer is aware of this problem and has supplied schematic and pictorial diagrams of the modifications necessary to their circuit board to end this trouble. The solution, basically, is to move the capacitor to the supply side of the relay contacts so that the capacitor is no longer switched in and out, but remains charged. The diagram, supplied by Regency, shows the modification. — *Kent Marshall, W4KRE*

[EDITOR'S NOTE: This information was supplied by a number of other Regency HR-2 owners and agencies, also.]

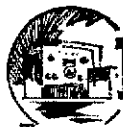
### A SIMPLE POWER-TRANSISTOR TEMPLATE

In various projects, I have often used a power transistor of the 2N1970 type. Correct placement amid the other components has been aided by a simple template made from a blown transistor of the same size and shape.



Power-transistor template.

I removed the domed portion by placing the transistor upside down in a small vise and gently closing the jaws on the dome. Next the emitter and base pins were removed with pliers and the glass portion was removed with a punch or nail. A 3/16-inch drill was then used to enlarge these holes, which completed the job. The template was then ready for use. — *J. F. Pyatt*



# Recent Equipment



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

## The Curtis EK-402 Electronic Keyer

NOT TOO LONG ago Curtis Electro Devices introduced a mnemonic keyer which provided a variety of messages by merely pushing a button.<sup>1</sup> A possible disadvantage was that the operator had to buy a new custom memory or diode board if he desired to change the message content. Curtis has solved that. The recently introduced Curtis EK-402 is an ultrasophisticated mnemonic keyer that allows the operator to program (and reprogram) the memory to send practically anything he wants.

The basic operation of the memory is the same as the EK-39M. The memory is divided into four quadrants. The first two are called X and Y. The last two quadrants are connected together and called Z. One of three programs may be selected for transmission. PROGRAM A consists of portions X and Z; PROGRAM B, YYZ; and PROGRAM C, Z alone.<sup>2</sup>

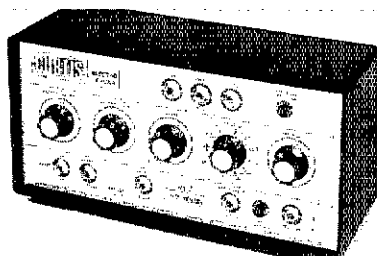
### Keyer and Memory

The keyer circuit is basically the same in both the EK-402 and the EK-39M. EK-402 improvements include different dash-lockout circuitry, greater tolerance to tarnished key contacts, and a sidetone jack for rigs not equipped with an internal keying monitor. Shunt diodes have been added across the dot and dash inputs to provide protection against application of overvoltages at the key. In addition, the EK-402 offers a choice of two keying jacks, one for keying grid-block and cathode-keyed rigs, and the other for solid-state equipment. Lambic features are retained, as are front-panel control of speed and weight.

The heart of the EK-402 memory is a 256-bit random-access-memory MOS read-write integrated circuit (RAM) manufactured by the Signetics Corporation. This IC is a static device that allows

<sup>1</sup> "Curtis EK-39M Mnemonic Electronic Keyer," *Recent Equipment*, QST, March, 1971.

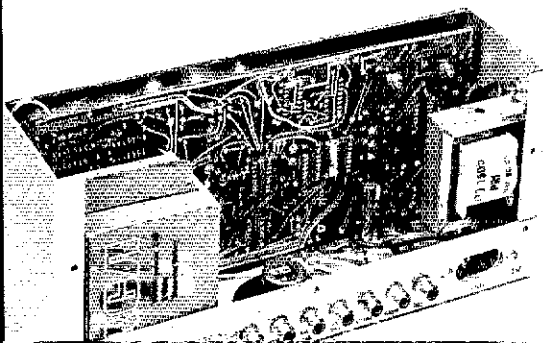
<sup>2</sup> A more complete description of the basic memory circuit may be found in the equipment review of the Curtis EK-39M, March, 1971, QST.



information to be retained as long as dc power is applied to the memory cells. It does not require constant clocking to retain information as would a dynamic device. Information is stored on a memory plane organized in a matrix, 16 units wide (row) and 16 units long (column). Two divide-by-sixteen synchronous counters are used to select a row and a column. Information is read from or placed into the storage cell at the intersection of the row and column selected. By applying the correct signal to the RAM-chip-select terminal, it is determined whether the memory should read or write data.

### Programming

To write a program into the memory the READ-WRITE switch is placed in the WRITE position. This position changes the keyer clock from an instant-starting type (used during normal operation and when reading information from the memory) to a free-running type. When "writing," the operator must synchronize his sending to the keyer clock pulses. Information is written into the memory by "sending to the keyer" at a slow speed (8-13 words per minute). Although material may be written into the memory at any speed, slower rates will provide a more accurate program when the operator is not familiar with the method. When a new program is written into the memory the old program is erased automatically.



Inside view of the Curtis Keyer. The 9-volt battery is mounted at the left. Phono jacks are provided for sidetone, transmitter keying, straight key, and keyer paddle. The ac cord plugs into the recessed socket at lower right. A 3-wire line cord and connecting cables are included with the keyer.

QST for

Table 1

		Start	End		
Program A	Message Programed	ORS WA	DE WA7GWL	K	
	Memory Location	X	Z		
	Quadrant Indicator	on	off	on	off
Program B	Message Programed	CQ CD	CQ CD	DE WA7GWL	K
	Memory Location	Y	Y	Z	
	Quadrant Indicator	on	off	on	on
Program C	Message Programed	End			
	Memory Location	DE WA7GWL	K		
	Quadrant Indicator	on	off	on	on

Table showing operation of the QUADRANT INDICATOR light during the programing sequence. Each memory location (or quadrant) may contain up to 64 bits of information. A way to indicate how the QUADRANT INDICATOR light operates is to demonstrate in what order information is programed. In this example, a "message" used in the ARRL Communications Department QSO Party will be used.

The program switch is placed in position A and the READ-WRITE switch to WRITE. The QUADRANT INDICATOR will go out when programing of location X (ORS WA) is started. When quadrant X is filled, the indicator will relight, signifying the beginning of memory location Z. Location Z will be programed later.

Next, the program switch is placed in position B. Since location Y (CQ CD) is read twice during

normal operation, it must be programed twice. The QUADRANT INDICATOR will go out at the start of Y. When the light comes on Y should be sent again. Programing of location Z (DE WA7GWL K) begins when the light goes off again. The QUADRANT INDICATOR will relight halfway through location Z indicating the midpoint of the quadrant. After B programing is completed, location Z will be found in PROGRAM C and at the end of PROGRAMS A and B. By obeying the QUADRANT INDICATOR each portion of the program may be placed in its corresponding memory location correctly.

Odd (long) sequences that do not fit into any one memory location, such as, QST QST QST DE W1AW, are placed in program A. Programs B and C will not be useful since portions of the sequence that do not fit into location X will be found in location Z.

Programing may be initiated by any of three methods: pushing the START button on the front panel, actuating an external start switch, such as a straight key or momentary-contact switch connected to a rear-panel jack, or keying the paddle. The first two methods allow a short space to be inserted at the beginning of the program being written. If a mistake is made during programing, the STOP button on the front panel may be pushed. The memory will reset to the beginning of the program. The two front-panel lamps, called QUADRANT INDICATOR and CYCLE COMPLETE, assist the operator in generating a message (see Table 1).

The CYCLE COMPLETE lamp indicates when the program memory is filled. If an attempt is made to insert too many bits of information into a program, the CYCLE COMPLETE lamp will come on for a split second indicating the memory is full. Any characters written after the CYCLE COMPLETE indication will be placed on top of the first part of the message. The result will be a message with the end at the beginning!

While programing, it is possible for the beginning of a dot or dash to be clipped off, or "split." This is the result of the operator not keying in step with the free-running clock. The memory usually will play back a perfect dot or dash even though it is split.

Programed material is retained only as long as power is applied to the memory cells. While the keyer is operational, power is obtained from the ac line. When the power is shut off, an internally

mounted 9-volt battery is used to supply power for the memory. The ac-power switch may be left on while all of the keyer circuitry, except the memory, can be shut off by the OPERATE-STANDBY switch. This power-down technique allows the memory to remain active by the ac line - the battery takes over only in the event of a power interruption. The battery may be omitted if the keyer is always connected to an ac line. The memory will be erased, however, if the power fails. Once material is correctly written into the memory, the function switch can be placed in the READ position and the keyer is ready for action.

### Operation

Program A, B, or C is selected by a front-panel switch. By actuating the START button (or an externally mounted momentary-contact switch) the program will be sent once, unless it is interrupted by hitting the STOP button or depressing the key paddle. Stopping the sequence disengages the memory, allowing the operator to break in for an "emergency" stop or to insert a different ending.

The EK-402 has provision to repeat a message. The repeating cycle can be delayed from 1 to 30 seconds by means of an adjustable front-panel control. This feature is useful for meteor-scatter work or when operating on a "dead" band. The repeating feature may be stopped at any time by depressing the stop button or by making a dash or dot on the paddle. Other features of the EK-402 include: front-panel control of side tone volume

and pitch, a locked-key switch for transmitter tune-up, and a rear apron plug for connection of a straight key.

The instruction manual warns that in some cases large amounts of stray rf will cause the unit to malfunction. At no time could the author make the basic keyer malfunction even when the unit was placed next to an unshielded 1-kW amplifier. In this case the memory readout, which is usually affected first, did not operate properly. In normal operation at the author's QTH the EK-402 was never affected by rf. *WA1PID/WA8VRB*

### Curtis EK-402 Programable Electronic Keyer

Dimensions (HWD) and Weight:  
 5 × 10 × 3-1/2 inches, 5 pounds.  
 Power Requirements: 100 to 125  
 volts ac, 50 to 60 Hz, 9 watts. (Also  
 available for 220-V ac operation.)  
 Price Class: \$290.  
 Manufacturer: Curtis Electro Devices, Box  
 4090, Mountain View, CA 94040

QST ————— QST ————— QST

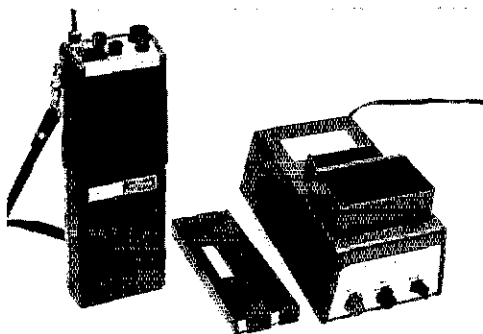
## Sonar 2307 Transistorized Portable Radiotelephone

**T**HIS WRITER first became acquainted with the Sonar name and equipment in 1946 and the companionship continued in one form or another until 1950. Sonar was one of the early proponents of fm — especially narrow-band fm, and their equipment of that era was used by many amateurs to put a phone signal on the ten- and six-meter bands. The acquaintance was interrupted for several years because of an interest in other modes of operating and in the uhf bands.

The appearance of the Sonar name on a modern piece of vhf fm equipment was like meeting an old friend, and one who had improved with age at that! The 2307 hand-held unit certainly has everything going for it in keeping with modern trends. It is compact, self-contained, and neat looking. Weighing in at 2.2 pounds, it is not a "light-weight." A husky battery and good construction accounts for the feel of "substance" when picking up the unit.

### Transmitter Circuitry

The transmitter stages employ a frequency multiplication of 9; therefore crystals must be in the 16-MHz range for operation on two meters. Diode switching is used to select any one of five



A battery charger and spare battery are some of the optional accessories offered. The volume and squelch controls are on the top, as is the five-position channel-selector switch. Jacks are provided for a remote microphone and earphone.

channels for transmit or receive. The signal is phase modulated, using two variable-capacitance diodes to obtain 5-kHz deviation. A speech clipper and audio filter are incorporated in the speech stages.

Minimum output from the transmitter is 1.6 watts. A low-pass filter at the PA output provides attenuation of harmonic currents. A rather unique circuit is used to maintain a constant transmitter output level as the battery voltage decreases during use of the transceiver. Collector current to the transmitter output stage is monitored across a resistor which is in series with the supply voltage. The voltage developed across this resistor is applied to two transistors in a regulator circuit. Output from the regulator circuit feeds voltage to the multipliers, a buffer, and the driver. A change in collector current causes the regulator to change the drive level, thereby keeping the transmitter output relatively constant.

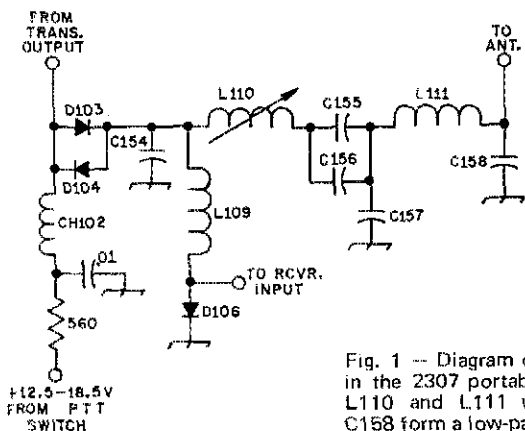
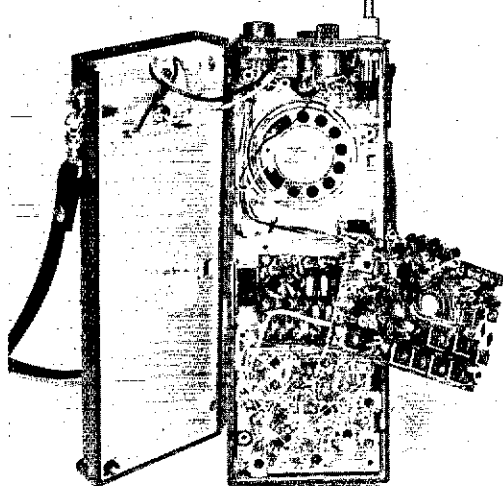


Fig. 1 -- Diagram of the antenna-switching circuit in the 2307 portable. The diodes are type 1S953. L110 and L111 with capacitors C154 through C158 form a low-pass filter.

The upper section of the transceiver is filled with the receiver, a speaker, and the controls. The oscillator section with transmit and receive crystals is in the center. The transmitter board is at the bottom of the unit. A switch, located at left center, selects either an internal or an external speaker.



### Operation

Diodes are used to switch the antenna between the transmitter and receiver. In this circuit, shown in Fig. 1, a dc voltage is applied to all three diodes while transmitting. This bias causes the diodes to conduct, so they appear as a closed circuit for rf. The output stage is thus connected to the filtering network and antenna, and the receiver input is shorted. In the receive condition, the three diodes appear as open circuits to provide a signal path through the filter network to the receiver input.

### The Receiver

The receiver uses two filtering systems to obtain good selectivity and freedom from spurious signals. The high i-f is at 10.7 MHz and two crystal filters follow the first mixer. The second mixer converts the 10.7-MHz signal to 455 kHz, and a 455-kHz ceramic filter is used ahead of three succeeding stages of i-f amplification which are followed by a two-stage limiter. A noise-operated squelch circuit cuts off the audio output during standby.

A nickel-cadmium battery pack powers the transceiver. The nominal full-charge voltage of the battery is 18.5 volts. In order to avoid power consuming voltage dividers in the receiver, several stages are connected in series. Among the stages connected in this manner are the rf amplifier and the first mixer, the second mixer with the second oscillator, and the noise amplifier with the 455-kHz limiter. Three transistors in the 455-kHz i-f amplifier are also series connected.

A built-in speaker serves as the microphone during transmit. Receiver volume is more than adequate for use during mobile operation. No difficulty with signal readability was experienced even though some not-too-quiet rear-engine cars were used for commuting. Provision is made to connect an external antenna, but very good results were obtained while using the self-contained whip. The local repeater was worked frequently with the transceiver antenna inside the car.

Optional accessories include a miniature ear-phone, a remote microphone, and a battery charger. The latter will charge the battery while it is in the transceiver, or separate. Either a fast or a slow charging rate may be selected. Battery life is stated to be 10 hours when the ratio for transmit to receive to standby is 1:1:4. The transceiver is housed in a tough, gray plastic case. A press-to-talk switch on the side of the equipment is easy to reach for either right- or left-handed operators. — WISL

## Strays

### Sonar 2307 Transistorized Portable Radiotelephone

#### Dimensions (HWD) and Weight:

9 x 3-1/4 x 2-1/4 inches, 2.2 pounds with battery installed.

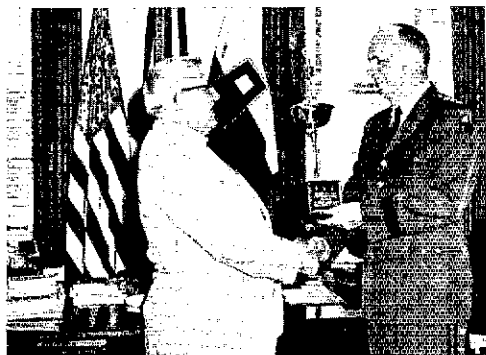
Power requirements: 450 mA at 16 volts during transmit; 50 mA in receive and 20 mA during standby; supplied by self-contained nickel-cadmium battery pack.

Transmitter power output: 1.6 watts minimum.

Receiver sensitivity: Less than 0.5 microvolt for 20 dB of quieting.

Price class: \$480, including battery pack.

Manufacturer: Sonar Radio Corporation, 73 Wortman Avenue, Brooklyn, NY 11207.



Lt. General C. E. Hutchin, Jr., presents the 1971 First Army Commander's Annual MARS Award Trophy to Eugene Gruber of Corry, Pennsylvania during a ceremony at Fort Meade, Maryland. (Photo by David F. Stockton)

# Technical Correspondence

## DANGER!!

### UHF KILOWATT AMPLIFIER AT WORK

Technical Editor, *QST*:

Familiarity often leads to contempt for the effects of rf radiation on the human body, especially at very-high and ultrahigh frequencies. In pretelevision days, it was not uncommon practice to have 6- and 2-meter kilowatt amplifiers running open in the ham shack. This weekend, while optimizing a small 432-MHz linear amplifier using a pair of 4CX250 tetrodes, I disregarded good shielding practice. Though only operating it at half power, 500 watts, I managed to give my right eye an overdose of 432-MHz diathermy, i.e., internal sunburn, without realizing it. The doctor advises that I will recover without ill effects, but had I continued another hour working on it, I could have permanently lost the sight of an eye. Note, to friends and colleagues: *CLOSE* that uhf-transmitter compartment, even when just tuning up! — *Bob Richardson, WAUCH, Miskel Farm, RFD 2, Sterling, VA 22170.*

[EDITOR'S NOTE: The important thing here is that a uhf kilowatt amplifier is very different from a vhf or hf amplifier. A 432-MHz amplifier with the cover off is (or can be) effectively its own antenna.]

### MORE ON THE SSTV VIEWING ADAPTOR FOR OSCILLOSCOPES

Technical Editor, *QST*:

It has been gratifying to learn of the tremendous number of adapters that have been constructed successfully from our earlier *QST* article.<sup>1</sup> The few letters we have received concerned sync problems, lack of contrast, and questions as to whether there were any errors in the schematic diagram.

<sup>1</sup> Briles and Gervenack, "Slow-Scan TV Viewing Adapter for Oscilloscopes," *QST*, June, 1970, p. 46.

The following suggestions may help to stabilize the unit:

1) CR1-CR4, incl., should be 150-volt PIV silicon diodes, such as 1N645.

2) Some transistors used in the prototypes, permitting false triggering from the black (1500-Hz) signal. To adjust this circuit, substitute a 50,000-ohm potentiometer for the 10,000-ohm resistor between L1 and L2. Connect a dc voltmeter between the collector of Q3 (sync level) and ground. With a 1300-Hz tone fed to the input of the adapter, adjust the potentiometer to the point where the dc voltmeter just reads +15 volts. Remove the potentiometer and replace it with a fixed-value resistor of the ohmage amount set on the potentiometer.

3) If the adapter is lacking contrast, the video signal level may be increased by adding a 2N718 transistor ahead of Q1, as shown in Fig. 1.

4) For those who wish to use 88-mH toroids in place of L1 and L2, the circuit of Fig. 2 is suggested. — *Bill Briles, W7ABW/0, 419 S. Lakeview, Derby, KS 67037, and Robert Gervenack, W7FEN, Route 1, Box 350, Monroe, WA 98272.*

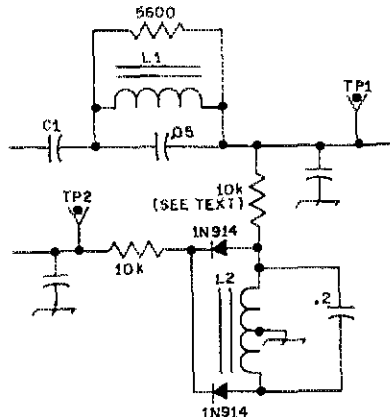


Fig. 2 — Circuit for use of 88-mH toroids in video discriminator and sync discriminator circuits of the SSTV adapter. Resistances are in ohms, k = 1000; capacitances are in microfarads, L1, L2 — 88 mH toroids (see *QST* Ham-Ads).

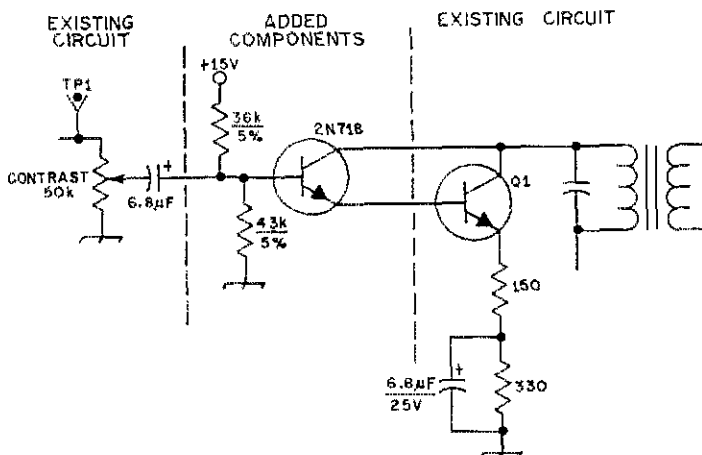


Fig. 1 — Circuit for increasing the video level of the SSTV adapter for oscilloscopes. Resistances are in ohms, k = 1000. In making this circuit modification, the 22,000- and 18,000-ohm resistors are removed from the base circuit of Q1.

## ETCHING YOUR OWN CIRCUIT BOARDS IS EASY

Technical Editor, *QST*:

I would not want to discourage experimentation or improvisation by amateurs (there's little enough of that around) but some "shortcuts" or "improvements" do not always pay their way. Two articles in the January issue of *QST* prompt me to write. One is "Simple Approach to Circuit Boards," by WA2EAW,<sup>2</sup> and the other is "A Simple Sweep Generator . . ." by WA6JLJ.<sup>3</sup>

WA2EAW cites, among other objections, dangers from etchants, special equipment needed for conventional board etching, and so on. WA6JLJ, describing construction of his instrument on electronic peg board, claims that a pc board would double the time needed for the project. Such objections may be valid, but after much resistance to the idea of etching my own boards, I have determined that even for a one-time, noncritical circuit, etched boards are cheap and easy to do, and provide mechanical and electrical advantages in the finished equipment.

For example, I recently put together a 12-V dc power supply, for which I designed and etched a board. The initial paper planning was more fun than a jig-saw puzzle, and considerably faster to do. The finished power supply has few mechanical weak spots. For a nonradio device, I had to mount 11 resistors which were to be selected by a rotary switch. After looking over my collection of terminal strips and other such items, I decided to etch a board having 11 closely spaced pads on one edge, and a continuous strip on the other, with holes to wire the resistors in between. The resulting mounting board was rigid, easy to wire, and very much smaller than any other arrangement would have been.

Copper-clad board is not cheap, but not much of it is used on any one project; there are surplus sources for the material. Comparatively safe etchants are available — and any ham who works his way around a 1200-volt power supply knows how to take precautions. Almost anything, it seems, will work as a resist . . . paint, nail polish, Magic Marker, vinyl tape, or chewing gum. Add to this a plastic or glass tray borrowed from the XYL and a pair of plastic photo tweezers (if you want to make sure that the etchant is untouched by human hands), and you're in the etched-board business. Experiment and improvise, of course, but be sure that you really are working toward improvements. — Julian N. Jablin, W9IWI, 9124 N. Crawford Ave., Skokie, IL 60076.

## INTEGRATED-CIRCUIT CLOCK OSCILLATOR FOR SOLID-STATE KEYS

Technical Editor, *QST*:

Recently I built the Micro-TO keyer as described in recent editions of the *Handbook*.<sup>4</sup> It performed beautifully until I tried to switch the 120-volt grid-block line of my surplus TBW transmitter. The oscillator became erratic, and no reasonable amount of bypassing or filtering seemed to cure the problem completely.

Further checks showed that the oscillator was susceptible to the energy radiated by the relay

<sup>2</sup> Morgenstern, "Simple Approach to Circuit Boards," *QST*, January, 1972, p. 34.

<sup>3</sup> Fury, "A Simple Sweep Generator for FM Receiver Alignment," *QST*, January, 1972, p. 48.

<sup>4</sup> Also see Opal, "The Micro-TO Keyer," *QST*, August, 1967, p. 17.

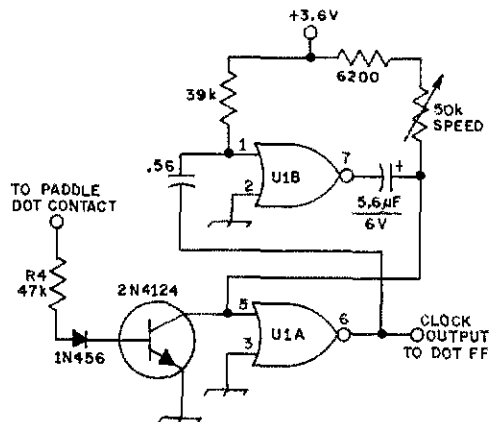


Fig. 3 — Integrated-circuit clock oscillator for solid-state keyers. Resistances are in ohms, k = 1000. Capacitances are in microfarads; polarity marking indicates electrolytic. U1 — RTL integrated-circuit dual 2-input gate (Fairchild  $\mu$ L914, Motorola MCB14G, Motorola HEP584, or equiv.). Connect pin 4 to ground and pin 8 to +3.6 V.

contacts when switching a lab power supply of 100 volts connected in series with a 100K-ohm resistor. Again, filtering didn't help.

A simple and effective cure was found. I replaced the clock oscillator circuit with the one shown in Fig. 3. — Frank Getz, Jr., K3PDW, Del. Tech. & Com. College, 330 E. 30th St., Wilmington, DE 19802.

## PUTTING THE MACROMATCHER ON 160 METERS

Technical Editor, *QST*:

The mail received at ARRL Hq. indicates that there will be a number of Macromatchers in use in the future ("The Macromatcher," *QST*, January, 1972). Several letters asked if the Macromatcher can be used on 160 meters. It certainly can; a Miller 42A475CBI coil having a nominal inductance range of 27.5 to 58  $\mu$ H covers the frequencies between 1.6 and 2.3 MHz. The small knobs used on the coil slug-adjusting screws, pictured on page 18 of the article, are Millen No. A019. — Jerry Hall, K1PI-P

## FEEDBACK

Having trouble locating a 2N5124 transistor for Q2 of Fig. 5 on page 42 of *QST* for January 1972 (Merritt, "The Modern Teleprinter Local Loop")? Give it up, and procure a type 2N5142 instead. The last two figures were inadvertently transposed in the schematic diagram. Motorola lists type HEP51 as a suitable substitute.

The PLL used in the Inexpensive Scanner Receiver for 146 MHz in the "Hints and Kinks" section of the February *QST* should be a Signetics NE565 and not the NE567 as published.

In the "Quacker Box" article (*QST* for February, 1972, pg. 28), the base diagram for U2 is incorrectly marked as the bottom view — the top view is shown.

# Are You Ready . . .

## for the Coming DX Openings?

BY WILLIAM I. DUNKERLEY, JR.,\* WA2INB

**D**X POSSIBILITIES are in for a big improvement! You might have thought otherwise, what with declining sun-spot activity and all. But with a program now underway, you'll see the tables turned on this sun-spot cycle minima for unprecedented opportunities in amateur operating.

How? The answer is a communications satellite usable by the average ham. It will be able to keep a DX band live, and also open up additional frequencies not previously useful for long-haul work.

This is not an indefinite plan for "sometime in the future." The satellite, called Amsat-Oscar C (AOC) is now nearing completion. The National Aeronautics and Space Administration has already agreed to provide a "piggyback" launch. AOC is expected to be in use this year!

### What Kind of Dx?

You should be able to work DX up to about 5000 miles away through this satellite. The map shown in Fig. 1 indicates the area of possible communication for a station located near Philadelphia. As you can see, over 100 countries are easily within range, not to mention all states including Alaska and Hawaii. To estimate what you'll be able to work, just envision a similar circle centered on your location.

Oscar will provide open-band conditions every day. The amount of time you hear the opening depends on your latitude. A station in Philadelphia will experience the DX for about 2-1/2 hours per day, whereas a station located at the North Pole will get 4-1/2 hours of action. In other words, the greater your latitude, the greater the openings. They will occur whenever the satellite passes

\* Assistant Secretary, ARRL.



within range of your station. The maximum usable time for any single pass will be about 25 minutes. The communication possibilities at any given moment will be within a circle of 5000 miles diameter, centered at a point on the earth directly below the satellite.

There will be plenty to work using the satellite. Amsat (with ARRL coordination) is planning a complete program of organized operating activities. Final details are not available yet, but you can expect exciting contest and award opportunities. How about an Oscar Worked All . . . award? An Oscar BPL? Or, maybe a Field Day bonus for Oscar operation from your FD site! Who knows, there may even be some new countries on through the satellite.

### How Can I Get in on It?

Your ticket to DX via Oscar is not hard to come by. Here are some often-asked questions with answers to help you along:

★ "Won't it take an exotic high-powered microwave-type station to use this satellite?" Definitely not! Amsat-Oscar C was designed with the average ham in mind. It will use the ham bands at 28 and 144 MHz. As for power, you can use less than 50 watts and an antenna shorter than 10 feet.

★ "I'm set up for all bands from 80-10. Will I have to start from scratch with new equipment?" If you're equipped for 80-10 operation on cw or ssb (your preference!) you already have the basics for satellite DX via AOC. In future issues, *QST* will carry articles describing some accessories you can add. For example, a transmitting converter can put your signal on 144 MHz, the input band for the satellite. Your ten-meter receiver can be used as is for the down-link.<sup>1</sup>

<sup>1</sup> The frequencies on which the satellite transmits to you.

Amsat-Oscar C is expected to be the first in a series of long-lifetime satellites for use by radio amateurs. Frequencies in the 10- and 2-meter bands are utilized. The satellite will provide DX communications for amateurs around the world.

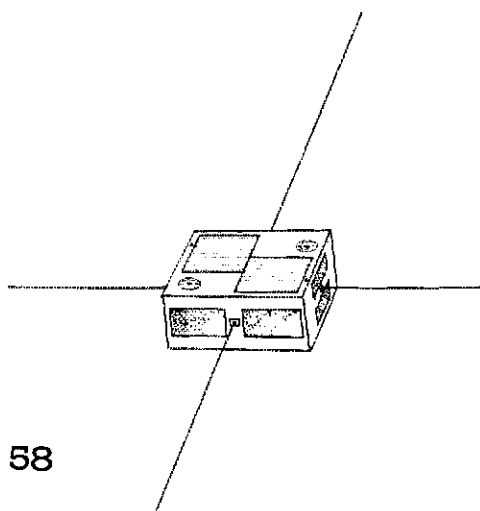
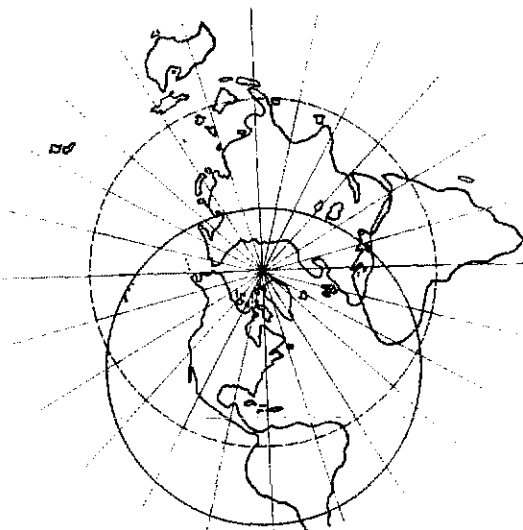




Fig. 1 — This is the area of communication possible via AOC for a station located in Philadelphia. A similar circle centered on your location will indicate what you should be able to work through Amsat-Oscar C.



★ "Will I have any special problems using my transceiver with AOC?" The answer to this question is yes and no. A transceiver plus transmitting converter will equip you for the appropriate bands, but not without certain problems. On the signals you will hear coming from the satellite Doppler shift will be present.<sup>2</sup> Each time that this causes you to retune the station you're receiving and working, you'll also move your own frequency. Then he'll have to retune, too. As a result, both stations will "walk" themselves across the band. This problem can be overcome with an "incremental" tuning feature on the transceiver, an external VFO, or an auxiliary receiver. Another problem of transceive-operation is that it will not allow you to listen to your own down-link. Use of an auxiliary receiver will overcome this drawback.

★ "If I get set up, will I have useful communication for more than just a few weeks?" Previous Oscars operated for only a few weeks. But AOC has a design lifetime of one year! And, Amsat has plans for another with similar characteristics to carry on from where AOC leaves off. So, your preparation for AOC should be useful for quite some time. Amsat-Oscar B, the satellite expected to follow AOC, could contain up to 3 separate repeaters. A brief description of AOB appears in March, 1971, *QST*, page 58.

★ "When the satellite is in operation, how will I know when I can use it?" A feature of the expected orbit is that it will bring the satellite near your location at about the same time every day. You'll get to know when to expect AOC DX much in the same way that you anticipate openings on the 80-10-meter bands. WIAW will transmit times at which the satellite will be near major cities. Reference data will be provided for those who wish more precisely to plot the location.

★ "Is this an fm repeater?" The AOC repeater will handle fm. In fact, it will accommodate any mode which appears in the input bandwidth. This type of a repeater is called a frequency translator. AOC receives 100 kHz at 2 meters for retransmission on 10 meters. Ssb or cw will be most efficient, but all modes (including RTTY, SSTV, etc.) should work.


★ "Will a fancy antenna-pointing system be required for tracking?" Best results will be obtained if your antenna is always pointed at the satellite. Movement of the antenna in elevation as well as azimuth<sup>3</sup> is necessary. But an easier alternative is available, providing adequate results. It is the use of a medium-gain antenna (about 10 dB for 144) pointed at a fixed elevation angle of about 30 degrees, rotatable in azimuth. The beam-

width of this antenna will be broad enough to allow satisfactory performance with most passes of the satellite. A ten-meter beam, located relatively close to the ground (a wave-length or less), will have a high enough take-off angle when mounted normally with its boom horizontal.

★ "How will I know if my signal is making it to Oscar?" You'll be able to hear your own signal coming back! The AOC repeater operates cross-band. So, you would transmit on two meters and listen on 10. If you keep your receiver on while you're transmitting, you can hear how effective your signal sounds through the repeater. This technique will allow you to adjust your antenna position and power output for maximum efficiency while using the satellite. In fact, by listening to your own down-link, you'll be able to hear any QRM which may come on while you're transmitting to allow moving to a clear spot.

### What Next?

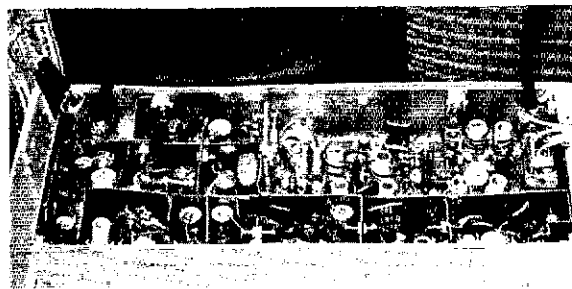
Articles in future issues of *QST* will describe accessories which can be added to your station to equip it for AOC operation. As construction of the satellite is completed, and the testing phase begins, we'll have a more detailed description of the spacecraft and what it can do.

The AOC project is an undertaking of Amsat, the Radio Amateur Satellite Corporation. The group is affiliated with ARRL and receives modest League financial support. Amsat membership is open to those interested. The *Amsat Newsletter* sent to all members contains the latest information on activities such as AOC. For a membership application, drop a note and s.a.s.e. to Amsat, PO Box 27, Washington, DC 20044. 

<sup>2</sup> A downward shift in frequency due to the motion of the satellite.

<sup>3</sup> The normal turning mode of ham antennas.

The electronics of a prototype Amsat-Oscar C repeater is shown. Its input is 100 kHz centered at 145.95 MHz with output centered at 29.50 MHz.



# The Growing Use of Foreign Languages by American Amateurs

BY C. J. SLETTEN,\* W1VLV

**E**XCHANGING SIGNAL reports in a foreign language is very similar to working a DX station in code. One can rather easily memorize and send the standard information and anticipate much of the reply. We have all worked foreign stations whose knowledge of English was very limited indeed, restricting the "conversation" to the standard phrases and reports. Many of us unwittingly have provided Italian, Russian, and German amateurs with English lessons.

Operating a phone in a foreign language is an exciting sport and it requires a certain amount of practice, skill, and showmanship. As a matter of fact, it is not uncommon these days to hear very fluent Spanish from Ws and Ks on 15 meters. Occasionally some sharp operators switch from German to French to English with good understandability in all three languages. The bravest are even making out in Japanese and Russian. Unlike proficiency in code, language skills are useful for travel and social life. This new dimension in radio provides an ideal language laboratory for the internationally-minded set.

## Avoid Pitfalls

There are a few pitfalls in this game, however, that ought to be regarded. The adequate mastery of a foreign language is a man-sized job even with high motivation. These motor skills come only with drill. For the man interested only in greetings and rudimentary exchange of signal reports or for DX hunting, distinguishing the call letters is always tricky and requires patient listening, familiarity with phonetic words, and learning special patterns of expression. Then there is the embarrassment of finding that your QSO partner really speaks good English after you have struggled valiantly in a strange tongue. Bad pronunciation is probably the worst crime committed by English speakers. Audio-lingual experience with native speakers is necessary to get some feeling for the language and acquire confidence that comes with successful two-way communication.

It is not too difficult, either, to memorize a very impressive idiomatic little QSO which triggers a torrent of high-speed comments that you cannot begin to decipher! The man with a couple of semesters of training has a big advantage in vocabulary building. Listening practice helps too - especially foreign language news broadcasts.

With the large growth in technologically-advancing nations an increase in the use of foreign languages is to be expected. Most all operators are anxious to learn English, which is likely to continue to be the *lingua franca* of the amateur bands for a long time. Many of the foreign operators are willing to exchange practice

in English for practice in German, French, Spanish, etc. If one is polite, modest, and helpful with a very imperfect knowledge of other languages he can often make some new friends while getting hours of pleasant practice in a target language.

Many high schools and colleges offer night courses for adults in foreign languages. Records, tapes and cassettes are available in most book or large department stores. A limited number of audio-lingual aids presenting the special jargon of amateur radio are also available along with standard QSOs and conversation drill. For example, a basic QSO in Spanish or German might go something like this:

### English

HK2ABC, this is KA1CD calling. How do you copy me? Go ahead.

KA1CD from HK2ABC. I copy you very well. Your signals are Q5 and S9 here. My name is John. My address is Box 112, 10 Main Street. How do you receive me in New England tonight? KA1CD, HK2ABC is standing by.

HK2ABC, here is KA1CD. Solid copy. Your signal is also Q5 and S9. My name is Bob. Please send me your QSL card via the bureau. Thanks for the contact. Seventy-three. KA1CD is off and clear with HK2ABC. Good night, John.

### Spanish

HK2ABC, *Aqui KA1CD llamando a HK2ABC. Como me escucha? Adelante.*

KA1CD de HK2ABC. *Le copio muy bien. Su senal es Q5 y S9 aqui. Me llamo Juan. Mi direccion es Buzon 112, Calle Major, 10. Que tal me escucha en Nueva Inglaterra esta noche? KA1CD, HK2ABC a la escucha.*

HK2ABC *aqui KA1CD. Ciento por ciento. Su senal tambien es Q5 y S9. Mi nombre es Bob. Por favor, envieme su tarjeta de QSL via bureau. Muchas gracias por el contacto, Setenta y tres. KA1CD termina su transmision para HK2ABC. Buenas noches, Juan.*

### German

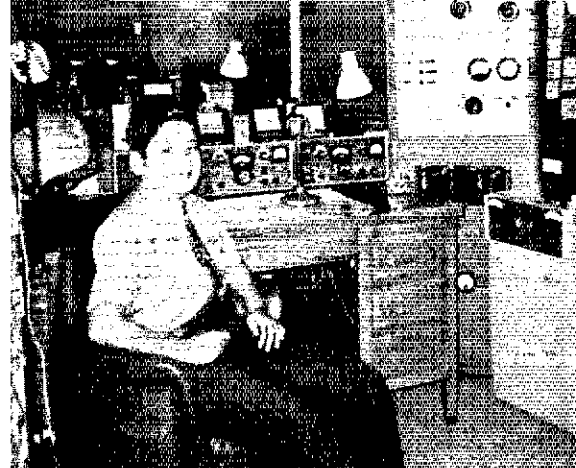
DK2ABC *hier ruft KA1CD. Konnen Sie mich aufnehmen? Bitte kommen.*

KA1CD *von DK2ABC. Ich kann Sie sehr gut aufnehmen. Ihre Signale sind hier Q5 und S9. Mein Name ist Hans. Meine Adresse ist Postfach 112, Hauptstrasse, 10. Wie ist mein Signal heute abend in Neuengland? KA1CD, DK2ABC geht auf Empfang fur Sie.*

DK2ABC *hier kommt KA1CD zuruck. Alles gut hier herbergekommen. Ihr Rapport ist auch Q5 und S9. Ich heisse Bob. Bitte senden Sie Ihre QSL uber das Buro. Ich danke Ihnen fur die Verbindung. Siebenundstebzig. Damit beendet KA1CD das QSO mit DK2ABC. Guten Abend, Hans.*

Don't be surprised, then, to hear your friends exchanging reports in one of the principal world languages other than English. These linguistic efforts are making our amateur fraternity a friendlier and more truly international spaceship society.

\*Box 53, Acton, MA 01720



To *QST* — Gentlemen: I thought I would write and tell you how much my sister Camille, WB8KUV, and I, WB8HEZ, enjoy your magazine. There's a mad dash to the mailbox for your magazine. I am ten years old and my sister is 12. We operate my father's rig. My dad is WA8OWJ. Enclosed is a picture of ourselves. — *Gregory Ameriguan*

## Strays



Three generations of hams. Monica Haley, WN3RJQ, is shown here with her father, W0NOW/3, and grandfather, W0PQP, (both Extra Class). With W0NOW/3 being a pilot at Andrews Air Force Base, the group can be found regularly holding schedules.

Last January, the University of Washington ARC, W7YD, and Chuck Hagey, WA7MEQ, handled the communications for a radio chess match between the Seattle Chess Club and the Spokane Inland Empire Chess Club. Four boards were accommodated, with Spokane winning 2-1/2 — 1-1/2. Operators were WA7OXQ and WA7QQY for the Seattle end and WA7MEQ at Spokane. The photograph shows the action at the University of Washington station.

Here's a real "his and hers" pairing — W4HE and K4SHE, who, despite their friendly embrace, met for the first time at the recent Gaithersburg, Maryland Hamfest. (Photo via W4DSW)



# So You Want to . . .

## See Your Call in QST?



"Hey Charlie, how come we never get our calls in *QST*?"

BY JOHN G. TROSTER,\* W6ISO

**H**HEY CHARLIE, how come we never get our calls in *QST*?"

"I dunno. Must be an oversight on their part."

"Well, I been sittin' here reading the new *QST* and, ya know what? This mag is *full* a calls. How you suppose all them fellas get their calls in there and we don't?"

"Yeah, we been rag chewin' on this same frequency for 30 years. Ya think the word would get around and they'd print our calls for . . . ahhhh . . ."

"Aw, it shouldn't be so tough to break into print here. Lessee here what we could do. I'll start reading and we'll go through this mag and find us a place to get our call in. Now . . . hm . . . hm . . . they print your call if you write an article. How about that?"

"About what?"

"Ahhhh, ok, what else we got here? How about a Hint or a Kink? Any ideas that would be helpful?"

"Naw, most of my ideas is Kinks . . . not Hints. What's next?"

"Maybe we could write a Technical Correspondence."

"How about if we could find a mistake in a article published last month and write a feedback?"

"Naw, they don't give your call credit for making Feedbacks. But how about a contest? Ya know, they publish everybody's call who sends in a log."

"Which contest?"

"Any of 'em. All we gotta do is work a few stations and send in our logs."

"Waaalll, trouble is, if you don't win top spot they only print your call in little tiny letters, not real big ones where everybody can see 'em."

"Yeah, guess so. And ya gotta spend all that time working stations. Cuts into rag chewing time . . . say, how about taking a picture of us and sending it in?"

"Doin' what?"

"I dunno . . . just standing there I guess . . . hm . . . oh well, how about this Brass Pounders League . . . lotsa calls here?"

"What's that?"

"Aw, ya gotta write down a lot of messages for other people . . . spend a awful lot of time. I hear some fellas spend maybe a hour a day just sendin' messages back and forth. All for free. Some of 'em even use code."

"Use what?"

\* 82 Belbrook Way, Atherton, CA 94025

"Code . . . the Morris Code . . . like ya send with a telegraph key."

"Naw, I'm no good at all with a key and the Morris Code. So what else we got?"

"Now here on the next page . . . Public Service Honor Roll. Hey, maybe this is it. Be nice to see your call in there for doin' the Public a Service."

"Maybe they'd get the mayor to give us a trophy. What we have to do to get our calls in for that one?"

"Lessee. It says down here in the corner . . . ahhh . . . check into cw nets . . . oooops, that's Morris Code, Sorry Charlie . . . or you can check into phone nets . . . then there's 'liaison' something, whatever that is . . . and here's making phone patches . . ."

"Ya gotta do all them things to Service the Public . . . just to get your call in *QST*. That might take hours."

"Yeah, that would be a lot of check-ins . . . and patches . . . ahhhh . . . and that Morris Code . . ."

"How come them fellas do all that stuff? Leaves no time for old-fashioned rag chewing . . . don't get paid . . . or get to watch the telly . . . s'pose they give points for rag chewing?"

"I dunno. Some fellas just . . . ahhh . . . say, here's the Correspondence part. We could write some letters to the Ed."

"I don't write so good."

"How about this DX column . . . the whole thing is calls! Maybe we could work a DX station and write in about it . . ."

"Naw, I don't speak them foreign languages too good."

"Me neither. So how about something in the high frequencies column. I see a lot a calls in here."

"Ya gotta sit up too late to work them fellas."

"How about this YL News?"

"Nah, my XYL wouldn't let me. What's next?"

"DX Century Club . . . wow, whole page full a calls . . ."

"Yeah, but ya gotta speak all them languages again . . . next?"

"Well, lookie here . . . Station Activities . . . ah haaa . . . all we have to do is write somebody a letter and tell 'em what we been doin' . . . and they print it . . . with your call . . . just what we been lookin' for!"

"Noooo, remember, we don't write so good. Besides, what are we gonna tell 'em we been doing?"

(Continued on page 104)

## COMING A.R.R.L. CONVENTIONS

March 17-18 - Great Lakes Division, Muskegon, Michigan

July 1-2 - West Virginia State, Jackson's Mill

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.



S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

### GREAT LAKES DIVISION CONVENTION

Muskegon, Michigan March 17-18

The 1972 ARRL Great Lakes Division Convention, sponsored by the Muskegon Area Amateur Radio Council, will be held on the campus of the Muskegon Community College, Muskegon, Michigan, March 17-18. Activities will kick off Friday evening with an informal social affair for early birds at the nearby Ramada Inn. A Wouff Hong initiation ceremony is planned for midnight. On Saturday the doors swing open at 8 A.M. on a full day of activities, including technical sessions on SSTV, RTTY, vhf fm, repeaters, antennas, and equipment design. Browsers will enjoy the manufacturers' exhibits and the giant swap and shop will be a bargain hunter's delight. ARPS and net traffic handling seminars will be held, with net meetings taking place all day. A special forum will be conducted on repeater frequency coordination. Latest word on League affairs will be available from Division Director Al Michel, W8WC, Communications Manager George Hart, WINJM, and other League officials in attendance at the ARRL Forum. The ladies will enjoy a special program of entertainment staged for them in the college's Overbrook Theatre. The day's activities will conclude with a banquet. Ticket prices for the affair are available upon request from the Convention Director.

Convenient parking is available for 1500 cars and there are complete luncheon facilities at the college. To reach it, head for Muskegon on Interstate 96, then follow US Route 31 to its junction with Michigan Route 46. Talk-in monitoring will be maintained on 3995 kHz and on 2-meter fm on 22/82 (local repeater), 34/94 (temporary repeater) and 94/94 (simplex).

Advance admission tickets are \$2.00 (\$2.25 at the door). Write to Henry E. Rickels, Jr., WA8GVK, Convention Director, Muskegon Area Amateur Radio Council, P.O. Box 691, Muskegon, MI 49443.

The League Headquarters building is open to visitors Monday through Friday, 8:30 to 4:30 on a "drop-in" basis, and at other times by appointment. The headquarters is on Main Street (Conn. Route 176 and 176-A) about a mile north of the center of town, and about 3 miles west of Conn. 15-U.S. 5, the Wilbur Cross Highway. (For WIAW visiting hours, see the schedule in "Operating News.") The office will be closed February 21, March 31, and May 29, in observation of George Washington's Birthday, Good Friday, and Memorial Day, respectively.

Delaware - The Delaware ARC Horse-Trader and Auction Night will be April 12 at 8 P.M. at the County Engineering Bldg., Kirkwood Highway, Wilmington. Bring your gear for sell or swap. For more information contact Charles McGonigal, WA3AVD, 18 Harvard Rd., Wilmington, DE 19808.

Florida - The Broward ARC in cooperation with the Hollywood ARC will hold their Annual Auctionfest at the Chamade High School on March 11 from 9 A.M. to 5 P.M.

Georgia - The Fourteenth Annual Columbus Hamfest will be April 9 at the Fine Arts Building behind the Municipal Auditorium at the Fairgrounds. For information write J. T. Laney, K4VGI, 1905 Iris Drive, Columbus, GA 31906.

Maryland - The Greater Baltimore Hamboree is April 9 at 10 A.M. at Calvert Hall College, Goucher Blvd. and LaSalle Rd., Towson (1 mile south of Exit 28 Beltway-Interstate 695). Food services, flea market, \$1.50 admission. No charge or percentage for tables.

New Jersey - The Knight Raiders VHF Club Auction and Flea Market is Sunday, March 26, at Passaic-Clifton YM-YWHA, 184 Washington Place, Passaic. Doors open at 1 P.M., free admission, free parking, refreshments available. For further information and table reservations write Knight Raiders VHF Club, P.O. Box 1054, Passaic, NJ 07055.

New Mexico - The Messilla Valley ARC Annual Beanfeed and Swapfest is Sunday, April 30 at La Mesa Fireman's Park. Call-in frequencies are 145.30/94, 34/94 MHz, and 3940 kHz. For more information write W4SKGI, Mike Gomez, Box 3576, Las Cruces, New Mexico 88001.

New York - The Thirteenth Annual Hamfest by the Southern Tier Radio Clubs is scheduled for April 15 at St. Johns Ukrainian Hall, Johnson City, at 2 P.M. For tickets or information contact John Pike, WA2UKS, 635 Lacey Drive, Endwell, NY 13760.

Ontario - The Scarborough ARC 26th Annual Banquet is Saturday April 8 at the Knights of Columbus Hall, 975 Kennedy Rd., Scarborough. For more information contact Scarborough ARC, 27 Flerimac Rd., West Hill, Ontario, Canada.

Puerto Rico - The 33rd Annual Meeting and Hamfest of the Radio Club de Puerto Rico will be held Sunday, March 26, 1972, at the Colegio San Antonio, a high school at the corner of Barbosa and 65th Infantry Avenues in Rio Piedras. Registration will begin at 9 A.M. and lunch will be served at 2 P.M. The club station, KP4ID, will be in operation from the site on all the popular bands. The Hamfest tops off Amateur Radio Week in Puerto Rico, which begins with a public demonstration of hamming at the Plaza Las Americas in San Juan on March 18. For further information write Roberto Gorbea, KP4AEF, club president, GPO Box 693, San Juan, PR 00936.

Wisconsin - The Tri-County ARC Mid-Winter Swapfest is March 5, 9 A.M. to 5 P.M. (Snow date is March 12) at the National Guard Armory, Whitewater. \$1 advance, \$1.50 at the door (additional \$1 reserves one display table). Talk-in on 3.985 MHz. Refreshments, free parking, everything indoors. More details from R. O. Lust, WB9DWW, RR-4, Box 235, Fort Atkinson, WI 53538. Tel: 414-563-4598.

**AMATEUR RADIO PUBLIC SERVICE**  
*NTS RACES AREC*  
*In the Public Interest, Convenience, Necessity* NRH

CONDUCTED BY GEORGE HART,\* WINJM

**GOT AN EC?**

**T**HIS IS BEING written prior to the annual Simulated Emergency Test but will not appear in print until after it is over. At the present time, headquarters is receiving requests for the name and address of the EC, from amateurs wishing to take part in SET.

Usually, the very reason it is necessary to make the requests is the reason why we cannot supply the information. There is no EC. In this (usual) case, the request is referred to the Section Emergency Coordinator (SEC), who handles it as best he can. The customary procedure is to sign the guy up in AREC as a sort of "free agent" and keep his papers on hand so that they can be given to the EC when or if one is appointed. This gives him a sort of cadre of enrollees to start off with. Or, if one of the inquirers is qualified and willing, he can be asked to take over the local AREC unit as EC.

The qualifications are not so tough. If you are a Technician Class licensee or better and an ARRL member, you are nominally qualified to hold this appointment. But being qualified to hold the appointment and being qualified to perform the job are two somewhat different animals. For the EC is in complete charge of all ARRL-sponsored emergency preparedness within his area of jurisdiction — whatever it is, as designated by the SEC. The EC is an organizer and a promoter. Generally speaking, a youngster can't do the job. You need someone with enthusiasm, energy, time, drive and no little experience, and someone who can and will command the respect of the AREC members working with him.

Incidentally, you don't have to be an ARRL member to sign up in AREC, and you don't have to belong to any other organization, either before or after. All you have to be is an amateur willing to

\* Communications Manager, ARRL.

devote some of your time and skill to helping keep amateur radio in the forefront in emergency preparedness. Not much time, either, in the main. The typical AREC unit gets together for a short drill (on the air) maybe once a week, the EC throws some kind of an exercise occasionally when an opportunity to do so comes up, and of course all AREC groups are supposed to put on some kind of simulated emergency exercise as a part of the national test (SET) each January.

Sometimes it can be a lot of fun, and a good EC with imagination and ingenuity can make it so. And that brings us right back where we started from — the EC. This is the guy who is the key to the whole picture. If you have one, fine and dandy; but if you don't have one, how do you get one?

There are two types of EC-less situations. Probably the more serious (and also, unfortunately, the more common) of the two is the situation in which there are a lot of hams in the area, and maybe even a lot of ham activity, but no candidates for the job of EC. How come? Well, maybe the hams aren't the public-spirited type, or maybe they're the misguided blase type who feel they can do an emergency-communications job any time, without organization. Or maybe the area seldom has communications emergencies. Or maybe it's already organized for communications emergencies under some banner, such as CB, public safety, taxicabs or RACES. If the latter, that's fine, because RACES is amateur radio and the AREC can become a part of this. If any of the others, or something else not mentioned, that's no good, because this isn't amateur radio and amateur radio probably won't get the credit.

This is a situation in which you have to start with the chief and recruit the indians. It isn't easy to do, and requires a mighty good man as EC. In an area with a lot of active hams, you can usually find one if you look hard and long enough. Once you find him, the procedure entails recruiting from among the active hams (those who aren't hopeless) and especially from among the newer ones. But even more important in recruiting is to get the prospective hams even before they get their li-



Shown at a recent meeting of the Treaty City Radio Club are, left to right, C.D. Director W8KZR, Ohio SCM W8ETU, and E.C. W8ARW, who recently completed his tenth year in that capacity.

Here's K3BHU, PAM for Eastern Pennsylvania, and her OM W3DGX passing and sorting traffic that was collected from snowbound travelers as reported in this month's *Diary*.

censes. Educate them yourself and bring 'em up right! In some places the climate is right to start emergency-preparedness training classes enrolling unsuspecting unlicensed people and get them their amateur tickets on the way to becoming proficient emergency-net operators.

The other situation is one in which a group of amateurs would like to take part in emergency preparedness activities but there is no one to lead them — in other words, a bunch of indians with no chief. Probably the best way to resolve this is to select one of their own number. If none of them is qualified, *get* one qualified. On the other hand, perhaps none of them feels he is qualified to do the kind of job that needs to be done; or they all want to be led, but none of them wants to be the leader.

One of the questions on the EC application form is "Why do you want to be EC?" This is a good question, but some applicants are inclined to select one of their own number. If none of them is qualified, *get* one qualified. On the other hand, perhaps none of them feels he is qualified to do the kind of job that needs to be done; or they all want to be led, but none of them wants to be the leader.

In every group of amateurs, even a small one, there is always at least one who has the requisite leadership qualifications, or at least some of them. But it appears that all too often the amateurs with the ability to do the job are too tied up in other pursuits to take it on. Every amateur in the county nods solemnly in agreement when the need for emergency preparedness and public service is mentioned, but when it comes to actually putting some work into the project, most of them are inclined to run and hide.

So we appreciate the amateur who says "Well, doggonit, *someone* has to do it!" and sends in his EC application. He knows it's not an easy job, he doesn't really have time for it any more than you do, and Joe Blow across town would make a much better EC. But if no one else will do it . . . . .

How about it? Got an EC in your area? — W1NJM.

### Public Service Diary

On Nov. 24, a sudden snow storm in the vicinity of Pine Grove, Pa. left over two thousand motorists stranded in their cars and knocked out all telephone service in the area. Learning of the stranded motorists, K3BHU contacted W3HK and WB4FUJ who notified the proper authorities of the situation. A number of trucks and buses were dispatched to transport the motorists to nearby



shelters where K3SLG and WA3JBO originated health and welfare messages for the weary travelers. These messages were relayed to K3BHU and W3DGX who in turn passed them on the Pennsylvania Fone Net. A total of sixty-one messages were handled during the storm. — WB4FUJ.

On Dec. 16, the Westchester Co. RACES-AREC group was called upon to assist in providing communications for a devastating fire in a local shopping center. EC WA2JWL was alerted through the K2AVP repeater. While on the scene a request went out for lighting equipment and W2WXP responded with the Cortlandt rd communications truck equipped with light gear and a 10 KW generator. Minor injuries were sustained by firemen and three buildings were destroyed before the flames were extinguished. Other amateurs participating were W2s DGD QGH, K2IAL, WA2s TNC ROT MCR OMT ROJ, and WB2AAQ. — WA2ROJ, Asst. EC Westchester, N. Y.

On Dec. 25, K8DHN mobile was in contact with K8WEN mobile when he notices a car traveling east in the west bound lane of a freeway near Flint, Mich. K8WEN put out a call for a Flint station and WA8OZP responded. After an exchange of information the Mich. State Police were notified. Within three minutes, the police had located and stopped the car. The amateurs' action, coupled by the rapid response of the police, averted what could have been a holiday tragedy. — K8WEN.

On Dec. 29, the Westchester County RACES-AREC group was again called upon to provide communications for an explosion and fire in New Rochelle N.Y. K2UTB was called on the K2AVP repeater and was requested to provide lighting utilizing the Greenburgh rd light truck. The fire was finally extinguished after eight long hours. Amateurs on the scene included W2WXP, WA2ROJ, WB2s FXB AAQ SIH. — WA2ROJ, Asst. EC Westchester, N. Y.

After a successful Norfolk RACES drill, K4UKT and K4JDK were on their way home on Dec. 30, when they found themselves caught in traffic on the Willowood bridge in Norfolk, Va. After a quick investigation, they learned that a woman had just jumped off the bridge. Telephone lineman had rescued her but needed additional assistance. An emergency call on six meter fm was answered by K4IIV and W4KBY, who summoned

local police. K4UKT and K4JDK helped with oxygen administration and with handling the stretcher. The woman recovered and police soon restored traffic to normal thanks to the quick actions of the Norfolk amateur radio operators.—*WA4BUE, RO Norfolk RACES.*

On Jan. 1, KL7HTT heard an emergency call by W7FYJ near Seattle. Upon establishing contact, it

was learned that W7FYJ was trying to obtain information on a lost boat out of Kodiak, in behalf of the mother of a crewman. KL7HTT obtained the needed information and transmitted it to W7FYJ who in turn passed it to the party concerned. *KL7HTT*

On Nov. 14, the Central Ohio AREC assisted the Muscular Dystrophy Assn. of America in a fund raising drive in Columbus, Ohio. Mobile units picked up bags containing money from twenty-one different collection centers and provided safe transportation to a centrally located bank. Two persons rode in each car and the net control station kept constant track of where each car was located. No problems developed in the day long event. A total of twenty-six amateurs participated in this highly successful function.—*W8ERD, EC Columbus, Ohio.*

Using a repeater, a total of twenty amateurs provided communications for a Christmas parade in Orlando, Fla. on Dec. 4. A number of mobile units, as well as hand-carried portables, enabled officials to learn of any difficulties along the parade route.—*W4LSR.*

The Redwood City, Calif. RACES also provided communications for a Christmas parade on Dec. 11. K6ANN manned the base station while a number of mobiles and portables along the parade route kept the public address announcers informed of any late changes. Other amateurs participating were W6s VQV UOK DEF, K6s DRN MPN, and WB6MED.—*W6DEF, EC Redwood City, Calif.*

The Luzerne Co., Pa. RACES group, in conjunction with a local broadcast station, provided an opportunity for local residents to send radiograms to friends and relatives on Dec. 18. WA3JVS, WA3JWT, and WA3LSS manned a mobile van and collected the messages. Messages were sent to the EOC where K3YTL, WA3FHE, WA3JZB and WA3JWP relayed them towards their destination via a number of East Coast nets.—*WA3JWF.*

Thirty-Seven SEC reports were received for the month of December accounting for 12,061 AREC members. This isn't a very good showing. Sections reporting: Ala, Alta, Colo, Conn, EFla, EMass, ENY, Ind, Iowa, Kan, La, Mich, Mont, Neb, Nev, NC, ND, NTex, Ohio, Okla, Ont, Org, Oreg, SBark, Sask, SDgo, SV, SD, SNJ, Tenn, Utah, WFla, WPa, Va, Wash, WMass, WVva.

### Traffic Talk

Telephone numbers are very nice to have when making deliveries. However, they have to be correct. Not almost correct, but 100% correct. One incorrect digit, especially if the phone is unlisted by the addressee's name, makes the number absolutely useless. So, if you have any doubt that you received a telephone number correctly — any doubt at all — ask for a repeat or a confirmation.

Always precede the telephone number by an indication that what is coming is a phone number, not a zip code or some other numerical designation. On voice, say "telephone," on cw say TEL or FONE.

It's helpful to the receiving operator to divide telephone numbers into groups; then even if you don't tell him beforehand that a telephone number is coming, he'll soon perceive it. For example, 814 521 1331 is obviously a telephone number. (Orig-

### BRASS POUNDERS LEAGUE

Winners of BPL Certificates for Dec. Traffic

Call	Orig.	Recd.	Rel.	Del.	Total
W9CUL#4	252	3291	2123	93	4759
K9ONK	189	734	694	18	1635
W6RSY	46	676	516	28	1466
W7BA	22	646	599	40	1307
K9ZSQ	2	646	1	645	1294
K3NSN	388	748	199	137	973
WA9VAS	105	428	45	383	961
W8EJX	64	444	427	6	941
WBEML	26	501	387	3	917
WA3DGM	52	451	396	17	916
W0LCK	25	464	366	18	873
W6VNO	12	415	350	1	778
K5TEY	6	430	423	1	860
W9CXY	21	376	366	10	773
W1LEW	43	390	317	9	759
W3VR#4	259	261	226	6	752
K3BHU	4	373	348	13	738
W6BGF	32	348	325	35	730
WB2LZN	51	358	250	58	717
W1QVY	21	361	305	14	701
K4NRP	17	340	336	2	695
WA1TMM	68	312	295	14	689
W8SSE	107	335	215	31	688
WA4IH	24	323	301	18	666
W8UPH	7	324	290	32	653
K2KOC	56	282	295	15	647
W7PL	13	312	274	43	642
WB8GED	51	290	264	26	631
W61PW	6	307	307	0	620
WA2ELD	14	292	293	14	613
W2ER	15	310	273	5	603
K3PLE	27	287	271	16	601
W3MPX	63	288	223	23	597
W5SBB	50	297	234	5	586
WA2ICU	77	283	194	21	575
WB4FTK	104	259	188	20	571
W1OJM	5	281	281	0	567
WA1FCM	40	264	244	6	554
W0ZHN	26	281	227	17	551
WA1EY	69	243	183	48	543
WB4PNY	63	246	211	23	543
WB2EAH	18	266	251	4	539
WB6ZVC	27	291	202	18	538
W61NH	36	249	222	27	534
WB2WFI	17	248	245	15	525
WB4QMG	30	289	198	7	524
W8BWF	76	237	196	9	520
WB8BMV	76	248	169	19	512
K7NTG	10	249	231	18	508
WB2RKK	12	245	212	33	502
W9ZWL	6	263	238	0	500
W9ZWL(Nov.)	0	302	230	0	532

BPL for 100 or more originations-plus deliveries

K6UYK	227	W01NH	134	WB4SVH	118
W3TN	196	WA4VEK	133	W2URP	112
K8ONA	193	WA2VLS	131	WA3LQV	111
WA3PLP	187	W44SON	129	WA1GGN	110
W4RUL	187	W3FBW#4	126	WA61VA	110
W5HKC	182	W81BX	126	K16CS	109
WA3OOZ	170	W8CUT	125	K9LXJ	109
WA3OFK	171	WA9VVT	125	WB4MWC	107
WA8OJA	151	WB6VTK#6	124	WB4KDL	106
WA3OJU	150	W4LLE	121	WB4KSG	106
VE4KA	147	WA9UBR	121	WB4PSP	106
K8OOD	145	K4CNY	120	VE3JDV	105
RH6BZF	140	W4BAZ	120	WB2UFG#5	104
W6BHG	140	W7OCX	119	WB4NCH	103
W2OE	138	WA3LWR	118	W8DNL	102
W8OCU	134			WB8DXF	101

More-Than-One Operator Station

WA3KOO 293

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 or 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.



nators can omit the area code unless collect delivery is authorized.) A number such as 16511 is pretty obviously a zip code and follows the state of destination, and 043 38 8982 is a Social Security number and usually follows a name in a message to a serviceman. Watch your spacing on cw and group the digits on phone, don't run the numbers all together.

The above is quoted almost word for word from Leo, W3LOS, in the WPA CW Traffic Net report. Thanks, Leo.

**National Traffic System.** Most of those who commented on the Jan. QST ARPS column proposal for a daytime NTS supplement were in favor of the idea. An uncomfortably large number of comments (but still a small minority) even went so far as to advocate abolition of NTS in favor of ARRL-sponsored CARS-type operations. There weren't many comments, numerically speaking, as usual, but those received were for the most part, eloquent and detailed, also as usual.

Without extensive quotes, we can sum up the plurality opinion in the direction of adoption of the WIDGL CTN proposal, but without the stress on mode. That is, it is conceded by most of this plurality, and by many others as well, that sideband will be the principal mode used in this kind of a venture, but there is reluctance to consider the daytime system as a sort of "phone NTS." Most thinking traffic-handling amateurs would prefer that NTS remain free of mode-restriction, and there was broad subscription to the idea that control and liaison stations be required to be familiar with both phone and cw traffic procedures so that either mode can be used. There was also quite a bit of comment concerning the use of RTTY, especially for cross-country point-to-point (TCC) purposes — something that has been considered desirable right along but difficult in implementation because of the dearth of traffic handlers equipped for RTTY.

What is the next step? Well, while there are those who would pull out the stops and plunge recklessly forward, your ARRL is not given to such methods. We proceed with caution, carefully, one step at a time. The first step, to get comments, can be considered to have been accomplished. The next step is to fabricate, from the comments received and the original proposals, some form of specific proposal for implementation along deliberative lines. That is, some form of compromise that probably will please nobody 100% but that will hopefully nevertheless be something we can all stomach without gagging. You will want this to be your own proposal, but this it will not be, and we hope that most of those who have submitted their "pet" ideas will be open to compromise in the realization that nobody's ideas will receive majority endorsement. This compromise proposal will probably appear in the CD Bulletin and a poll conducted among traffic appointees, with others invited to vote *only* if they understand the full import of the proposals and are interested.

Why restrict the poll to appointees, you ask? Well, what better (and more convenient) way to contact those most interested in and concerned with ARRL-sponsorship of an activity? The ARPSC-type appointees (OPS,ORS,PAM,RM,SEC,EC) are logically those who will be most concerned and most interested. Other appointees will not be excluded, but will be *discouraged* from voting unless they have a real interest in and understanding of the subject.

If the poll is favorable, a QST article on the subject may be called for. Meanwhile, recruitment of net managers will be taking place. It is not likely that any system devised as a result will be ready to go into operation before the fall of '72. NTS first went into operation on Oct. 1, 1949. Perhaps we can aim at Oct. 1, 1972, as a target date to put its daytime supplement into operation — assuming all goes smoothly according to the above rough timetable.

### Public Service Honor Roll December, 1971

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	20	3	3	5	5	Totals	
WB8BMV	10	10	12	12	12	6	3	-	5	70	
WA8ETX	10	10	12	12	12	4	3	-	5	68	
W3FCS	10	10	12	12	12	6	-	-	5	67	
WB6ZVC	10	10	12	12	9	6	3	-	5	67	
WB7AEH	10	10	12	12	12	-	3	-	5	64	
WB2UFG/S	10	10	12	12	12	-	3	-	5	64	
WAJOGM	10	10	12	12	12	-	3	-	5	64	
WB4KDI	10	10	12	12	12	-	3	-	5	64	
W3EET	10	10	12	9	12	4	-	-	5	62	
WA7KIU	10	10	12	12	12	-	-	-	5	61	
WAJNAZ	10	10	12	9	12	2	-	-	5	60	
WA7JQS	-	10	-	12	12	20	-	-	5	59	
WB8DXF	10	10	12	12	12	-	3	-	-	59	
WB2IKL	10	10	12	12	12	-	-	-	-	56	
K3ZNP	10	10	12	12	12	-	-	-	-	56	
WB4SBD	10	10	12	12	12	-	-	-	-	56	
W7BQ	10	8	12	9	12	-	-	-	5	56	
W8RW	10	10	9	9	12	-	-	-	5	58	
WA3OKZ	10	10	12	-	12	2	3	-	5	54	
WA8VAS	-	10	-	12	9	20	3	-	-	54	
VO1CA	10	3	12	12	12	-	-	-	5	54	
W2OF	10	10	12	12	-	-	3	-	5	52	
WA3LQV	10	10	12	12	-	-	3	-	5	52	
W3MPX	10	10	12	-	12	-	3	-	5	52	
W5SBM	10	10	12	-	12	-	3	-	5	52	
W7OCX	10	5	4	12	12	-	3	-	5	51	
WA2JCU	10	10	12	3	12	-	3	-	-	50	
WB8CWD	10	10	12	6	12	-	-	-	-	50	
WA6VYV	10	10	12	6	12	-	-	-	-	50	
W2MTA	10	10	12	-	12	-	-	-	5	49	
WB4PNG	10	10	12	12	-	-	-	-	5	49	
WB5DEK	10	10	12	-	12	5	-	-	-	49	
WB9ANT	10	10	12	-	12	-	-	-	5	49	
VE3ERU	10	10	12	-	12	-	-	-	5	49	
WB6MXM	10	10	-	12	9	7	-	-	-	48	
WB4EDT	10	10	9	6	12	-	-	-	-	47	
W4NOG	-	10	-	12	-	20	-	-	-	5	47
W8IMI	10	8	12	-	12	-	-	-	5	47	
WA8UPI	8	10	-	12	12	-	-	-	5	47	
VE4EA	10	10	12	-	12	-	3	-	-	47	
WA6TVA	10	10	-	12	6	-	3	-	5	46	
K0BAD/4	10	6	12	6	12	-	-	-	-	46	
W1BVR	-	44	W3LOS	-	-	39	K1SKF	-	-	34	
W2BU	-	44	W3NEM	-	-	39	K2KTK	-	-	34	
K3JOI	-	44	W5RBB	-	-	39	W3OKN	-	-	34	
K4EAC	-	44	W7LBK	-	-	39	WN4SON	-	-	34	
WB4JMH	-	44	W8RAU	-	-	39	WB4THH	-	-	34	
WB4SVX	-	44	WB8BP	-	-	39	K4UNW	-	-	34	
K5ROZ	-	44	W8SVK	-	-	39	W4ZJY	-	-	34	
WA6DFI	-	44	VE3ARS	-	-	39	K5MAT	-	-	34	
W8WCU	-	44	WB4DA	-	-	38	W6LYY	-	-	34	
W4LFD	-	42	W4QVYB	-	-	37	W9CJLW	-	-	34	
W2ER	-	42	W3TN	-	-	37	W49SGL	-	-	34	
WA2MPC	-	42	R4KNP	-	-	37	VE3AWE	-	-	34	
WA3IP1	-	42	W4QU	-	-	37	VE3FXI	-	-	34	
WA7LMO	-	42	VE3GHN	-	-	37	W7PI	-	-	32	
W7MCW	-	42	WB4EKJ	-	-	36	WB4VOS	-	-	32	
VE3CQT	-	42	W6MNY	-	-	36	K8MLG	-	-	32	
W4SVTW	-	41	W7GHT	-	-	36	VE3FQZ	-	-	32	
W6JNH	-	40	WA2NLP	-	-	35	W2TPV/0	-	-	31	
W10BG	-	39	K3MVO	-	-	35	W3YA	-	-	31	
WA2BAN	-	39	W1CE	-	-	34	WA2CCF	-	-	30	
W2RUF	-	39	WA1MSB	-	-	34	WA6VYT	-	-	30	

\*Denotes multiplier 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 each; (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.



Shown during the review of the N.J. AREC/RACES plan for Union Co. are, left to right, K2K2Q, W2NKD, W2VQR (seated), David Erickson, and RO W2IIN.

Sections <sup>2</sup>	2829	18524		
Summary	3652	41480	EAN	28.5
Record	4045	51705	1.916	27.3

<sup>1</sup>TCC functions not counted as net sessions.

<sup>2</sup>Section nets reporting (89): AENR, AENM, AEND, AENB, AENT (Ala.); OZE (Ark.); SCN, SCNT, OrgCo AREC, Org LO (Cal.); CHN, CCN, CN (Colo.); NVHFTN, NETN, CPN, CN (Conn.); QFN, EAST, WFPN, VEN, FMTN, GN, TPTN, EPTN, QFTN (Fla.); GSN, GTN (Ga.); LLN (Ill.); KFN, KYN (Ky.); LAN, AREC6AM, LTN (La.); SGN (Me.); MDCIN (Md.); WMN (Mass.); PAW, MSN, MJN, MSPN (Minn.); MIN (Miss.); MSN, WEN (Mo.); NHVTN (N.H.-VT.); NJEPTN, NJN, ECTTN (N.J.); NMRTN (N.M.); NYS, NLI (N.Y.); CNL (N.C.-S.C.); BNR, SCTMFMEN, BN, OSSBN, COAREC6, COAREC2 (Ohio); OPEN (Okla.); BSN (Oreg.); GCRN, KSSN, EPA, WPA, PTTN (Pa.); RISPAN (R.I.); TEX, TTN, PARN (Tex.); BUN (Utah); VSBN, VN (Va.); NSN, WSN, PSEN (Wash.); WVNN, WVCD75, WVN (W.V.); BFN, WSSN, BWN, WBSN, SW2RN (Wis.); MTN (Mont.); GBN, OQN (Ont.); WQVUHE (Queb.); SATN (Sask.).

**December reports.** December turned out to be a record traffic month with a total traffic count of 41,480. EAN had a fantastic rate of over two a minute. All managers reporting good traffic totals for the month. The large amount of traffic was due, in part, to the large amount of Christmas traffic that was originated during December. EAN manager K2KIR reports a new total traffic record for the calendar year in addition to a new monthly record. W7BQ reports that RN7 is still having trouble with the long skip. W9HRY issued first time 9RN certificates to W9EI and K4UNW. First time TEN certificates went to W0LJ and K0YBD.

Transcontinental Corps. All area TCC directors report extra sessions to combat the large amount of Xmas traffic. W0LCX reports trouble with long skip during the month of Dec. W3EML issued a TCC certificate to WA8PIM.

**December Report Summary**

Net	Sessions	Traffic	Rate	Avg. Rep. %
EAN	31	3561	2.049	114.999.5
CAN	31	2007	1.443	64.7100.0
PAN	31	2110	1.220	68.198.8
1RN	62	1149	.538	18.594.6
2RN	61	1190	.922	19.598.7
3RN	62	725	.514	11.797.3
4RN	62	1155	.577	18.698.8
RN5	62	1179	.546	19.092.3
RN6	62	1535	.579	24.8100.0
RN7	60	427	.407	7.164.5
8RN	62	961	.576	15.594.1
9RN	62	794	.600	12.894.3
TEN	62	1136	.714	18.374.7
ECN	61	384	.355	6.395.9
TWN	52	407	.248	7.859.7
TCC Eastern	161 <sup>1</sup>	1552		
TCC Central	120 <sup>1</sup>	1081		
TCC Pacific	148 <sup>1</sup>	1603		

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	161	88.8	4465	1552
Central	120	96.6	2294	1081
Pacific	148	90.7	3206	1603

The TCC roster: Eastern Area (W3EML, Dir.) - W1s BJB EJI NJM QYY YNE, K1SSH, WAJJM, W2s FR GKZ, K2KTK, WA2s ICU LZN UWA, W2BRKK, W3EML, K3MVO, WA3OGM, W4s SOQ UQ, E4s BSS/I KNP, WB4NNO, W8s PMJ RYP, K8KMQ, WA8s PIM VDA/J, WBBALU. Central Area (W0LCX, Dir.)-W4s UGG ZJY, WB4KEP, W5s QU MI SBM, W9s CXY DND YB, WA9VZM, W0s HI INH LCX ZHN, WA0IAW, K0AEM. Pacific Area (W6VNO, Dir.)-W5RE, K5MAT, K6DYX, W6s BGF EOT IPW MLF MNY RSY VNO VZT, W6s DEI LFA, W7s BQ EM KZ PI DZX EKB GHT, K0JSP, WA0Q.

**Independent Net Reports (Dec.)**

Net	Sessions	Traffic	Check-ins
H & B Morning Watch	31	1218	450
Eastern Area Novice Net	25	24	74
N. American 20 Meter Traffic	27	786	533
Clearing House	30	1083	569
75 Meter Interstate SSB	31	478	1422
Early 80 Free Net	30	198	224
20 Meter SSB Traffic Net	22	1976	534
Redwood Empire Net	4	1	34
Forty Meter CW Traffic & Emergency Net	27	137	261

Here's PJ2CE. Max has been very active in emergency work. He is currently a Regional Director for the Caribbean Emergency net and also the Director of the Antilles Weather Net. Photo by AE1AX.



**ARE YOU LICENSED?**

• When joining the League or renewing your membership, it is important that you show whether you have an amateur operator license. Please state your call and/or the class of operator license held, that we may verify your classification.

# Strays

## Time-Service Broadcasts

By international agreement, commencing January 1, 1972, all stations transmitting standard time and frequency information adopted a new time scale for Coordinated Universal Time, also known as UTC, GMT, or Z. This new scale is being transmitted in order to take advantage of an atomic frequency standard as an absolute reference. With this new time scale, UTC seconds will "track" those of the international atomic standard precisely. However, because of variations in the earth's rate of rotation, differences between UTC and mean solar time, or UT1, will arise. (The atomic time scale was chosen to agree in rate with the orbital motion of the earth about the sun in the year 1900, but the present time difference amounts to approximately one second a year.)

In order to correct for cumulative differences between UTC and UT1, leap seconds will be incorporated into the UTC time broadcasts when necessary, preferably on the last day of June and the last day of December. When such a correction is needed, it will be announced at least 8 weeks in advance, and the last minute of the month will contain 61 seconds. In the event that the earth increases its rotational speed, negative leap seconds will be incorporated, with 59 seconds contained in the final minute of the month. Corrections will be incorporated before the difference between UTC and UT1 exceeds 0.7 second.

For those needing to know UT1 or earth time more accurately than to the nearest second, emphasized second markers or time ticks will be broadcast denoting the correction to be applied. With this correction, earth time can be determined to the nearest tenth second. Various methods of emphasis will be put to use by different stations, but the correction code will be the same in all cases. For WWV, WWVH, and CHU, the emphasis will be supplied in the form of one or more double time ticks during each minute. The number of such double ticks indicates how many tenth seconds should be added (or subtracted) from the received UT time signal to obtain UT1. If the group of double ticks begins on the first second of each minute, the correction is positive (add to UT) and if it starts on the ninth second, the correction is negative (subtract). Absence of double second markers denotes zero correction. — K1PLP

Having trouble with Ohm's law? A little history may help you with the subject. This was taken from the *X-Mittler*, the monthly publication of Penn Wireless Asso., Inc. They credit the piece to W9EE via K3BNS.

### Ohm's Law

Although history books are replete with accounts of the Spanish exploration of America, few books tell of a small Spanish colony that settled on the Scandinavian shores. This colony was called "El Ektrik."

The Spanish had chosen a poor site and the only means of survival was to harvest and live off the currants that grew in the surrounding forests. But this was not easy, for the Norse raiding parties forced the colonists to fight for their crops. The

colonists needed a battery of vaults to protect their harvest.

The currants were perishable, but the leader of the colonists (who had been schooled in England) had a good idea. "Let's store the harvest in our cool vaults."

And so they did with such success that in a few years time the leader began to worry about the inadequate vaultage and the unpredicted alternating currant production.

Two brilliant El Ektricians, Al Gebra and Geo. Metry discovered that the vaultage required was proportional to the currant production and to the number of homes in the settlement. Thus, they convinced the leader of the colonists to pass a new law that enumerated the maximum number of homes per vault, or:

*Vaultage equals currant times homes."*

Of course, you and I know that this law came down through the ages as 'omes law.



### LAQAD

Bob Snyder, that ubiquitous ham about the world, earned the first European 5BWA just a few months ago. Here he is, proudly displaying both 5BWA No. 70 and his 5BDXC No. 46. Bob's about ready to go from Argentina and we're betting his next 5BWA from LU will come a lot easier.



The Amateur Radio Club of the State University of New York at Albany set up this booth for Activities Day in the Student Union. Shown (l. to r.) are WB2UZE, WB2JSE, WB2YIP, and ex-WN2ZLG. (Photo by Steve Schumach)

# Results, 11th RTTY DX

## "British Columbia Centennial" Sweepstakes

COMPILED BY, GWEN BURNETT, VE3AYL†

### SCORES

REPORTS FOR the 11th RTTY DX "British Columbia Centennial" Sweepstakes, October 16-18, 1971, were varied from different parts of the globe, but the general consensus was: good propagation. QRM was at a minimum under contest circumstances, due no doubt to the almost exclusive use of narrow shift. There was no problem adding new stations to the average list; three entrants claimed over one million points.

Of the 117 logs submitted, 97 were single-operator, 10 multioperator, 4 SWL Printer and 6 check logs. Some 50 countries were worked, these included KL7 CR6 KC4 LU VK OE VP7 ON VP9 PY VE KZ5 CE HK 9Q5 OK OZ GET3 F DJ FG7 KH6 PA0 HA EI 4X4 11 JA VO2 LX ZS2 XE ZL IIP OA KP4 IS1 IT1 ZS EA SM HB FO8 9Y4 W UA YV and 9J2. Over half the logs showed activity on 10 meters, and 37 stations, an increase over last year, achieved WAC. We missed India this year, but 4X4MR and 9Y4VU were both welcome newcomers to the contest.

Plaque and medallion awards for single-operator stations were won by: 11KG, W3KV, 16CQE, W4YG, 15MPK, 11CAQ, YVSAS, WA2YVK, WA3KEG, ON4BX, VE7UBC, 9Q5BG, ISCLC and Paul Menadier, SWL. Multioperator plaques were earned by VE2LO/W6, DL8VX and HASKBF.

The CARTG is appreciative of the interest and co-operation given for the yearly contest. Our sincere thanks to all who helped publicize the event.

Awards will have been sent out prior to the end of January, certificates will follow in a short time. Complete contest statistics can be obtained by sending an IRC to cover cost of postage to: CARTG, 85 Fifeshire Rd., Willowdale, Ont., Canada.

### Contest Comments

The 11th RTTY SS is out, three cheers for the 12th! — ON5WG. Blew HT-33 final about 0100 on Saturday and 100 watts in the pile is rough. Had a grand time. — W6AEE. This is my first contest on RTTY. — IS1AOV. Strong signals on 80 and lots of VE stations, I'll be back next year. — VE6ANE. I am active on RTTY for about 1½ months. Enjoyed the contest very much because all countries were new ones for me! — PA0WDM. This year had a greater variety of stations. For once the 40 meter gave long skip. Score almost same as last year, when we worked one more station. VO2AF was 589 most of the time. — E1SBH. Conditions were fantastic on all bands with the possible exception of 80 on this side of the pond and the turnout was terrific. — W3KV. Courtesy was the outstanding thing. Good sportsmanship. Was pleased that there will be a difference recognized between single and multioperator stations. — W4YG.

† CARTG, 85 Fifeshire Rd., Willowdale, Ont., Canada.

11KG*	1,595,370	HK3SO*	33,705
W3KV*	1,188,996	K8KAG	28,880
16CQE	1,000,044	E1SBH*	27,712
W4YG*	966,652	ON4WG	21,460
15MPK	955,440	OZ4FF*	20,398
11CAQ	918,994	VE7AKE	19,500
YVSAS*	865,000	WA7CIP	19,220
WA2YVK*	790,436	11AMP	17,010
WA3KEG	785,390	KISGU	16,760
ON4BX*	778,450	K2RY1*	16,546
917ED*	753,270	LX2BQ*	15,264
G3MWI*	748,854	VE6AVQ	15,142
IT1ZWS*	725,446	WA0CWH	11,604
ISCLC	721,246	JAIFFX	11,305
KH6AG*	720,916	OK1MP*	11,280
VE2LO/W6*	707,534	PA0WDW*	9880
EA7PZ*	691,344	HA6KNB*	9010
JAIACB*	683,740	WA6WGL	7148
KZ5LF*	613,855	PA0SCH	7120
9Q5BG*	605,110	VE7AFJ	6105
VE7UBC*	605,100	VE6ANE	5430
K7MNZ*	557,890	IS1AOV*	4248
W4EGY	493,755	VE2AXO*	3936
W7TZL	490,248	OZ6OB	3600
CE3EX*	452,516	LX2FD	2772
WA0TLT*	443,478	W9WYL	2148
W1KJL*	393,315	VE3TA*	2114
DJ9MJ*	377,700	VE3CWO	1910
W8CQ*	365,112	W7GNP	1730
SM4CMG*	355,434	HA6NA	700
PY2CBS*	348,115	W8TCO	122
VE6LZ*	331,364	SK4SSA	20
K6YUI*	319,044		* Certificate Winner
WB6IMP	313,306		
ON4CZ	280,372		
W3CIX	274,488		
W9YGN*	267,060		
K5ARH*	249,622		
DL1VR	240,445		
WB6RXM	237,842		
F9RC*	228,205		
F6AOE	216,894		
W1GKJ	208,796		
FO8BO*	198,100		
W0HAH	189,400		
KL7GPS*	186,885		
K7BVT	185,544		
W6JOX	168,760		
SM3DKL	152,220		
XE1YJ*	124,500		
W0MT	123,150		
ZL2ALW*	115,425		
WA5LJZ	100,875		
I61HB	98,380		
VE6MM	80,640		
VE4FG*	74,230		
W7RGL	73,365		
K6RTV	68,890		
VO2AF*	67,292		
DJ8BT	59,592		
11DML	57,205		
VE4SC	54,035		
W6AEE	53,200		
SM0QOY	42,786		
DL0AK	36,388		

### Multioperator

VE2LO/W6	709,370
DL8VX	691,862
HASKBF	372,416
WB6SCH	323,205
UK4FAD	140,112
WSCEG	116,460
KL7AIZ	46,584
HA5KFB	35,828
DK1AQ	14,768
HB9FT	2754

### SWL Printer

P. Menadier	455,468
S. Morton	243,036
P. Kueng	174,620
R. Hudyma	

### Check Logs

G6JF
WA2ULE
WAJHXR/YV5
VE7LL
VE3CXK
VE3RTT

### Late Entry

SMSAPI	21,252
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# FCC's Amateur Chief

at Las Vegas, Dallas, Miami



**A** PROSE WALKER, W4BW, Chief of the Amateur & Citizens Radio Division of the Federal Communications Commission, made his first major appearance in that capacity at the SAROC Convention, Las Vegas, Nevada, in January. On his return trip to Washington, he stopped in the Dallas-Fort Worth area to attend a meeting of the Richardson Wireless Klub; and later in the month he was featured on the program of the South-eastern Division Convention in Miami.

In his presentations he discussed at some length various problems facing amateur radio today, and his personal views on solutions. While it is true that only the seven Commissioners make *final* decisions in FCC matters, it is equally true that — since his division is responsible for the administration of amateur regulations, and conducts the studies and makes first drafts of eventual orders — his beliefs and conclusions most certainly have an influence on at least the initial course of events.

His opinions, therefore, are of considerable interest to every concerned amateur. We present below a summary of his remarks on the various subjects discussed. However, it must be understood clearly that these are indeed *all personal views*, that there could be “many a slip” between the first draft and the eventual outcome decided by FCC, so readers are cautioned not to assume that these will necessarily be the final results.

## VHF Repeaters (Docket 18803)

Vacancies on the staff as the result of retirements have delayed completion of the Report and Order. The following recommendations *probably* will be included in the Division's report:

1) The concept that the “least control is the best control” (urged by the League in its comments), will be applied.

2) Linking (cascading) of repeaters beyond two or three hops probably will not be permitted except where a well-documented need to provide for emergency situations has been submitted. (The original Notice of Proposed Rule-Making proposed *no linking* of repeaters).

3) Discrete In/Out frequencies for repeaters will not be specified. Amateurs will be encouraged to set up regional frequency coordinating committees. (The Notice of Proposed Rule-Making specified frequency pairs as in the Land-Mobile Services). However, repeater operations will likely be restricted to portions of various bands to prevent interference to other vhf and satellite operations as authorized by the recent Geneva WARC.

W4BW addressing North Texas area amateurs at the January meeting of the Richardson Wireless Klub (K5RWK). At Mr. Walker's left is Stu Bonney, W5PAQ, President.

4) The 600-watt power input proposal will not be adopted. Instead, the usual 1-kW input limitations will apply. Applicants for repeaters will be required to submit certain data such as output power, line loss, antenna characteristics, height above average terrain (HAAT), etc., so that the range of the repeater can be computed.

5) Automatic transmitter identification (ATIS) will be proposed for repeaters if adopted by the Commission.

6) Tone access (whistle on) will be permitted but not made mandatory. (The Notice of Proposed Rule-Making proposed mandatory tone access.)

7) The question of “which call to sign,” even though wrapped up in repeater operations, probably will be made the subject of a separate Notice of Proposed Rule Making. Other aspects such as logging, attended/unattended operation, control points, link circuits, etc., will be covered in the Report and Order.

## Phone Band Expansion (Docket 19162)

The various proposals and counter-proposals must be considered in light of all five objectives of the Amateur Service as set forth in Section 97.1 of the Rules:

“a) Recognition and enhancement of the value of the amateur service to the public as a voluntary non-commercial communication service, particularly with respect to providing emergency communications.

b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the Radio Art.

c) Encouragement and improvement of the amateur radio service through rules which provide for advancing skills in both the communications and technical phases of the Art.

d) Expansion of the existing reservoir within the amateur service of trained operators, technicians, and electronics experts.

e) Continuation and extension of the amateur's unique ability to enhance international good-will.”

Unfortunately, many of the proposals and counter-proposals appear to have not fully considered each of the five objectives.

One of the most important considerations is the effect of expansion of the U.S. phone bands upon both the attitude as well as the actual operations of amateurs in other countries. Recently a delegation of Canada's Department of Communications visited Washington and discussed at the FCC the impact upon Canada of some of the proposals.

Consideration must be given in any allocation plan to the fact that phone is a wide-band system, and the impact of any expansion on other emissions in those bands.

The Office of Telecommunications Policy, a part of the Executive Office of the President, in comments on possible phone-band expansion (1) endorsed cw as a spectrum conservation measure; (2) noted that cw overcomes language barriers and thereby enhances international good-will in a manner often not possible by phone; (3) noted that an amateur less oriented to voice often rates higher as an experimenter; and (4) expressed concern that expansion of the U.S. phone suballocations could adversely affect amateur operation in other countries where there is a great interest in cw.

The proposals must be considered band-by-band. The following appears feasible:

1) A modest expansion of the 75-meter phone band.

2) Expansion of the 40-meter phone band possibly to 7,150 kHz, a 50-kHz increase. The hardship upon Novices is recognized; however, crystals are relatively inexpensive. The window

between 7,075 and 7,100 kHz, used widely by phone stations in Regions I and III, must be kept open.

3) By far the most critical band is 20 meters. A change in the present allocations is not contemplated.

4) Although certain portions of the present 15-meter phone band are heavily loaded, other portions are lightly loaded. Relief can probably be achieved in day-to-day operations by shifting frequencies of operation without expansion of the phone bands. However, this band is far less critical than 20 meters.

5) Ten meters is such a broad band and is so subjected to propagation conditions that little benefit would accrue from changes in the allocations. The use of this band for satellite operations was expressly approved at Geneva last summer. Repeater operations may be feasible from 29.5 to 29.7 MHz on a non-exclusive basis.

6) No reductions in the Extra Class segments are foreseen.

#### 220 MHz

The EIA proposal to assign 2 MHz of the 5 MHz of this band is under active consideration. The Commission has been subjected to considerable pressure from supporters of the proposal. One of the considerations is that the Government has first priority of use in the band. It is suggested that comments in opposition to the EIA proposal be withheld until issuance of a Notice of Proposed Rule-Making.

### FCC AMATEUR CHIEF VISITS NORTH TEXAS

The January, 1972, meeting of the Richardson Wireless Klub marked a high point for amateurs from the Dallas, Fort Worth, and North Texas areas. A. Prose Walker, W4BW, Chief of the Amateur and Citizens Division, FCC, delivered a far-ranging address that touched on, nearly every topic of current interest to the amateur fraternity and included some new

Mr. Walker's visit to Texas was well filled with events planned to give him exposure to area amateur activities and thinking relating to matters presently before the Commission and to receive the benefits of his thinking on the same subjects. Upon his arrival from Las Vegas on the afternoon of January 10, he was met at the airport by Joe Beler, W5WY, and was whisked to the home of Joe Johnson, W5QBM, for a reception with club officers. Also present was Roy Albright, W5EYB, West Gulf Division Director. Following dinner with Mr. Albright and RWK officers, Mr. Walker gave his address at the club meeting. Invited guests present included Gene Harrison, W5LR, North Texas SCM, and members of Dallas, Tarrant County (Fort Worth and vicinity), and other North Texas area amateur radio clubs and repeater associations. It was a large, attentive, and appreciative audience. Mr. Walker devoted over an hour to answering questions from the floor after his address.

The following morning, Mr. Walker was hosted at breakfast by members of local repeater groups, after which he and Mr. Albright were taken on an intensive tour of Dallas and Fort Worth 2-meter fm repeaters. Conducting the tour were Byron Harrison, K5AIT, Ted Bensinger, W5PCX, and Jack Mason, W5NSQ. The first stop was at the Dallas Amateur Radio Club .28/.88 repeater, which features a tone-accessed link to the Dallas police dispatcher from amateur mobile stations. Representatives of the police department spoke enthusiastically of the participation of amateurs in the Community Crime Watch program. The group then visited the Fort Worth .34/.94 repeater and heard an area Civil Defense official speak warmly about amateur participation in Operation Skywarn, a severe weather alert net.

The consensus of area opinion is that Mr. Walker's visit presented a rare opportunity to gain a first-hand view into an important segment of current FCC activity and thinking. At the same time it gave him an opportunity to view some facets of modern amateur practice in depth. It was clear to all who talked with Mr. Walker and heard him speak that he is vitally interested in amateur radio from the active ham's point of view as well as the official position. — S. E. Bonney, W5PAQ, President, Richardson Wireless Klub.

## Excessive Power

The amateurs should clean up their own house by eliminating use of power in excess of that authorized by the Rules. Unless the abuses are ended, the Commission may specify tubes which can be used based upon plate dissipation and other characteristics.

## Conditional Class Licensees

The Commission is most concerned about mail examination procedures, and has evidence of actual fraud. When Conditionals have been called in for examination, only a small percentage (25 to 50%) appear, and close to 50% fail. Experience with Technicians has been similar. Consideration may be given to changing the Conditional Class to a "Provisional Class" with a limited life, possibly two or three years; and to require Conditionals moving close to a regular examination point to take a supervised exam within a given time, perhaps 90 days.


## Expansion of Allocations

Amateurs are faced with a golden opportunity in the next few years to obtain additional hf bands and/or expansion of some of the present hf bands, as the result of shift of much fixed traffic to satellite and cables. Already other services are preparing requests and justifications for new and additional space in this portion of the spectrum. Preparation of the case of the amateurs will be a big job both domestically and internationally, will

require the expenditure of substantial time and money for in-depth studies by allocation experts, and must call upon assistance by well-known amateurs throughout the World.

## Call Signs

A new call sign plan will be proposed which will utilize many different types of calls. The chief characteristic will be that the prefix will indicate the class of license held. For example, WT or KT may be assigned to technicians, WR to repeaters, WS to satellites, etc. Use of two by three calls will be minimized. The objectives are (1) to provide additional incentives to upgrade (as urged by the League), (2) to immediately reflect the class of license, and (3) to give Extra Class 25-Year licensees a call of their choice if unassigned. As an added incentive to attain the highest class of license, new call signs may be made available using 2-letter prefixes and 1- and 2-letter suffixes. The block from AA through AL may be used for prefixes to supplement the K and W blocks. In addition, the amateur moving from one district to another may request, if available, the same suffix (counterpart call). Finally, the 2-letter prefix/3-letter suffix (2 X 3) calls will be phased out for General Class and above.

**Caution:** Once again, please remember that Mr. Walker's remarks were intended to reflect his own views and not necessarily the views of the Chief, Safety & Special Services Radio Bureau, or the Commission. 

## 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.

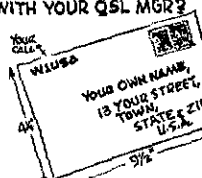
- W1, KI, WA1, WN1<sup>1</sup> - Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.  
W2, K2, WA2, WB2, WN2 - North Jersey DX Assn. P.O. Box 505, Ridgewood, NJ 07451.  
W3, K3, WA3, WN3 - Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.  
W4, K4 - North Alabama DX Club, P.O. Box 2035, Huntsville, AL 35804.  
WA4, WB4, WN4<sup>1</sup> - 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<sup>1</sup> - 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<sup>1</sup> - 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.  
W0<sup>1</sup> - Reggie Hoare, W0QYF, P.O. Box 115, Mitchellville, IA 50169.  
WA0<sup>1</sup> - Lloyd Harvey, W0QGI, P.O. Box 7, Attica, IA 50024.  
K0, WB0, WN0<sup>1</sup> - Dr. Phillip D. Rowley, K0ZFL, 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, C.Z.

- KH6, WH6 - John H. Oka, KH6DQ, P.O. Box 104, Aiea, Oahu, HI 96701.  
KL7, WL7 - Alaska QSL Bureau, Star Route Box 65, Wasilla, AK 99687.  
VE1 - L. J. Fader, VE1EQ, P.O. Box 663, Halifax, NS.  
VE2 - A. G. Daemen, VE2JJ, 2960 Douglas Avenue, Montreal 301, PQ.  
VE3 - R. H. Buckley, VE3UW, 20 Almont Road, Downview, ON.  
VE4 - D. E. McVirtie, VE4OX, 647 Academy Road, Winnipeg 9, MB.  
VE5 - A. Lloyd Jones, VE5JL, 2328 Grant Road, Regina, SK.  
VE6 - Karel Tettelaar, VE6AAV, Sub. Po 55, N. Edmonton, 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.  
<sup>1</sup> These bureaus prefer 5 X 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.

IS YOURS ON FILE  
WITH YOUR QSL MGR?



# Happenings of the Month

## DANNALS NEW PRESIDENT

Harry J. Dannals, W2TUK, director from the Hudson Division since 1965, on January 21 was elected as President of the American Radio Relay League, the seventh to hold the office. Harry was SCM of the New York City-Long Island Section from 1955 to 1961, assistant director, Hudson Division 1958-1961, and vice director, 1961-1964. He's a director and past president of the Hudson Amateur Radio Council, the group of metropolitan-area clubs which sponsored the 1964 National Convention, several division conventions, and the World's Fair Station, K2US; past vice president, SSBARA, which for years sponsored the "Sideband Show" just before the IRE (IEEE) convention; past director, Suffolk County Radio Club; past vice president, Lake Success Radio Club; past president, Nassau Radio Club; Commander, USNR; ORS, OPS, OO, OVS, AREC, A-1 Operator Club; Navy Mars; Life Member, QCWA; Charter Life Member, ARRL; and a few more *et ceteras*.

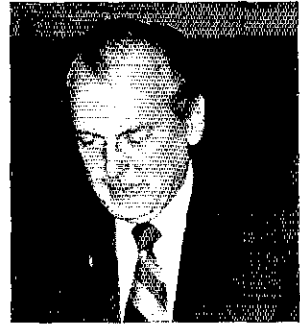


ARRL's New President, W2TUK

Our new president lives in Dix Hills, New York, with his wife Kay and four children (including a 250-country DX chaser named Bob, WB2UZU). The presidency of ARRL is, of course, an unsalaried post; Harry works as a senior engineer, Sperry Systems Management Division. He's 44 years old, licensed since 1946, and is himself the son of a ham, the late Earl Dannals, W2GG/K4GG.

His predecessor, Robert W. Denniston, W0DX, was not a candidate for reelection, preferring to

**EDITOR'S NOTE:** Because of the large number of photographs of the Board meeting, and because the names and titles of all the participants are listed in the minutes, we are identifying individuals only by call sign to save space. Unless otherwise noted, all are listed from left to right. The formal portrait is by QST's official photographer, Frank Beaudin; the candid are by W1CER and W9PRN.]



IARU President-nominee W0DX

concentrate on international affairs, a matter treated more fully in the editorial, page 9 of this issue. W0DX was, however, elected as an ARRL vice president.

Charles G. Compton, W0BUO, was reelected first vice president of ARRL and will serve in a similar capacity for IARU. Dr. R. O. Best, WSQKF, was also reelected as a vice president. John Huntoon, W1RW, was reelected as secretary, and David H. Houghton as treasurer; Honorary vice presidents are Carl L. Smith, W0BWJ, Ed Handy, W1BDI, and W. M. "Soupy" Groves, W5NW. John R. Griggs, W6KW, was chosen as a new member of the Executive Committee.

## BOARD MEETING HIGHLIGHTS

The ARRL Board of Directors met January 20-21, 1972, under its "new look" calling for two meetings per year. Election of officers was the biggest news, perhaps, especially concerning the office of president of the International Amateur Radio Union which has been held by the ARRL president since 1925. This matter is covered in the editorial, however, and the election of Harry J. Dannals as ARRL president is covered separately in "Happenings." So on to other news.

In view of the general increase in operating costs, and particularly the costs of postage for all classes of mail, the Board of Directors adopted the recommendations of its Finance Committee and, effective July 1, 1972, raised dues of members to \$7.50 in the U.S., \$8.50 in Canada (it costs \$1.26 more to send QST north of the border each year). Dues will be \$9 overseas. Life member dues are pegged at 20 times the annual rate, so will go to \$150 on July 1 for the U.S., its possessions, and the Commonwealth of Puerto Rico; \$170 in Canada, and \$180 elsewhere; all "time-payment" plans started before July 1, however, will be honored at the earlier rate. Thus, it will only take a U.S. ham 17 years and four months to amortize a \$130 life member fee; only 15 years, three months for a Canadian member to "break even" at the old



rate. (Incidentally, dues of non-profit membership organizations are not among the prices regulated by the U.S. government.)

Another big move is toward formal long-range planning. The Board asked for the naming of an *ad hoc* committee to list goals and objectives and develop formal "position responsibilities" for the Board, officers, and staff. (Later, President Dannals announced that the *ad hoc* committee would be the members of the Executive Committee plus Director Shima). The committee is to prepare written reports before the July meeting of the Board.

A special committee will promote and implement the growth of the new Amateur Satellite Service which was created officially at the World Administrative Radio Conference on Space Telecommunications at Geneva last summer. Here at home, the Repeater Advisory Committee has been asked to study a structure of Regional Frequency Coordination Committees to facilitate repeater operation. Other studies include vhf beacon stations, parts procurement for home constructors, training aids, 18-year-olds authorized to conduct examinations, sponsorship of technical symposia, and a Herbert Hoover, Jr. Memorial Station in the western part of the country.

FCC will be asked to allow operation by Technician and higher class licensees in the 50.0-50.1-MHz band; to relax mobile logging requirements; to require adequately filtered power supplies on frequencies above 144 MHz as well as below; and to grandfather from Advanced to Extra those with 40 years amateur experience and who have reached 60 years of age.

The ARRL Technical Merit Award for 1971 went to Mel Wilson, W2BOV/W1DEI, for his studies of sporadic-E-layer skip which led to *QST* articles in December, 1970, and March, 1971. The Board expressed its appreciation to elected and appointed volunteers working in the League's field organizations, and its thanks to FCC and the Canadian Department of Communications for co-operation with the amateur fraternity in regulatory matters. The Board agreed to have *QST* sent by first-class mail to SCMs to aid in their volunteer work on the League's behalf.

Proposals which failed of adoption included separate mobile and RTTY DXCC and WAS awards; cash award for *QST* articles; putting *QST* on newsstands (which was attractive in principle but failed on practical grounds); a propagation prediction column; and rotation of Board meetings on a fixed schedule around the continent (a similar but more flexible rotation will be studied by the Planning Committee).

These and other matters appear in detail in the full minutes, published elsewhere in this issue.

#### EXAM SCHEDULE CORRECTION

In the February issue of *QST*, the District 14 examination points incorrectly showed Missoula, Montana, in August. This city has been dropped; instead, there will be tests at Helena, Montana, in May.

#### EDGAR D. COLLINS

With deep sadness we report the sudden death, on January 7, 1972, of Edgar D. Collins, advertising assistant for *QST* and other League publications for the past 30 years — "Mr. Ham-Ad" to many of our members. Ed was enroute to work that morning by bus when he suffered a fatal heart attack; he would have been 65 years old on January 31. "Behind the Diamond" in February, 1970, *QST* recorded his interests in reading, writing letters-to-the-editor (over a thousand published!), sketching, walking, and working aboard freighters (e.g., with Capt. Carlsen, K2ZXM) during his vacations. Ed leaves a brother and a niece.

#### AMATEUR RADIO WEEK, PUERTO RICO

Puerto Rico will observe Amateur Radio Week March 20 to 26 this year, in accordance with a proclamation by the Secretary of State. On March 18 there will be a display of the Radio Club de Puerto Rico's station, KP4ID, at the Plaza Las Americas in San Juan. During the week itself, the ARRL film, "Ham's Wide World" will be shown on at least two TV stations. Closing the week will be the 33rd annual meeting and Hamfest of RCPR on Sunday, March 26, at Colegio San Antonio in Rio Piedras.

Chases' *Calendar of Annual Events* lists Amateur Radio Week for June 18-24, 1972, the week which ends with Field Day. Where there is no local reason to pick another date, this "week" is recommended to groups seeking proclamations, to take advantage of national publicity and the PR opportunities offered by FD activities. Libraries, banks, and malls often lend display space to worthwhile groups; why not start *now* to see what kind of celebration *your* club can develop?

#### AMATEUR ABOARD SKYLAB! . . .

With the recent announcement by NASA of the selection of crews for the three Skylab missions came the good news of the choice of Dr. Owen Garriott, W5LFL, ARRL and Amsat member. Skylab is a post-Apollo experimental space station project to take place next year. Three visits to the space station will be made by separate crews spending from 28 to 56 days aboard. Dr. Garriott is a member of the second crew commanded by Capt. Alan L. Bean. W5LFL's areas of specialization are electrical engineering and ionospheric physics. A primary job of the second crew will be the operation of a solar telescope.

#### . . . BUT HAM STATION NIXED

A proposal to permit the NASA Skylab astronauts to carry aboard a 10-meter transceiver has been turned down, but not without bringing favorable comment from the space agency on amateur space activities. In a letter to IARU President WØDX, Dr. Dale D. Myers, NASA Associate Administrator for Manned Space Flight, reported the decision not to accept the Amsat

proposal made with League backing. NASA commented that they were generally favorably disposed to encourage Amsat activities and that this proposal had broad appeal, but concluded that they could not add the ham station to Skylab at this stage of the program. Dr. Myers said, "Our conclusion was not an easy one to reach. Considered by itself, the proposal appeared feasible and reasonable -- one that we could not reject out of hand. It may be of some solace that the subject was brought to the attention of Dr. Fletcher (NASA Administrator) and Dr. Low (Deputy Administrator) because of the uniqueness of the proposal, and that the final decision was made by them, and only with reluctance."

MINUTES OF THE 1972 ANNUAL  
MEETING OF THE BOARD OF DIRECTORS

THE AMERICAN RADIO RELAY LEAGUE, INC.

January 20-21, 1972

1) Pursuant to due notice, the Board of Directors of The American Radio Relay League, Inc., met in annual session at the Shoreham Motor Hotel, Hartford, Connecticut, on January 20, 1972. The meeting was called to order at 9:50 A.M., with President Robert W. Denniston, WØDX, in the Chair, and the following directors present:

Roy L. Albright, W5EYB, West Gulf Division  
Ralph V. Anderson, KØNL, Midwest Division  
Max Arnold, W4WHN, Delta Division  
Robert York Chapman, W1QV, New England Div.  
Victor C. Clark, W4KFC, Roanoke Division  
Charles M. Cotterell, WØSIN, Rocky Mount. Div.  
Harry J. Dannels, W2TUK, Hudson Division  
Noel B. Eaton, VE3CJ, Canadian Division  
J. A. Gmelin, W6ZRI, Pacific Division  
John R. Griggs, W6KW, Southwestern Division  
Philip E. Haller, W9HPG, Central Division  
Harry A. McConaghy, W3SW, Atlantic Division  
Alban A. Michel, W8WC, Great Lakes Division  
Larry J. Shima, WØPAN, Dakota Division  
H. Dale Strieter, W4DQS, Southeastern Division  
Robert B. Thurston, W7PGY, Northwestern Div.

Also in attendance, as members of the Board without vote, were Charles G. Compton, WØBUO, First Vice President; K. O. Best, W5QKF, Vice President; and John Huntoon, W1RW, General Manager. Also in attendance, at the invitation of the Board as non-participating observers, were the following Vice Directors: Jesse Bieberman, W3KT, Atlantic Division; George A. Spencer, VE2MS, Canadian; Edmond A. Metzger, W9PRN, Central; Edward C. Gray, WAØCPX, Dakota; Franklin Cassen, W4WBK, Delta; Richard A. Egbert, W8-ETU, Great Lakes; Paul Grauer, WAØLLC, Midwest; Albert F. Gaetano, W6VZT, Pacific; L. Phil Wicker, W4ACY, Roanoke; Larry E. Price, W4DOD, Southeastern. There were also present Honorary Vice Presidents Wayland M. Groves, W5NW, and F. E. Handy, W1BDJ; Treasurer David H. Houghton; General Counsel Robert M. Booth, Jr., W3PS; Canadian Associate Counsel Arthur K. Meen, VE3RX; Assistant General Manager Richard L. Baldwin, W1RU; Communicator Manager George Hart, WINJM; Senior Assistant Secretary Perry F. Williams, W1UED; QST Technical Editor Doug DeMaw, W1CER; and Public Relations Consultant Don Waters.

2) On motion of Mr. Gmelin, unanimously VOTED that Item 10 of the agenda, action on committee recommendations, be moved up to follow reports of said committees; that Item 7, supplementary oral reports of the officers, be moved up to follow acceptance of the written reports; and to add to the listing of committee reports those for the ARRL Foundation, the advisory committees, and Amsat.

3) On motion of Mr. Thurston, unanimously VOTED that the minutes of the 1971 Annual Meeting of The Board of Directors are approved in the form in which they were issued by the Secretary.

4) On motion of Mr. Albright, unanimously VOTED that the minutes of the meeting will show the name of the person seconding each motion.

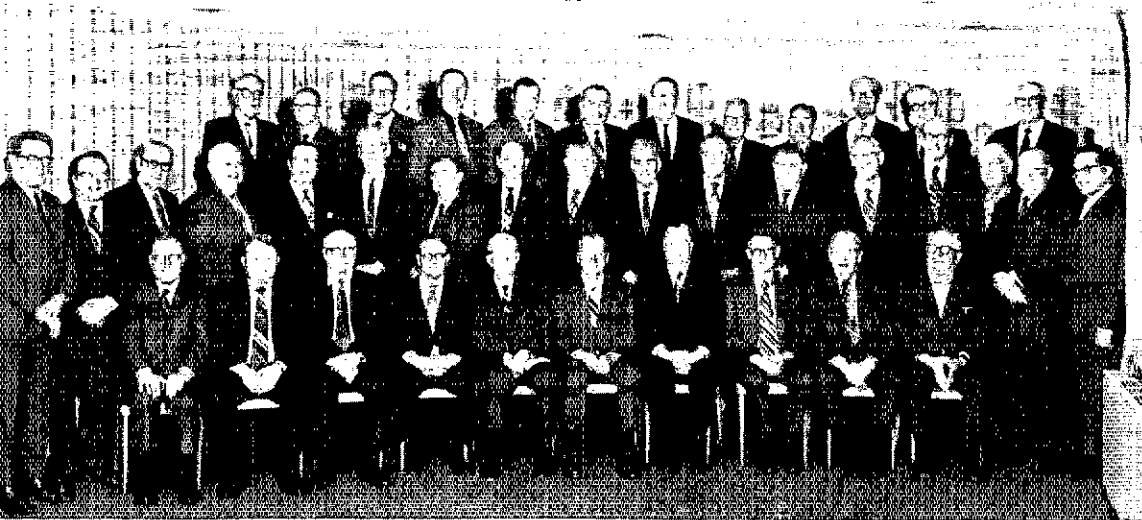
5) At this point, extensive oral reports were offered by the officers of the League, with particular attention to the results of the 1971 ITU Conference on Space Communications, and plans and preparations for future high-frequency allocations conferences. On motion of Mr. Chapman, seconded by Mr. Arnold, unanimously VOTED that the Board expresses its thanks to the President, and to the IARU delegation, for their thorough representation and accomplishments at the Space Conference. (Applause). During the course of the oral reports, the Board was in recess from 11:10 to 11:40 A.M., and again for luncheon from 1:00 to 1:45 P.M.

6) At this point an oral report was offered by the General Counsel, including a summary of his action on the tasks which had been assigned him by the 1971 Board Meeting.

7) Mr. Compton, as chairman, read the report of the Finance Committee; Mr. Gmelin, as chairman, read the report of the Planning Committee; Mr. Albright, as chairman, read the report of the Membership & Publications Committee; Mr. Haller, as chairman, read the report of the Public Relations Committee; Mr. Groves, as Chairman, presented the report of the Merit & Awards Committee; Mr. Chapman, as chairman, gave an oral report for the Committee on an ARRL Foundation. As liaison directors, Mr. Clark presented a report on the activities of the Contest Advisory Committee; Mr. Strieter on the DX Advisory Committee; Mr. Griggs on the VHF Repeater Advisory Committee; Mr. Clark on Amsat; and Mr. Gmelin on Oscar. During the course of the above, the Board was in recess from 3:55 until 4:10 P.M.

8) Moved, by Mr. Compton, seconded by Mr. Eaton, that in view of the general increase in operating costs, and particularly the costs of postage for all classes of mail, and to provide additional services to our membership, that effective July 1, 1972, By-Law 4 be amended to read as follows: "The dues of members of any class shall be \$7.50 per year in the United States and Possessions or the Commonwealth of Puerto Rico, and \$8.50 in Canada, payable annually in advance." After extensive discussion, on a roll call vote, the motion to amend the By-Law was ADOPTED, 16 votes in favor to none opposed; all directors voted in favor.

9) Moved, by Mr. Compton, seconded by Mr. Eaton, to amend By-Law 5, effective July 1, 1972, to read as follows: "Provided that a member is without sight, or is the husband or wife, brother or sister, son or daughter, father or mother of another member living at the same address and either a Life



The Board took time out Friday morning for an official photograph. Seated from left: W0BUO, W0PAN, W7PGY, W1RW, Treasurer Houghton, W0DX, W3PS, W0SIN, W6KW, W1QV. Standing, second row: PR Consultant Waters, W1RU, W3SW, W8WC, VE3RX, VE3CJ, W6ZRJ, K0NL, W2TUK, W4WHN, W6VZT, W4DQD, W9HPG, W4KFC, W5QKF, W5EYB, W1UED. Top row: W1BDI, W4DQS, WA0LLC, W1CER, WA0CPX, W8ETU, W1NJM, W4WBK, W3KT, W5NW, W9PRN, and W4ACY.

Member or one paying dues at the rate of \$7.50 per year in the United States and Possessions or the Commonwealth of Puerto Rico, or at the rate of \$8.50 in Canada, he may at his request pay dues of \$2.00 per year, in advance, but without the right to receive *QST*, said membership to be concurrent with that of the member receiving *QST*." On a roll call vote, the motion to amend the By-Law was ADOPTED, 16 votes in favor to none opposed; all directors voted in favor.

10) Moved, by Mr. Gmelin, seconded by Mr. Thurston, to amend By-Law 20 to substitute the word "Thursday" for the word "Friday" wherever the latter word appears. After discussion, on a roll call vote, the motion to amend the By-Laws was ADOPTED, 16 votes in favor to none opposed; all directors voted in favor.

11) Moved, by Mr. Gmelin, seconded by Mr. Cotterell, that the ARRL legal counsel is instructed to petition FCC on behalf of the ARRL to change the rules and regulations for amateur radio so that Technician, Conditional, and General Class licensees will be allowed to work A-1 operation in the 50.05- to 50.1-MHz segment of the 6-meter band, as well as Advanced and Extra Class as at present. The 6-meter band for cw would then be: 50 to 50.1 MHz - Advanced and Extra Class A-1; 50.05 to 50.1 MHz - Technician, Conditional, and General Class A-1. After discussion, on motion of Mr. Shima, seconded by Mr. Albright, VOTED (Mr. Eaton abstaining) to amend the motion to provide Technician and higher class operation in 50-50.1 MHz. The question then being on the original motion as amended, the same was unanimously (Mr. Eaton again abstaining) ADOPTED.

12) The Board was in recess for dinner from 6:00 P.M. to 8:05 P.M.

13) Moved, by Mr. Gmelin, seconded by Mr. Shima, that the General Manager implement a procedure for the 1972 Board of Directors election, whereby each candidate will be invited to submit one page of typewritten copy stating his qualifications and platform, such one-page statement to be printed by Headquarters and included with the mailing of ballots. But, after extensive discussion, the motion was rejected.

14) On motion of Mr. Michel, seconded by Mr. Gmelin, VOTED that the President shall instruct the ARRL Planning Committee to institute a six-month study of the present standing committees of the Board of Directors to determine what changes, if any, should be made in the By-Laws regarding Standing Committees in order to make the committee structure more efficient. Mr. Chapman requested to be recorded as voting in favor.

15) Moved by Mr. Michel, seconded by Mr. Gmelin, that the General Manager instruct the Headquarters staff to establish a mobile WAS and DXCC Award, this award to be a separate but regular DXCC or WAS certificate with a mobile sticker. But, after discussion, the motion was rejected, 6 votes in favor to 9 opposed. Mr. Chapman requested to be recorded as voting in favor.

16) On motion of Mr. Albright, seconded by Mr. Shima, unanimously VOTED that elected League officials receive *QST* by first-class mail.

17) Moved, by Mr. Albright, seconded by Mr. Thurston, that the General Manager initiate action to resume sale of *QST* on the newsstands, date of resumption of such sales to be determined by the Board of Directors. But, after extensive discussion, the motion was rejected, 5 votes in favor to 10 opposed. Mr. Griggs requested to be recorded as voting in favor.

18) On motion of Mr. Haller, seconded by Mr. Griggs, unanimously VOTED that the Public Relations Committee of the Board be directed to continue to investigate and determine the availability of material for use in a future film on amateur radio public service accomplishments.

19) On motion of Mr. McConaghy, seconded by Mr. Thurston, unanimously VOTED that in recognition of outstanding studies and contributions to the advancement and knowledge of "E" layer propagation in the VHF range as reported in December 1970 and March 1971 *QST*, the League presents the 1971 Technical Merit Award to Melvin S. Wilson, W2BOC/W1DEI, Pittsford, N.Y.

20) On motion of Mr. Griggs, seconded by Mr. Gmelin, unanimously VOTED that the annual



The "gavel end" of the table — W3PS, W0DX, W1RW

27) At this point, President Denniston announced to the Board his view that the dual responsibilities of ARRL and International Amateur Radio Union presidencies have grown beyond the capabilities of one man, and accordingly he declines to stand as a candidate for reelection as ARRL president. He indicated that, if the Board so wishes, he would be happy to serve separately as president of IARU, if such a nomination were made by the Board and approved by member-societies of the Union.

reports of the directors to the Board of Directors are accepted and the same placed on file.

21) The Board was in recess from 9:40 to 10:00 P.M.

22) On motion of Mr. Chapman, seconded by Mr. Haller, the following resolution was unanimously ADOPTED:

WHEREAS, Edward P. Tilton, W1HDQ, has for more than 25 years been VHF Editor of *QST*; and WHEREAS, he has served the League with foresight, intelligence, and fidelity; and WHEREAS, he has provided, through his travels, a valuable interface with the members, adding thereby to the stature of the League;

NOW THEREFORE BE IT RESOLVED, by the Board of Directors of The American Radio Relay League, that it does hereby commend Edward P. Tilton for his devotion to the League and amateur radio.

23) Moved, by Mr. Chapman, seconded by Mr. Arnold, that the League study the feasibility of petitioning FCC to permit licensed amateurs, 18 years of age and older, to conduct license examinations. After extensive discussion, a roll call vote being requested, the motion was ADOPTED, 14 votes in favor to 1 opposed; all the directors voted in favor except Mr. Albright, who voted opposed, and Mr. Eaton who abstained.

24) On motion of Mr. Gmelin, seconded by Mr. Griggs, after extensive discussion, unanimously VOTED that the President appoint a special committee to make a study of the possible establishment of a League-sponsored Herbert Hoover, Jr. Memorial Station in the western United States.

25) On motion of Mr. Clark, seconded by Mr. Arnold, unanimously (Mr. Eaton abstaining) VOTED that the General Counsel approach the Federal Communications Commission regarding the continued need for maintaining a detailed log of contacts by amateur mobile stations, with the objective of negotiating a relaxation of these requirements.

26) The Board recessed at 10:30 P.M., reconvening at 9:15 A.M. on January 21, with all directors and other persons hereinbefore mentioned in attendance.

28) Moved, by Mr. Cotterell, seconded by Mr. Griggs, that the 50¢ of each year's membership dues to the League now normally left with an affiliated club of the League, be collected as it is with any other member's dues, and that a refund in the amount of 50¢ per membership for each membership remitted by an affiliated club be made by the General Manager of the League after the end of each calendar year. After discussion, on motion of Mr. Clark, seconded by Mr. Strieter, VOTED that the matter is referred to the Membership and Publications Committee for study. The question then being on the original motion as amended, the same was unanimously ADOPTED.

29) On motion of Mr. Strieter, seconded by Mr. Albright, after discussion, unanimously VOTED that a study be made by the Headquarters staff for all possibilities for procuring hard-to-get components necessary in the building of specific construction articles as printed in *QST* or the *Handbook*.

30) Moved, by Mr. Griggs, seconded by Mr. Thurston, that the General Counsel is hereby instructed to file a petition with the Federal Communications Commission requesting that a change be made in Rule 97.71 of the Amateur service Regulations, so as to require adequately filtered power supplies on all transmitters, regardless of frequency. After extended discussion, on motion of Mr. Gmelin, seconded by Mr. McConaghy, unanimously VOTED to call for a decision on the question. Whereupon Mr. Griggs' motion was ADOPTED, 12 votes in favor to 3 opposed, Mr. Eaton abstaining; Mr. Chapman requested to be recorded as voting opposed.

31) Moved, by Mr. Albright, seconded by Mr. Shima, that the General Manager shall publish annually in May *QST* a brief financial resume of the preceding year's financial history, the resume to be in the form of a "pie chart" showing the percentage of dollars spent and received for all major categories of revenue and expense. After discussion, on motion of Mr. Gmelin, seconded by Mr. Michel, unanimously VOTED to refer this matter to the Finance Committee for study. The question then being on the original motion as amended, the same was unanimously ADOPTED.

32) Moved, by Mr. McConaghy, seconded by Mr. Shima, to amend the last portion of Article 4 of the Articles of Association to read as follows: "The Board shall meet twice each year at times and places provided by the By-Laws. The first meeting shall be called the Annual Meeting, and shall be a closed meeting. The second meeting shall be called the Membership Meeting, and will be an open



The Treasurer's Report, by Dave Houghton; W0SIN (left), W9HPG (right).

And at the other end: W4WBK, W5NW, W4DQD (near window), W8ETU, WA0LLC (center), W1BDI (next to curtain), W3SW (foreground), W1NJM, W4ACY. Back to camera: W2TUK.



meeting. Special meetings of the Board shall be called by the President upon written request of at least one-half of the Board members, as then constituted." After extensive discussion, on motion of Mr. Shima, seconded by Mr. Griggs, VOTED to refer this matter to the General Counsel for study as to its legal aspects. After further discussion, the question then being on the motion as amended, the same was rejected. During the course of this action, the Board was in recess from 10:20 A.M. to 10:55 A.M.

33) On motion of Mr. Eaton, seconded by Mr. Gmelin, the following resolution was unanimously ADOPTED:

BE IT RESOLVED, that the Board of Directors of the American Radio Relay League do hereby extend to the relatives of Edgar D. Collins their sincere condolences and do express their sense of loss at his sudden death, noting his 25 years of faithful service to the League and amateur radio as advertising assistant for *QST* and League publications.

34) On motion of Mr. Shima, seconded by Mr. Griggs, after extended discussion, unanimously VOTED that the President of ARRL shall appoint and direct a special *ad hoc* committee to develop proposed long- and short-range goals and objectives for the American Radio Relay League, Inc., proposed goals and objectives to be submitted to the Board (in writing) 30 days prior to the July 1972 Board meeting; formal Board action will be required to adopt the proposed goals and objectives.

35) On further motion of Mr. Shima, seconded by Mr. Albright, unanimously VOTED that the special *ad hoc* committee shall study the duties and responsibilities of the Board, officers, and staff and develop formal position responsibilities which consider: (1) equitable distribution of duties and responsibilities, (2) maximum utilization of abilities and talent available within ARRL management, and (3) means of measuring attainment of goals and objectives; proposed responsibilities are to be submitted in writing to the Board 30 days prior to the July 1972 Board meeting; formal Board action will be required to adopt the proposed responsibilities.

36) On motion of Mr. Strieter, seconded by Mr. Chapman, the following resolution was unanimously ADOPTED:

WHEREAS, this year marks the 25th during which Rodney Newkirk, W9BRD, has edited the *QST* column, "How's DX?" and, WHEREAS, his wit and humor have helped teach painless lessons in good operating practices to DXers, and WHEREAS, the information conveyed in the column has been valuable to countless radio amateurs; NOW, THEREFORE BE IT RESOLVED, that the Board of Directors of The American Radio Relay League do hereby convey their hearty "TNX" and "FB, OM" to Rod Newkirk for a job enticingly done.

"But this is important!" -- W5EYB, W3SW, W1NJM

37) On motion of Mr. Dannats, seconded by Mr. Cotterell, after discussion, unanimously VOTED that a special committee be established by the President to plan, guide, and coordinate the growth of the Amateur Satellite Service created by the 1971 World Administrative Radio Conference of the International Telecommunication Union.

38) Moved, by Mr. Anderson, seconded by Mr. Shima, to amend Article 7 of the Articles of Association so that the first sentence will read as follows: "A vacancy in the Board of Directors shall be deemed to occur upon the death, resignation, move of permanent residence outside the division from which elected, or refusal to act of any director." After discussion, on a roll call vote, the motion to amend the articles was ADOPTED, 16 votes in favor to none opposed; all directors voted in favor.

39) On motion of Mr. Chapman, seconded by Mr. Arnold, unanimously VOTED that this Board go on record as recognizing the dedication of Roland Bourne, W1ANA, for his work in perpetuation of early amateur radio equipments and historical facts, in his duties as the ARRL Amateur Museum Curator, and extends its best wishes for his speedy recovery.

40) Moved, by Mr. Gmelin, seconded by Mr. Shima, that the General Manager is instructed to include in the contest calendar in *QST*, those contests of other amateur radio magazines and societies. But, after discussion, on motion of Mr. Clark, seconded by Mr. Chapman, unanimously VOTED that the matter is laid on the table.

41) On motion of Mr. Clark, seconded by Mr. Chapman, unanimously VOTED that an amount not to exceed \$3,000 be authorized to the Radio Amateur Satellite Corporation for reimbursement of travel and administrative expenses during 1972.

42) On motion of Mr. Griggs, seconded by Mr. Chapman, after discussion, unanimously VOTED that the General Manager is hereby instructed to provide for sale at cost to those qualified to receive and wear it, a lapel pin for anyone ever achieving a place on the DXCC Honor Roll.





43) On motion of Mr. Albright, seconded by Mr. Shima, after discussion, unanimously VOTED that the General Manager review training aids films and film strips, and prepare a program for updating those whose content no longer conforms to present-day usage.

44) Moved, by Mr. Haller, seconded by Mr. Albright, that the ARRL establish a DXCC award for RTTY stations with requirements similar to present DXCC rules. After discussion, moved, by Mr. Shima, seconded by Mr. Clark, that the subject be referred to the DX Advisory Committee for study and recommendations; on the motion to amend there was a tie vote, 8 votes in favor to 8 opposed; the Chair cast the deciding vote in the negative, so the motion to amend was lost. The question then being on the original motion, the same was rejected, 4 votes in favor to 11 opposed.

45) The Board was in recess for luncheon from 12:30 P.M. to 1:05 P.M.

46) On motion of Mr. Shima, seconded by Mr. Dannels, after extensive discussion, VOTED that in recognition and appreciation for long-time support of the American Radio Relay League, members shall be awarded a distinctive pin signifying that they have attained a total of 25 or 50 years membership in ARRL as reflected by ARRL records. Mr. Chapman requested to be recorded as voting opposed.

47) Moved, by Mr. Anderson, seconded by Mr. Shima, to amend By-Law 20 to substitute the word

Concentration . . . W5QKF and KØNL (during recess)

"March" for the word "January," and substitute the word "September" for the word "July." After extended discussion, on motion of Mr. Gmelin, seconded by Mr. Arnold, VOTED to amend the motion to refer the matter to the Planning Committee for study. The question then being on the original motion as amended, the same was unanimously ADOPTED.

48) Moved, by Mr. Gmelin, that the Editor of *QST* shall establish a monthly radio propagation column in *QST*. But there was no second, so the motion was lost.

49) On motion of Mr. Clark, seconded by Mr. Cotterell, unanimously VOTED that a committee be appointed by the President to study and prepare recommendations as to the desirability of re-phrasing and updating the amateurs code.

50) Moved, by Mr. Cotterell, seconded by Mr. Shima, that it is the sense of this Board of Directors that whenever it is found feasible by consultation with the President and General Manager and upon a majority vote of the directors, the second meeting of the American Radio Relay League's Board of Directors be convened at a site in one of our large metropolitan areas; this site to be rotated throughout the United States and Canada, and that one evening of this meeting be devoted to being available to the press such as newspaper and magazine reporters, radio and television interviews and that a second evening be devoted to an open meeting of the Board with as many amateur radio operators and friends of amateurs as may find it convenient to attend; all to be as widely publicized as possible. After discussion, on motion of Mr. Chapman, seconded by Mr. Gmelin, unanimously VOTED to amend the motion to refer the subject to the Planning Committee for study. The question then being on the original motion as amended, the same was ADOPTED.

51) On motion of Mr. Strieter, seconded by Mr. Gmelin, VOTED to take from the table Mr. Gmelin's earlier motion concerning *QST* contest listings. Moved, by Mr. Strieter, seconded by Mr. Shima, to amend the motion by striking the text and substituting therefor the following: "that the General Manager be instructed to insert line items in the Operating Events column at the appropriate times specifying the dates and times of the CQ WW Phone and CW DX Contests." After extended discussion, the motion to amend was ADOPTED, 11 votes in favor to 4 opposed. The question then being on the original motion as amended, the same was ADOPTED, 9 votes in favor to 4 opposed.

52) Moved, by Mr. Griggs, seconded by Mr. Shima, that an *ad hoc* committee consisting of the three vice-presidents of the League be established to study the feasibility and desirability of electing the ARRL president by the League membership at large, and also to consider similarly the limiting of the president's term in office to a maximum of four years, or six years, and to report upon its findings at the next regular ARRL Board meeting, together with appropriate changes in the by-laws as necessary. After discussion, on motion of Mr.



. . . W9PRN . . .

Clark, seconded by Mr. Arnold, VOTED to amend the motion to provide that the committee personnel should be appointed by the President. Moved, by Mr. Cotterell, to further amend the motion to provide that the consideration of this matter is postponed to the July meeting; but there was no second, so this motion to amend was lost. On motion of Mr. Arnold, seconded by Mr. Albright, VOTED to further amend the motion to provide that because of the nature of non-profit corporations and possible conflict with the corporation laws of the State of Connecticut, the matter is referred to the General Counsel for a study and opinion on the legality of such procedure. The question then being on the original motion, the same was ADOPTED, 12 votes in favor to 3 opposed.

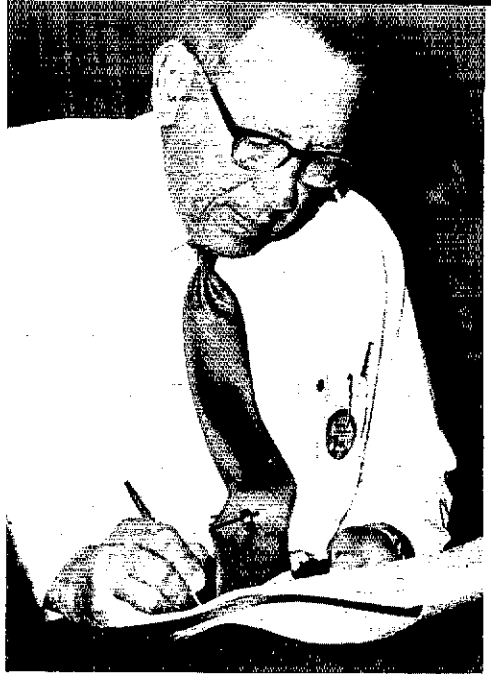
53) Moved, by Mr. McConaghy, seconded by Mr. Shima, to amend By-Law 31 by adding a sentence at the end as follows: "The president shall appoint, as an interim appointment, newly elected directors to Standing Committees, for the unexpired term of members not re-elected as director." After extended discussion, on a roll call vote, the motion to amend was rejected, 2 votes in favor to 12 opposed. All the directors voted opposed except Messrs. Haller and McConaghy, who voted in favor, and Messrs. Albright and Cotterell, who abstained.

54) Moved, by Mr. Haller, seconded by Mr. Albright, that the VHF Repeater Advisory Committee be authorized and directed to establish, with the approval of the Executive Committee, regional frequency coordinating committees, who would suggest practical frequency assignments for coordination under the FCC rules. After discussion, on motion of Mr. Clark, seconded by Mr. Cotterell, unanimously VOTED that the matter is laid on the table.

55) On motion of Mr. Gmelin, seconded by Mr. Haller, unanimously VOTED that the General Manager is hereby authorized to reimburse the division directors for actual expenses incurred by them during the year 1972 in the proper administration of ARRL affairs in their respective divisions, up to amounts as follows:

Canadian Division Director	\$1750
Atlantic Division Director	3600
Central Division Director	2400
Dakota Division Director	1600
Delta Division Director	2900
Great Lakes Division Director	2500
Hudson Division Director	2500
Midwest Division Director	2200
New England Division Director	2700
Northwestern Division Director	2500
Pacific Division Director	4000
Roanoke Division Director	2000
Rocky Mountain Division Director	1600
Southeastern Division Director	2500
Southwestern Division Director	3500
West Gulf Division Director	2900

56) On motion of Mr. Chapman, seconded by Mr. Arnold, unanimously VOTED that the amounts of \$88.24 for the Atlantic Division, \$139.13 for the Dakota Division, \$24.27 for the Rocky Mountain Division, and \$70.38 for the South-

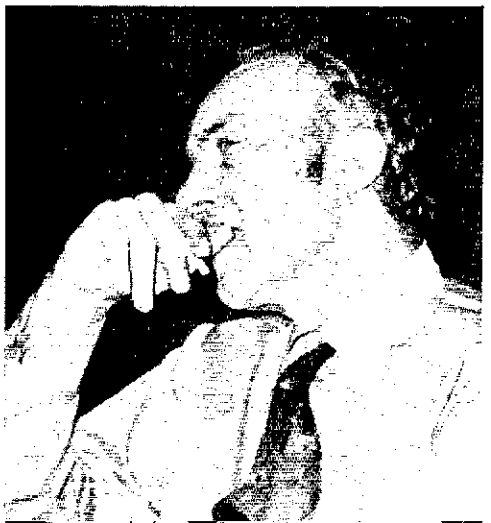


western Division, are authorized as additional reimbursed expenses for 1971.

57) On motion of Mr. Thurston, seconded by Mr. Griggs, unanimously VOTED that to continue the Board's policy of reimbursing Section Communications Managers and QSL Managers of the League for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1972 a total amount not to exceed \$13,500 under terms prescribed by the Communications Manager for SCMs, and the General Manager for QSL Managers, following the general pattern established by the Board.

58) On motion of Mr. Arnold, seconded by Mr. Cotterell, unanimously VOTED that, to continue the Board's policy of reimbursing Section Emergency Coordinators for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1972 a total amount not to exceed \$8,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

59) On motion of Mr. Gmelin, seconded by Mr. Griggs, unanimously VOTED that, to continue





Earnestness, W5EYB and VE3CJ . . .

the Board's policy of reimbursing National Traffic System officials above the section level for certain approved travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1972 a total amount not to exceed \$6,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

60) On motion of Mr. Compton, seconded by Mr. Gmelin, unanimously VOTED that the minutes show that the General Counsel reported upon the progress to date, in the establishment of a "Legal Counsel Committee," pursuant to Minute 32 of the Minutes of the 1971 Annual Meeting of the Board of Directors.

61) On motion of Mr. McConaghy, seconded by Mr. Clark, unanimously VOTED that the minutes show that the General Counsel reported that comments had been filed with the Federal Communications Commission as directed by Minutes 9, 35, 40, 43, and reported upon action taken pursuant to Minutes 37, 50, 60, 80, and 94 of the Minutes of the 1971 Annual Meeting of the Board of Directors.

62) The Board was in recess from 3:10 to 3:30 P.M.

63) The Chair announced the opening of nominations for the office of President. Mr. Dannals nominated Mr. Denniston; but, after expressing his appreciation, Mr. Denniston withdrew his name. Mr. Shima nominated Mr. Compton; but, after expressing his appreciation, Mr. Compton declined the nomination. Mr. Clark nominated Mr. Dannals. On motion of Mr. Chapman, seconded by Mr. Haller, unanimously VOTED that the nominations are closed. The Chair appointed Messrs. Bieberman, Metzger, and Wicker as Tellers. The Tellers announced the result of the balloting as follows: 15 votes for Mr. Dannals, 1 blank; whereupon Harry J. Dannals, W2TUK, was declared elected President of the League for the ensuing term. (Extended applause).

64) The Chair announced the opening of nominations for the office of First Vice President. Mr. Gmelin nominated Mr. Eaton; but, after expressing appreciation, Mr. Eaton declined the nomination. Mr. Clark nominated Mr. Compton. On motion of Mr. Chapman, seconded by Mr. Griggs, unanimously VOTED that the nominations are closed. The Tellers announced the result of the balloting as follows: 12 votes for Mr. Compton, 4 blank votes. Whereupon Charles G. Compton, W0BUO, was declared elected First Vice President of the League for the ensuing term. (Applause).

65) The Chair announced the opening of nominations for an additional Vice President. Mr. Dannals nominated Mr. Denniston. Mr. Griggs nominated Mr. Best; but, after expressing appreciation, Mr. Best declined the nomination. On motion of Mr. Chapman, seconded by Mr. Michel, unanimously VOTED that the nominations are closed. The Tellers announced the result of the balloting as follows: 13 votes for Mr. Denniston, 3 blank votes. Whereupon Robert W. Denniston, W0DX, was declared elected as a Vice President of the League for the ensuing term. (Applause).

**BOARD THANKS VOLUNTEER  
A.R.R.L. OFFICIALS**

The Board expressed by resolution its sincere thanks for the untiring work and devotion to the League and to amateur radio by the vice directors, assistant directors, SCMs, SECs, QSL Managers, and all members of the League. It also thanked the FCC and DOC for their cooperation on regulatory matters; and commended the Intruder Watch for their dedicated efforts toward the preservation of amateur radio.

66) The Chair announced the opening of nominations for an additional Vice President. Mr. Compton nominated Mr. Carl Smith, W0BWJ. Mr. Albright nominated Mr. Best. On motion of Mr. McConaghy, seconded by Mr. Chapman, unanimously VOTED that the nominations are closed. The Tellers announced the result of the balloting as follows:

Mr. Best 9  
Mr. Smith 7

Whereupon Roemer O. Best, W5QKF, was declared elected as a Vice President of the League for the ensuing term. (Applause).

67) The Chair announced the opening of nominations for Honorary Vice Presidents. Mr. Shima nominated Carl Smith, W0BWJ. On motion of Mr. McConaghy, seconded by Mr. Chapman, unanimously VOTED that the nominations are closed. The Tellers announced the result of the balloting as



and hilarity, W1QV and K0NL.



follows: 15 votes for Mr. Smith, 1 blank vote. Whereupon Carl L. Smith, WØBWJ, was declared elected an Honorary Vice President of the League for the ensuing term. (Applause).

68) The Chair invited any other nominations for Honorary Vice President. Mr. Chapman nominated Mr. Handy. On motion of Mr. Clark, seconded by Mr. Cotterell, unanimously VOTED that the nominations are closed. The Tellers announced the results of the balloting as follows: 16 votes for Mr. Handy. Whereupon Francis E. Handy, WIBDI, was declared elected an Honorary Vice President of the League for the ensuing term. (Applause).

69) The Chair invited any other nominations for Honorary Vice President. Mr. McConaghy nominated Mr. Groves. On motion of Mr. Chapman, seconded by Mr. Clark, unanimously VOTED that the nominations are closed. The Tellers announced the results of the balloting as follows: 16 votes for Mr. Groves. Whereupon Wayland M. Groves, W5NW, was declared elected an Honorary Vice President of the League for the ensuing term. (Applause).

70) At this point President-elect Dannals made the following statement:

"I believe that the offices of President of the American Radio Relay League and President of the International Amateur Radio Union are each so important and so demanding of time and energy that they should be held by separate individuals. I therefore choose not to serve as IARU President, and I move the nomination of ARRL Vice President Robert W. Denniston, WØDX, as the ARRL official to be recommended to the IARU headquarters to serve as President of the IARU, the matter then to be voted on by IARU member-societies as specified in the IARU Constitution.

The motion was seconded by Mr. Michel, and unanimously ADOPTED.

71) The Chair announced the opening of nominations for the office of Secretary. Mr. Eaton nominated Mr. Huntoon. On motion of Mr. McConaghy, seconded by Mr. Clark, unanimously VOTED that the nominations are closed. The Tellers announced the results of the balloting as follows: 13 votes for Mr. Huntoon, 3 blank votes. Whereupon John Huntoon, W1RW, was declared elected Secretary of the League for the ensuing term. (Applause).

72) The Chair announced the opening of nominations for Treasurer. Mr. Chapman nominated Mr. Houghton. On motion of Mr. Cotterell, seconded by Mr. Michel, unanimously VOTED that the nominations are closed. The Tellers announced the results of the balloting as follows: 16 votes for Mr. Houghton. Whereupon David H. Houghton was declared elected as Treasurer of the League for the ensuing term. (Applause).

73) The Chair announced that the Board would now proceed to the election of four directors to the Executive Committee for the ensuing year. Mr. Michel nominated Mr. Eaton. Mr. Cotterell nominated Mr. Thurston. Mr. Griggs nominated Mr. Albright. Mr. Thurston nominated Mr. Clark. Mr. Albright nominated Mr. Griggs. Mr. Chapman nominated Mr. Gmelin. On motion of Mr. Chapman, seconded by Mr. McConaghy, un-



W1BDI enjoys W3KT's anecdote.

animously VOTED that the nominations are closed. The Tellers announced the results of the balloting as follows:

Mr. Clark	15
Mr. Thurston	14
Mr. Eaton	11
Mr. Griggs	9
Mr. Albright	8
Mr. Gmelin	7

Whereupon Victor C. Clark, W4KEC, Robert B. Thurston, W7PGY, Noel B. Eaton, VE3CJ, and John R. Griggs, W6KW, were declared elected as members of the Executive Committee for the ensuing term. (Applause).

74) The Board was in recess from 4:30 to 4:50 P.M.

75) On motion of Mr. Haller, seconded by Mr. Albright, unanimously VOTED to take from the table his motion concerning regional frequency coordinating committees. On motion of Mr. Haller, seconded by Mr. Michel, unanimously VOTED to amend the motion by striking the text and substituting therefor the following: "that the VHF Repeater Advisory Committee be encouraged to



W2TUK sending, WØPAN receiving.



Ellen White, W1YL, brought mail to the hotel and came away with a surprise plaque from the Contest Advisory Committee, presented by W4KFC, while W1NJM beams approval.

bursement for the cost of printing and mailing to members and affiliated clubs one section newsletter per year for the purpose of disseminating information of interest and concern to the section membership regarding Communications Department activities. Mr. Thurston requested to be recorded as voting opposed.

83) On motion of Mr. Clark, seconded by Mr. Chapman, unanimously VOTED that funding not to exceed \$250 per committee be authorized for each of the advisory committees created by the Board of Directors.

84) Moved, by Mr. Gmelin, seconded by Mr. Griggs, that the General Manager shall pay an award of \$100 in addition to the Cover Plaque given for the article in *QST* voted to be best in each issue of *QST*. But, after discussion, the motion was rejected. Messrs. Gmelin and Griggs requested to be recorded as voting in favor.

85) Moved, by Mr. Griggs, seconded by Mr. McConaghy, that the next meeting of the Board be held at Morro Bay, California. After discussion, moved, by Mr. Gmelin, seconded by Mr. Strieter, to amend the motion to provide that the next meeting would be in San Francisco; but, after extended discussion, the motion was rejected; Mr. Gmelin requested to be recorded as voting in favor. The question then being on the original motion, the same was rejected; Mr. Gmelin requested to be recorded as voting opposed, and Mr. Griggs requested to be recorded as voting in favor.

86) At this point the following committee appointments were announced:

Finance Committee	Mr. Eaton, Chairman Mr. Albright Mr. Shima
Planning Committee	Mr. Gmelin, Chairman Mr. Clark Mr. Cotterell
Membership & Publications Committee	Mr. Arnold, Chairman Mr. Michel Mr. Thurston
Public Relations Committee	Mr. Haller, Chairman Mr. Anderson Mr. Griggs
Merit & Awards Committee	Mr. Groves, Chairman Mr. Chapman Mr. McConaghy

87) On motion of Mr. Compton, seconded by Mr. Griggs, unanimously VOTED that the General Manager is hereby authorized to pay expenses for the operation of ARRL committees during the year 1972, but not to exceed amounts as follows:

Finance Committee	\$2500
Planning Committee	1500
Membership & Publications Committee	900
Public Relations Committee	1500
Merit & Awards Committee	600

88) On motion of Mr. Thurston, seconded by Mr. Compton, unanimously VOTED that the sum of \$500 be appropriated for the use of the special committee on the study of a Herbert Hoover, Jr. Memorial Station.

prepare recommendations leading to the establishment of regional frequency coordinating committees for terrestrial repeaters and links." The question then being on the motion as amended, the same was unanimously ADOPTED.

76) On motion of Mr. Haller, seconded by Mr. Michel, after discussion, unanimously VOTED that the Board of Directors endorse the suggestions of our Public Relations Consultant in relation to additional emphasis on youth activities, and request the General Manager to implement this program.

77) On motion of Mr. Haller, seconded by Mr. Griggs, after discussion, unanimously VOTED that the General Manager investigate the possibilities of establishing or helping others to establish VHF beacon stations.

78) On motion of Mr. McConaghy, seconded by Mr. Gmelin, unanimously VOTED that an *ad hoc* committee be appointed by the President to consider a reapportionment of the territories of the Atlantic and Hudson Divisions to effect a better balance of membership and territory.

79) On motion of Mr. McConaghy, seconded by Mr. Michel, after extensive discussion, VOTED, 11 votes in favor to 4 opposed (Mr. Eaton abstaining), that the Federal Communications Commission be petitioned to consider the grandfathering of Advance licensees to the next higher grade who have attained a life span of 60 years of age or higher, plus 40 years of continuous license tenure. Mr. Chapman requested to be recorded as voting in favor.

80) Moved, by Mr. McConaghy, that the Board of Directors petition the FCC requesting change of classification for the Technician Class license to Technician I and Technician II; Technician I to retain "Experimenter" classification; Technician II to be classified "Communicator." But there was no second, so the motion was lost.

81) On motion of Mr. Chapman, seconded by Mr. Clark, VOTED that the President appoint a special committee to study and report to this Board on the feasibility of holding and sponsoring technical symposia.

82) On motion of Mr. Clark, seconded by Mr. Shima, after extended discussion, VOTED, 12 votes in favor to 3 opposed, that Section Communications Managers, at the discretion of the Communications Manager, are authorized reim-

"Damfino where he got that!" -- W1RU and WØDX.



89) On motion of Mr. Best, seconded by Mr. Arnold, unanimously VOTED that the Board expresses its sincere thanks for the untiring work and devotion to the League and to amateur radio by the vice directors, assistant directors, SCMs, SECs, QSL Managers, and all members of the

89) On motion of Mr. Best, seconded by Mr. Arnold, unanimously VOTED that the Board expresses its sincere thanks for the untiring work and devotion to the League and to amateur radio by the vice directors, assistant directors, SCMs, SECs, QSL Managers, and all members of the League; it is the sense of the Board that their contribution to amateur radio has done much to enhance amateur radio, particularly in the fields of technical development and public service.

90) On motion of Mr. Haller, seconded by Mr. Michel, unanimously VOTED that the Board extends its appreciation to the Field Engineering Bureau, to the Safety and Special Radio Service Bureau, and the Amateur & Citizens Radio Division of the Federal Communications Commission, and to the Canadian Department of Communications, for their continued assistance and cooperation in administering affairs of the amateur body during the past year.

91) On motion of Mr. Haller, seconded by Mr. Michel, unanimously VOTED that the Board acknowledges the dedicated efforts of the members of the Intruder Watch and heartily endorses their continued work; further, the Board urges interested amateurs to join the ranks of the Intruder Watch and assist in this important contribution to protection of our frequencies.

92) At this point the Board gave a rising vote of applause in recognition of the outstanding service to the League and amateur radio by President Robert W. Denniston, WØDX.

93) On motion of Mr. Albright, seconded by Mr. Thurston, unanimously VOTED that the Board expresses its deep appreciation for the fine performance and dedication to League objectives of the General Manager, John Huntton, W1RW. (Applause).

94) On motion of Mr. Michel, seconded by Mr. Gmelin, unanimously VOTED that the Board now adjourn, at 7:05 P.M.

95) (Total time in session, 16 hours, 45 minutes; total direct appropriations, \$80,722.02.)

Respectfully submitted:  
JOHN HUNTOON, W1RW  
*Secretary*

Minutes of

EXECUTIVE COMMITTEE MEETING

No. 338

January 19, 1972

Pursuant to the requirements of the Articles of Association, the Executive Committee of The American Radio Relay League, Inc., met at the headquarters office of the League in Newington, Conn., at 2:10 P.M. January 19, 1972. Present: President Robert W. Denniston, WØDX, in the

chair; First Vice President Charles G. Compton, WØBUO; Directors Victor C. Clark, W4KFC, Harry J. Dannals, W2TUK, Noel B. Eaton, VE3CJ, and Robert B. Thurston, W7PGY; and General Manager John Huntton, W1RW. A number of ARRL directors and vice directors were also present.

On motion of Mr. Thurston, affiliation was unanimously GRANTED to the following societies: Brookhaven High School Amateur Radio Club, Columbus, Ohio; Cache Amateur Radio Club, Logan, Utah; Central Missouri State Amateur Radio Club, Warrensburg, Mo.; Central Virginia Contest Club, Richmond, Virginia; Clinton County VHF Amateur Radio Club, Frankfort, Indiana; Edison Jr. High Amateur Radio Club, East Gary, Ind; Farmington Amateur Radio Club, Farmington, Michigan; Greenville School Amateur Radio Association, Greenville, Calif.; Indianapolis RCA Amateur Radio Club, Indianapolis, Ind.; Interstate VHF Society, Springfield, N.J.; Kent State University Amateur Radio Club, Kent, Ohio; Los Angeles County Operational Area Radio Council, Los Angeles, Calif.; Miraleste High School Amateur Radio Club, Miraleste, Calif.; Molalla Union High School ARC, Molalla, Oregon; Monterey High Amateur Radio Club, Monterey, Calif.; Moorhead High School Amateur Radio Club, Moorhead, Minn.; Northern Ohio Amateur Radio Society, Lorain, Ohio; Onalaska Area Amateur Radio Club, Onalaska, Wisc.; South High School ARC, Sheboygan, Wisc.; South Kansas DX Association, Wichita, Kansas; Texas DX Society, Alvin, Texas; Tektronix Employees' Radio Amateur Club, Beaverton, Oregon; Triangle Repeater Association, Inc., Nederland, Texas; West High School Amateur Radio Club, Torrance, Calif.; Western Washington DX Club, Inc., Seattle, Wash.

On motion of Mr. Dannals, unanimously VOTED to grant approval for the holding of a Pacific Division Convention in San Mateo, California, October 14-15, 1972.

On motion of Mr. Clark, Life Membership was unanimously GRANTED the following applicants: Ray M. Acred, WB4EEF; Lawrence W. Allen, Jr., K1ZIT; Paul C. Amis, W7RGL; Dexter Anderson, W2YLN; Lee S. Apple, K3RFB; Walter L. Baldwin, Sr., W3AHS; Stanley N. Barbee, Jr., WB6NVX;



A pleasant pause -- W6VST, W6ZRJ, WØBUO.



Coffee break — W6ZRJ and W3SW.



... W6KW and PR man Don Waters.

William B. Barker, K1MWB; William R. Baucum, WA6YWS; Harlan Bercovici, W0MYN; Rose Ellen Bills, WA2FGS; Douglas A. Blakeslee, W1K1K; Ronald J. Borkey, Sr., K8VJG; Donald E. Bostrom, K6YFZ; Al Brogdon, W4UWA/K3KMO; M. V. Burggraaf, WA7AJA; Ralph Calman, WB2IPO; Peter Chamalian, WIBGD; Robert G. Cherry, K0CSE; Leonard Chertok, W3GRF; Jack R. Chichester, W9AMF; John E. Coleman, W8SK; Harold S. Corbin, WA3OHG; Walter L. Coss, W4RND; Harold L. Crispell, W6TZV; Wm. Dean Davis, W5BGE; Peter M. Detwiler, WA2MFY; W. G. Bannerman Edwards, VE3SU; Donald J. Faris, K9GBR; Charles R. Fisher, K0TYB/4 Edward Foster, WA2UOM; B. K. Galbreath, WB6POQ; Grover C. Gaskin, W4GZO; Winfred R. Goddard, W6RCD; Earl Eugene Gooch, W8WFF; Clarence Gregory, Jr., W1YFM/W7BUE; Hollingsworth Franklin Gregory, W5KW; Alfred J. Hartzell, Jr., W6JRX; Alan E. Hatfield, WA0KUM; Everett L. Hawkins, WB6TUR; Stephen G. Hawley, WA4UAZ; David C. Henny, K7DDQ; F. Allan Herridge, G3IDG; Walter M. Honea, W4HM; Robert H. Howell, W6IAM; Jack W. Hudson, W9KDX; Timothy P. Hulick, W9MJ/4 Masanobu Katsusai, JA3GZ; Charles E. Keener, W3AJS; Richard T. Knadle, Jr., K2RIW; Robert L. Kraushaar, WA6TNN; Herbert L. Lacey, Jr., K4FBG; Charles H. Lloyd, WA2IDM; Kenneth G. MacLean, W2KKM; James G. Mast, K9UNM; Edward L. Meade, Jr., K1AGB; Frank C. Nelson, WASSEG; Ben B. Norman, ZP5TT; James C. Owen, III, K4CGY; John W. Page, W9IPT; George Pagels, Jr., K9BGM/W9ESF; Ross A. Pettit, W5SSS; Julian M. Pike, WA0TCU; George H. Reifenstein, W3ML; Robert L. Rooney, W2QCI/W2AET; Donald E. Rose, W7JPH; Fred A. Rusin,

W9BDZ; Sam Salo, WB8GAN; William J. Schmidt, W0GU; Damian E. Schumacher; Donald B. Search, W3AZD; Kenneth L. Shaw, K5VZN; Jesse C. Shields, WB4ADE; Michael L. Sledge, Jr.; Vernon J. Smith, W4CJD; Raymond E. Spence, Jr., W4QAW; Howard D. Springer, K7MFD; James R. Stahl, WA3BGE; Francis K. Staudenraus, WA0-TBN; Peter S. Stone, K0VLD; Wayne J. Sulser, W0BQ; Clyde V. Taylor, W5DXN/W7CKL; Robert Lee Toelner, WN5EKS; Mirabeau C. Towns, Jr., K6LEH; Willy Vinken, ON5WV/9Q5WV; Melvin F. Wardell, K4PI; Theodore S. Warren, WA8OEN; R. T. Weir, W3GWM; Robert Wessel, Jr., K4PR; Joseph Westheimer, WB6KUC; Orval M. Wingate, WB6ERT; Eugene A. Wood, WA7FYU; Edward Williams Yoder, W3YMB.

On motion of Mr. Compton, unanimously VOTED to express ARRL approval of the application for membership in IARU of the Romanian Radio Amateur Federation.

On motion of Mr. Eaton, unanimously VOTED to provide a copy of the film, "The Ham's Wide World," to the film library of the International Telecommunications Union in Geneva.

During the course of its meeting the Committee discussed, without formal action, the problems of antenna tower restrictions in new community developments, and a League Lines mention of "Liberty Lobby."

There being no further business, the Committee adjourned, at 2:45 P.M.

Respectfully submitted:  
JOHN HUNTOON, W1RW  
Secretary

Minutes of  
EXECUTIVE COMMITTEE MEETING  
No. 338-A January 21, 1972

At the call of the President, the Executive Committee of the American Radio Relay League met at the Shoreham Motor Hotel, Hartford, Conn., at 10:00 P.M. January 21, 1972. Present: President Harry J. Dannels, W2TUK, in the chair; First Vice President Charles G. Compton, W0BUO; Directors Victor C. Clark, W3KFC, Noel B. Eaton, VE3CJ, John R. Griggs, W6KW, and Robert B. Thurston, W7PGY; and General Manager John Huntoon, W1RW. Vice President Robert W. Denniston, W0DX, and General Counsel Robert M. Booth, Jr., W3PS, were also present.

On motion of Mr. Eaton, affiliation was unanimously GRANTED to the Jeff Davis High School

#### OFFICERS' REPORTS TO BE AVAILABLE

Each year the League publishes a hundred-page report on the work of the officers, directors, and staff of ARRL. This year's volume, which is expected to be ready in May, is available to members at cost price of \$1 per copy. The Board has asked that it be sent free of charge to those affiliated clubs who order a copy in writing by March 15th or so. The financial information (part of the bound volume above) also will be available to members by itself, at no charge, but s.a.s.e. appreciated!



"Just between us . . ." — W4WHN, W1RW.

Amateur Radio Club, Montgomery, Alabama, and the Kirkwood Community College Amateur Radio Club, Cedar Rapids, Iowa.

President Dannals briefly discussed broad objectives of the League and stressed the importance of a team approach in reaching them, particularly IARU/ARRL collaboration.

President Dannals announced that the ad hoc committee to develop long-range planning and goals, as ordered by the Board of Directors earlier in the day, would consist of the present members of the Executive Committee plus Director Shima.

There being no further business, the Committee adjourned, at 10:40 P.M.

Respectfully submitted:  
JOHN HUNTOON, W1RW  
Secretary

QST

## Strays

Power to burn? A new mobile antenna announced by a well-known CB antenna manufacturer, is being merchandized by stressing the fact that the "massive new mobile antenna is guaranteed not to burn out in CB installations." It has a "power handling safety factor of 40 to 1!"

To celebrate the Centennial Anniversary of the City of San Leandro, California, the San Leandro ARC has tentatively scheduled some special operations using the call KQ6SLC on 80 through 10 meters during the week of March 17 to March 26. If you work the station and want a QSL, send an s.a.s.e. to the club, c/o City Hall, San Leandro, CA 94577. A special souvenir will be issued to the first, fiftieth, and one hundredth stations worked to commemorate the many historical years of San Leandro.

## Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

- W1CPT, Afton W. Mallet, South Portland, ME  
 W1FDN, William A. MacKenzie, Reading, MA  
 W1EY, Raymond C. Stevens, Framingham, MA  
 WA1ICK, William P. Madden, Framingham, MA  
 K1JRL, Leslie R. Dimes, Danville, NH  
 W1NH, Forrest J. Hassom, Bennington, VT  
 W1VSL, Eugene L. McLaughlin, Limestone, ME  
 W2HPK, Leroy L. Brown, Long Branch, NJ  
 K2LIV, William D. Donohue, Freehold, NJ  
 Ex-W2LU, Robert E. Haight, Sr., Scotia, NY  
 K2MPK/W1EBA, Ralph G. Black, Elmsford, NY  
 WA2UFS, Stephen J. Albert, Yonkers, NY  
 WB2ZHR, Edward W. Koell, S. Ozone Park, NY  
 W3QT, Col. Charles Howard Colman, Parkesburg, PA  
 \*W3ZM, Harry D. Helfrich, Annapolis, MD  
 W4BNN, Charles Furr, Dillon, SC  
 WB4BOY, Leelon R. McNealy, Jr., Winchester, VA  
 W4CQZ, Harry L. Nishel, Fort Myers, FL  
 WA4UVB, Paul F. Stamer, Jr., Arlington, VA  
 W4MYY, Armando J. Digriolamo, Lakeland, FL  
 WB4WCP, Larry R. McNeese, Danville, VA  
 W4ZMM, O. B. Asten, Hollywood, FL  
 WA5DAE, Jimmie R. Porter, Garland, TX  
 W5HRM, Leo Abbot Russell, Jr., Metairie, LA  
 W5WWE, Joseph Patrick Foley, Sr., Dallas, TX  
 W6CJE, Earl H. "Nick" Carter, North Hollywood, CA  
 W6DYP, Albert A. Brown, Alamo, CA  
 K6EPK, Henry L. Griffin, Jr., Redding, CA  
 W6HMS, William F. Fuller, Sacramento, CA  
 WB6JN/WA7ICS, Warren A. Smith, Carmichael, CA  
 K6KVI, Joe V. Aguilar, Northridge, CA  
 WA6MZZP, Clarence E. Mason, Huntington Beach, CA  
 WA6PHD, James F. Thompson, San Marino, CA  
 W6QL, James R. Wells, Highland, CA  
 W6TYM, Jesse B. Baker, Compton, CA  
 K6ZIC, John J. Janulis, West Hollywood, CA  
 W7CN, Leland M. Cray, Albany, OR  
 W7JIX, Marshall L. Wilderman, Moscow, ID  
 W7JHY, Frank H. Larsen, Rupert, ID  
 WA7RXE, Donald K. Vore, Coeur d'Alene, ID  
 K7UXS, Col. Richard L. Lederer, Spokane, WA  
 W7VWO, F. Clifford Evans, Bellevue, WA  
 Ex-W8ACZ, Howard K. Foucaillon, Albuquerque, NM  
 WRAL, Wilson E. Weckel, Canton, OH  
 WA8APY, Joseph E. Albert, Tiffin, OH  
 W8LQB, Russell E. Swope, Zanesville, OH  
 W8MDI, Francis H. Drake, Marion, OH  
 W8QYI, Cecil G. Minch, Akron, OH  
 WB9FHG, Gary M. Gagnon, De Pere, WI  
 WN9FQK, Emeril D. King, Edinburg, IN  
 W9ITL, Albert M. Bart, Chicago, IL  
 W9LYE, Ernest C. Swanson, Chicago, IL  
 W9KJ, Frank L. Hughes, Chicago, IL  
 W9OFV, John N. Haskins, Portage, IN  
 K9PYG, Claude Kite, Frankfort, IN  
 W0AYQ, Pius Paul De Witt, Green City, MO  
 W0BCK, Raymond P. Richardson, St. Louis, MO  
 WN0BKJ, Robert F. Harnden, Kansas City, MO  
 W0IHA, Robert M. Cramer, Chillicothe, MO  
 K0MLS, Marion E. "Slim" Lomax, Kansas City, MO  
 K0RCL, Roy N. Adams, Kansas City, MO  
 WA0YJK, Paul H. Bishop, Littleton, CO  
 VE1AAN, C. W. R. Hartlin, Halifax, NS  
 VE1WF, R. L. Anderson, Bathurst, NB  
 VE3AOO, Wendell H. Anderson, London, ON  
 VE3BYQ, J. B. Browne, Burlington, ON  
 VE3CTY, K. A. Kaufman, Sheffield, ON  
 VE3GG, M. J. Caveney, Willowdale, ON  
 VE7DH, W. J. Emerson, Nanaimo, BC  
 HP1RR, A. Robert Rowley, Panama 1, Panama  
 VK3ARX, C. Serfe, Caulfield, Victoria 3071, Australia  
 \*Life Member



# Correspondence From Members -

The publishers of *QST* assume no responsibility for statements made herein by correspondents.

## THE PRICE OF ADMISSION

● In January "Correspondence," Benny Copeland, W5BCA, identifies himself as a Ph.D. Well, I will soon receive my Ph.D., and from the similarity of our calls we were licensed about the same time. Mr. Copeland had certain requirements to complete for his degree which I'm sure could be considered out-of-date as an excuse for their rigorousness. I passed the code exam and I am not an engineer, nor am I a former Signal Corps member. Actually, I was a clerk. It just takes a little work, Benny . . .

No FCC requirement is discriminatory or an "infringement of the People's rights." A Ph.D. is available to anyone who can complete the requirements. Would you cheapen your own accomplishment by lowering the requirements for the Ph.D. so every "citizen" could have one? - *Richard Sinclair, W5AGX, Oklahoma City, OK*

● I despise cw with a passion, and each time my license has come up for renewal it has been necessary for me to practice like crazy so I would not be lying when I said I could copy code as fast as when I first took the test. I feel, however, that the code requirement is fair, and have started working with tapes and copying WIAW to endeavor to get my speed up to the 20 wpm for the Extra Class test. It will also require a great deal of study on my part to push enough theory into my skull for the Extra since my entire connection with electronics has been in ham radio, not in my daily work, and for several years I was not even in a position to increase my knowledge through ham radio.

However, I definitely do not feel put upon in being required to learn something more about my hobby in order to obtain additional privileges in connection with it. Folks like Mr. Copeland would probably think that a kid who has driven a go-kart has the right to go out on the highway driving a 30-ton tractor trailer! People's rights, my eye! How about the rights of the people who have to be on the highway with that tractor trailer or who have (or wish) to be on the ham bands with signals put out by people who have no more knowledge than is required to obtain a CB license? - *Paul S. Leach, WAFHE, Arlington, VA*

● I am a 15-year-old General. I gladly submitted to the 13 wpm test for my license in order to show myself worthy . . . - *Yuri Owechko, WAØERJ, Greeley, CO*

● It seems to me that any infringement of the People's right to the use of the radio frequency spectrum was committed when 3.5 billion people with voices having a frequency range of 3 kHz decided to inhabit a world whose ionosphere will not reflect back radio waves of frequencies greater than 50 MHz very efficiently. The only matter in question is how you would like to see the few frequencies which exist distributed: (1) by lottery, (2) by default to whoever can afford the biggest transmitter, or (3) to those individuals who are willing to work to improve their technical com-

petence so that they can use the frequencies efficiently. The choice seems obvious to me. - *Roger Grismore, W9IV, Terre Haute, IN*

● Mr. Copeland's letter has prompted me to join your League. Perhaps I can fill the void he is about to leave. - *Jack Long, WA3GKO/S, Dallas, TX*

● W5BCA's letter should have been held over for the April issue. Unless you think maybe the good Doctor is serious! - *C. Harold Campbell, W2IP, Mt. Vernon, NY*

● Dr. Copeland's right to use the airwaves could never have been discriminated against, since neither he nor anyone else has a "right" to them. Since he holds the calls KBX4026/W5BCA, he should know that he can use the airwaves at any time he so desires. His gripe is not with the ARRL, but with the ITU, for it is they who set the international radio regulations.

The restrictions for the class license Dr. Copeland holds (Technician) can be passed by almost any 12 year old. With his education I find it hard to believe that he had to put in much more than 2 weeks study to qualify for his license.

It is my hope that Dr. Copeland will allow his amateur license to lapse along with his ARRL membership, and further, that the FCC will permanently retire the call letters, W5BCA.

Be advised that his big 10-7 will be gladly accepted by this ARRL member. As I see it, his loss is the League's gain. - *Chet Moore, WA4KJR, Woodbridge, VA*

● If there are no "admission requirements," why even bother with getting a license at all? Just open the box, turn on the rig, and made up your own call, i.e., The Texas Road Runner or Louisiana Alligator or some other cuteness as heard on 11 meters. Now, who is adolescent? - *Ken Lambert, W5EOG, Houston, TX*

● If anyone does not understand why CB has become such an uncontrollable wasteland as it is today, only a minute of his time is required to find out. Mr. Copeland's attitude seems typical of the majority of the present-day 27-MHz DXers. - *Charles R. Mathis, WA9OVN, Chicago, IL*

● I've worked in several CB groups (REACT, CERT, ALERT, to mention a few) and have a fair idea what goes on on the CB channels. I'm also an active ham and ARRL member. So, whenever I hear all this talk about "give CB more frequencies," it irks me.

The cw requirement shows who has the ambition and who doesn't. And it is very important - especially in an emergency - that every ham should know it. Anyone who thinks giving CBers extra frequencies is gonna straighten 'em out is nuts! Channel 9 is an emergency channel, but try to get through with someone talking from Columbus, Georgia to California with 200-watts output. - *James F. Volant, KBZ2625/WB4UIS, Columbus, GA*

● I certainly hope that Dr. Copeland's *Demo-cracy* does not live to see the light of day. If

anything, the technical ante for operating a radio station, CB or amateur, should be raised rather than lowered if we hope to justify our allocations from ITU as we have done in the past. Imagine a million more people trying to work a 20-meter band opening, most of whom can't tell splatter from a messy paint job!

If Dr. Copeland hopes to improve the lot of the CBER, I recommend that he do so by working within the CB community in an effort to develop arguments more viable in a congressional subcommittee than the type of one-way "democracy" which he proposed in his letter. — *M. R. Manes, K4VBT/4, Brunswick, GA*

### THREE POINTS

● I'm an "organization man" of sorts, having started as a Seaman recruit, and gradually worked up to Chief Petty Officer, then to Warrant Officer. Having worked at different levels, from "blue-collar" to "foreman" to "executive," I am most aware of the value of good organization and management. I don't buy organization for its own sake — there must be a purpose. In the case of the League, the purpose is the furtherance of our hobby as a useful entity. . . I have little use for people who condemn the League outright, but they *can* be saved if the rest of us will try. I have equally little use for those who profess allegiance to the League, but do little to "spread the word." Look what "spreading the word" has done for Communist Doctrine! I don't admire their tactics but you have to give them credit for getting results. With some real effort (low-key propaganda, etc.), every amateur could help immensely in generating support for the League. As I see it, there are 3 things every amateur can do to help protect ham radio:

1) Support the League, by joining and by drumming up new members.

2) Study League policy, get to know local, area, and national representatives, and *speak out*, both for and against.

3) *Be active in League affairs*, by voting, seeking appointments, aiding others who seek appointments, and by making a good public example of oneself as an active amateur.

We *can* do a lot, and we must, if we are to continue as amateurs. — *Paul Bock, K4MSG, Petersburg, VA*

### “. . . BUT AN AMATEUR!”

● With all respect to Paul Godley, I doubt that Guglielmo Marconi ever said "I too am *but* an amateur," (*QST*, December, page 53).

I can report what Marconi *did* say, because he said it to me. He told me "I have always considered myself an amateur." I found Marconi a quiet, sensitive man who couldn't conceivably have sturred radio amateurs with the condescending comment ". . . *but* an amateur."

In 1933, I was the manager of the RCA Communications' Exhibit at the Chicago World's Fair (A Century of Progress Exposition) when Marconi visited it in October. His wife and son were with him, as were Dave Sarnoff, President of RCA, and General James G. Harbord, Chairman of the Board. I asked Marconi to autograph three RCA radiophotos of himself, one for Sarnoff, the second for Harbord, the third for myself.

Later that day I saw Marconi at the Amateur Radio Exhibit (W9USA), handing out autographs right and left to hams. I said "Mr. Marconi, you're

more liberal here with your autographs than you were at our RCA exhibit!" Marconi smiled, and replied "Well, I have always considered myself an amateur!"

There was an amusing sequel when, a week later, Lee de Forest and I were having lunch alone together at the Fair. I repeated Marconi's remark that he had always considered himself an amateur; de Forest snickered "I agree with him!"

I've washed my hands many times since, but anyone who wishes to shake the hand that shook the hands of Guglielmo Marconi and Dr. Lee de Forest is welcome to do so, by appointment! Hi! — *B. Frank Borsody, K4EC/W2AYN, Palmetto, FL*

!!!

● Here is one old fogey (born 1896) who agrees that we need the exclamation point! The one proposed by Pennarc (Operating News, page 106, November *QST*) sounds fine: *didididahdahdah*. So let's see how many can accept something new.

I am trying to think of some astounding statement to make on my next QSO where the exclamation point will be appropriate. — *Ralph W. Johnson, W6PMH, Saint Helena, CA*

● I surely go along with the need for an exclamation point!!! I do have one fear about the . . . — since it is the beginning of SOS. Under conditions of noise or heavy QRM it is conceivable that it might cause some trouble. My contribution would be . . . — a character in which one can accentuate the dashes to denote the degree of his feelings.

Why not set up a contest by printing a small form in the corner of the page of Operating News? You could invite ideas or you could present a few that have already been sent in and have us vote for our choice. *Gene Pearson, W3QY, Philadelphia, PA*

● All is coming right in the world again with the move to restore the exclamation point! In reply to W1NJM's query in Operating News, January *QST*, it is not a trivial matter, and is well worth space in *QST*. In a nice relaxed rag chew, there is an absolute necessity for an exclamation point to properly drive home choice *bon mots*.

The exclamation must end with a dash. I suggest simply moving the first dash of the old exclamation to the end, getting *XM* which fulfills all requirements, including being mnemonic.

By the time I get my new licenses, I hope the exclamation point is back! — *P. M. Thompson, ex-W6HVU/ex-W6LZJ, New York, NY*

### QST EXPOSED!

● If memory serves me, there was a ruckus of sorts when you initially allowed a company to run an ad in *QST* which contained a substantial portion of a bikini-clad *demoiselle*. I must, therefore, admire your courage in permitting the advertisement which graced the rear cover of the December issue.

Even in this permissive society, it is worthy to note when such a usually conservative tome as *QST* takes a major step towards relaxation of previously puritanical standards. Surely, including a picture of a very attractive and very topeless young lady is such a step. Indeed, *QST* has "come a long way."

Be advised, however, that women's lib surely has members in the YL ranks and any further such activities will probably be considered typical of a male-chauvinistic magazine. — *Al Nowakowski, K8KFP/WA9ZRG, Toledo, OH*

# 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

## IARU OFFICERS

The IARU constitution provides that officers of the Union's headquarters society, *ARRL*, serve in similar capacity with IARU. Election of officers took place at the recent *ARRL* Board of Directors meeting. It was felt that holding both presidencies is too great a task for the shoulders of one man. Accordingly, the Board elected Harry J. Dannals, W2TUK, as *ARRL* president, and nominated Robert W. Denniston, W0DX, to continue as president of the Union. A special Calendar is enroute to our 85 member-societies seeking their concurrence. Charles G. Compton, W0BUO, and John Huntoon, W1RW, continue as vice-president and secretary respectively.

## ALIEN OPERATING

With many amateurs engaged in international travel for business or pleasure, occasions have arisen for possible hamming while in a particular country. The advent of licensing reciprocity between some nations has opened up operating permission for visiting amateurs in many cases. Still other countries offer temporary licenses as a courtesy to foreign amateurs.

Headquarters receives inquiries from numerous amateurs about obtaining operating permission abroad. In fact, in a year's time, we supply info regarding over 100 different locations. The most popular countries in this regard are the United Kingdom, Germany, and Switzerland. But, it's not unusual to hear from an amateur with plans for a trip to St. Pierre or Tahiti.

As assistance to traveling amateurs, elsewhere in this department appears a list of countries having licensing reciprocity with the U.S. and Canada. In addition, member societies of IARU have furnished details to help alien license seekers. Headquarters has compiled this information as presented below. A word of caution, however, when applying - be sure to allow enough time since most countries require from 30 to 90 days processing time.

The information below presents the country name, name of IARU society, names of countries whose amateurs are accorded eligibility for amateur operating privileges, and the address from which forms and assistance for application may be obtained.

**Argentina:** (*Radio Club Argentino*) - USA. Direccion General de Telecomunicaciones, (Seccion Radio-aficionados) Sarmiento, 189 Buenos Aires, Argentina, or, Radio Club Argentino, Carlos Calvo 1424, Buenos-Aires, Argentina.

**Australia:** (*Wireless Institute of Australia*) - All countries. 2 P.M.G. Department, Controller, Radio Branch, Parkade Building, Bourke Street, Melbourne, Vic. 3000, Australia.

**Austria:** (*Oesterreichischer Versuchssenderverband*) - Germany, United Kingdom, Canada, Australia, New Zealand, Switzerland, Liechtenstein, Luxembourg, Finland, Czechoslovakia, Denmark, Netherlands, Sweden, Yugoslavia, Romania, USA, Monaco, Costa Rica. Walter Nowakowski, OE1WN, c/o OVSFV, Dachverband, P. O. Box 999, A 1014 Wien 1., Austria.

**Barbados:** (*Amateur Radio Society of Barbados*) - United States. Government Electrical Inspector, Old Hospital Buildings, Jemcott's Lane, Bridgeton, Barbados.

**Belgium:** (*Union Belge des Amateurs-Emetteurs*) - All countries in the world. Union Belge des Amateurs-Emetteurs, international Affairs Manager, Rene A. Vanmuysen, ON4VY, 52, Diepestraat, 1970, Wezembeek-Oppem, Belgium.

**Bermuda:** (*Radio Society of Bermuda*) - Same as U.K. Reginald S. Pitman, VP9AX, Telecommunications Officer, P.O. Box 1536, Hamilton, Bermuda.

**Canada:** (*American Radio Relay League - Canadian Division*) - All British Commonwealth, Belgium, Bermuda, Dominican Republic, France, Germany, India, Israel, Luxembourg, Mexico, Netherlands, Nicaragua, Norway, Peru, Portugal, Senegal, Sweden, Switzerland, United Kingdom, United States, Uruguay, Venezuela. Dept. of Communications, Berger Building, Ottawa, Ontario, Canada.

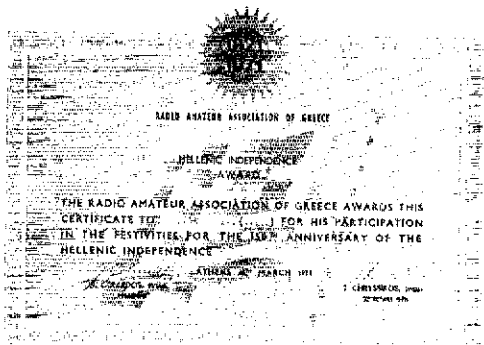


*Radio Club Argentino* president LU4CG receives a commemorative certificate and Key to the City of New Orleans from Argentine Consul (New Orleans) and Greater New Orleans Amateur Radio Club member LU3EHT. Seated on left is Colonel Mario Augusto DeSimoni, Secretary of Communications of Argentina. The occasion was a banquet commemorating the 50th anniversary of the *Radio Club Argentino*.

QST for



The Hellenic Independence Award is available from the *Radio Amateur Association of Greece*, P.O. Box 564, Athens, for contact with any 10 Greek amateurs.



- Ceylon: (*The Radio Society of Ceylon*) Commonwealth countries. The Post-Master General, New C.T.O. Building, Lotus Road, Colombo-1, Ceylon.
- Chile: (*Radio Club de Chile*) - Peru, United States, Canada. Radio Club de Chile, Nataniel 1054 (Casilla 13630), Santiago, Chile.
- Colombia: (*Liga Colombiana de Radioaficionados*) - United States, Spain. Ministerio de Comunicaciones, Bogota, Colombia, or, LCRA, Ap. 584, Bogota, Colombia.
- Costa Rica: (*Radio Club de Costa Rica*) - United States, Brazil, Canada, Central America. Radio Club of Costa Rica, Apartado 2412, San Jose, Costa Rica.
- Denmark: (*Experimenterende Danske Radioamatører*) - W. Germany, England, Sweden, Norway, Belgium, Northern Ireland, Canada. Generaldirektoratet for Post & Telegrafvaesenet, Tietgensgade Farvergade 17-DK1007, Copenhagen K, Denmark.
- Dominican Republic: (*Radio Club Dominicano, Inc.*) - United States, Venezuela, Brazil, Canada. Direccion General de Telecomunicaciones, Santo Domingo, Dominican Republic.
- East Africa (Uganda, Kenya, Tanzania): (*Radio Society of East Africa*) - All countries except South Africa, Rhodesia, & Portugal (and territories). The Engineer in Chief, R.C. Section, E.A. P. and T., Box 7129, Kampala, Uganda.
- El Salvador: (*Club de Radio Aficionados de El Salvador*) - Central America, United States, Club de Radio Aficionados de El Salvador, c/o The Secretary, P. O. Box 517, San Salvador, El Salvador, C.A.
- Faroe Islands: (*Foroykskir Radioamatører*) - Same as Denmark. Post & Telegrafvaesemet, Farvergade 17, 1007 Kobenhavn K, Faroe Islands, Europe.
- Finland: (*Suomen Radioamatooriilitto r.y.*) - United States, England, Austria, Switzerland, Canada, Sweden, Iceland, Germany (West), France, Australia. Suomen Radioamatooriilitto r.y., Box 10306, Helsinki 10, Finland.
- France: (*Reseau des Emetteurs Francais*) - Belgium, Great Britain, United States, Holland, Luxembourg, Monaco, Israel, Canada, Germany, Switzerland, Andorra, Morocco. Direction des Services, Radio Electriques, 5 Rue Froidevaux, Paris 14, France.
- Germany: (*Deutscher Amateur Radio Club e.V.*) - All countries. Deutscher Amateur Radio Club, e.V., International Affairs, P.O. Box 180, D-402 Mettmann, Germany.
- Greece: (*The Radio Amateur Association of Greece*) - U.S. Military Personnel. Radio Amateur Association of Greece, P. O. Box 564, Athens, Greece.
- Honduras: (*Radio Club de Honduras*) - USA, Central American countries. Humberto Andino N., Jefe de Radio National, Tegucigalpa, D.C., Honduras.
- Hong Kong: (*Hongkong Amateur Radio Transmitting Society Ltd.*) - Same as U.K. Telecommunications Department, General Post Office, Hong Kong, B.C.C.
- Iceland: (*Islenskir Radiouamatører*) - Norway. Post-og simamalastjornin, Landssimahusinu v/ Austurvoll, Reykjavik, Iceland.
- India: (*Amateur Radio Society of India*) - England, United States, Switzerland, West Germany, Sudan, Arabian Gulf, Canada, Australia. Wireless Adviser, WPC Wing, Department of Communications, Parliament Street, New Delhi 1, India.
- Ireland: (*Irish Radio Transmitters Society*) - United Kingdom, United States, West Germany, Norway. Department of Post & Telegraphs, Experimental Radio Section, Hamman Buildings, O'Connell Street, Dublin, Ireland.
- Israel: (*Israel Amateur Radio Club*) - United States, Canada, United Kingdom. Radio Engineering Services, Frequency, Licensing and Legislation Section, Achad Haam St. 9, Tel-Aviv, Israel.
- Italy: (*Associazione Radiotecnica Italiana*) - All countries (operator's license only). Direzione Centr. Servizi Radioelettrici, Viale Cristoforo Colombo, 153 00100 Roma, Italy.
- Jamaica: (*The Jamaica Amateur Radio Association*) - British Commonwealth. Mr. V. A. Panton, Chief Telecommunications Engineer, P. O. Headquarters, South Camp Road, Kingston, Jamaica, West Indies.
- Lebanon: (*Association des Radio-Amateurs Libanais*) - All IARU member countries recognized by govt. of Lebanon. Service Telegraphique, Ministere DGS P.T.T., Beirut, Lebanon.
- Liberia: (*Liberian Radio Amateur Association*) - All countries. Dept. of Post & Telegraph, Division of Telecommunication, Monrovia, Liberia, or, Liberian Radio Amateur Assn., P. O. Box 1477, Monrovia, Liberia.
- Luxembourg: (*Reseau Luxembourgeois des Amateurs d'Ondes Courtes R.L.*) - United States, Canada, Great Britain, Netherlands, Belgium, France, Germany, Austria, Switzerland. Administration des P. & T., Hotel des Postes, Luxembourg-Ville, C.D. Luxembourg.
- Malaysia: (*Malaysian Amateur Radio Transmitters Society*) - Australia, Hong Kong, Japan, New Zealand, Germany, United Kingdom, Canada, USA. Director General of Telecommunications, Government of Malaysia, Kuala Lumpur, West Malaysia.
- Malta: (*Malta Amateur Radio Society*) - United Kingdom, United States, Canada, Germany. Mr. Galea, Inspector of Wireless Telegraphy, The Prime Ministers Office, Valletta, Malta. Monaco:

Monaco: (*Association des Radio-Amateurs de la Principaute de Monaco*) - Germany, Austria, Belgium, France, USA, and United Kingdom. Association des Radio-Amateurs de la Principaute de Monaco, 16, Boulevard de la Suisse, Monte Carlo, Principaute de Monaco.

Morocco: (*Association Royale des Radio-Amateurs du Maroc*) - Countries allied or friendly to Morocco. Association Royal des Radio-Amateurs du Maroc, B.P. 299, Rabat, Morocco.

Netherlands: (*Vereniging voor Experimenteel Radio Onderzoek in Nederland*) - All countries. Radio Control Dienst, P.T.T., Kortenaerkade 12, S-Gravenhage, Netherlands.

Netherlands Antilles: (*Vereniging voor Experimenteel Radioonderzoek in de Nederlanden Antillen*) - All countries. Govt. Radio & Telegraph Administration, P. O. Box 103, Curacao, Netherlands Antilles.

New Zealand: (*New Zealand Association of Radio Transmitters, Inc.*) - British Commonwealth, United States. Director General Radio Division, G.P.O., Wellington, New Zealand.

Nicaragua: (*Club de Radio Experimentadores de Nicaragua*) - All countries. Club de Radio Experimentadores de Nicaragua, Box 925, Managua, Nicaragua, C.A.

Norway: (*Norsk Radio Relae Liga*) - United States, Canada, West Germany, Ireland. Teledirektoratet, Universitetsgt. 2, Oslo 1, Norway.

Panama: (*Liga Panamena de Radio Aficionados*) - United States, Costa Rica. Liga Panamena de Radio Aficionados, P. O. Box 9A-175, Panama 9A, R.P.

Paraguay: (*Radio Club Paraguayo*) - All countries. Radio Club Paraguayo, P.O. Box 512, Asuncion, Paraguay.

Peru: (*Radio Club Peruano*) - West Germany, Bolivia, Canada, Chile, Spain, Holland, Venezuela, Uruguay, United States. Radio Club Peruano, P.O. Box 538, Lima, Peru.

Philippines: (*Philippine Amateur Radio Assoc.*) - U.S., Africa, Canada. PARA, Inc., P.O. Box 4083, Manila, Philippines.

Poland: (*Polski Związek Krotkofalowcow*) - All countries. Polski Związek Krotkofalowcow, P. O. Box 320, Warszawa 1, Poland, or, Państwowa Inspekcja Radiowa, Swietokrzyska 3, Warszawa, Poland.

Portugal: (*Rede dos Emissores Portugueses*) - USA, England, France, West Germany, Belgium, Switzerland, Holland, Morocco. Rede dos Emissores Portugueses, Rua D. Pedro V - 7 - 4, Lisboa - 2 - Portugal.

South Africa: (*South African Radio League*) - United Kingdom, Rhodesia. Postmaster-General, Somerset House, Vermeulen St., Pretoria, South Africa.

Spain: (*Union de Radioaficionados Espanoles*) - Belgium, Germany, Colombia. Union de Radioaficionados Espanoles, P. O. Box 220, Madrid, Spain.

Surinam: (*Vereniging van Radioamateurs in Suriname*) - United States, Netherlands, Netherlands Antilles. Verniging van Radioamateurs in Suriname, P. O. Box 566, Paramaribo, Suriname.

Sweden: (*Foreningen Sveriges Sandareamatörer*) - All countries. Televerkets centralforvaltning, Urf, S-123 86 Farsta, Sweden.

Switzerland: (*Union Schweizerischer Kurzwellen-Amateure*) - France, Belgium, Germany, Finland, Monaco, Netherlands, Netherlands Antilles, Austria, Kuwait, United States, Great Britain, Luxembourg, Canada. Generaldirektion der PTF, Sektion Allgemeine Radioangelegenheiten, 3000 Berne, Switzerland.

USSR: (*The Radio Sports Federation of USSR*) - All countries. IARU Society in country of applicant.

United Kingdom: (*Radio Society of Great Britain*) - Austria, Belgium, Cyprus, Denmark, Finland, France, German Fed. Rep., Ghana, Rep. of Ireland, Kenya, Luxembourg, Malta, Mauritius, Netherlands, Nigeria, Rep. of S. Africa, Sweden, Switzerland, Tanzania, U.S. Ministry of Posts & Telecommunications, Amateur Licensing Branch, Waterloo Bridge House, Waterloo Road, London S.E. 1, England.

United States: (*American Radio Relay League*) - 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, Netherlands Antilles, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, Surinam, Sweden, Switzerland, Trinidad and Tobago, United Kingdom, Uruguay, and Venezuela. American Radio Relay League, 225 Main Street, Newington, Connecticut 06111, USA.

Uruguay: (*Radio Club Uruguayo*) - All countries. Radio Club Uruguayo, P. O. Box 37, Montevideo, Uruguay.

Venezuela: (*Radio Club Venezolano*) - United States, Canada, & Costa Rica. Radio Club Venezolano, Av. Lima Los Caobos, P.O. Box 2285, Caracas, Venezuela.

Zambia: (*Radio Society of Zambia*) - British Commonwealth. Director of Telecommunications, P. O. Box 1660, Ndola, Zambia. 



Amateur radio is on the upswing in the Khmer Republic (Cambodia), due in no small measure to the efforts of John Van Lear, VE7IR. Shown here operating XU1AA is Vong Sarin, XU1VS, Deputy Minister of Communications in Phnom-Penh.



# How's DX?



CONDUCTED BY ROD NEWKIRK,\* W9BRD

## How :

In the wake of your League's fine first 50, golden anniversaries are in vogue for pioneer amateur radio societies around the globe. These we salute with best wishes for their next half century and beyond. Among them, for example, is Finland's famed SRAL, now in its 51st year and thriving. That society thumbnails its own exciting history in interesting paragraphs:

One of the oldest radio amateur societies in the world is *Suomen Radioamatooriliitto*, the Finnish radio amateur league which held its first official meeting on September 15, 1921. The Finns were early to start with radio experiments but a contributing factor was that they are usually early to start societies. Already in January of 1921 a society for youth (NVL) asked for official permission to start a radio club with the right for its members to use radio receivers and transmitters. It was mentioned that a similar permission had been given in the U.S.A., Great Britain, and France. In April it was decided to form a society by name, NVL Radio Society, and in August the permission was granted. On September 15th, the official first meeting, Leo Lindell (call NVA, later INA) was elected first president. Because of the name of the parent society, NVL, all calls were to start with the letter N, and this is why the ham alphabet in Finland starts with N.

Local radio clubs followed rapidly in various parts of the country. In 1927, the modern form of the name was accepted and SRAL became an independent society. Before then hams had already started broadcasting transmissions (1923-'4) and had formed the company which

\* 7862-B West Lawrence Ave., Chicago, IL 60656.

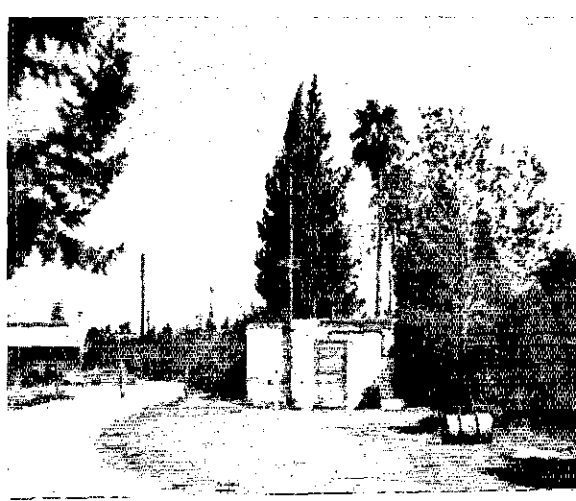
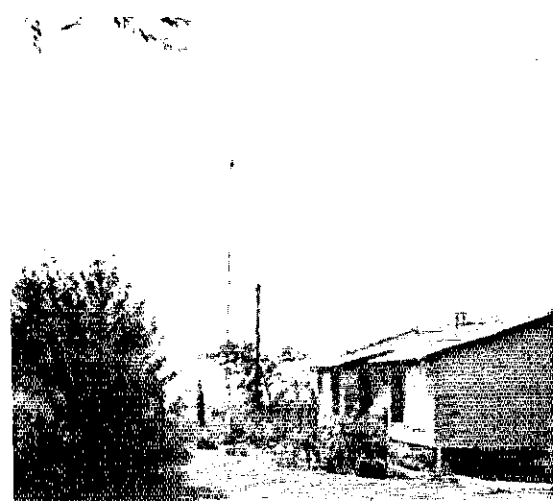
now is the government owned Finnish Broadcasting Company. The founder of this activity was Arvi Hauvonen (3NB) in the city of Tampere in 1923. OT Arvi is now retired but is still active on vhf signing OH3PP. In 1924, Arvi was also the first Finnish ham to QSO a foreign country. The first president, Leo Lindell, was one of the first to see the importance of short waves. When his advice and example were followed, the Finnish amateurs were among the first to have world-wide contacts. A transatlantic QSO occurred between 2ND and rp4SA in 1925. A year later New Zealand was reached by 2NM.

Amateur radio was not allowed during World War II and licenses were not renewed until 1947. At that time SRAL had about three hundred members. Now the membership numbers 2400 . . . OH hams have kept their tradition of doing pioneering work in radio. Finland's television was started by amateurs in the early 1950s. Many of the leading engineers in broadcasting and electronics have been and remain radio amateurs. Axel Tigerstedt, OH5NW, now is president of SRAL with office and staff in Helsinki. At this time ham licenses in Finland are valid for five-year periods and all Finnish amateurs are required to be SRAL members.

Mandatory membership or not, it takes heaps of ham-spirited work by dedicated amateurs to perpetuate such time-honored institutions, not only unstinting Elmer-like leadership but constant support by loyal members. Nobody appreciates this more than the world's growing crowd of DX enthusiasts who know full well from whence our blessings flow. You can't work DX without DX.

† † †

4X4s BL and QR enjoy scenic QTHs at Kibbutz Ramat-David in the valley of Jezreel. 4X4BL operator Zvi oversees operation at club station 4X4QR and obviously gets interesting Yagi-vs.-quad DX comparisons 'twixt home and club. 4X4BL runs a TR-44 while 4X4QR drives 572Bs with an SBE-34. (Photos via WA2FDG/4X)



**W h a t :**

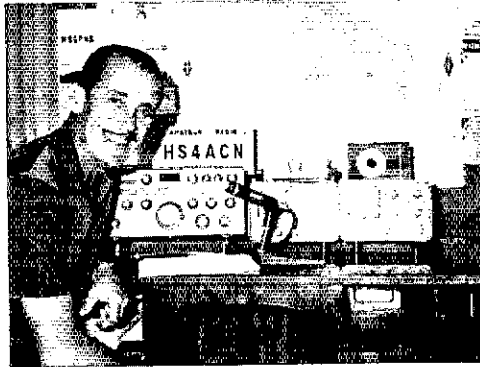
Unless your receiver has been laid up or you've been out of town out of touch you don't need to be told that the lads have been socking away a little DX over the past few ARRL Test weekends. Nighttime refugees from 14 MHz and higher find considerable solace on 40 meters beneath and betwixt SWBC and other pollutants. The band's DX bag also swells for the same reason, fortunately, and we owe unbelievers a sampling of 7-MHz stuff showing up in recent "How's" correspondence and periodicals since last we peeked. First for the mike men,

**40 PHONE** keeps Ws 1PL 2HAE 3HNK 8YGR, Was 3MSU 3RDU 8VRB 9NNA, WB4KZG and the clubs press grabbin' at CE3AQW, CN8s AV HG HD, COs 2FA 8RCB, CRs 4CB 6TP 7FM, CT3AS, CXs 2AX 3CJ, JDs 2YA 9KC, DL0WW, DU1FH, EAs 4JV 4LH 6BN 8GR 9AI, EL2CB, EP2s BI BQ DX WE, F6KAW, FG7TI/FS, FM7s AJ WE, FO8BJ, FY7AF, G3s SEZ SSO YJR, HA2KMR, HBs 9ADQ 0AFM, HClARE, HKs 3FP 5BQW 0AA 0BKX, HL9KH, HP1JL, HRs 1ALT 1KAS 2GR, HV3SJ, Is 1J 2BWV 5LAA, IS0SIF, JAs 1ELY 9DE, JR1GHV, JX1AK, JYs 8BI 9AA, KCs 4USB 4USN 4USV 6RK, KH6s FJK HCM HHH HML, KL7s AIZ HEH, KP4s AN AST CL, 7V4s FC FZ, KX6IY, KZ5s LS JE, LUs 3DGX 8AJG, LZ2KRM, M1L, OAs 4OS 8V, OD5s EH HB, OE9AH, OHs 2QV 8OS, OK1ADM, OY5NS, PIs 1AA 2CW 2MI 2PS 7RO 9AF, PY2DL, PZs 1AH 1CU SCW, TAITR, TG8IA, TJ1AW, T19CF, TU4AA, UZ2AC, UG6AW, UD6BR, UI8LM, UK2BAA, UW9AF, Vks 2ABZ 2AVA 2FU 2RS 2UC 3HW 3OZ 3VJ 3ZL 5NB 5PB 6CT 7AZ 7JV 7WH, VPs 2AA 2AAP 2DAG 2GW 2LB 2MK 9BK 9GE, VR1AA, Was 2BVU/4X 4OVP/8R, WB4RJK/TF, XE1EH, YNs 1BAA 3AAA 0HSM, YU3CNO, YVs 1BI 1KZ 4QK 4YC 7GE, YB2BL, ZDs 3Q 8CS 8TS, ZLs 1AGO 1AM0 1CK 2BT 3LE 4IF/a 4OL/c, ZP5AL, ZSs 1JU 1MH 5LB, 4W1AF, 4X4N1, 4Z4HE, 5B4IS, 7Q7AA, 7X2OM, 8P6DR, 9G1s DY WW, 9H1s BF BX, 9K2AF, 9L1VW, and 9Y4KR. These ain't easy pickin's, voice on 40, and it's the highest hurdle for 5B-DXCCing without a key. Much simpler to narrow your selectivity to a hundred Hz or so and soak stuff up on

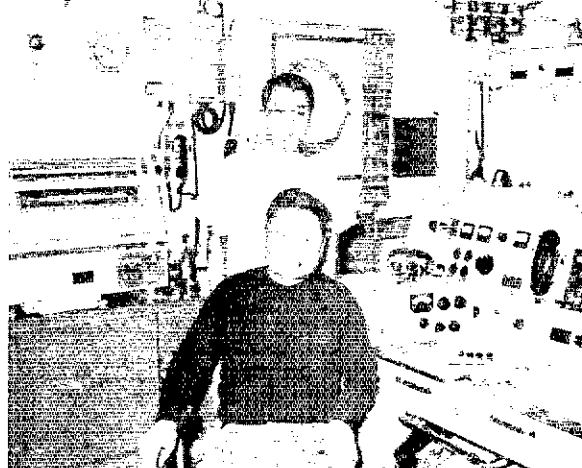
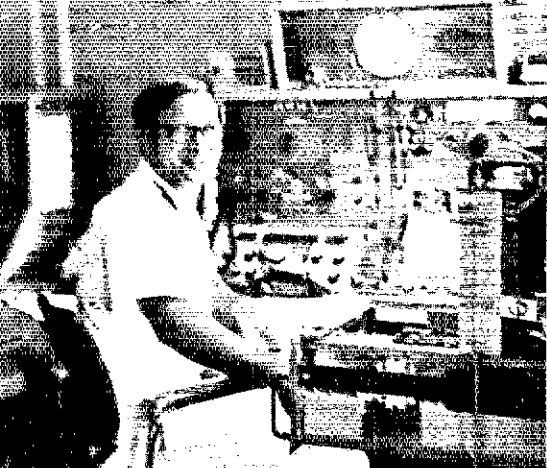
**40 CW** where radiotelegraphers Ws 1PL 3HNK 4ZYT 7JLU 9EY, Ks 3YVN 5MHG/6 7JRE, Was 2EAH 2FOS 3RDU 6PZL 8VRB 9NNA, Wbs 2AQC 4KZG 4SXX 6KBI 9BUV, WN0CTQ, 11ER, KP4DJJ and DX periodicals recommend the comforting companionship of curious BY5XX, CMs 2FV 2IO 2OF 3LM 3LN 3OD 6HT 8RC, COs 2DC 2DR 2FC 3BU 3JS 7AA 8RCB, CRs 6AI 6DN 7CN 7IZ, CTs 1LN 1MC 1VX 2AK 3AS, CXs 1EK 4AQ 6BBH 8BBH, DJs 3AZ 3JV 9RP, DK3s FW GL, DLs 1PB 1RK 2AK 6GB 6TQ 7AA 7GQ 8DD, DMs 2ADC 2DJN 3BE, EAs 1BC 1JD 2DM 4CR

4IS 4LH 6BH 7IF 8BK 8BT 8FF 8FH 8HB 9EO, Els 4CB 9J, EL2s Y CB, FP2s BQ WB, ET3USA, Fs 2QQ 2ZE 3NL 6AXX 6AMI 6KAW 6KBJ 8AH 8CS 8EX 8IH 9TL, FGs 7XF 0GD/FS, FK8KAA, FM7s AI AJ WU, FO8BY, FP0CA, Gs 3BFA 3BNU 3AAE 3HCT 3GFG 3KLH 3KWK 3PDL 3PFZ 3PHW 3RBP 3SVC 3TBK 3TLX 3WSJ 3XAP 3YDX 3YUK 5JL SWP 6CJ 8HX 8PB, GCs 2FMV 2LU 5ANY, GIs 3JEX SUR, GMs 3JDR 3XO 5ASI, GW3s LEW NJW WRE, HAs 1SB 3GF 3KNA 3MB 4AXX 4KYH 4XX 5DJ 5HS 5IU 5JK 5KDO 5KZF 6NA 7KLC 7LO 8KUN 8KWG 8UO 8VM, HBs 9ADQ 9AMB 9UB 0NL, HCs 1JU 1PR 2GG 2HM 8FN, HIs 3PC 7JM 7NFM 7OMR, HKs 4AJF 4ASF 4BRP 4GM 7BDA 0BKX, HM1s CY EX, HP1s BR NM, HSSABD, HV3SJ, IIs 3BQLER MMR XK YT, IS1AEW, ITIAGA, JAs 1BYL 1GDN 1NRQ 1OHV 1XEL 1YEL 1JW 2OHV 3BK 3VLD 6IQK 0SX, JD1YAA, JW7UH, JXs 2HK 5CL, Ks 2YGM/VP7 4BZB/VP7, KCs 4USB 6BK, KGs 4CS 4EQ 6AL 6JAC 6JAR, KH6s GRU HKM 1J RS SP, KL7s AIZ FAQ GDU, KP4UW, KR6AY, Ks 4CJ 6DY, KV4s AM CI CK FZ, KX6s DC IY, LAs 8XM 9CE, LUs 1AZO 3EX 6DXK, LZs 1AG 1BM 1KPG 1KVV 1NJ 1W1 1ZQ 2KGO 2KRE 2DRS 2KSF 2PG 2VP, OA4VE, OHs 1LQ 1LU 1NK 2BFJ 2BJZ 2LA 2QV 2MK 3NO 3OL 5UC 6NS 8RC 0NT, OKs 1AMI 1ANR 1APV 1AOR 1IDC 1IAG 1MAS 1NR 1PD 2BCO 2BDC 2BIP 2BOB 2PEW 2RT 2ZU 3CEG 3TBV 3YRI, ON4s CI DY, OXs 3EN 3ZW 3YY SAT, OY9LV, OZs 1LO 2NU 7YV, PA0RE, PJs 2HN 2HT 7VL 8AR 9JT, Pys 1DVG 2EQO 2FCJ 4ABH 4AP SCEX 6GJ 7AWE 7AXE 7AZZ 7BBX 7DF 7BIY 7GAI 7MD 7ND 7PO 8LJ 8RC 0AD, PZIs AH AV, SK6s AB AM, SMs 3BUS 3EAG 5CMP 6AGR 7BEM 7BIC 0CCE, SpS 1BHx 2AVE 5ARN 6ASD 8CH 8ECV 9ASS, SV0s WEE WO, TG9CD, TIs 2 AP PZ, TJ1AW, TUs 2BK 2DD 4AA, UAs 1DZ 1JN 1KAE 1ZX 3GO 3TAB 6DK 0AB 0AC 0AC 0FAX 0FBA 0FR 0KAF 0LH 0PY, UB5s HS 1F LS MZ, UC2s AAB WAE, UD6s AN CN, UF6s FAC FAX, UG6s AD AO, UI8s GAC LAL, UJ8IAS, UKs 1ZAA 1ZAB 2BBB 2FAS 3UAA 3B 5LAN 5LAZ 6AAA 6FAA 6IAZ 6LAZ 6LEZ 7GAA 0FAA 0FAI 0FAF 0KAG 0KFG 0ZAB, UL7s BL GW LAF, UM8s AP MAO, UO5s AW OAX PK WO, UP2PAO, UQ2s GBC GCW, UR2TAX, UT5s AA MD QE SN UH WU, UVs 9CO 0IP, Ws 3AA 3RE 6NP 9AF 0AJ, UY5s AB MV OC ZM, UZ0SX, USARTEK, VKs 2AGH 2ASF 2BKH 2BKM 2HW 2NS 2SA 2TK 3APN 3AXK 3CW 3OP 3Q1 3QK 3VJ 6SA 7JV 9JV 9RH, VPs 1AV 2A 2AAP 2AV 2AX 2AZ 2DAE 2DAJ 2EE 2GBG 2LAM 2LAW 2SAH 5RF 7CQ 7GC 8JT 9BO 9GR, VRs 1AA 2DK 2DO, VS6EN, W0FXM/KL7, WA2BVU/4X, XE2s BC NH, YA1OS, YB0AAO, YN1YL, YOs 2APY 5ALH 5GR 7DL 9APJ 9HO, YUs 1AFQ 1BCD 1EDC 2AKL 3ADG 3CDE 3DBE 3DCR 3DCK 3DM 3DZR 3DQ 3EY 3KAB 3TKF 3OS 4FVC 5FA 5FAG 5OO, YVs 1AD 1E 4DLN 5AVW 5BBW 5BPG 5CKR, ZB2AV, ZC4CB, ZDs 3Q 7CC 7CW 8H 9BM, ZEs 1CC 1CY 1DX 5JJ, ZF1s AA AN, ZLs 1AIR 1OI 1SV 2OD 5AX, ZP5s AL AN AQ KA RL, ZSs 1A 1JX 1MH 2HI 5AN 5JY 5LB 6AK 6KO 6OS, 3D6AX, 3B8CN, 4Ms 5AA 5AMT 0LM, 4S7s AB EC, 4U1TU, 4Z4s BR HF, 5H3LV, 5X5NK, 6D1AA, 6Y5s RM SR, 7X2BD, 8P6s DM DO DR, 9E3USA, 9F3USA, 9H1s BB BL, 9J2XZ, 9L1VW, 9M2FR, 9Y4s KR and VU. Increased DX usage of 7 MHz pushes the cw juicier far enough upband to make our Generals almost forget about their Extras. Can we stand such prosperity? Sure, so long as we hang onto our crystal filters!

† † †



HS4ACN, a Thailand regular for years, hits 20 phone almost daily at 1100-1500 GMT. Bob signs W4SQO when Stateside and you may have worked him previously as HS3BA, VP7BC, and W8UYX.



LA7QM, left, sails around the DX world while operating LKQH aboard MS *Skyward* on ship bands. JA0AIG, standing in the picture at right, sometimes swaps commercial QRM with Arvid while keying *Caracas Maru's* 1500-watter, JPIY. Chief JPIY operator Nishimura is seated before Muneo who also has permission to sign JA0AIG/mm on 20 and 40 with Yaesu gear. A good percentage of the world's professional communicators continue to rise through amateur ranks. (Photos via W3CY, K4SF)

## Where:

**AFRICA** — DXers should be reminded that the official QSL bureau for amateurs in Ethiopia is Telecoms ARC, P.O. Box 1047, Addis Ababa. Only QSLs for Kagnew Station ARC members should go to the Kagnew address. I recently picked up nearly two thousand unforwarded QSLs at KSARC, some on file almost five years, and these are mostly undeliverable because intended recipients have left the country. (ET3GK, WB4RDG) . . . I find it impossible to get logs from FL8HM so kindly notify the gang I no longer handle his QSLs. (W9FN) . . . Self-addressed envelopes with International Reply Coupons receive 100-percent QSL reply here. (5T5CJ) . . . Yes, the ARRL *Handbook's* list of International Telecommunications Union prefix block assignments usually solves such riddles as XX6 and XX7. (K2QHT) . . . CR7FR QSLs for QSOs of September 1, 1971, and later are handled by W7VRO, so any cards received here are forwarded as necessary. (W2GHK) . . . K2KGB may be of assistance if you're still shy an FR7AM/Europa QSL for contact during July of '71. Also, W2RHK prepares to undertake 9J2JM's QSLing. (L1DXA) . . . My QSL managerial clients include 9J2RO from February 1, 1971, and 9J2EA from February 1 to April 17, 1971, also A2CAY as of December 12, 1971. (WA1HAA)

**ASIA** — The last log I received from TA3AY, for whom I've been managing QSLs, covers contacts through September 15, 1970, and all cards on hand have been answered. I understand that TA3AY has been jailed. If and when other logs are received I will confirm contacts accordingly. (W1NYA) . . . IASBTY says cards received via vureau for JD1AAZ's Ogasawara contacts will be answered 100 percent via bureaus. (WB5AOF) . . . I was surprised to read that my old call HS1CW is unknown to STAR. They handled hundreds of cards for me in 1965-'68. Anyway, QSOs with HS1CW for that period can still be confirmed via my address, Route 1, Lisbon, Iowa 52253. (W0MOQ) . . . Nearly gave up but EP2BQ just came through with a QSL for our 1967 QSO. (W6AKM) . . . Still assembling statistics on QSLing for my 6904 YA2HWI/1 contacts. Incidentally, 46 reports indicate unauthorized use of my call since I closed down in Afghanistan. (K9HWI) . . . As of January 1, 1972, K8UDJ no longer handles 524LW QSLing. Cards should go via my address. (W8KCI) . . . A5 is said to be Bhutan's new ITU-assigned prefix, and Okinawa KR8s appear to be signing ID6 calls, KR8EA becoming ID6EA. (DXNS)

**EUROPE** — Effective immediately, if direct QSL addresses are not otherwise available, QSLs for U.S. licensees operating /TF in Iceland should be sent to Keflavik Amateur Radio Organization, Box 44, FPO, New York 09571. The Box 1058, Reykjavik, address is appropriate only for QSLing Icelandic national TF-prefixed stations. (W5LR/TF, KARO QSL Custodian) . . . QSLs for next month's C31FA DXcursion by Gs 3TVY 3VUI 3YUT and 4AFJ will be sent out via RSGB unless s.a.e. with IRCs are received for direct mailing. (G3VUI) . . . Found myself in possession of one of those U.S.S.R. callbooks listing some 14,000 stations. Looks very interesting but translation is a must. (WA9MZS) . . . Fx-GD3AIM, now settled in his new GM3AIM QTH, is busy reducing the Man Isle QSL backlog. (DXNS) . . . I handle QSLing for Vince of SV0WJJ dating from November 1, 1971, also for the Crete DXpedition of November 27-28, 1971, by SV0s WII and WJJ. Too many W/Ks still seem to expect direct response from QSL manager without s.a.e. (WA1HAA)

**SOUTH AMERICA** — Ex-OA3X tells me he wrote 1965 QSLs over the Christmas holidays, 1267 for U.S. contacts. These were sent via surface mail to ARRL Bureau branches and should soon be reaching recipients. Hal, now SM6CSB, says senders of s.a.e. plus IRCs were cleared previously. He's an awards hunter and hopes for high returns. (K3RDT) . . . I still hold complete logs for all CP3BY operation and will continue as Phil's QSL manager when he returns to Bolivia this summer. Illness in his family brought him home for a while where he's signing WN0GFV. Phil is beginning to enjoy cw work now that he's given it a try and expects to be keying regularly from CP3BY. By the way, an FY7 on 80 finally checked off all South American countries for me after an eight-year hunt. (WA0EMS) . . . My QSLing for CE0AE contacts includes only those by Fr. David, K2BUI, not for prior users of the call. Forwarding addresses for the Air Force operators who signed CE0AE on Easter are still needed. (WA3HUP) . . . I'll be handling VP8JT's South Georgia QSLs with logs from April 21, 1971. No cards via bureau, please. (ZS6BBK) . . . Starting the first of this year I serve as QSL manager for HC8PS on the usual s.a.e., or s.a.e.-plus-IRC basis. (K6EC) . . . HK3CMI stresses that it's customary for postal systems down his way to have double sets of box numbers, one for surface and one for air mail. Since the holder of "Box 30" is rarely the same person who holds "Air Box 30" one must be careful on this point of addressing. My DX QSL



CT3AS, "Mr. 5B-DXCC" in so many logs world wide, is visited here by WA4EPM. Though still convalescing from major surgery Hal manages to keep Madeira available on 80, 40, and other bands.

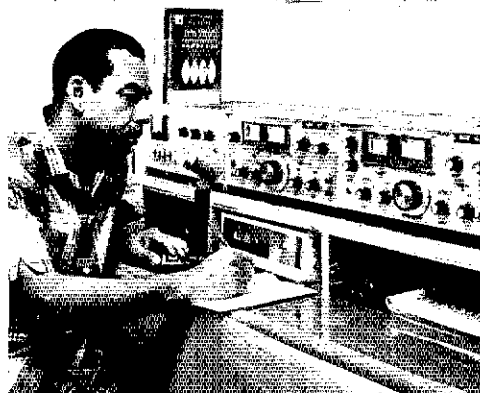
5X5FS; W4NJF wants to run down DX1HMI, TG7WT, TK 5CPG 6GO 6LS, 9Js 3ITU 4AA; K3RDT will settle for scoop on AP5CP, VQ9AR; and VE1AL needs good word on CE9AF, FY7s YG YI, HL9VU, PY0AD, and VP2SAB. Any 'alp?

**O**CEANIA — It seems that KS6 stations have established a reputation for not QSLing but I found KS6EH a very pleasant exception. Don is chief justice of the high court there, by the way, so don't forget *your* QSL. (W7MWF) . . . Getting QSLs from KG6-land is the problem here. (W5IB) . . . Former VR2s EQ and GE become JD2s EQ and GF in ITU's new Fifth garb. (DXNS) . . . My logs from Y18BW stop at September 12, 1971, and he has not replied to my letters of inquiry. Patience, please! (W4NJF) . . . Scanning specifics now, let's rattle the far corners of your DX mailbag to see what flutters forth. Keep in mind that each item always is necessarily neither "official," complete, nor accurate. Just *might* work, though. You're perfectly welcome to

returns as a Novice ran 80 percent but dropped, at least temporarily, to 40 percent as a General. And I find 20 meters the poorest band of all for QSLers. (WB4SXX)

**H**EREABOUTS — With new Novice generations coming along so rapidly I feel *QST* is due for another series of fundamental operating articles including treatments of DX and QSLing. (WB4SIJ) . . . Cleared all YN1MG QSLing in December. Mike is touring Europe and Asia now but I'll continue to answer stragglers. (WA5GES) . . . Please advise your readers I am no longer QSL manager for HR1KS. (WA0WKW) . . . As manager for FG7XF I hold logs for March through September, 1971, and await later records. I also note many cards incoming for OSOs between July 27th and August 20th which do not have matching log entries. This will have to be cleared up. I'll also try to help confirm earlier FG7XF contacts but applicants must be patient. (W8HGG) . . . In-bound cards are stacking up rapidly at our Nineland ARRL Bureau branch where I help with the Ks and Ls. Exotic QSLs may be awaiting *your* s.a.s.e., fellows! (WA9AIH) . . . FM7WF QSLs are handled by WB8BTU so those which arrived here are being forwarded to that station. (W2GHK) . . . For especially prompt QSL comebacks your current crop of "QSLers of the Month" includes A2CAB, CR7IK, CTs 11D 3AS, E15F, ET3ZU/a, FH8CG, FM0IX, F08BJ, GC2FZC, HKs 3CMI 0AA, HR4FJT, JA2AAQ, JD1ABH, K4BZH/VP7, K5s 4DX 6EH, PA0SNG, VKs 4TY 9UC, VP8 2AA 2VV/ES 9AH 9BK, W6SO, WB9EWJ, XE2MX, ZF1AA, 3Cs 1EG 0AN, 4W1AA, 6Y5XX, 7X0WW, and 9U5BB, plus QSL aides Ws 2RHK 7VRO, WASUHR, and VE2DCY, all nominated in "How's" correspondence from Ws 1SWX 4NJF 51B 7MWE, Ks 2AHT 3YVN, WA1HAA, WBs 4SXX 5FIU 9DRE, VEs 1AL 7BAF 7BZY, and ON8VH. Miss anybody? . . . Halp! W1BRJ still seeks a QSL tracer on

- A2CAE, P.O. Box 49, Gaborone, Botswana
- C21TL, Box 32, Nauru Island
- EP2MJ, P.O. Box 2252, Tehran, Iran
- ex-G2AH/W4 (to ZL1OI)
- G3JKO, M. Dransfield, 10 Welbeck close, Trimley
- St. Mary, Ipswich, Suffolk, IP10 0TD, England
- GB3LP (via GW3s VKL or ZQG)
- ex-GD3AIM (to GM3AIM)
- GM3AIM, L. Wright, 54 Douglas cres., Bargarran, Erskine, Renfrewshire, Scotland
- HC2JE, P.O. Box 3992, Guayaquil, Ecuador
- ex-HS1CW (to W0MQO)
- 12XAK, A. Bovio, via Panizzi 10, I-20146, Milano, Italy
- JD1Is ACA ACB ACG (via JARI)
- JYs 6AAM 6FC 9ADO, P.O. Box 2353, Amman, Jordan
- JY6s ABS AMF AMH, P.O. Box 117, Zarka, Jordan
- JY9AC, G. Holmes, PATF, Box 2600, APO, New York, NY 09205
- K7YGB/TF, E. Rankin, Box 22, WSNCS, FPO, New York, NY 09571
- OX5AS, R. Cash (W4DOX), CMR 1215, APO, New York, NY 09023
- PZ1AN, P.O. Box 1334, Paramaribo, Surinam
- PZ2AB, P.O. Box 71, Nickerie, Surinam
- PZ5RK, Box 1439, Paramaribo, Surinam
- VP2GAE, Box 34, St. Georges, Grenada, W.I.
- VP8KF, J. Wright, P.O. Box 59, Port Stanley, Falklands (or via G3TWW)
- VS9MF, R. Boydell, 75 Beechwood Rd., Fishponds, Bristol, BS16 3TW, England
- WC4BCC, P.O. Box 603, Birmingham, AL 35201
- WM1NSA, Box 310, Boston, MA 02102
- ZD7SD, W. Stevens, P.O. Box 16, St. Helena Island
- ZK1CF, S. Arsenius (SM6E1Y), Box 474, Rarotonga, Cook Is.
- ZL1OI, H. Bourne, 54 Whitehaven Rd., Glendowie, Auckland 5, New Zealand
- 3B8CJ, J. Hassam, 3 Destaing St., Port Louis, Mauritius
- 5R8BD, Box 20, Tananarive, Malagasy
- ST5CJ, J. Crete, Box 202, Nouakchott, Mauritania



PZ1AC recently visited WB2AQC's "Welcoming Center for Foreign Amateurs Visiting New York City." Otto presented George with this photo of his widely worked Paramaribo station.

5Z4LW, O. Hope, P.O. Box 47872, Nairobi, Kenya  
(or via W8KCIJ)  
9H1AF, 8 Cowpey flts., Luqa Briffa St., Gzira,  
Malta  
9Q5BW, J. Spooner, Faraway Farm, Junction City,  
AR

A2CAB (via W2RHK)  
A2CAL (to DK2SI)  
AP2KV (to SM0KV)  
C31FA (via G3VUI)  
CR7RF (see text)  
CT3AW (to DJ21B)  
DJ6SI/LX (to DJ6SI)  
EL2CJ (to DL2YM)  
EQ2TW (to EP2TW)  
FG7TG (via REF)  
FG7XF (see text)  
FL8HM (see text)  
FM7WF (see text)  
FO8DL (to FO8AA)  
HB0XHW (to DJ6SI)  
HC8PS (via K6EC)  
HR1KS (see text)  
JD1ABW (via JR1JOL)  
JD1ACE (via JH1NFX)  
JD6EA (see text)  
JW7FD (via LA3UC)  
JX6RL (via LA8AG)  
KC4US1 (via W7JDC)  
KX6EB (via KX6BU)  
LX3BD (via DJ6SI)  
MP4MBM (to G3ZNV)  
OM0BDE (to OK2BDE)  
OM0SFS (to OK2SFS)

PJ0AT (via W3RNO)  
SU1MI (via W3HNK)  
SV0WLL (to WB4WZ)  
TA3AY (see text)  
ex-TA3GB (to 9H3B)  
ex-TU2BW (to 5T5CJ)  
TY3ABF (to DL8OA)  
VK9JK (via W2GHK)  
VK0RC (via W1A)  
VP7CK (to VE3COK)  
VQ9LV (to 5Z4LW)  
VS6MC (to DA2YW)  
VS6AA (to DA2YW)  
VS6DR (via W2GHK)  
W0SHU (via WB8CWD)  
YB0AAX (via 9M2AA)  
ZC4BJ (via ZC4LC)  
ZF1AA (to K2FD)  
ZS6MF/3/4 (via W5QPX)  
3B8CR (to G3LCJ)  
3D2EQ (see text)  
3D6AD (via KP4DKY)  
5B4OH (to OH3IS)  
5N2ES/m (via 4X4TX)  
5Z4NM (via DJ3YU)  
6D4J (to XE1J)  
9H3B (via VE3MR)  
9J2JM (via W2RHK)  
9M2OFA (to 9M8OEA)

trip intending operation in six or seven of the following areas: EL TJ TR TU ZD3 SN 5V 6W 7G 9G and 9L. Our NCX-500 and 12AVQ will go along. (WB2AQC, WA2BAV) . . . 3B8CJ usually is active from 1900 to 2100 GMT around 14,045-14,050 kHz. (K1HRX) . . . ZE1CY worked 2447 stations on his recent 7Q7UY venture. (W4JUK) . . . I operated 5Z4NM mostly on 15 and 20 meters from Mombasa's Sun 'n' Sand Hotel in January and February. (DJ3YU) . . . 9J2RO plans to be in Zambia on 10 meters till mid-'73 but 9J2EA pulled stakes and awaits a license in South Africa. (WA1HAA) . . . I'm ready for DX on five bands, code or voice. (5T5CJ) . . . My XYL Penny, available for YL-DXCCers, helps me operate FT3GK. (WB4RDG) . . . ZD8AY's amazing 160-meter DX record lists 252 QSOs. "The 1.8-MHz path to North America and Europe from Ascension is virtually always open," says Roger. (WIBB) . . . CR5XX may yet be activated by CR6s NN and XX this month, and TTRAO knocked off for F8KP in December. F88XX's Kerguelen rhombic appeals to 5B-DXCCers on 3507, 3798, 7005, and 7083 kHz at 1900-2100 GMT each Saturday. (DXNS) . . . VF8RA's TU4AA outburst produced flocks of contacts with 98 countries. EX-SN2s ABF and ABI now sign YB0s ABB and ABD in Djakarta. (NARS) . . . 7Q7BC is active in International Short Wave League's 21,350-kHz net on Sundays. (ISWL) . . . VQ9SM, back in Mauritius this month, now points toward Rodriguez. (NTDXA) . . . A West Africa net meets daily at 1930 GMT on 21,300 kHz with many a gaily in tow. (WCDXB)

**E**UROPE — Reminder: G6UW/LX will be big on DX bands over the 11th-25th of this month. (G3ZHL) . . . SV0s WII and WJJ are thinking of Crete and the Dodecanese again by '73. (WA1HAA) . . . Working HV3SJ in December was my first contact with DL9PE since our in-person QSO almost ten years ago. (W8IBX) . . . PJ2PS soon will renew DX friendships as PA0PSK. (WA3KSO) . . . So far only fourteen DXers have claimed the WALT (Worked All London Town) certification sponsored by Grafton Radio Society. Who will be the first U.S.A. stations to qualify? S.a.s.e., please, for full details. (G3KEB of G3AFT) . . . As a KC-135 pilot I've made eyeball ham friends from Thailand to Spain including GM3VEY of Dundee. (WA1OXR-WASYEE) . . . We'll be operating C31FA on 80 through 10 meters early next month with 100 watts of phone and code into a TA3J jr and inverted Vs. The site will be 8500 high, well above the snow line. (G3VUI) . . . Some interesting QRP contacts in my cw log include OE6BW3's two watts and dipole, ZC4IM's 500 mW and ground-plane. If you really hunger to operate under conditions that would discourage any but the most patient and devoted hams, try 40 meters in Europe! (ON8VH-W2BTQ) . . . Malta gives up 160 in favor of 2 meters, and the 1972 British Empire Radio Union contest occurs on the 11th-12th of this month, an intra-society activity. (NARS) . . . The '71 SP DX Contest, a radiofele-

(Continued on page 151)

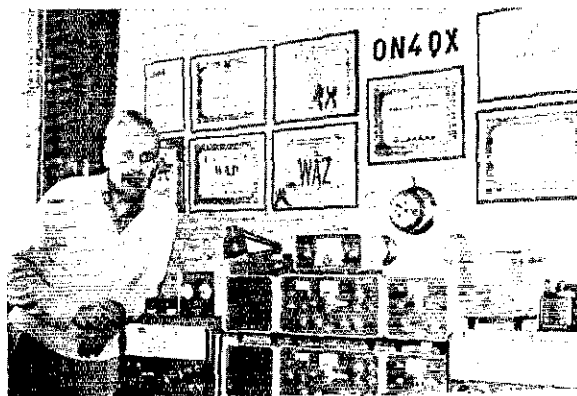
Your postal advisory panel for this go: Ws 1PL 1SWX 1WPR 1YL 2BTO 2GHK 5CNU 5IB 81RX 9LNQ, Ks 1HBX 2QHT 3RDT 3YVN 4SD 8PYD, WAs 1HAA 2BAV 2EAB 2KWB 7HOR, WBs 2AQC 4SIJ 4SXX 5FIU 9DRE, OH8VH, VE7s BAF BZY, Columbus Amateur Radio Association CARAscope (W8ZCCQ), DX News-Sheet (G. Watis, 62 Bellmore Rd., Norwich, N72T., England), Far East Auxiliary Radio League (M) News (KA2LL), Florida DX Club DX Report (W4FRO), International Short Wave League Monitor (E. Chilvers, 1 Grove Rd., Lydney, Glos., GL15 5JE, England), Japan DX Radio Club Bulletin (K2KGB), Newark News Radio Club Bulletin (J. Heien, 3822 Marshall Ct., Bellwood, IL 60104), Nigerian 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), UBA's On the Air (ONs 4AH 5VA), VERON's DXpress (PA0s FX LOU to VDV WWP XPS) and West Coast DX Bulletin (WA6AUD). Your turn?

† † †

**Whence:**

**A**FRICA — Egypt's only YL operator, the daughter of SU1MI, signs SU1MI on 20 cw. Moona runs a small crystal-controlled rig into a three-element rotary. (W3HNK) . . . SV2YH, working on a high-voltage power line project linking Ghana and Togo, uses a 200-foot-high ground-plane. 9L1VW is dean of agriculture at Njala U. (K2QHT) . . . Regarding my April DXpedition we'll leave for West Africa on a four- or five-week

ON4QX, active since 1936, prefers the code mode with this well-appointed Antwerp installation. Bob's enthusiasm for English gear doubtless stems from five years of wartime service with the British Navy. ON4QX has done his share of DXpeditioning as 3A2CZ, 1L1QX, LX3QX, and 9A1QX.





# YL news and Views

CONDUCTED BY LOUISE RAMSEY MOREAU,\* WB6BBO

*Happiness is . . .*

**WE IDENTIFY** ourselves by all sorts of symbols. There are seals for patriotic, hobby, pet, and flower themes. We boost our egos with monograms or initials, or we find our particular zodiac sign and splash it in jewelry and seals. We plaster whole acres of mushrooms on everything from dish towels to bath mats and, most recently, we have been sporting pins to suit our moods — sad, scowling, frowning, a blah “I goofed” — and everywhere we find the smile of a happy face.

We are indeed near to tears when the ice begins to coat the antenna and we watch the wire glisten, then sag, then drop as YL-OM is about to begin. Our blues are deep when the final refuses to load and we have a special sked. We go into the worried frown when we realize we hollixed the agenda at club meeting or forgot the proper QNA sequence in a net. The “I goofed” face is very obvious after a triumphant start to work YLAP with precise diction, proper adherence to protocol brings no answers and the realization dawns that we were listening on 20 and calling on 40. Nothing can be more deflating. We burn over the misdirection of a message, the speaker who promised to be at the club meeting and wasn't, or the transceiver that we ordered for the OM a month earlier and which had not arrived at seven P.M. December 24.

The mood-faces fit all groups of people but they are most apt for the amateur radio operator and, as with everyone, we find that the smile of the happy face is the one that we wear the most, for all we need to do is settle down at the desk, switch on the rig, and we are happy in the best dictionary definition of the word with a “feeling of great pleasure, contentment.”

To the amateur, happiness is DX — the logging of a new country, the feeling that that terrible weak signal might be a rare one and, to our delight,

\* YL Editor, QST. Please send all news notes to WB6BBO's home address: 1036 East Boston St., Altadena, CA 91001.

it is. It is the DX-YL Certificate, DXCC, WAC, and WAC-YL, and it is the far-away places with the odd prefixes that bring the entire world into our shack. It's friendship that begins with a chance meeting in a contest and grows into a regular sked with a YL we come to know as well as the neighbor next door.

And happiness is contests, that moment of silence just before H-hour, and the following crash of contest CQs layers deep. It's patience and timing and skill. It's remembering the errors of the last one and correcting them this time to build the score. It's passing up the loud neighboring sections and signals, and delving deep to catch those tough ones first. And it is carefully milking each frequency before moving to another for more.

To the gal who devotes the major amount of her time to ARPSC, happiness is a night on the nets handling traffic. It is working the familiar fists and voices time after time, or the excitement of a drill, and the feeling of contentment at the EC's “well done.” It is an evening of moving from Section to Region to Area and back with the rigid protocol that is a part of the traffic flavor. To the many ladies from MARS it is that wonderful moment, a grateful “thank you” from a mother who was able to talk to her serviceman son.

It is the friendly club atmosphere of net operation, a gay ragchew about everything and nothing, the satisfaction of good copy in a qualifying run, the delight of finding that two people considered us an A-1 Operator. And it is that rewarding moment when an excited member of our code class floats in on Cloud 9 to tell us with shining eyes, “I just passed General. Thank you!”

Joan King, K6HEY

Amateur radio was Joan's reaction to interference in her hi-fi, her television, and, would you believe, her electric stove? The result of this was not only curiosity, but she went into it right up to her ears and stayed with the various stages until she passed Extra Class in November, 1971.

Mainly active on 40-meter cw and 2-meter fm, Joan's interest other than “just plain down-to-earth ragchewing” is the technical side of radio, troubleshooting, design, and improvising.

Licensed first in 1957, she is a former secretary-treasurer of the UCLA Radio Club, YLRL, Palisades Radio Club, Inglewood Radio Club, ARRL, Los Angeles County RACES where she was Radio Officer in Hollywood for some time. Joan holds CP 35, RCC, Operation Search Award, and the Fire Hazard Alert Award.

K6HEY, Joan King

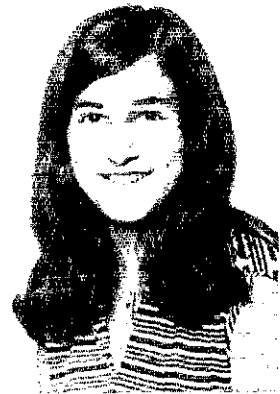


QST for



As if Amateur Extra Class weren't enough, Joanie also holds a First Class Radio Telephone with radar endorsement, Third Telegraph License, and is anxiously awaiting word from FCC as to whether she passed the Second Class Radiotelegraph examination.

WB8ISD/4, Robin, listened to her father, W8NM, operating for as long as she can remember and naturally caught the radio virus. Found mainly on 40 and 15 meters, Robin enjoys rag chewing on both ssb and cw.



### 32nd YLRL Anniversary Party Results

#### Cw Winners

YV5CKR	1702.00	Gold Cup, 1st place
WA9TVM	1472.00	Certificate, Second
HC1KP	1342.00	Certificate, Third

#### Phone Winner

W2GLB	9720.00	Gold Cup, 1st place
VE3GTI	8085.00*	Certificate, Second
K6DLL	7695.00*	Certificate, Third

#### Top Combined Scores

VE3GTI <sup>1</sup>	9525.00	WA9TVM	5977.00
HC1KP	9035.00	K8ONV	3243.00
YV5CKR	8622.00	VE1AMB	3213.00
K6DLL	8162.50*	SM0CXC <sup>2</sup>	2210.00*
K4RHU	7071.00	G8LY	734.00*
K8ITF	6217.50*	VK3KS	542.50*

#### Cw Scores

WB2JCE	1156.25	WA4UWK	2090.00
WB2PYI	532.00	W4TVT	1880.00
K3SQX	880.00	W4FHN	1023.00
K4RHU	1200.00	WB4NKO	69.00
WA5FZ	1125.00*	K5OPT	4940.00
K6DLL	467.50*	W5ZPD	4092.00
WA7BDD	380.00*	K6DLL	7695.00*
WA8USU	617.50*	K6KCI	6272.00
K8ITF	467.50*	WA6AOE	3200.00*
WA8KMT	460.00	W6NLM	2560.00
K8ONV	408.00	K7UBC	4218.75*
WA9TVM	1472.00	K7RAM	3080.00
VE1AMB	1008.00	WA7FLC	2860.00
VE3GTI	1440.00	WA7MOA	2580.00
VE6YL	450.00	K7WRS	2000.00*
YV5CKR	1702.00	W7NJS	1725.00*
HC1KP	1342.00	K8ITF	5750.00*
11MQ	499.00	WA8VXE	3024.00*
SM0CXC	460.00	K8NGR	2948.00
G8LY	300.00	K8ONV	2835.00
OK2BBI	70.00*	K8LHF	2580.25*
F5VV	37.50*	K9LUI	6710.00
		WA9TVM	4505.00
		WA9FRS	2650.00*
		WB9EJB	54.00

#### Phone Scores

WA1JYO	2682.50*	WA0TNT	3285.00
W4HWR/1	2320.00	K0EPE	2940.00
W1ZEN	1365.00*	WA0MVO	1595.00*
W2GLB	9720.00	KL7FJW	2982.00
WA2RDV	6210.00	VE1AMB	2205.00
WA2GPT	5557.75*	VE3GTI	8085.00*
W2DXC	1504.00	VE6RP	3750.00
WB2ZNN	1215.00	VE7ADR	2171.00*
WA2RRI	965.00	HC1KP	7693.00
W3MDJ	6660.00	YV5CKR	6920.00
W3TNP	5208.00	TF3YL	1917.00
WA3GZT	1550.00	SM0CXC	1750.00
K4RHU	5871.00	G8LY	434.00
K4AOH	3960.00	3E1QC	364.00

Confirmation log submitted by W3CDQ

\* Indicates low-power multiplier claimed.

<sup>1</sup> Corcoran and North American Hager Award

<sup>2</sup> World DX Hager Award.

Please address all inquiries regarding scores and standings to the 1971 Contest Custodian, K7QGO.

K6ANG, Billie Blakesley; W6MPF, Agnes Langevin; W6JZA, Elsa Wheeler, with the YLRC-LA membership, discuss plans for the 6th YLRL International Convention.

### YLRL Contest Logs

The logs from the various YLRL-sponsored contests should be mailed to the contest custodian, the YLRL vice-president each year. "YL News and Views" only reports the results of the contests as sent to us by YLRL. To send a log to this column means delay while forwarding to the custodian, and possible disqualification if the deadline for receipt has been passed.

### 1972 YLRL Committees Appointed

President Mae Hipp, K7QGO, has announced the following as members of YLRL committees for 1972. *Budget and Finance:* Chairman, K5YIB, Barbie Houston; W5RYX, Lyn Ohlson; WA2UAB, Mable Fitzsimmons. *Auditor,* Martha Rast, K6DLL. *Membership:* Eastern, Marge Campbell, K4RNS; Western, Beth Taylor, W7NJS. *International Membership Correspondent:* Gretna Longware, WA2WHE. *Supplies:* Lisa Whitman, WA7MOA. *Publicity:* Kay Anderson, W8DIU. *Advertising:* Elaine High, W0HEM. *Librarian:* Meta Brazell, WA6BNS. *Certificates:* YLCC, Onie Woodward, W1ZEN. *Continuous Membership:* Ruth Siegelman, W2OWL. *WAS-YL:* Irene Akers, W3RXJ. *WAC-YL:* Miriam Blackburn, W3UUG. *DX-YL:* Emma Berg, W0JUV. *YL Harmonics:* Editor, Mae Hipp, K7QGO; New Member Editor, Claire Bardon, W4TVT; Novice Correspondent, Joan Haro WASWGA. *"Tape Topics" Librarians:* Raj Cauthers, K7NZO; Dot Baumgardner, WA8JW. *Nominating Committee:* WA9NEJ, WA7FLC, K3ZDN. *Ballot Auditors:* WA4EPM, WB4MPW.

QST





CONDUCTED BY BILL SMITH,\* KØCER

### WB6NMT Low-Noise 220-MHz Preamplifier

LOUIS ANCIAUX, WB6NMT, has devoted much effort to the development of low-noise front ends for 220 MHz. One result is the preamplifier described herewith, which can be used at the receiver or mounted up at the antenna.

The transistor is a 2N5245 or 2N5486 JFET, operated grounded-source, with inductive neutralization. Hand-picked transistors and careful adjustment have yielded noise figures as low as 1.3 dB, but Louis says that 1.6 to 1.9 dB is more common. A preamplifier of this type, taken to a converter-testing session at the ARRL Convention at San Jose last summer, was measured at 1.4 dB.

The preamplifier is built on double-clad circuit board, mounted on spacers inside an LMB T-F770 aluminum box, 2-3/4 x 2-1/8 x 1-5/8 inches in size. A shield of circuit board stock divides the amplifier as indicated by the broken line in the

circuit diagram. BNC or N-type fittings are recommended for the input and output connectors, and top-grade glass trimmers should be used. Louis can supply quality Corning trimmers at \$1.00 each, including postage, to a limited number of amateurs interested in building the amplifier. His address: Box 1000, Rt 2, Dixon, CA 95620.

### Mounting at the Antenna

Everyone knows that the place to put a preamplifier, to get the most out of it, is at the antenna. If there is an appreciable run of line from the antenna to the first rf stage of the receiver, the line loss in dB must be added to the receiver noise figure, if we are to know the true worth of the entire system in reception of weak signals. Viewed this way, the antenna-mounted preamplifier becomes a must - the best step left to take in improving performance, especially at 220 MHz and higher frequencies.

Antenna-mounted amplifiers posed considerable power problems when tubes were used, but with only 5 mA at 12 volts dc involved a transistor stage is handled quite readily. Only the input

\* Send reports and correspondence to Bill Smith, KØCER, ARRL, 225 Main St., Newington, CT 06111.

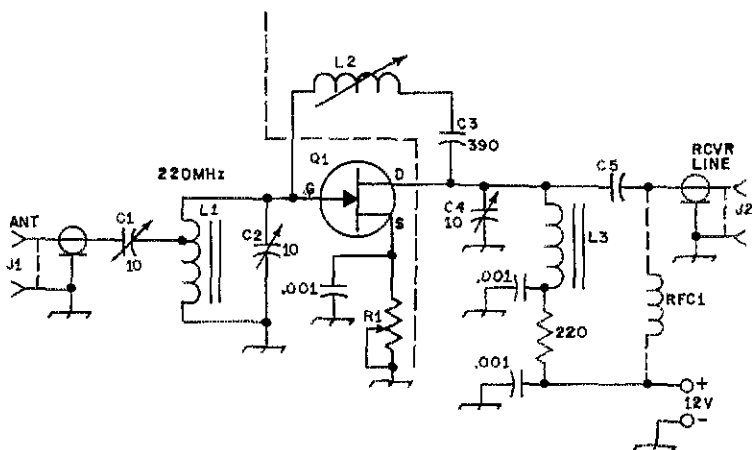
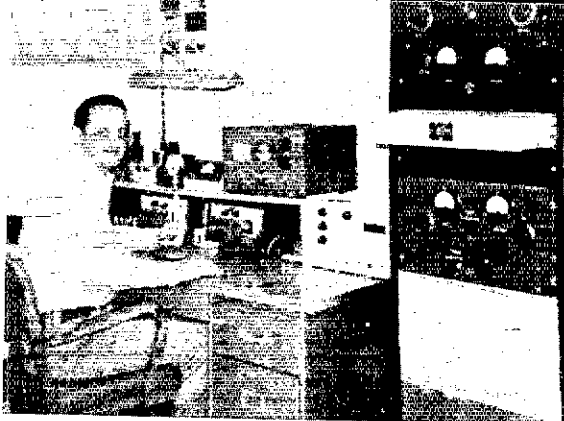


Fig. 1 - Circuit and parts information for the WB6NMT 220-MHz preamplifier.

- C1 - 0.8 or 1 to 10 pF glass trimmer (Johanson 2950 or JFD VAM or MVM series).
- C2 - Like C1, or Corning Direct Traverse CGW, 0.8 to 10 pF.
- C3 - 390-pF silver mica.
- C4 - Like C1, C2, or less expensive type with 1 to 10-pF range.
- C5 - Experiment with values 1 to 5 pF, for maximum gain in system as it will be used.
- J1, J2 - BNC or N-type connector.

- L1 - 4 turns No. 22 enam. on Micrometals T-30-0 toroidal core (Amidon Associates). Tap 1 turn from top, subject to adjustment for lowest nf. (Air-wound coils also usable, but toroids preferred.)
- L2 - 9 turns No. 28 enam. on 1/4-inch slug-tuned form (Miller 4500, brass slug). Do not ground the slug.
- L3 - Like L1, but no tap.
- Q1 - 2N5245, 2N5486, MPF-107, TIS-88.
- R1 - 200- or 250-ohm control.
- RFC1 - Vhf rf choke, 0.8 to 3  $\mu$ H. Use only when preamp is antenna mounted. See text.



K5BXG, Tulsa, Okla., worked more than two dozen states during his first year on 144 MHz. Charlie runs 500 watts and an array of four 11-element Yagis stacked vertically.

### OVS and Operating News

50-MHz DXers are not in complete agreement in regard to the winter *E* season. There were several openings but few which compared to past winter *E*, and there have been no reports of international DX between the Americas or into the Pacific. WAINNW, Mass., reported three *E* sessions, Dec. 17, 20, and 26. On the 17th, Ed worked his fourth SSTV station, KØMST, Iowa. K1GVT, Vt., reports, "just a few short openings to 8s and 9s." WA1DFL, Mass., is one of few who found December conditions good. Steve says, "one of the best Decembers in recent years." He caught openings Dec. 10, 18, 22, 26, 29, and 30. WA1MWN, Mass., worked 4s Dec. 14 and 9s on the 26th. Pat, WA5IYX, Texas, called the Dec. 14 opening "wild" and noted *E* above 107 MHz in the early evening. WA5VJB, Texas, running one watt output, managed solid contacts with numerous 7s on Dec. 4-5.

From Los Angeles, WA6HXM, reports, "very little *E* and no *F*-layer propagation." Pete worked K7DBR, Seattle, on Jan. 1. W6DPD, Fresno, worked 5s Dec. 5 and South Dakota and VE7 the following day. At Dixon, WB6NMT observed the Dec. 5 opening, and another to Colorado and Washington Dec. 29. WB6NMT is working on a 6-meter array consisting of two 3-wire rhombics spaced one wavelength vertically. The array is 15 wavelengths per leg, or about 300 feet, requiring a fair amount of real estate! Louis hopes to use the array for moonbounce and summer *E*. WA7OET, Wash., says there was a good opening Dec. 29, which included stations from VE7 to Arizona. K7QFW, Wash., found Dec. 5 good for contacts into South Dakota, Wyoming, and Arizona. K7GSE worked 6s. K7ICW, Las Vegas, reports DX on the 5th, 28th, and 29th. Al says, "way down

circuit of the first stage is important in setting the noise figure of the system, so the line between the preamplifier and the converter proper is not critical, and putting the dc for the amplifier through the line has no adverse effect on overall performance. Probably the simplest solution is to mount a coaxial relay and the preamplifier in a weatherproof box, at the antenna, and run the amplified signal down an inexpensive line to the receiver. RG-8 should be good enough, for up to 100 feet; RG-58 for 50 feet or less. The low-loss line can then be reserved for transmitting only. The dc voltage for the preamplifier is fed through one arm of a coaxial T fitting at the receiver input. This assumes use of some sort of blocking capacitor in the receiver input, to prevent grounding the dc through a coupling loop or tap on a grounded tuned circuit.

The rf choke in the preamplifier circuit, RFC1, and the one used at the receiver input (to isolate the dc from the rf) are not critical. Any reasonably good vhf choke should do. If you're still willing to take the losses involved in the line, and you want to use the preamp at the receiver input, leave RFC1 out of the circuit, and connect the dc as shown in Fig. 1.

### Adjustment

WB6NMT has some useful ideas on adjustment for best noise figure. First set R1 for about 5 mA current drain, at 12 to 15 volts dc. Touch the neutralizing coil, L2. If there is any change in current, the stage is oscillating. Keeping contact with L2 (to prevent oscillation) readjust R1 for 5 mA. Using a strong 220-MHz test signal, adjust C4 for maximum signal indication. Set C1 to minimum capacitance, and peak C2. Increase C1 slowly until signal no longer rises, then back off one turn and readjust C2 and C4 for maximum signal.

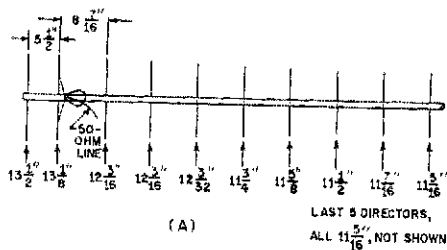
Now reverse the preamplifier, connecting J1 to the receiver input, and feeding the signal into J2. With the dc still applied, tune L2 to minimum signal feed-through. If L2 has an ungrounded brass slug, the amplifier attenuation should be about 50 dB. Drain current should remain at 5 mA.

Connect the amplifier normally, and repeat the process outlined above, until the tuning of C4 remains nearly constant. Finally, adjust C1 for best signal-to-noise ratio (lowest noise figure) and readjust C2. This should yield a noise figure of 1.5 to 2 dB, and gain of 12 to 18 dB, depending on the transistor used. Often the lower-gain condition will also give the best noise figure. WB6NMT will attempt to answer any questions. Please send a stamped self-addressed envelope. Thanks, Louis, for sharing this information. (KØCER and WHDQ)

### WØEYE 432 Yagi Correction

An unfortunate drafting error was made on the element lengths given for WØEYE's 432-MHz Yagi in the January column. Director lengths must be cut to the lengths shown in the drawing at the right. Don Hilliard, WØEYE, says performance of the Yagi built with the incorrect measurements could suffer 3 or 4 dB. Anyone who built the Yagi according to the published lengths should cut new director elements.

Don's design is becoming popular, and the antenna is performing well at many locations around the country. We regret the error, which was not found in time for correction last month.



The WØEYE 432 Yagi

from previous years; no double hop and only one opening lasted more than two hours."

In the January column we published the complete list of stations having achieved 50-MHz WAS. Somehow K7KHU's call was incorrectly printed. Therefore, he it known that YL Grissa, K7KHU, holds 50-MHz WAS No. 90! At Milwaukee, husband and wife team, WA9HUX and WB9DXM, found December interesting. They worked 4s and heard a KP4 Dec. 14, during what was apparently the best opening of the winter E season. On the 19th, 1s, 2s, and 3s were worked in the morning and 5s that evening. Jan. 2 the band opened to New England. WA9HUX has 49 states confirmed, needing Hawaii for WAS.

Iowa is well represented this month. KØMST reports two SSTV contacts and several openings to the East Coast during December. Kerth runs a kilowatt on both 6 and 2, has worked 45 states on 50 MHz -- and one of the five still needed is bordering South Dakota! WBØAAM, Des Moines, worked E Dec. 10 and 21, with the latter and better opening including Connecticut and Massachusetts contacts. WAØUPS found E Dec. 15, 22, 23 (to VE1ASJ), 24, 26, 27, and 31.

This month's mile-per-watt award goes to WAØJBH of Dubuque, Iowa. Bob worked K2RTH and WB2QZF Dec. 22 while running 26 milliwatts of ssb from a homebuilt solid-state transceiver. Bob is working on a 2N3553 amplifier "to increase power to one watt when conditions get rough."

WAØQHC, Duluth, Minnesota, worked W1s January 7.

Been wondering what happened to the TF openings? T12MQ writes from San Jose, Costa Rica, that fall TF, even in his favorable latitude, was limited to nine openings during October and November, to Argentina, Uruguay, and Brazil. T12MQ has held several DX calls including LU8BF, LU8HF, HS1MQ, and EA4MQ, since first being licensed in 1938. T12MQ and T12HL (ex-OA4C) are the only Costa Rican stations currently active on 50 MHz.

From Tasmania, VK7KJ wrote QST's DX column editor, W9BRD, he sports a 4CX350A final and 6-element Yagi looking for DX. Greg reminds us that VKs are not permitted operation below 52 MHz.

144-MHz DXers concentrated on meteor scatter during December and early January. We have these

additional reports on the December Geminids. WA2UDT, N.J., worked W9JDD, Wisc., on the 14th and said he would possibly have had other contacts had he used ssb for a quicker exchange rate. W3BHG, Del., had a near contact with KØAWU, N.D., on the 13th, and last May worked W5RCI, Miss., for state number 33. K5BXG, Tulsa, using a new vertical stack of four 11-element Yagis, worked W2UK on the 13th. Charlie heard good bursts from W1FZA, N.H., over a 1400-mile path, proving to him the vertical stack is working. WASHNK, Texas, worked W9JDD, Wisc., the 13th. WA6LYC, Los Angeles, was disappointed with Geminids schedules with K7BBO, Tacoma. Dave agrees with Dick, saying, "Geminids below par this year and far below 1970." Dave did manage ssb contacts with W6UOV, WA6JRA, and WA6NRV. K7ICW also agrees, "way down from previous years." Al received calls from WASHNK and W5SXD, Texas, and partial calls from KØAWU and WØLER.

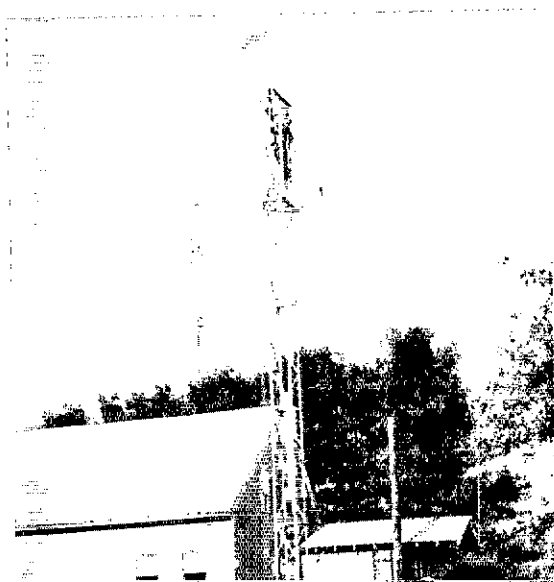
The January Quadrantids were apparently not too good. WØLER, Minneapolis, says the peak was short, coming between 0900 and 1030 GMT, Jan. 4, over the east-west path. John estimates the count at 70 per hour during that time. He had contacts with WA2GSX and WA2UDT. WØMJS, also Minneapolis, worked W1FZA and K3ARN, and W9JDD, Wisc., exchanged with WA2GSX. WA2UDT's contact with WØLER was state number 22 for Bill, earning him a box score listing. W1FZA, N.H., enters the boxes with 21 states, thanks to WØMJS. Ken runs a kW to an 80-element collinear array and has heard his EME echoes twice. K5BXG, Tulsa, contacted K2ZAT/8, Ohio, on the 3rd for state number 25. WA9QZE, near Chicago, worked K2VDK, N.J., Jan. 2, for state number 23.

Winter tropo formed Dec. 25-27 from Oklahoma and Texas east to Georgia. W4ISS, Augusta, worked K5WXZ and W5HN, Texas, and K5BXG, W5UGO, and W5WAX, Oklahoma, on the 26th. WASHNK, Texas, worked Oklahoma stations Dec. 25, 26, and 27 and bemoans lack of activity during the sessions. K5BXG, Tulsa, says that vertical stack does well on tropo, having worked K4FRH, W4EHM, W4ISS, W4LRR, and K4BDJ, all Georgia, W5AO, Miss., and K5PTG, Texas. The latter was worked Dec. 26, the others on the 27th. W5WAX, Muskogee, worked many of the same stations and K4GOF in Kentucky, bringing Sam to 37 states worked. He says also that K5WVX, Okla., worked K4FRH, Atlanta, on both 6 and 2 meters. W5HFV, near Tulsa, has some interesting theories on clear-air turbulence and tropo which we'll explore next month.

Now these 2-meter notes. K1OJQ, Mass., says 22 ssb stations checked into one recent Northeast VHF Association net "showing the activity is there." WA2ZPX, New York City, is nearing a box listing with 19 states worked. WA7OBC, Bellevue, Wash., reports good a-m activity.

Remember Shelby Ennis, W4WNI? He is now signing WB8DMD at Flushing, Michigan. Before work loads got too rough, Shelby did much early observation of 2-meter E. His address is 5077 Duffield Road. Nice to hear from you again

K2GRI recently completed the 50-foot tower shown in the foreground. Atop is a 6-foot dish used on 2304 MHz for schedules with W1AJR, K1JIX, and others. In the background is a 4-foot dish for 1296 and 432 Yagi array.



These five UHFers represent much activity on 432, 1296, and 2304 MHz in the Northeast. They are, (l. to r.), K2CBA, W1MEP, K2GRI, W1AJR, and W2BVU. (photo via W2BVU)



Shelby, and where did you find that 1954 OVS reporting form? WA8NBD, Mich., reports several December evenings of above-average tropo to Ohio, Illinois, and Indiana. WA9UUF says 2-meter a-m was very popular during the Holidays around St. Louis including a 10-1/2-hour marathon round-table New Year's Day involving 45 stations, all near 145.5. KØYMQ, Kansas, asks that "we put in a plug for a-m." Jon found tropo conditions excellent to Texas on Christmas day. And January 10, KØWLU, S.D., worked Wisconsin, Iowa, and Minnesota during an early-evening aurora. I expect to receive additional reports on this aurora, because Bill says signal levels were good. He is now running 100 watts of ssb and cw and offers meteor scatter schedules to those wanting South Dakota.

220-MHz continues to experience growth. WA6GYD's newsletter lists much activity in the San Francisco area including newcomers K6DYF, WB6FUZ, WB6DAA, K6USS, WB6JPY, and WB6WLE. WA6GYD has done much to promote the 220-MHz band and deserves a "well done, Don." Another 220 promoter, WB6NMT, has taken the lead in states worked from the western United States. Louis reached 7 by contacting WAØQLP, South Dakota, on meteor scatter, Dec. 15. The contact was also the first between the respective states on 220. WAØQLP has 4 states, not a bad showing from western South Dakota. K7BBO, Tacoma, has completed his kW final using 4CX250Rs feeding a 40-element collinear array at 85 feet. He wants ssb or cw schedules for any meteor shower. Dave reports K7SMN new on 220 at Renton, Wash., and WA7NAN, Kent, should soon be active. From Bend, Oregon, K7HSJ writes there are five active 220 stations in the Portland area. Don says 220 operators in California, Oregon, and Washington use 3840 kHz after 1900 PST daily for liaison.

What is happening elsewhere in the country on 220?

432-MHz interest remains high, although that first meteor scatter contact remains elusive. W4FJ, Richmond, Va., ran schedules through much of December and into the January Quadrantids with WØDRL, Kansas, and WØLER, Minneapolis, with only the usual pings and a few letters heard. Ted received a recent letter from ZESJJ, Rhodesia, who said he expected to be ready for 432 moonbounce in January. W4NUS and WØWYZ tell Ted they have heard their EME echoes on 432.

KSZCO and WB5CEV, Dallas, are getting on ATV using 440 MHz for their video carrier frequency. WA6HXW, who runs a kilowatt and Tilton Yagi array from near Los Angeles, reports 432 activity good in southern California. Harley notes W6DQJ, W6YVO, WA6SQV, W6QED, and K6HX active and that for 25 weeks he has worked W6FZJ, San Jose, about 400 miles without a miss on their weekly schedule. WA6EXV schedules W6FZJ and K7ICW while working on various projects, including preparations with WA6QYR to give 10 GHz a try.

WØDRL, Topeka, continues to be the moving force on 432 in the Midwest. Running meteor

scatter schedules with W7JRG, Montana, during the Quadrantids he heard complete calls and a batch of pings on the 4th. Al says Ken has a fine 4.2 m.s. signal and is optimistic they may complete a contact. On tropo schedules, WØDRL has found KØCER, S.D., workable at 320 miles most evenings except when temperatures dip well below zero. KØCER also worked WØBJ, North Platte, Nebr., 265 miles, twice, and WØLER, Minneapolis, 225 miles, on several December and January nights.

From Winnipeg, VE4MA maintains schedules with WØPHD, Minn., and KØAWU, N.D. VE4AS and VE4JX are also active, 432.008 MHz.

1296 MHz and Up is becoming more popular with a number of operators experimenting with various preamp, antenna and transmitter designs. WA2LTM, N.J., responded to my query in January for 1296-MHz states-worked listings saying he has worked 30 stations in 10 states and 4 call areas in the past year. Apparently Doug has the highest states-worked total in the country. WA2LTM predicts the 350-mile home station DX record will fall, especially now that W8YIO is active in Michigan. K2YCO has been doing antenna evaluation and says that while 1296-MHz collinears do work, he recommends using a screen reflector instead of parasitic elements. Chuck says the screen is about 2 dB better for forward gain, and greatly reduces back and side lobes. He is also working on Yagi designs and has developed a 6-footer with gain similar to a 32-element expanded collinear with screen reflector.

In addition to promoting 220, WA6GYD is hammering away at 1296. Don says W6AJF, W6ZUB, W6ET, W6OHQ, K6MYC, and he are on 1296 in the San Francisco area. WA6GYD is trying to convince the group to use helix antennas similar to the one described by K6UQH in the August, 1963, QST and late editions of the ARRL Handbook.

WA8KPY, Pontiac, Michigan, is interested in a 1296-MHz varactor tripler design. WØDRL is attempting to drum up 1296 activity in the Midwest. Al has completed a converter, tripler, and four 12-turn helices. He favors the circular polarization of the helix - so long as a standard is observed for right or lefthand. Righthand is popular on the West Coast. WØYZS, Kansas City, is righthand, and WA9HUV will be this spring. I would not be surprised to see more midwestern 1296 interest this spring and summer. If half of those in the "talking stage" become active, we may hear some interesting 1296 tropo DX this year.

## Northeast FM Repeater Assn. Annual Meeting

Fm and repeater operators, 71 in number and representing 18 repeater groups of northeastern USA, met in West Chester, Pa., January 8, to discuss repeater problems and consider standardization of repeater input and output frequencies. An increasingly mobile amateur population, and the high cost of crystals needed to work into repeaters encountered even in regional travel, point up the need for better coordination of repeater frequencies, at least on a regional basis. If such cooperation can be arrived at regionally, perhaps the way will be opened for better planning on a nationwide scale.

All groups represented at the January meeting agreed to move frequencies, where necessary, to 600-kHz spacing. There was also discussion of the need for limiting power output of "super repeaters," to provide some balance between input sensitivity and power output. Also considered was the desirability of separate frequencies for base stations and mobiles, with mobile-priority input to the repeater, in the manner of the Simulmonitor described by Kowols in January, 1972, *QST*. A proposal was advanced to add 220-MHz output to repeaters, to gain experience and increase occupancy in that band. All hands recognize that with the ultimate result of Docket 18803 still in doubt, most plans cannot be fully implemented, but concrete efforts toward regional coordination were never more important or timely.

The following slate of officers was elected: president - W1JTB/W2GHR, vice-president - W3DTN, secretary - K2IEZ, treasurer - W3GTX, assistant treasurer - WA3HFL. A similar session is scheduled for Hartford, Ct., April 9, 1972, to start at 1:30 P.M.

Late report: On Jan. 26, 0200 to 0530, WA6HXW, Lomita, CA, heard his 432-MHz signals reflected from the moon. Harley runs 500 watts output to an array of 32 Tilton Yagis. He will be on nightly, and will welcome EME schedules. Phone 213-325-3075. Thanks, WA6HXM, for passing along this information.

## Repeater Update

Starting with this issue, new listings and changes submitted for the *ARRL Repeater Directory* will be reported in this column. To conserve space, only the repeater location, call, access method, and input/output frequencies will be given here. All repeater information sent in will be kept on file for the next edition of the *Directory*. Repeater registration forms and copies of the current Repeater *Directory* are available from ARRL Headquarters (please include an s.a.s.e. with your request).

Area	Call	In	Out	Access
Rhode Island	K1ABR	146.10	146.70	COR
		52.525	146.70	1800 Hz
Southern NH	K1MNS	146.25	146.76	COR
		444.25	447.25	COR
Long Island, NY	WA2PDJ	146.445	147.36	COR
Northern NJ	WA2UWC	146.34	146.94	COR
Northern NJ	WA2UWO	146.22	146.82	PL
		447.40	449.40	COR
Bergen Co., NJ	WA2UWR	146.28	146.79	PL
		448.10	443.10	PL
Long Island, NY	WA2UZE	146.52	146.76	COR
		52.80	146.76	PL
Philadelphia, PA	WA3BKO	146.16	146.76	COR
		146.37	146.97	COR
Montgomery Co., MD	MDWA3EWJ	146.04	146.64	COR
		443.45	449.45	COR
Wheaton, MD	WA3PVP	448.30	449.30	COR
		146.07	146.67	COR
		223.30	224.30	COR
Atlanta, GA	W4RRW	146.28	146.88	COR
Northern VA	WB4QFP	146.31	146.91	COR
Hale Co., TX	W5YNL	146.22	146.82	COR
		146.22	146.94	COR
San Bernardino, CA	WA6ALV	146.34	146.85	1800 Hz
Ventura Co., CA	WA6SIN	146.28	146.88	1950 Hz
Detroit, MI	WB8CRK	449.00	444.00	COR
Sioux Falls, SD	WA0VVG	146.34	146.94	1800 Hz
Brookings, SD	W0BXO	146.34	146.94	2100 Hz
Essex Co., ON	VE3III	146.40	147.06	COR
		432.90	147.06	COR

## So You Want to . . .

(Continued from page 62)

"Ahhhh, we rag . . . chewed . . . down the block . . . hmmm . . . well now, way back here we got the Ham Ads . . . maybe . . . we could advertise . . . then they'd have to print our calls."

"Now ya got somethin' . . . yessir . . . not had . . . how much?"

"Fifteen cents a word."

"Oh well, ya only operate once . . . let's take a chance. I'll pay half if you will . . ."

"OK, great. What are we going to advertise? Got anything you want to buy . . . or sell . . .?"

"Nope. You got anything?"

"Nothin'."

"You mean we got a chance to buy our calls into *QST* and we can't think of anything to . . . ya know, this breakin' into print is a lot tougher than I thought! They're gonna have to come up with some new columns for us to write in to . . . er sumpin'."

"Well, listen Charlie . . . ahhhh, ole buddy . . . there's one regular column I seen here in *QST* that I didn't ahhh . . . tell ya about. And one a these days, we'll both get our names in that column . . . for free, too. Yeah. But I want you

to know that when the . . . ahhhh . . . time comes . . . ahhh . . . I promise ya I'll send your call in to have it printed in that column. And I know you'd do the same for me . . . ole buddy."

"Oh yeah? What column you gonna put my call in?"

"Silent Keys."

"There ya go with them keys again. I told ya before I just ain't no good with that Morris Code."

## Back Copies and Photographs

Back copies of *QST* referred to in *QST* issues are available when in print from our Circulation Department. Please send money order or check - 75¢ for each copy - with your order; we cannot bill small orders nor can we ship c.o.d.

Full size (8 by 10) glossy prints of equipment described in *QST* by staff members (*only*) can be furnished at \$2.00 each. Please indicate the *QST* issue, page number, and other necessary identification when ordering, and include full remittance with your order - we do not bill or ship c.o.d.

Sorry, but no reprints of individual *QST* articles are available, nor are templates available unless specifically mentioned in the article.

# Operating News

GEORGE HART, WINJM  
*Communications Manager*  
ELLEN WHITE, W1YL  
*Deputy Communications Mgr.*  
ROBERT L. WHITE, W1CW; DXCC  
GERALD PINARD, *Training Aids*  
ALBERT M. NOONE, WA1KQM; *Contests*

**Cheaters.** A recurring problem at headquarters, and one in which the field is intimately concerned as well, is what to do about cheaters — in contests, in awards, in traffic count, and in just about every kind of operating activity the League conducts and sponsors. Oh yes, we have them — big-time cheaters, small-time cheaters, and quite a few “legal” cheaters who take advantage of every small loophole in the wording of the rules to violate what they know to be the intent.

What to do about them? The average, strictly-honest member will be in favor of vigorous application of the Uggerumph, Rettyssnitch and Wouff-Hong, in that order of seriousness or repetition of the offense. Since these instruments of torture are more or less legendary and their application only theoretical, such convictions usually take the form of vigorous prosecution and disqualification, with figurative placing in the “stocks” for all to see — that is, public disgrace in the pages of *QST* for those found guilty of willful and deliberate rules violation to the detriment of amateur radio and the League. To put it still differently, the average member will be in favor of strict enforcement of the rules so that complete integrity of the activity can be maintained. Also, that all loopholes be closed as quickly as they are discovered.

And there is much to be said for this viewpoint. But there are some practical barriers and difficulties involved, and we would like to reveal some of them, although many are fairly obvious.

The loophole-seekers are probably the most numerous, and perhaps it is unfair to call such people “cheaters” at all. They don’t technically violate any rules, but often the intent is clear enough that they do so in effect. Amateurs in this category can be taken care of by closing the loopholes in the wording of the rules. It seems, however, that no matter how carefully this is done, more loopholes are found, and “loophole Louies” among the fraternity seem to delight in searching for and exploiting them to the limit. The result? Complicated rules. The more loopholes that have to be closed by tighter language, the more compli-

cated and hard to understand the rules become. All our major contest rules are now so complicated it often takes considerable study and research to understand or explain them, and in some cases the reason for a certain kind of rules wording has long been forgotten in some hassle which arose years ago which at that time seemed to make such wording necessary.

Then there are those who deliberately flout rules and invite (nay, in some cases seem to dare) disqualification. Although few, such “cofflaws” have the potential for causing your headquarters to devote endless hours in research to ascertain which rules have been broken, to what extent, and what to do about it, in that order for each individual case. In some cases such situations can be resolved at CD-branch level; in other cases they involve the Awards Committee (a headquarters advisory group), the general manager, the Contest Advisory Committee (an advisory group appointed by the president) and, in extreme cases, the Board itself. The cost can be many hundreds of man-hours and many thousands of dollars — usually because of accusations made, investigations conducted, and counter-actions by the person or group accused.

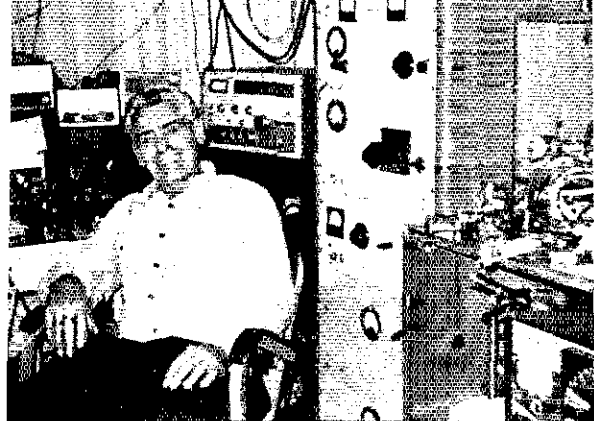
Your FCC has an enforcement division with no other function but to insure compliance with FCC rules, which are laws of the land. We all know it cannot adequately enforce them. Most police departments cannot even come close to enforcing all their regulations. It is the same everywhere; vigorous action in law and rules enforcement becomes more and more difficult, verging on the impossible, as more complications arise and the potential for violations rises with the number of people involved.

Yes, most agencies which operate under laws or rules have enforcement facilities and personnel. Your ARRL has not. Our task is purely administrative, to apply the rules as they exist to the activity at hand, pretty much on the assumption that those participating will observe or have observed them on an “honor system” basis. Unfortunately, there are those who have no honor, and in a group as large as

## Meet Your SCM

Eastern Florida SCM Regis K. Kramer, W4ILE, is a well-known figure in the organized end of amateur radio. He was first licensed in 1935 and has held the calls of W8NJA (Ohio) and W9VKQ (Wisconsin). W4ILE was E. Fla. RM for 5 years and an active editor of publications for section traffic nets. He holds ORS, OPS, BPL, A1 Operator, WAS, DXCC, and WAC. W4ILE says he is greatly indebted to amateur radio — providing him with the incentive, years ago, to obtain commercial licenses — thus enabling him to earn a comfortable living and raise a family while doing something he loves — radio operating.





### Meet Your SCM

L. A. SCM Eugene H. Violino, W6INH, is that ranty, a native *Los Angelino*. Gene is currently a communications electrician for the L.A. Dept. of Water and Power with considerable service in past years as a commercial airlines telegrapher, a merchant marine operator, and a press copy man for Press Wireless. He was first licensed in 1935 and now holds Extra Class, is an A-1 Operator, recipient of the BPL award, holds ORS appointment, and is a member of MARS. This SCM's ham interests include traffic handling, DXing, and homebrewing equipment.

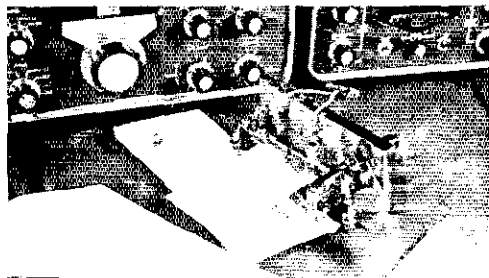
amateur radio competitors is becoming we occasionally run headlong into them. They make a travesty of our "honor system" to the extent that many consider it a completely impractical concept, and demand more enforcement of the rules and suitable action against those who violate them.

As a principle, this makes good sense. As a practical matter, it is costly beyond belief and in many ways just as impractical as the "honor system" might seem — or more so. So what's to do? Pull out all the stops to enforce the intent as well as the letter of the rules, follow a policy of limited enforcement — limited, that is, to what seem to be the more flagrant cases — or adhere to the honor system and let those without honor reap whatever benefits they think they are receiving as a result of their questionable practices?

Or, there might be still other methods too numerous to detail here and now but all worthy of being considered in the overall question of rules enforcement.

Meanwhile, cheaters we have always had and always will have. In fact, a case could be made for the philosophy that in the climate of today's world it can become even more prevalent. Shall we bow to its prevalence and devote more time, money, and personnel to enforcement, or shall we continue to operate on the honor system?

Two-Letter WAS. Remember that 2-letter-call-75-meter-extra-class WAS endorsement we talked



about last month? As of this writing, we already have nine qualifiers, in this order: W0NL, W8LBM, W7UG, W5DS, W8OA, W5HW, W5SW, K4EZ and W9SFR.

Feedback. In last October's *QST* we made a statement to the effect that apparently the League's WAS was the first operating award. We admitted that this was a guess (i.e., without much research) and expected to be corrected. Surprisingly enough, no correction until just recently, a letter from G3IDG informing us that the WAS was predated by the RSGB's WBE (Worked British Empire) and the IARU's WAC, circa 1929 and 1926 respectively. Furthermore, says Allan, a list of 31 operators qualifying for the League's RCC appeared in June, 1925. *QST*.

Oh, well — can't win 'em all. — W7NJM.

### STRAIGHT-KEY NITE



Another Straight-Key Nite has come and gone, leaving pleasant memories (and some pretty sore arms!). This second event brought in 140 reports with a total of 738 participants. The general caliber of fist demonstrated that night indicated some advance practice by many of the crew. Of the 738 participants, 104 picked up one or more votes for "best fist" of the night. The most votes this year were garnered by W4KFC who has been awarded an appropriate certificate. (Now, would you call him the *key* man of the night?) Runners-up, whose fists drew plenty of nifty comments, included W3GN and K4CAX. Ten participants picked up two votes apiece: K2UAR/7, W2LYH, W2LMS, W3WL, WB4JYB, K4QWO, W7DI, W8WU, W8OXQ and W9BX. W'YL.

### SOAPBOX

I got out an old Navy key from my collection to take part. It's an old 2-KW spark key from a WW-1 Navy destroyer. — W2LV. Very pleased with the turnout and noted that 40% of my OSOs were with 2 letter calls. This must be telling us something. — K2HW. *Unappointed not to work* W7NJM; he was too rushed with callers. My key that night was a marble-based Clapp-Eastham antique. — K4QF. My nominee for prettiest list was YL K4VDO. — W8IBX. Change the event into a contest. — WA3PQX. I bet I was the youngest one around at 13 years of age. — WB2QYV. What about an a.m. night? — DJ1US/W3. Compared with 1970, the general quality of sending was better and only a smattering of complaints about the work involved. — W3CY. Used a homebrew 9 watter with an inverted vee to work 6 stations. — K4GSX.

It's hard to find a straight key these days. I finally had to turn my bug on it's side to simulate a straight key. — W1FLM.



## WIAW FALL-WINTER SCHEDULE (Oct. 31, 1971-April 30, 1972)

The Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday ( P.M.-1 A.M. EST, Saturday 7 P.M.-1:00 A.M. EST and Sunday 3 P.M.-11:00 P.M. EST. 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 on Nov. 25, Dec. 24-25, Dec. 31, 1971; Jan. 1, Feb. 21, Mar. 31, 1972. Please note that all times-days are in GMT. Specific operating frequencies are approximate and indicate general operating periods.

GMT	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000					RTTY Bulletin <sup>3</sup>		
0030	CODE PRACTICE DAILY <sup>1</sup> 10-13-15 wpm						
0100	CW BULLETIN <sup>1</sup>						
0120-0130 <sup>4</sup>			3.7 Novice <sup>5</sup>	14.020	7.020	7.15 Novice <sup>5</sup>	3.520
0130-0200			3.7 Novice <sup>5</sup>	14.100	7.080	7.15 Novice <sup>5</sup>	3.555
0200	PHONE BULLETIN <sup>2</sup>						
0205-0230 <sup>4</sup>			3.820	50.120	145.588	1.820	21.270
0230	CODE PRACTICE DAILY <sup>1</sup> (35-15 wpm TThSat, 5-25 wpm MWFSn)						
0330-0400 <sup>4</sup>			3.555		1.805		3.555
0400	RTTY Bulletin <sup>3</sup>				RTTY BULLETIN <sup>3</sup>		
0430	Phone Bulletin <sup>2</sup>				PHONE BULLETIN <sup>2</sup>		
0435-0500 <sup>4</sup>			7.220	3.820	7.220	3.820	7.220
0500	CW Bulletin <sup>1</sup>				CW BULLETIN <sup>1</sup>		
0520-0520 <sup>4</sup>			3.7 Novice <sup>5</sup>	7.020	3.945	7.15 Novice <sup>5</sup>	3.520
0530-0600			3.7 Novice <sup>5</sup>	7.080	3.915	7.15 Novice <sup>5</sup>	3.555
1400	CODE PRACTICE <sup>1</sup> (5-25 wpm MWF, 35-15 TTh)						
1800-1900	21/28 CW <sup>7</sup>	21/28 SSB <sup>8</sup>	21/28 CW <sup>7</sup>	21/28 SSB <sup>8</sup>	21/28 CW <sup>7</sup>	21/28 CW <sup>7</sup>	
1900-2000	14.280	14.050	14.280	14.050	14.280	14.280	
2000-2100	7.080	7.255	14.095 RTTY	7.255	7.080	7.080	
2100-2130	21/28 SSB <sup>8</sup>	21/28 CW <sup>7</sup>	21/28 SSB <sup>8</sup>	21/28 CW <sup>7</sup>	21/28 SSB <sup>8</sup>	21/28 SSB <sup>8</sup>	
2130		CW Bulletin <sup>1</sup>			CW Bulletin <sup>1</sup>		
2200-2230		7.150 Novice	21.125 Novice <sup>5</sup>	7.150 Novice	21.125 Novice <sup>5</sup>	7.150 Novice	
2230		RTTY Bulletin <sup>3</sup>			RTTY Bulletin <sup>3</sup>		
2300	CPN <sup>6</sup>	7.095 RTTY <sup>1</sup>	3.825 RTTY	14.095 RTTY <sup>1</sup>	CPN <sup>6</sup>		
2345		CN <sup>9</sup>			CN <sup>9</sup>		

<sup>1</sup> CW Bulletins (18 wpm) and code practice on 1.805 3.52 7.02 14.02 21.02 28.02 50.02 and 145.588 MHz.  
<sup>2</sup> Phone Bulletins on 1.82 3.82 7.22 14.22 21.22 28.52 50.12 and 145.588 MHz.  
<sup>3</sup> RTTY Bulletins sent at 850-Hertz shift, repeated with 170-Hertz shift; frequencies 3.625 7.005 14.095 and 28.095 MHz.  
<sup>4</sup> Starting time approximate. Operating period follows conclusion of bulletin or code practice.  
<sup>5</sup> WIAW will tune the indicated bands for novice calls, returning the call on the frequency on which called.  
<sup>6</sup> Participation in section traffic nets.  
<sup>7</sup> Operation will be on one of the following frequencies: 21.02, 21.08, 28.02 MHz.  
<sup>8</sup> Operation will be on one of the following frequencies: 21.270, 21.410, 28.520 MHz.  
 Maintenance Staff: W1s QJN WPR YNC.

### WIAW CODE PRACTICE

WIAW transmits code practice according to the following schedule. Approximate frequencies are 1.805 3.52 7.02 14.02 28.02 50.02 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 EST dy	0030 dy
	4:30 PM PST	
5-7½-10-	9:30 PM EST SaTThS	0230 MWFSn
13-20-25	6:30 PM PST	
5-7½-10-	9:00 AM EST MWF	1400 MWF
13-20-25	6:00 AM PST	
35-30-25-	9:30 PM EST MWF	0230 TThS
20-15	6:30 PM PST	
35-30-25-	9:00 AM EST TTh	1400 TTh
20-15	6:00 AM PST	

The 0230 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period. To permit improving your fist by sending in step with WIAW (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 0230 GMT practice on the following dates.

Mar. 13:	It Seems to Us
Mar. 16:	Correspondence
Mar. 22:	League Lines
Mar. 28:	ARPS

The subject of practice text for the following sessions is *Understanding Amateur Radio*; First Edition.

Apr. 3:	Making Measurements, p. 256.
Apr. 7:	Homemade Volt-ohmmeter, p. 260.

I'd like to see this held at least twice a year. - WB2TFH. Those on tend to restore my faith in code ops. - W6FB. I didn't hear a bad fist all night and they call us amateurs? - WA1JSD. Let's have it quarterly. - KØHP. Much fun! - K9KQR. All the old hams are in the same predicament, a sore arm - so all have a mutual feeling of friendship. - K4QZV. After being away from ham radio for 42 years, I passed my Novice exam and operated as WN5EXQ till Dec. 31. I Passed my General in November and on Dec. 31 I got my new license

and call, W5YN. Thus, SKN could not have come at a more opportune time for me. - W5YN. Conditions weren't too good, but still no trouble copying good operators. - WB6WDS. Nominate VE7BBI for best fist; although recently licensed his fist though slow sent excellent code. This just goes to show that liddy operation is definitely not restricted to new hams. - VE7BBO. Let's continue SKN - it's now a tradition. - W4UQ. I haven't touched the key I bought way back in 1936 for about 5 years, but I found that it made about the

some music as the electronic keyer after a few minutes of use. - W2JMZ. Strange to have this on New Year's Eve, but I guess it does keep a lot of guys out of trouble. - W2LYH. Boy, by the times the 6s get going the 1s are so stiff-wristed that they can't send their calls. - WRHUI. New call via Gettysburg roulette (W2LL, ex-W2ESO); this hunk of brass feels strange (W3MJ); I'm trying to follow this key around the table (K4KA); good sign cw isn't dead yet (W3HK); I crave my keyer (WA9AUM); you're sending a big slower than in

the SS (WA0PXT). - Heard at W4KFC. It's hard to find a straight key these days and I finally had to turn my bug on its side to simulate a straight key. - WFLM. Somehow I wish there were more of these. The mad rush of electronic speed keys these days is akin to the current mad rush of life itself but we all seem to be missing something. - W1BDV. I wish we could expand this a bit. More and more old timers are showing up on cw, even with the phone QRM we're getting on 40 these days. CU on SKN next year! - W7DI.

## DX CENTURY CLUB AWARDS

The DXCC Honor Roll consists of the top ten numerical totals in the DXCC. Position in the Honor Roll is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total DXCC credits given including deleted countries. All totals shown represent submissions received through December 31, 1971.

### Honor Roll

G3FMK	323/343	W4DOS	322/332	W9GFF	321/337	K4EZ	319/329	W7ADS	318/340	W9JUV	316/338
G8KS	323/344	W4LRN	322/337	W9GIL	321/341	K4JC	319/325	W8DMD	318/343	W9MOK	316/331
GW3AHN	323/345	W4OM	322/347	W9RCJ	321/336	K9LCE	319/331	W8KIA	318/345	W9TKV	316/334
H89J	323/350	W4OPM	322/340	W9SLR	321/339	K9KVF	319/330	W8QJ	318/338	W9YFV	316/343
K2BK	323/340	W5KC	322/348	W9CJZ	321/328	ON4NC	319/343	W9RKP	318/338	W8AUB	316/327
K4LNM	323/340	W5MMK	322/346	ZL1HY	321/348	PY2CK	319/345	W8BN	318/327	W8OBM	316/332
OE1ER	323/348	W5POA	322/343	DL7AA	320/345	PY2CQ	319/323	YV5BOA	318/322	W8NVZ	316/331
VF2NV	323/344	W5QK	322/336	G2BOZ	320/341	PY2PA	319/323	UJ7ZG	317/321	YV5AIP	316/328
W2AGW	323/350	W6BZE	322/345	G13VJ	320/338	PY2SO	319/323	DL7HU	317/329	DL7BA	315/335
W2CTO	323/346	W6CUO	322/350	K1IXG	320/330	W1JNV	319/339	G3DO	317/342	F3AT	315/331
W2DXX	323/332	W6FPF	322/346	K1SHN	320/237	W2CYS	319/344	G5VT	317/340	G3HDA	315/330
W2NUT	323/342	W6HX	322/348	K4TJL	320/331	W2PDB	319/333	G13HM	317/332	H89KB	315/332
W2OKM	323/344	W6OSU	322/337	K6YRA	320/324	W2RDM	319/336	K2UVU	317/333	18KDB	315/332
W2RGV	323/342	W6TZD	322/345	K8IKK	320/334	W2WZ	319/346	K6OW	317/340	R6OW	315/325
W2SSC	323/342	W6WQO	322/342	K8ONV	320/332	W2ZTV	319/322	K4PLV	317/334	K6OH	315/318
W3MP	323/348	W7MB	322/349	VK4QM	320/346	WA2RLQ	319/323	K4TWF	317/326	K6VVA	315/323
W4VVD	323/343	W7PHO	322/343	W1DK	320/340	W4BHXD	319/323	K6DC	317/337	OK1ADM	315/323
W5ABP	323/343	W8MPW	322/343	W1FZ	320/342	W4IF	319/334	K6NA	317/341	V6SRU	315/331
W5UX	323/341	W8OK	322/336	W1GL	320/326	W4ML	319/342	K6OI	317/341	VK3KB	315/341
W6AM	323/351	W8WZ	322/347	W1HH	320/334	W4SSU	319/330	K6WR	317/326	W2LAX	315/335
W6CY	323/344	W8ZCO	322/339	W1MV	320/340	W5HH	319/323	K6LZL	317/321	W2PN	315/320
W6KZL	323/342	W8DWO	322/338	W2CR	320/340	W5OKZ	319/330	SM3BEZ	317/337	W2UVP	315/336
W6NJU	323/340	W8HB	322/339	W2DOD	320/341	W6CHV	319/340	W1DGL	317/325	W2BFMK	315/320
W6PT	323/343	W8I	322/331	W2KA	320/336	W6GGG	319/323	W2GT	317/339	W4AVY	315/330
W6ZO	323/347	W9LNM	322/348	W2GKZ	320/325	W6TA	319/336	W2MS	317/338	W4VMS	315/320
W7AOB	323/338	W9AIH	322/340	W2GON	320/324	W7AC	319/346	W4IC	317/325	W5EJT	315/325
W7KH	323/349	W9ELA	322/348	W2GUN	320/339	W8AKH	319/323	W4ICW	317/337	W5GO	315/321
W7BF	323/347	W9MLY	322/341	W2LV	320/342	W8EV	319/340	W5GJ	317/327	W6BSY	315/334
W8DAW	323/350	W9NK	322/347	W2MJ	320/335	W8VZ	319/325	W5GR	317/340	W6IOZ	315/336
W8GZ	323/349	W9PGI	322/341	W2PCJ	320/340	W9WYV	319/336	W5HDS	317/336	W6AEPQ	315/342
W8JBI	323/345	W9QJ	322/341	W2QHH	320/344	W8BFB	319/340	W5PM	317/334	W7LNV	315/323
W8NGO	323/343	W9SKY	322/343	W2SUC	320/340	YV5AB	319/340	W5PWW	317/331	W9OON	315/319
W8PHZ	323/341	DL1IN	321/334	W2ZX	320/342	YV5ANE	319/320	W6GPB	317/341	YV5AJR	315/321
W9BG	323/351	HLZL	321/336	W3AFM	320/333	Z13IS	319/335	W6KK	317/333	Z6LW	315/333
W9NOA	323/350	IT1TAL	321/340	W3DJZ	320/330	4X4DK	319/340	W6KUF	317/340	H89TJ	314/333
W8BW	323/347	JA1BK	321/332	W3GAL	320/346	4X4JU	319/337	W46GLD	317/321	JA2JW	314/328
W8BC	323/348	K6RO	321/334	W3MWC	320/337	D10KQ	318/322	W7BA	317/330	K2KLR	314/317
UJ7HW	323/342	K8LSG	321/334	W4AIT	320/346	DL1IW	318/333	W8KBT	317/333	K4ICK	314/329
DL3RK	322/342	E14DMG	321/340	W4MCM	320/334	DL7LN	318/336	W8KPL	317/337	K4YYL	314/318
DL6FN	322/340	I16DJX	321/348	W4NJJ	320/326	G3FXB	318/339	W9TKD	317/330	K6AHV	314/322
DL9OH	322/336	OH2NB	321/345	W4QCV	320/340	I1ADM	318/336	W8GKL	317/334	K8DYZ	314/320
(4MJ)	322/342	W1CKA	321/334	W5AO	320/342	K2DCA	318/338	DL1KB	316/338	VF3CFG	314/331
H89MO	322/343	W1HZ	321/342	W5GC	320/332	K2YXY	318/328	DL3RK	316/333	W2FXN	314/331
K2BZT	322/342	W1NU	321/339	W6FL	320/326	K6CF	318/340	K2OEA	316/335	W2YCW	314/319
K2LWR	322/338	W2BMK	321/336	W6LZJ	320/338	K6FV	318/323	K7PXX	316/324	W2ZGB	314/321
K6AN	322/346	W2BOK	321/341	W6HOC	320/336	K8OHG	318/326	K5AAD	316/322	W4ZLS	314/321
K6LC	322/339	W2I7V	321/337	W6ID	320/342	K9BGH	318/321	K7ADL	316/324	W3LCR	314/334
K6LGF	322/337	W2OM	321/339	W6KTF	320/324	K9LUI	318/328	K9WTS	316/321	W3HTT	314/323
K7GCM	322/333	W2SAW	321/341	W6RHH	320/329	K9ARK	318/331	LU5AQ	316/335	W4CKB	314/327
PA0X	322/345	W2WMG	321/335	W6RKP	320/337	LA7J	318/343	OH3OV	316/324	W4EFL	314/354
W1AX	322/348	W2ZY	321/332	W6LN	320/343	OH2RH	318/323	PY2BKO	316/320	W4RLS	314/321
W1AZY	322/339	W3ZRAU	321/325	W7CFO	320/333	ON4DM	318/340	VF7WA	316/330	W5EKG	314/335
W1RAN	322/338	W3CQS	321/343	W7GJ	320/331	W1GYE	318/336	W1CBZ	316/334	W5MBB	314/321
W1BHI	322/349	W3GRS	321/336	W7OF	320/340	W2AYJ	318/340	W2EXH	316/325	W5MDD	314/336
W1CLX	322/348	W3LMA	321/346	W8UT	320/330	W2BQM	318/334	W2IOT	316/319	W5NOU	314/330
W1GKK	322/350	W3LMO	321/344	W8IIN	320/348	W2NO	318/325	W2JT	316/338	W5WZO	314/341
W1HX	322/345	W4BJ	321/336	W8MB	320/334	W2PV	318/323	W42DG	316/328	W6CAE	314/338
W2BXA	322/349	W4GXB	321/345	W8UAS	320/344	W4ZHOK	318/333	W82CKS	316/320	W6EUE	314/317
W2CP	322/331	W4XPL	321/339	W8HUZ	320/343	W3FVW	318/343	W4JDR	316/335	W6HVN	314/319
W2HTI	322/341	W5KTW	321/327	W8KF	320/340	W4MR	318/340	W4TM	316/341	W6OMI	314/330
W2JYU	322/346	W5OLG	321/345	W8LWG	320/334	W5RHU	318/338	W5CGS	316/335	W6JMV	314/323
W2TP	322/343	W6ANN	321/343	CF3AG	319/346	W5TTZ	318/334	W61RS	316/325	W6ZJY	314/321
WA2IZS	322/341	W6ZM	321/334	C6GBX	319/339	W5UKK	318/335	W6ISO	316/326	W9AMU	314/333
W3KT	322/344	W8BODP	321/329	G2BVN	319/340	W5FL	318/323	W6SDP	316/334	W9GB	314/328
W3NKM	322/343	W8BT	321/341	G3CFT	319/333	W6A	318/325	W6MFWG	316/330	W8BK	314/327
W3RNO	322/342	W8CT	321/328	G6TA	319/337	W6DZ	318/333	W7OPK	316/324	W8NLY	314/331
W3WGH	322/340	W8FS	321/348	11AMU	319/341	W6KZS	318/323	W8LY	316/333	Y5ID	314/333
W4BYU	322/343	W8KJL	321/330	K2YLU	319/322	W6OIV	318/335	W9FKC	316/340	YV5BNW	314/319
						W6WX	318/328				

## Radiotelephone

W6AM	323/349	DJ2YT	320/338	K2YLM	319/322	W5JWM	318/332	W3KT	316/338	18KDB	314/331
W6GVM	323/347	DL6FN	320/335	K9XYF	319/330	WA5EFL	318/322	W4SKO	316/332	JA1BK	314/323
WRRF	323/347	G3FKM	320/337	PY2CK	319/345	W6BAF	318/331	W6NUJ	316/327	KP4CL	314/320
WRGZ	323/349	G13VJ	320/336	PY2PA	319/323	W9DWO	318/324	W7QPK	316/323	PY2PC	314/316
DL9OH	322/356	K1XG	320/330	VK5MS	319/341	W9WHM	318/338	W8EVR	316/321	SM5CZY	314/320
W1FFG	322/340	K6LGF	320/332	W2OKM	319/338	YV5ANF	318/319	W9SFR	316/326	VF5RU	314/329
W2BXA	322/347	K8RTW	320/337	W2ZTV	319/322	4X4JU	318/332	YV5AIP	316/328	W2BOM	314/329
W2HT1	322/340	LJ4DMDG	320/339	W3DJZ	319/326	HB9I	317/340	Z111Y	316/342	W2EXH	314/321
W2RGV	322/339	W1ONK	320/339	W3WGH	319/331	K2BZT	317/330	DJ2BW	315/328	W2GLF	314/330
W2PT	322/331	W2ZX	320/342	W4OM	319/338	K4HEF	317/329	DJ7ZG	315/319	W2JT	314/331
W9ILW	322/331	WA2I2S	320/330	W6FL	319/324	K5JFA	317/331	G5VT	315/338	W4ANE	314/332
W0BW	322/340	W3NKM	320/339	W8AJJ	319/323	ON4DM	317/339	OF1ME	315/331	W4FEE	314/334
G8KS	321/338	W4PDL	320/333	W0GAA	319/325	W2PV	317/322	W2GQN	315/319	W4UWC	314/321
T12HP	321/346	W4OCW	320/336	YV5AB	319/340	W3RIS	317/345	W2LV	315/330	W5SZ	314/316
W1BAN	321/336	W5GC	320/332	4X4DK	319/340	W6RKP	317/329	WA2HOK	315/320	W6EUF	314/316
W3YV	321/326	W6REH	320/325	DL1IN	318/336	W8QJR	317/337	W5KBU	315/334	W6WY	314/313
WA2RU	321/325	W8MPW	320/332	K4TJL	318/330	W9RNX	317/338	W5LZW	315/325	W7ADS	314/332
W6ZM	321/329	W9NLM	320/334	K6YRA	318/322	G3DO	316/340	W6KTF	315/319	W8JIN	314/332
W7PHO	321/342	ZP5CF	320/338	K9EFC	318/329	K6WR	316/325	W7CMO	315/321	W8UAS	314/335
W8RT	321/341	SZ4ERR	320/345	K9LUT	318/328	W1CLX	316/333	YV5AHR	315/321	W8GKI	314/330
W9NDA	321/344	G6TA	319/336	ON4DH	318/337	W1DCJ	316/324	ZS6LV	315/330	W8MLY	314/329
W9NZM	321/328	H1AMU	319/341	PA0HBO	318/334	W2FGD	316/320	CR6BX	314/330	YV5BNW	314/314
W0CM	321/341			W4NHF	318/323	W2WMG	316/323				

Radiotelephone listings follow the general-type "New Member" and "Endorsement" listings - December 1-31, 1971

### New Members

VE2CAB	234	ZE2KY	145	18KGO	110	JA1TGZ	108	K4YNG	103	WA3JRY	101	W1TEE	100
VF6VM	203	WA7ASD	137	JA1SR	110	WA5ZNY	108	WA2PPV	103	WB5AOF	101	W2RHK	100
JA1JG	201	ON5GL	135	WB4OFH	110	WB9DZI	106	W4UAG	103	DL2DQ	100	WA2JIL	100
JA15JV	198	W2BZL	129	K6ELX	109	ZL2CH	105	DJ2MS	102	TY1ABE	100	WB2NSD	100
W6JHV/7	184	WB6PNX	125	VE3DEL	109	VF3RHH	104	WA4EFP	102	VE3PLE	100	W4DSW	100
016ZM	147	WA7GCO	112	DK5SQK	108	DK3BZ	103	W6FWN	102	VF3JE	100	WA8HNY	100
OE1ZNC	145											WB8ICV	100
PY2CAB	233	WA4MGC	140	W0MAN	122	18KGO	109	WRKJC	104	K2AAC	103	DJ2RB	100
W6AFJ	231	HP1AA	135	K4EM	114	13CJ	105	DK1ZH	103	NG4EL	102	K3YVN	100
DL7AH	223	VE3PCW	126	OE1ZNC	111	K6SLUC	105	DK4YA	103	WA7GOO	101	VF7AGT	100
WA2DHS	179											W4JXF	100

### Endorsements

In the endorsement listings shown, totals from 120 through the 240 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.

PY1HX	330	W1JMT	305	W7PK	290	K2DNL	260	HB9T	220	W7GYF	200	WA6OUF	160
W1WDD	330	W2MQ	305	W0MYN	290	K3OTY	260	K4ELK	220	W8CKJ	200	WB8FE	160
W6TS	330	WA4NBV	305	K4CFE	280	SM6AFH	260	K6LOA	220	W9PFX	200	WB8AKW	160
W4BR	325	W0BL	305	K9PPY	280	WB2BWB	260	K9KXA	220	4X4KM	200	W91L	160
W9HJ	325	DJ1CG	300	OZ3PO	280	W3HNK	260	K0EKR	220	DM3SBM	180	DK1IK	140
DL1DC	320	DL7AH	300	W2FFM	280	WB6PNB	260	OH3XZ	220	F3TK	180	K4TXJ	140
K6FV	320	H1X	300	W2LU	280	W7YBX	260	VE3WF	220	K3YUA	180	K9HDP	140
OZ3Y	320	K2OUS	300	WB2NYM	280	WA8PYL	260	VF4TT	220	K4UFE/6	180	VE2ADZ	140
ZL4BO	320	K6GLA	300	W8ZCK	280	WA8TPL	260	WA2GHS	220	K8LH	180	VF6GQ	140
EJ0PN	315	K9AWK	300	W9LAX	280	W9YGN	260	W3QLW	220	KP4DW	180	W1RYE	140
W3CS	315	W4JYU	300	K6BTT	270	CF2AK	250	WA4IHW	220	PY2Y	180	W4VE	140
W4DLG	315	WA4FDR	300	VE3BU	270	K1TDD	250	WA5RXT	220	W1STW	180	W5UNF/6	140
W6KJ	315	WA0CFX	300	VF7IG/VE8	270	WA4TYO	250	W6EUF	220	WA6TAX	180	W8KFH	140
JA1JBX	310	DJ5FA	290	W1HGA	270	W8JJA	250	K1PVB	200	DJ6BN	160	W4UDS/0	140
K3UZY	310	K1DRN	290	W6AFM	270	W9ZWH	250	K4EJK	200	K4FVY	160	K1AJ	120
K4HX	310	K3J1J	290	W6CLS	270	DF5GJ	240	PY4ALC	200	K4FN	160	K1TB	120
PY4AP	310	K4CFB	290	W6CQ	270	SM6CVX	240	SP9AI	200	K9ZGX	160	K4QLO	120
VF3WT	310	K9YXA	290	W0UX	270	VO1CU	240	VK3BG	200	K0HWB	160	K8TMK	120
W3PVZ	310	OH2QO	290	W0YCR	270	W5HCJ	240	WA1HJZ	200	PY2DBU	160	WA2MDR	120
W5P10	310	W2CNO	290	DJ1YA	260	W5TUJ	240	W2SJM	200	WA3CSF	160	WA5SCG	120
W6MUR	310	WB4KZG	290	DJ4XA	260	WA9LUD	240	W4VJH	200	WA5SU	160	WA5ZRZ	120
SM6CKS	305	W6LYR	290			WA9SVY	240			W6NPY	160	WA9ZQG	120

DL7BA	330	DL3RK	305	11JX	290	W4NBV	280	W2MS	250	W3CDI	220	WA6TAX	180
OZ7FG	330	JA1ADN	305	JA1DM	290	W8MB	280	WB4BAP	250	W6CUF	220	4X4KM	180
SM3BIZ	330	LA7Y	305	JA1HBX	290	W9WYB	280	W6AOF	250	W8JJA	220	JA1HBC	160
W6YMV	320	W3FVW	305	K1DRN	290	W0BB1	280	W9YGN	250	DL9HC	200	W4CWO	160
OK1ADM	315	W6KZS	305	K4BBE	290	DJ0PN	270	K4IEK	240	K1PVB	200	W4LOJ	160
PY3CYK	315	WB8RH	305	OE3FGI	290	K2BK	270	W3HNK	240	K4LSP	200	W6OMA	160
VF3MR	315	WB2OK	305	W2CNO	290	K6BIT	270	WA3RY5	240	WA1H1Z	200	W9KAA	160
W3GRS	315	K3UZY	300	W2QJ	290	PY2DSO	270	WB4KZG	240	WB4JLO	200	W9UJ	160
W7KH	315	K4FT	300	W4BRE	290	W1HGA	270	W5WJQ	240	W8WZ	200	WB9EJX	160
W0AAA	315	OZ3Y	300	W4DGF	290	WB2NYM	270	W6SI	240	W9PWO	200	CP1FW	140
ZP5FT	315	PY3DYI	300	W4TUC	290	W6TKJ	270	W7YBX	240	W0PAN	200	DL1DR	140
DL3RK	310	VK4QM	300	W5QKZ	290	W6ZC	270	WA8PYL	240	CF6LO	180	KP4DH	140
1P9JT	310	W4JYU	300	WASREB	290	W7OK	270	W9HJ	240	K3GZE	180	K9LH	140
K2KFR	310	W6DZZ	300	WA6MWC	290	K3OTY	260	W9ZWH	240	K4ITY	180	W7BKR	140
VF3WT	310	WA6AIF	300	W0MYN	290	K9PPY	260	WA9SVY	240	OZ5GF	180	W9QCF	140
W1BHP	310	YV5UJ	300	ZL4BO	290	WA4FDR	260	DJ4XA	240	W5LR/TF	180	VF3WF	120
W1WDD	310	DJ5FA	290	DJ1CG	280	W6CTS	260	DJ9JX	220	W2UJ	180	K66AQI	120
W5H1	310	DL7BN	290	W3MP	280	W6ODU	260	G2MI	220	WA2DXJ	180	W4HGX	120
W0XGJ	310	G3WW	290	WA3HGV	280	W0GYM	260	ON8AW	220	W6FIF	180	W7FSF	120

# Operating Events

de W1YL

## MARCH

**2** **W6WP Qualifying Run** (W6ZRL, alternate) at 0500 GMT on 4590/7129 kHz, 10-35 wpm. This is 2100 PST the night of March 1. Underline correct minute of highest speed copied, certify copy made without aid and send to ARRL for grading.

**4-5** **DX Competition** phone, p. 65 Dec. **Space Net VHF Contest**, to coincide with the anniversary date of Apollo 9, all bands 50 MHz and up, from 6 pm to 6 pm your local time. Single and multiop, categories and power classes from 1-25/25-100/100-1000 input with trophies for 1st and 2nd in each power class. Provision for club aggregate score. Two points per QSO, each different zip code = 1 multiplier. Contacts on different bands permitted but zip codes count just once. All modes, except repeaters. Logs must be postmarked no later than March 31. All those sending logs will receive a participation certificate. Send entries to: Tony Slapkoacki, WB2MTD, VHF 909, Sacklerdale, New Jersey 08081.

**10** **W1AW Qualifying Run** 10-35 wpm, at 0730 GMT on 1.805, 3.52, 7.02, 14.02, 21.02, 28.02 and 145.568 MHz. This is 2130 EST the night of March 9. 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.

**11-12** **Virginia QSO Party**, p. 92 Feb. **Worldwide VHF Activity**, p. 92 Feb. **YL/OM Contest** cw, p. 88 Dec.

**14-16** **OWTC QSO Party**, p. 92 Feb.

**18-19** **DX Competition** cw, p. 65 Dec.

**20** **Connecticut Wireless Assn. High-Speed Code Test**, p. 92 Feb.

**25-26** **Rocky Mt. QSO Party**, p. 92 Feb.

**25-27** **BARTG Spring RUY Contest**, p. 92 Feb.

**27** **W1AW Morning Qualifying Run**, 1400 GMT (this is 9 am EST). Same frequencies/details as under the March 10 listing.

## APRIL

**1-2** **SP DX Contest**, 1500 GMT April 1 to 2400 GMT April 2, 80-10 cw, only. Single and multiband for single ops and multiop-multiband categories. Exchange RST plus QSO no. starting with 001. SPS will send RST plus their Powiat's abbreviation (example, 019WA). Each SP for 370 QSO counts 3 points. The same station may be contacted on additional bands. One multiplier for each different Powiat. Single op/single band entrants total QSO points times the no. of different Powiat's for score. Single op-multiband entrants score the same except that the multiplier becomes the sum of different Powiat's worked on each band. Multioperators score same as just noted. Multi-transmitter operation is not permitted. First place awards in each category in each country; multiband awards to the 3rd place where justified. Log in GMT with a separate sheet for each band, furnish summary and clearly print name/address/call and supply the usual contest declaration. Logs must be postmarked no later than May 1 and sent to the Contest Mgr., PZK, P.O. Box 520, Warsaw 1, Poland.

**2** **Samuel F. B. Morse Contest**, sponsored by the Morse Telegraph Club, Inc., a cw-only straight-key only contest in observance of the centenary of the death of Samuel F. B. Morse, to run the full 24-hour period GMT. Exchange an under-10-word message which includes any pertinent details of Morse's illustrious career. Call CW SFBM and operate about 50 kHz in from all cw subbands. One point per QSO, repeat contacts on additional bands permitted. Total QSO's times no. of different ARRL sections = final score. Appropriate awards. Report full contest info, and include your call, name, address and ARRL section (plus exchange!) and mail by May 1 to: Joseph B. Milgram, Chairman Morse Centenary Committee, Morse Telegraph Club, Inc., 952 East 19th St., Brooklyn, N.Y. 11230.

**5** **W6WP Qualifying Run**.

**11** **W1AW Qualifying Run**.

**15-16** **CD Party** cw. This is a quarterly event for League appointees and officials, notified separately by bulletin. Check with your SCM (page 6) to see if YOU can qualify for an appointment. The July event is open to all ARRL members. **15-22 Contest**, starts 1500 GMT Apr. 15 and ends at 1:00 GMT Apr. 16. Use all bands 160-10 meters, cw to cw or phone to phone. Exchange consists of RST1 plus a 3-figure serial starting with 001. Swiss stations will send the number plus an abbreviation of the name of their Canton, i.e. 07190BHZH. Each contact with an HB station counts 3 points. Each station may be worked once per band either on cw or phone. Multiplier is the sum of Swiss Cantons worked per band (a possible multiplier of 27 per band). The final score is the sum of QSO points multiplied by the sum of cantons worked on each band. Certificates

go to the highest scorer in each country (U.S.A. and Canadian call areas will receive separate awards). Logs must be postmarked no later than 30 days after the contest and go to the Traffic Mgr. USKA, HB9AAA, P. O. Box 17, 2500 Bienna 4, Switzerland. Note that abbreviations of the 22 Cantons are as follows: AG AR BI BS FR GI GL GR LU NE NW SG SH SO SZ TG TI UR VD VS ZG ZH.

**22-23** **Bermuda Contest** phone, 0001 GMT to 0200 GMT. Rules same as 1971. Full particulars from VP9BY, Box 73, Devonshire, Bermuda. **CD Party**, phone.

**24** **Special W1AW Qualifying Run** (weekend) at 0230 GMT. This is 2130 EST the night of April 23 (Sunday evening, locally). Full details under the March 10 listing.

## MAY

**4** **W6WP Qualifying Run**.

**6** **World Telecommunications Day Contest**, cw.

**6-7** **Bermuda Contest**, cw (see April 22 listing).

**10** **W1AW Qualifying Run**.

**13** **World Telecommunications Day Contest**, phone. **Frequency Measuring Test**.

**20-21** **Michigan QSO Party**.

## JUNE

**4** **Minnesota QSO Party**.

**7** **W6WP Qualifying Run**.

**10-11** **VHF QSO Party**.

**15** **W1AW Qualifying Run**.

**24-25** **Field Day**.

**28** **W1AW Morning Qualifying Run**.

**September 9-10**, **VHF QSO Party**.

**November 11-12, 18-19**, **Sweepstakes**.

**December 9-10**, **160-Meter Contest**.

QST



WB4PSP, Net Manager of the Ohio Valley Teenage Net, invites anyone, regardless of age, to call into their teenage net on 3965 at 2230 GMT.

Bill Tuck, K5OCX, writes us and asks, "Is WN0AYL, Lou Cozby, of Cameron, Missouri the oldest Novice (age 93)?"

Perhaps the use of the phonetic alphabet is mandatory even during a newspaper interview. Members of the Ohio State University ARC, WB1T, were being interviewed by a reporter from the *Ohio State Lantern*. The story appeared okay in the paper but with the club call in giant type reading "WALI to test efficiency." The reporter read the "S" as an "A" and redubbed the station call!

K0DY sent us in a newspaper clipping about a new scheme for maintaining classroom discipline. The author suggests wiring all the classroom seats (except for the teacher's!) with 600 volts. Punishment would range from a measly 15 volt application for sassing the teacher to the full 600 to teach teenage boys to stand up when a lady principal enters the schoolroom. Once discipline has been established, the job of education can begin. What a chance for a live-wire instructor!

SCM — AREC — ORS — CP — SEC — OBS — TCC — OO — NTS — WAGS

# Station Activities

OVS — AIOPR — EC — DXCC — CLUBS — RM — OPS — RCC

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 this column. The addresses of all SCMs will be found on page 6.

### ATLANTIC DIVISION

**DELAWARE** - SCM/SEC: Roger F. Cole, W3DKX - PAM: WA3GSM, RM: W3FEB. Appointment: WA3FRV as OPS. Endorsements: W3HKS as ORS and WA3DUM as OPS. The SCM was speaker at the Kent County ARC Banquet in Dover. OVS W3BDP and W0LMS in Nebr. heard each other on Meteor Shower sked but missed establishing contact on 2 meters. Congratulations to WA3QJU for making BPL with 133 originations. The Delaware Repeater Assn. is operating in the Wilmington area on 146.13 transmit and 146.73 receive. Association pres. is K3GUV; WA3HFL, vice-pres.; WA3QIU, secy.; WA3QPX, treas. New members are needed. Delaware Nets meeting Sat. on 3905 kHz report DEPON 2215Z QNI 41, QTC 26. DEPN 2300Z QNI 42, QIC 9. Traffic: WA3QIU 353, W3FEB 171, WA3LTA 63, WA3FRV 59, W3DKX 43, WA3GAY 16, WA3GSM 10, WA3DUM 3, DJ1US/3 (from W3GTZ) 1.

**EASTERN PENNSYLVANIA** - SCM, George S. VanDyke, Jr., W3HK - SEC: W3FBF. RMs: W3EMI, W3MPX, K3MVO, WA3AFI,

K3PIF, W3CDB, PAMs: K3BHU, WA3PLP. OBS reports were received from K3BHU, W3CRH, WA3AFI. OVS reports from W3ZRR, WA3KFT, W3CL, WA3MCK. OO reports from K3OIO, W3KFK, K3TXG, K3RDT, W3BFF, W3CPR, W3NNC. BPLs: WA3OGM, K3NSN, W3FMI, W3MPX, W3HK, WA3OOZ, WA3LWR, WA3PLP, K3BHU, K3PIE. PSHR: W3MPX, K3OIO, WA3OGM, K3MVO.

Net	kHz	Time/Days	QNI	QTC	RM/PAM
PTTN	3610	6:00 P Dy	186	114	WA3AFI
PEN	3960	5:30 P M-F	607	706	K3BHU
EPA	3610	6:45 P Dy	454	510	W3MPX
EPAP&TN	3917	6:00 P Dy	433	386	WA3PLP
Early 80	3733	6:15 A Dy	224	198	WA3OOZ

WA3IYC says he now is 100% homebrew; any others? WA3QFN on the DX prowl. The Penn ARC visited ARRL Hq. and report they had a ball! K3NSN is now pres. of WENS ARC. W3FMI reports WA3OGM did a fine job on TCC during Christmas rush. We need more EPA members to try their hand at TCC assignments. Top QNI stations for EPA in 1971 were: WA3OGM 292, W3ADI 269 and W3MPX 246, wow! WA3PLP trying to put some life into Delaware Co. AREC; Del. Co. members note and give him a hand. W3FBF needs ECs, how about volunteering? WA3ATO says SS Hope left for Brazil in Feb. W3HK made all three TV channels to give Ham Radio a boost to message handling. W3LU says he finally finished his antenna farm. K3WU/6Y51 reports hearing our nets in Jamaica. W3GKM reports RITY up on all bands including vhf (atfk). WA3OOZ got his big "A." The VHF SS was a real exciting one, it sure proved that there are a lot of hams interested in vhf. Hope there was much interest in the St-T. Traffic: K3NSN 972, W3EMI 917, WA3OGM 916, K3BHU 738, K3PIE 601, W3MPX 597, WA3OOZ 470, WA3PLP 384, W3HK 249, K3MVO 226, K3OIO 161, WA3GUK 144, WA3LWR 138, WA3POA 131, WA3LVC 130, WA3QFN 109, WA3MOP 100, WA3ATQ 77, W3BNC 67, WA3IYC 61, WA3PI 47, W3ADI 44, WA3AFI 33, WA3EEC 28, WA3HIT 26, W3VA 17, K3KTI 16, W3VAP 16, W3BUR 14, W3OY 14, W3CI 13, W3OML 13, W3CBH 10, WA3MCK 5, WA3BJQ 3, W3ID 3, WA3JK 3, W3EU 1, W3GKM 1, W3KFK 1, WA3PGT 1, K3VAX 1, W3YPI 1.

**MARYLAND-DISTRICT OF COLUMBIA** - SCM, Karl R. Medrow, W3IA - SIC: K3KMO, RM: W3LZT, PAM: W3FCS, W3TN, WA3LOV and WA3KOO made BPL for Dec. W3FCS, W3FZT, WA3LOV, W3TN and W3OKN made PSHR. WA3LOV reports activities on the new Eastern Area Novice Net (EANN)

which meets daily at 2000 GMT on 7160 kHz. Join 'em! The Antietam Radio Assn. had your SCM and his XYL as a guest at their sumptuous annual Christmas Banquet. A live wire group with lots of activities and helping to create new hams through code, theory and practice classes, W3OKN renewed as ORS. W3CDO reflects on 50 years as a radio ham this year. W3JPT keeps the AMSAT schedules and reports WA3NDS has been testing the 2- to 10-meter transponder planned for the AOB satellite. W3BWT renews with FCC and keeps his hand in on 80. W3ABC had a real stint on the traffic net - surprised himself. W3GRM reports his new tax exemption and jr. op. named Charles. W3OU reports heavy winds bent his mast but the Quad survived. W3ZNU reports AREC and RACES activities on 50 MHz. W3GN opines 2-meter maintenance interferes with his operating. WA3LFU manages to pass traffic between semesters. WA3FHK shows no idle moments by his report. WA6LDN/3 applies for ORS and spent the holiday season patching servicemen traffic on MARS. W3EOV has been doing the same on FCARS. Attn.: Novices see W3EOV for free parts. W3LDD still is hunting those rare counties. W3EZT spent a couple of weeks in sunny Atlanta. Springbrook High ARC WA3KOO totaled up 293 messages from the faculty and students for Christmas. Too bad we don't report MARS traffic but W3PYW spent a busy 6 days with his RTTY machine and garnered about 472. W3JZY has the big trophy for all the counties. K3BA uses both four and cw. The BARC of Baltimore has a nice publication with a title for everyone in it. The Potomac Area VHF Society is challenging the VHFers. The Itchycow Park VHF Society may accept. MDCTN in 17 sessions had 77 messages with average net size 14.1. MDD had 61 sessions with 344 and QNI of 7.8. The new FANN met 24 times with 24 messages and an average 3.1 enthusiasts. The Mid Two-Meter Termite Net puts out a nice all point bulletin edited by W3LOY. W3CIX is now the AMSAT teletype data coordinator. Traffic: (Dec.) W3TN 495, W3OKN 335, WA3KOO 293, WA3LOV 180, W3OU 151, K3HA 140, W3FCS 134, W3EZT 100, W3FZV 72, W3FA 62, W3EOV 42, WA3JYS 33, K3GZK 32, WA3EHK 25, W3GRM 25, WA3LFU 24, WA6LDN/3 22, W3ABC 14, W3BWT 8, WA3GXN 7, W3ZNV 7, K3QDC 1, K3LFD 90. (Nov.) WA3MJE 7.

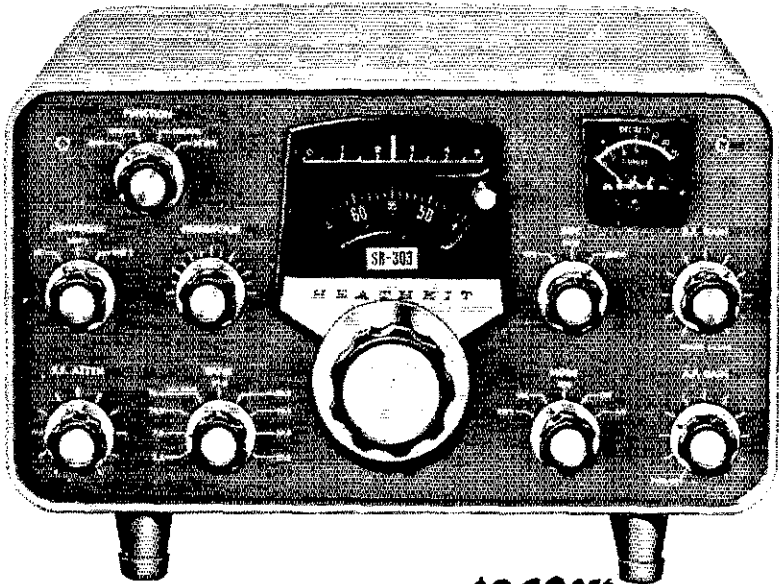
**SOUTHERN NEW JERSEY** SCM, Charles F. Travers, W2YPZ - SEC: W2LVW. PAMs: WB2FJE, W2YPZ, WB2HMU, RM: W2JL.

Net	Freq.	Time(PM)/Dy	Sess.	QNI	Tfc.	Mgr.
NJPON	3925	6 Su	5	83	50	WB2FJE
ECTN	7290	4:30 Dy	25	249	130	WA2HMU
MCVHF	145.9	8 P	3	8	0	W2YPZ

After a very successful year, which included many activities from various stations and the origination of new nets, the coming year promises many interesting achievements. WA2FCS, Salem County CD RO reports Salem County is now equipped with 6 fm units on frequency 147.27 MHz. WA2KWB reports the installation of a new 40-ft. vertical antenna for 160 meters. The AREC applications of WN2CMA and WN2ALN are acknowledged and welcome into our AREC program. WA2SLA EC for Gloucester Co., has been endorsed for another year. WA2NZJ has been appointed as OPS and ORS. WA2BAN, retiring NIN Mgr. reports outstanding participation by the following stations: WB2VEJ, W2JL, W2IU, W2ORS, WA2BLV, WA2FGS, WB2GJY, WA2KIP, W2CKE. Congratulations and keep up the good work. K2ARY reports transmitting five bulletins during Dec. The Gloucester Co. ARC is trying a novel plan to upgrade member licenses by paying half of the fee. W2FBF reports WN2MEM received his General and now is WA2MEM. Traffic: WB2VEJ 416, WA2NZJ 195, WB2HMU 85, W2ZO 50, WB2FJE 44, WB2SFX 38, W2IU 36, WA2KWB 32, WA2KIP 25, WA2FGS 20, W2YPZ 12, WB2WHB 4, W2ZI 4, W2JI/4 3, W2ORS 2.

**WESTERN NEW YORK** SCM, Richard M. Pitzeruse, K2KTK - Asst. SCM: Rudy M. Ehrhardt, W2PVI. SIC: W2CPP. After having served as SEC for over 6 years W2RUF has resigned the post. Clara feels that the work she is doing on NYSN is all she can handle at this point. I have appointed W2CFP as SEC. Thanks from WNY to W2RUF for having served us so well. Sorry to report losing K2BRE and ex-W2RGI to Silent Keys. Newly elected officers of NYSPTEN are K2VCZ, W2DBU, WB2VBK and WB2QKO. New officers for the WNY Emergency Net are K2CEC, WA2LCC and WA2MPC. WA2KJI reports that 25 operators are working on a 400 channel synthesizer on 2 meters in the Buffalo area. K2CEC is

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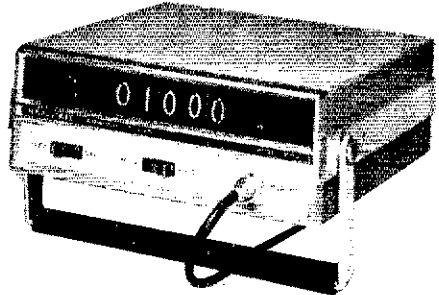
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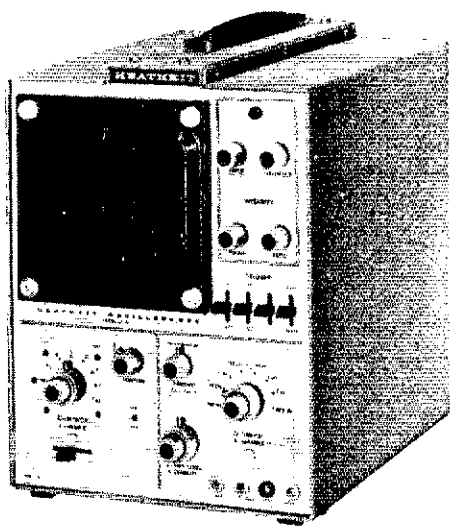


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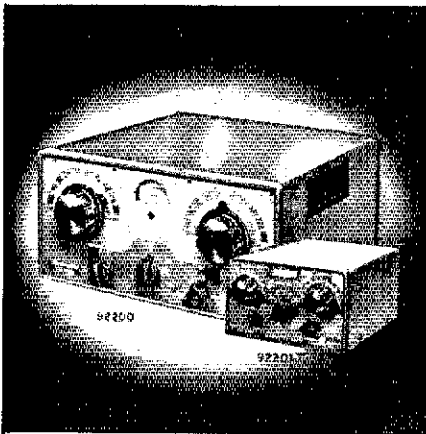
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organizing an SSTV group. NYS held 62 sessions in Dec., 820 check-ins and QTC 654. For all of 1971 NYS held 742 sessions, 9205 check-ins, 4687 pieces of traffic, 206 different stations and a total time in session of 13737 minutes. Very FB and congrats to manager W2MTA. WB2BLL a new ham in Solvay reports having a ball on 6 meters am and ssb. W2CFP was elected treas. of FCARS. WA2BCK, WA2DHS and WA2EKW made a pilgrimage to W1AW during the Christmas vacation. WA2LCC has a new Advanced and WA2MPC has made WA2 ssb. K2LGI earned plaque No. 130 for WNY's seventh 5BDKCC. Mark it down, the Southern Tier Amateur Radio Clubs are holding their 13th Annual Hamfest and Dinner on Apr. 15 at St. Johns Memorial Center in Johnson City. Newly elected for the Oswego County Amateur Radio Assn. are WA2LOW, pres.; W2OZW, veep; WN2SPD, secy. treas. W2FXA has a new 32S-3. W2MU was operated by WB2YOH, WA2BCK, WA2EKW and WA2DHS during the Nov. SS. The Corning Amateur Radio Assn. elected WA2BPL, pres.; WA2AIM, veep; WB2PMI, secy.; WA2ADZ, treas. as well as WA2GCU, act. mgr. WA2BPE is trustee of club station WA2JOO. In Dec., the All Service Net held 4 sessions, QTC 41 and QNI 81. Mike Farad held 27 sessions, QTC 541 and QNT 404. Welcome to WNY to WB2RBA at SUNY in Binghamton. BPLs went to K2KQC, WA2ELD, WA2ICU, W2FR and W2OE. Wow, that Christmas traffic! Traffic with the \* indicating PSHR: K2KQC 647, WA2FLD\* 613, W2FR\* 603, WA2ICU\* 375, W2OE\* 470, W2RUU\* 442, W2MTA\* 257, K2KTK\* 177, K2JBX 163, W2FZK 138, W2FEB 124, W2BU\* 117, WA2MPC\* 116, W2MSM 108, K2QIW 85, W2RQE 77, K2UIR 76, W2DBU 50, WN2PUU 46, W2EAF 44, K2OFV 42, WB2IKL/2\* 39, WA2HSB 36, K2DNN 35, WA2ICB 27, WB2RBA 27, WA2LUF 20, W2PNW 20, WB2QAP 15, WA2HII 12, WA2NPO 11, WN2AOG 10, K1BWK 8, W2CFP 8, W2PVI 8, WA2LCC 6, K2RTO 5, WA2GLA 4, WA2KAT 4, WN2SR 4, WB2FPG 2.

**WESTERN PENNSYLVANIA** - SCM, Robert E. Gawryla, W3NEM - SEC: W3KPI, PAM: K3ZNP. RMs: W3LOS, W3KUN, WA3JPU. WPA CW Net meets daily 3585 kHz at 7:00 P.M. KSSN meets Mon. through Fri. at 6:30 P.M. on 3585 kHz. All times local. It is with the deepest regret we record the Silent Key of WA3AKH. New officers for the Beaver Valley ARC are WA3JPI, pres., Jerry Williams, vice-pres.; K3VYV, secy.; K3LGM, treas. K3BSY has been operating from F13USA and doing a little DXpedition activity with his DX friends. They hope to visit Kamanan Island-VS9K soon. K3HZL took top honors for the Pennsylvania station and WA4FFW, for the second time, took top honors for the non-Pennsylvania station in the recent Pa. QSO Party of 1971. The Nittany ARC has a bigger and much better 2-meter fm repeater station replacing their trusty old little unit. The NARC repeater is licensed as WA3KUU. The Steel City ARC operated the club station in the 160-meter contest. K3ZYK is on his way to Germany. W3POS and K3TIP recently gave a public demonstration of amateur IV (A1V) to a group of 85 people. K3KRA is a new Advanced Class licensee, WA3KKT a new Extra Class. WN3RVT, WN3RVG, WN3RVT, WN3RVZ are new Novices in the Erie area. Check your license expiration date. Upgrade when you renew. WPA had 31 sessions, 425 stations QNI, and 216 messages in Dec. KSSN had 20 sessions, 81 stations QNI, and 21 messages. Public Service Honor Roll for Dec.: K3ZNP 56, WA3NAZ 60, WA3JPU 42, W3LOS 39, W3NEM 39, W3YA 31. Traffic: W3KUN 237, WA3JPU 194, W3NEM 188, K3ZNP 144, W3LOS 129, W3YA 121, W3MJ 94, WA3NAZ 88, WA3MDY 81, K3HCT 65, W3ATO 42, K3ASI 32, K3VOV 22, K3SMB 25, K3SUN 15, W3SN 8, W3IDO 5.

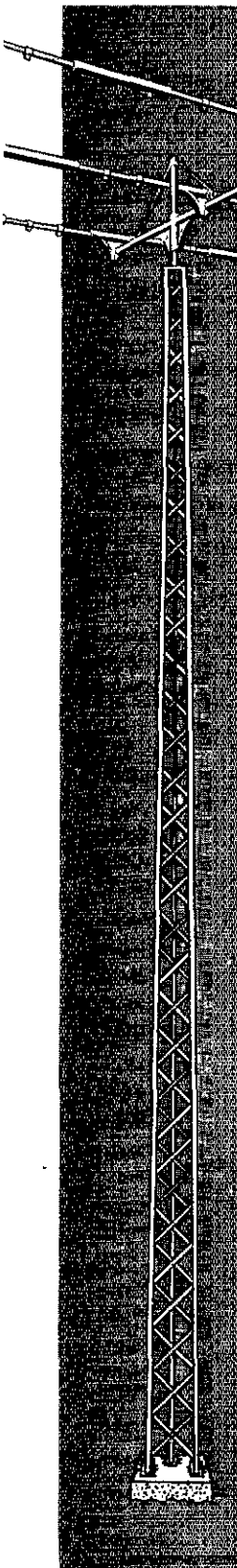
## CENTRAL DIVISION

**ILLINOIS** - SCM, Edmond A. Metzger, W9PRN - SEC: W9RYU. PAMs: WA9CCP and WA9PDI (vtd). RM: WA9ZUF. Cook County TC: W9HPG.

Net	Freq.	Time(21)Days	Freq.
IFN	1940	1400 Su	15
IFN	3690	2300/0300 Dy	300
NCPN	3915	1300/1800 M-S	134
Ill PON	3915	1430/2245 M-F	726
Ill PON	145.5	0100 MWF	8
Ill PON	50.25	0200 M	0

W9HRY reports the traffic count for the Ninth Region Net was 442. WB9AIR was among the many who lost their antennas during the Dec. wind storms. WA9FZR is teaching First Aid at the Lincoln Trail Junior College. The Northern Ill. DX Assn. call is W9UXO and have sent an Icom 753 transceiver to 58CR in Mauritius. Their club officers for the coming year are W9RI-R, W9YYG, W9DWO, WB9FHX, W9IKI, K9ITN and K9WFH. W9LFX has graduated from Roosevelt Univ. with an MBA degree. K9MYD has joined the ranks of Silent Keys. Our sympathy to his wife (K9ROC) and many friends. A new Novice in the Orlong area is WN9HPS and operating





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*Use Swan's New Revolving Credit Service and pay just \$15 a month.*

This is an exceptional antenna value. The Swan TB-3 or TB-3H Antenna provides optimum performance on 10, 15 and 20 meters, with high Q traps precision tuned at the factory. To feed the TB-3 or TB-3H, connect a 52 ohm coax to the driven element where a SO-239 coax connector is provided for your convenience. This matching system achieves an excellent match over the entire width of each band and results in extremely low SWR at resonance.

All the TB-3 castings and fittings are precision machined lightweight aluminum, as well as the boom to mast fittings. The TB-3H is a 3 element heavy-duty antenna, with heavier, wider spaced elements and castings using commercial type construction. With this superior mechanical construction, the elements cannot work loose, even under extreme conditions.

The Rohn-Spaulding HDX-HC-40 free-standing Tower can easily be ground mounted. A hinged base plate is furnished. Order either Giant Killer Pack today, and Charge It to your Swan credit account.

Complete specifications are in our new 1972 Swan Catalog.

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**MONEY BACK GUARANTEE**

Since this low price is possible only by direct factory purchase, you can order your Swan Super Giant Killer Pack by mailing in the coupon at the right. If you are not completely satisfied, return the antenna package to Swan and we will refund the full purchase price to you by return mail.

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with TB3 @ \$260

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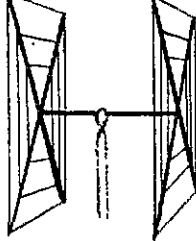
# AHA! YOU THOUGHT GOTHAM

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 DK4VJ, SM7DLH, XE1AR, DM4SEE, FL8SK, RAUM, HK7YB in few hours. Instructions a breeze. WB8DO1

## 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 fool-proof 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' x 1 1/4" 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' x 1" OD aluminum 'hi-strength' alloy tubing, with telescoping 3/8" 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)

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**

**BEAMS** "Just a note to let you know that as a Novice, your 3-EI, 15 Beam got me RI 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. Jav, 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; 3/4" 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 EI 20. . . . . \$21	4 EI 10. . . . . \$20
3 EI 20. . . . . 27*	7 EI 10. . . . . 34*
4 EI 20. . . . . 34*	4 EI 6. . . . . 20
2 EI 15. . . . . 17	8 EI 6. . . . . 30*
3 EI 15. . . . . 21	12 EI 2. . . . . 27*
4 EI 15. . . . . 27*	*20-ft. boom
5 EI 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, T12FGS, W5K YJ, W1WOZ, W2ODH, WA3DJT, WB2-PCB, W2YHH, VE3FOB, W8ACZE, K1SYB, K2RDJ, K1NVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1-MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, W8ACGA, WB2-KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1-LG, 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

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\* Strong \* Lightweight \* Easy to assemble \* Rust-Free (less maintenance) \* Self-Supporting Models are available from 30-90 feet with a choice of wind loads to meet your specific needs. Write us for literature. Shown here is a Model 18-50 (18 sq. ft. wind load - 50 ft. high) installed at Ted Willett's house (W9NHE), our Print Shop Manager. AMATEUR ELECTRONIC SUPPLY can recommend the proper UNIVERSAL TOWER to fit your particular needs.

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Phone (414) 442-4200

Thunder Club officers: K9GSC, proxy; WB9BPS, vice-pres.; K9PKO, secy.; WB9EWR, treas. Their Hamfest '72 at Lake Delton, May 20, promises to be bigger and better this year. Congrats to the following for endorsement or issuance of appointments. PAMS: WA9OAY, WA9OKP, K9HIL. OOs: W9KCR, K9UTO, K9GSC. ORSs: W9AFB, K9ZSE, W9YT, WA9OKP. OPSS: W9YT, K9LJU. OVSs: W9LWC, W9FBC, K9GSC, W9YT. IC for Columbia County K9GSC; EC for Brown County WA9MCC. Traffic: W9CXY 773, W9DND 373, K9CPM 358, W9ESJ 188, WB9BJR 183, K9HII 86, W9KQB 78, WA9ZLU 76, W9HCR 69, K9KSA 65, WB9ABF 50, WB9CIL 50, WA9OAY 42, K9IPS 40, W9KRO 38, WA9ZCM 36, WA9BZW 24, WB9DKK 24, W9DXV 23, W9NRP 22, K7RSO/9 22, W9IHW 21, WA9PKM 18, K9UTO 18, W9ZBD 14, WA9LRW 13, W9WJH 12, W9HDG 10, WB9EEJ 9, W9RTP 9, W9KMD 6, W9JR 3, WB9DAN 2.

### DAKOTA DIVISION

MINNESOTA - SCM, John H. Halstead, K0MVF - SEC; K0LAV, RMs: W0ZHN, WA0YAL. PAMS: K0FLT, WA0HRM.

Net	Freq.	Time/Days	Sess.	QMI	QTC	Mgr.
MSN 1	3685	0030 Dy	29	371	222	W0ZHN
MSN 2	3685	0400 Dy	24	130	38	W0ZHN
MJN	3685	0100 M-S	27	231	33	WA0YAL
MSPN 1	3945	1800 M-S	31	1189	211	K0FLT
		1500 Su-Hol.				
MSPN 2	3942	2345 Dy	31	1302	173	WA0HRM
PAW	3925	1500-1800 M-F	3482			
		1900-2300				
		1500-1800 S				
Pico Net	3925	1900 S/Su				
Handi-Ham	3925	1930 S				
AREC	3912	2300 Su				K0LAV
RTTY	3620	0200 Su				K0VPM

Piconet-Handi-Ham convention was held Dec. 4 with the usual hie turnout and snow storm. WA0PMM was elected pres. of Piconet for 1972 and W0TLE was reelected pres. of the Handi-Ham System for 1972. Traffic: (Dec.) WA0VAS 961, W0ZHN 551, WA0IAW 499, WA0YVT 216, WA0GRX 172, W0TYP 144, WB0DYZ 135, WA0EBZ 120, W0PCGT 114, WA0RKF 113, WA0ONI 93, WB0DZA 84, W0WEA 82, K0ZRD 82, WA0EPX 81, WB0BRG 68, K0MVF 68, WA0TFC 68, K0ZBI 58, W0PET 57, K0FLT 44, WA0YAI 42, WA0IPR 36, WA0VYB 36, WA0YWA 36, WA0VYV 35, W0WAS 35, W0INJ 32, WA0HRM 29, W0KNR 24, K0PIZ 22, WA0RKY 20, K0SRK 20, WA0SGJ 18, WA0UWT 18, K0CIG 16, K0BID 15, WB0CNM 13, W0FDM 12, W0OBB 12, W0EHI 11, W0BATR 10, W0BUO 9, WA0TQT 9, WA0XOH 8, W0UMX 8, W0PAN 7, WA0VHX 7, WA0YTR 6, WA0VHO 4, WA0MMV 3, WA0PRS 3. (Nov.) WA0VHX 3.

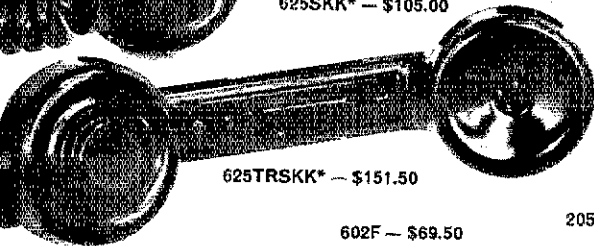
NORTH DAKOTA - SCM, Harold L. Sheets, W0DM - SEC; WA0AYL. OBS: W0BATB. RM: WA0RSR. OO: W0BI. The International Peace Garden Hamfest will be held July 8, 9, 1972. The Teddy Roosevelt ARC elected the following officers for '72: K0IAB, pres.; W0ZCM, vice-pres.; W0FTTR, secy.-treas. WB0AUM will serve as pub. rel. mgr. while W0BHF will serve as act. mgr. W0MEA joined Silent Keys in mid-Dec. He will be missed a great deal. WA0IOB is back on the air in Devils Lake. W0EFL has been helping with the YL weather net this season, his XYL WA0MND has the wrong working hours. WA0RWM and OM came home with a nice GT550-A. WB0DGY has a new FR-4. W0BHI not to be outdone reworked the 811 power supply and is putting out a lusty signal from Rolla. WB4AYN/0 has an R-19 on 2 meters and set up a vfo for the old an rig and now is hobnobbing with a few on 10 meters. He reports some strange DX on 20 meters in the wee small hours. WB0BIN had the misfortune to have a high voltage capacitor in a stereo go up in his hands resulting in a few days in the hospital. WA0YFF and XYL celebrated their 23rd anniversary by taking off to Hawaii. K0ABC after a long absence has returned to the air. W0CGM, Chief Dispatcher in the state radio system at Wahpeton, gets on the air a little when home. In the ND OSO Party the three top scores in ND were: WB0BCZ with 13260 points, WB0BIN 11460 and WA0SUF with 5740. Out of state were VE4OZ with 646, WA7GVT/7 408 and WA7OBL with 574 points. New calls in Dickinson are W0FTTR and W0GZFZ, W0KXB, W0NRB and W0PTX. WA0ELO kept ND on the map in the TRN traffic participation in Dec. He recorded 38 minutes.

Net	kHz	CST/Days	Sess.	QMI	QTC	Mgr.
Goose River	1990	0900 Su	4	73	3	W0CDO
NDPON	3996.5	0900 Su	12	306	50	WA0SJB
		1830 S-S				
YL WX	3994	0730 M-F	23	367	231	WA0GRX
						W0LLJ
NDRAULS	3996.5	1730 M-F	46	825	231	W0BATJ
		1830 M-F				
NDCW	3640					

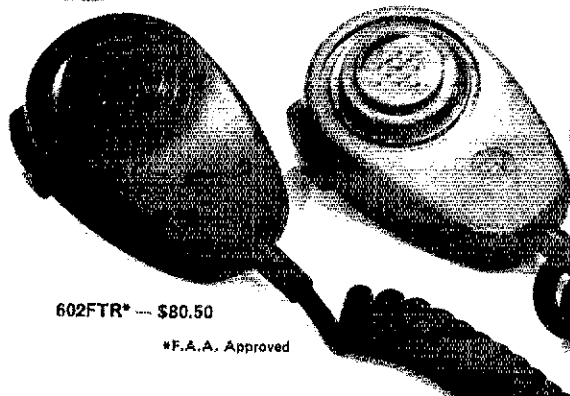
# Cancel Noise 8 Ways!



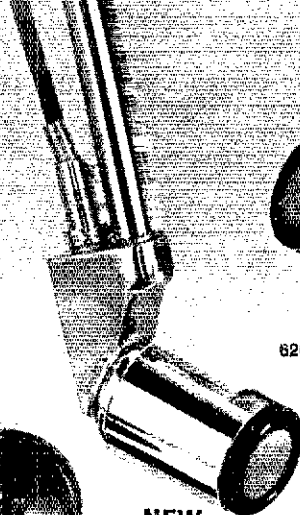
625SKK\* — \$105.00



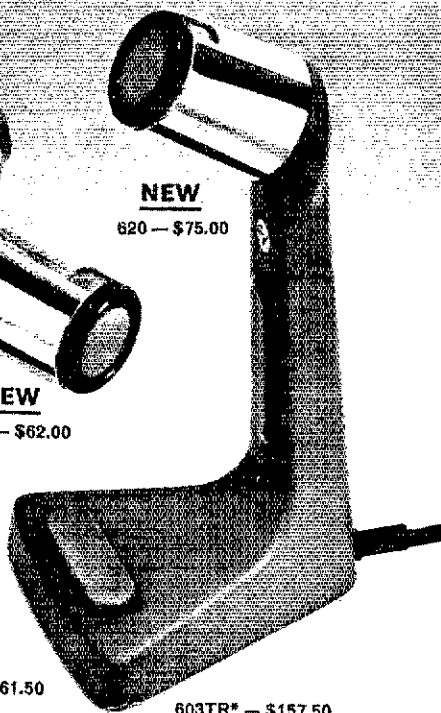
625TRSKK\* — \$151.50



602F — \$69.50



NEW  
607 — \$62.00



NEW  
620 — \$75.00

603TR\* — \$157.50

205STCKK\* — \$61.50

602FTR\* — \$80.50

\*F.A.A. Approved

List prices less normal trade discounts.

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Cyclac<sup>®</sup> cases, and a host of other features. Indeed, the Model 602FTR is one of the few civilian products of any type to earn a military designation (M-109) with no more significant change than a new nameplate.

Your choice of dynamic, transistorized, or carbon models in hand-held or handset form. Plus the handsome new Model 607 stud-mounted, or Model 620 with unitized dispatcher stand. It's the widest array of noise-cancelling microphones offered today. All from your local E-V microphone specialist. Write today for free catalog. It's the first step (and the last word) in improved communications.

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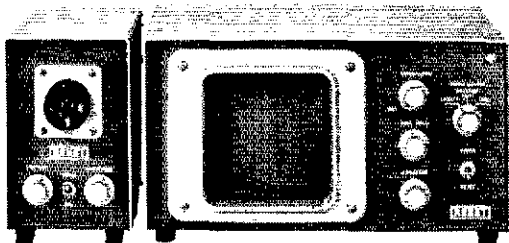
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Ship me:

I Enclose \$ \_\_\_\_\_ I will pay balance (if any):

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 Master Charge\*  BankAmericard  American Express

Account Number: \_\_\_\_\_

Expiration DATE \_\_\_\_\_ \*Master Charge Interbank number \_\_\_\_\_ (4 digits)

Name: \_\_\_\_\_

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Send used gear list

Send Robot literature

Traffic: WA0ELO 301, WA0SUF 208, WA0RWM 135, W0WWL 94, W0DM 40, WA0REW 31, WB0AUM 26, W0CDO 26, WA0LPT 24, WA0SJB 23, WB4AYN/0 22, W0EJF 21, W0BHT 19, W0B0FH 17, W0B0PS 11, W0B0UE 11, WA0RWK 10, W0B0CA 8, W0HSC 6, K0LAB 5, W0MXF 5.

SOUTH DAKOTA - SCM, Ed Gray, WA0CPX - SEC: WA0OVR. PAM: WA0YAK, RM: WA0TNM. Net Mgrs.: W0ZWL, W0HOJ, WA0RNF, K0TXW and W0NEO. W0ZWL made BPL two months in a row. The Prairie Dog Amateur Radio Club of the Yankton-Vermillion area announces a Mar. week end OSO Party. Week ends only Mar. 4, 0001Z through 2400Z Mar. 26. CW and ssb on 3745, 3950, 7165, 7275, 14275, 21111 kHz. A handsome certificate will be awarded for making three different PDARC member contacts during this period. Your SCM spent an enjoyable evening visiting the Hot Spring amateurs Jan. 4. Net reports: Weather Net - average QNI 26 per day; NJ0 - 572 QNI and 22 formal; Early Evening - 729 QNI and 51 formal; Late Evening - 1275 QNI and 77 formal; SDN-CW - 222 QNI and 95 formal. Traffic: W0ZWL 500, W0MZI 264, WA0TNM 128, W0HOJ 119, WA0UEN 78, W0DVB 36, K0AIE 22, W0B0DH 21, WA0SHA 6.

### DELTA DIVISION

ARKANSAS - SCM, Jimmie N. Lowrey, WA5VWH - SEC: W5RXU. RM: WA5TLS. PAM: WA5OMO. WA5ZKE has a new L-4B and MN-2000. W5KI scored over 118,000 points in the CW SS. OZK is sponsoring a picnic on Apr. 9, in Burns Park, North Little Rock; more details on the nets. WA5TLS is now running a new Johnson Valiant and Collins 75S-1. W5RII and XYL, W5UCD, spent Christmas in Acapulco and Mexico City. New officers for CAREN are W5RXU, net mgr.; W5BIV, asst. mgr.; W5SCZR, secy.; W5EHB, member-at-large. W5GKO is developing a touch-tone decoder and logic switching for the Little Rock phone patch repeater. W5EJH, W5PGB and W5PGV now have their version of a logic switching system working and hope to have it in operation on the Fayetteville repeater soon. W5CQK is now operating from Mountainburg with a new Swan 350. WA5FA's XYL is now W5NGAA. W5EWH and W5FAE are getting close to WAS. WA5OMQ was married Christmas Eve. Repeaters: WA5NO-Fayetteville 52.550/53.020; W5FKF-Forrest City 146.16/76; W5YUT-Fort Smith 146.34/94; W5DL-Little Rock 146.34/94; Jonesboro 146.34/94. Traffic: W5NND 174, WA5ZKE 69, WA5TLS 43, W5KL 14, WA5VWH 12, W5VEW 5, WA5BBS 1, W5SSO 1.

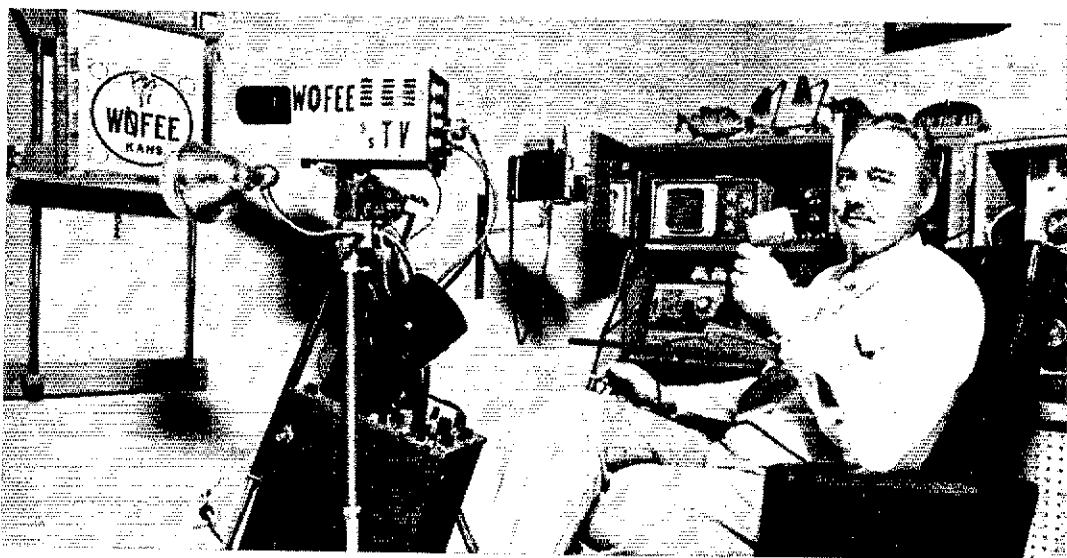
LOUISIANA - SCM, J. Allen Swanson, Jr., W5PM - SEC: W5DB. RM: WA5OVE. PAM: WA5NYY. VHF ARC: WA5DXA. It is with regret that W5HKM, pres. of the Jefferson ARC has joined Silent Keys. Leo was a devoted amateur and a fine proxy. W5UFG/S is a new ORS and OPS. He also made BPL. K5TFG was high scorer in the recent 160-meter contest, both in La. and in the 5th call area. A new club up Ruston way is the La. Tech. Club. W5HGT is now active on 2 meters. WA5YFO has been appointed as an Asst. Dir. The OARC in Slidell had a bang-up Christmas party. W5OB still is hard at his DX chores. Fellows, by the time this is read my term as SCM will be just about over. Please submit your nominations when requested in QST. I have had it for eight years and appreciate the confidence you have had in me. I leave for England Aug. 1 and will be gone some four or five months and will operate under a G5 call. Traffic: W5UFG/S 289, WA5VOE 274, WA5WBZ 51, WA5NYY 47.

MISSISSIPPI - SCM, Walker J. Coffey, W5NCB - SEC: WA5JWD. RMs: WA5YZW, W5D&K. PAMS: W5JHS, WA5KEY, K5MDX.

Net	Freq.	Time(Z)/Days	QNI	QTC	Net Mgr.
MTN	3665	0045 Dy	163	101	WA5YZW
MNN	3733	0000 MWE	41	3	W5DEK
GUSHN	3925	0030 Dy	-	-	W5JHS
CGPHN	3935	0100 Dy	1367	83	WA5LZB
MSBN	3990	0015 Dy	1070	197	WA5FTW

Our section had best traffic month with over 1700 QTC. W5D&K, is new Net Mgr. and RM for the Novice Net. Very glad to have Keesler AFB, K5TYP, active again. Club pres. are: WA5SUF, Miss. Coast VRA; K5MDX, Jackson ARC; W5SZVZ, Monroe ARC; W5SAHY, Old Natchez ARC; K5YPV, N.E. Miss. ARC; K5VVM, Tombigbee ARC. Appointments: W5D&K, RM; W5AO, OPS and ORS. PSHR and BPL: W5SBM, PSHR; W5D&K, New mgr. Hurricane Net is WA5LZB with WASZOP as asst. mgr. Congrats to W5BCEW now Advanced and W5EEN now General Class licensees. Traffic: W5SBM 586, W5D&K 303, WA5YZW 302, W5LDT 141, K5TYP 69, W5NCB 60, WA5BKH 52, K5YTA 39, W5WZ 33, WA5UIH 28, K8YOW/S 28, W5BUE 19, WA5KEY 18, W5WB 12, W5BKM 11, K5MDX 6, W5EIN 3.

# "What do you think of SSTV?"



## "Doc" Taylor, W0FEE answers

We recently called Doc, one of the most active amateur radio operators in the country, who we knew owned a Robot SSTV Camera and Monitor, and asked him, "What do you think of SSTV?" Here are some of his comments: "I've been an active ham since 1946 and SSTV is the greatest thing that's ever happened to amateur radio... I love the friendliness of SSTV because we can be so personal, sending pictures of ourselves and our families to one another... I spend practically all my spare time operating SSTV... there are many, many people on SSTV now, new Robot stations are popping up every day... I've worked Australia, New Zealand, Laos, South America, Africa, Italy, Hawaii, Alaska. Establishing contacts is no problem... As far as the Robot equipment is concerned,

it's excellent equipment, the Cadillac of the industry. And I've gotten excellent service. I'm really pleased with the Robot gear."

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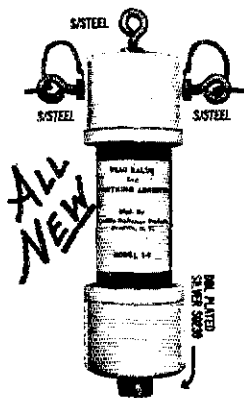
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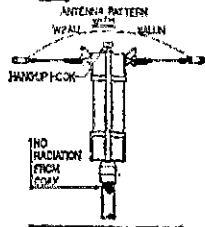
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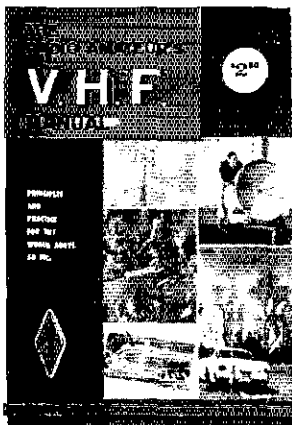
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<input type="checkbox"/>	SN7404N Hex Inverter	.39
<input type="checkbox"/>	SN7405N Hex inverter, open collect	.39
<input type="checkbox"/>	SN7410N Triple 3 input NAND gate	.39
<input type="checkbox"/>	SN7420N Dual 4 input NAND gate	.39
<input type="checkbox"/>	SN7430N 3 Input NAND gate	.39
<input type="checkbox"/>	SN7440N Dual 4 input NAND buffer	.39
<input type="checkbox"/>	SN7441N BCD-to-Decimal driver	1.25
<input type="checkbox"/>	SN7446N BCD-to-7 seg. dec./driver	1.98
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<input type="checkbox"/>	SN7492N Divide by 12 counter	1.25
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<input type="checkbox"/>	SN7495N 4-bit register right-N-left	1.50
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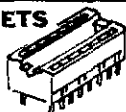
Type	Description	Sale
<input type="checkbox"/>	SN5510L 40MHz, Video Amp	\$.35 50 for 9.00
<input type="checkbox"/>	702 Hi Gain, DC amp TO-5	.79 3 for 2.00
<input type="checkbox"/>	703 RF-IF, 14 hookups, TO-5	1.19 3 for 3.00
<input type="checkbox"/>	709C Operational Amp***	.59 2 for 1.00
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<input type="checkbox"/>	711C Memory Sense, Amp***	.59 2 for 1.00
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<input type="checkbox"/>	709-709 Dual 709's (DIP)	1.49 3 for 4.00
<input type="checkbox"/>	741-741 Dual 741's (DIP)	1.98 3 for 5.50
<input type="checkbox"/>	749-749 Stereo Preamp (DIP)	1.98 3 for 5.50
<input type="checkbox"/>	741-741 Dual 741's (DIP)	2.25 3 for 6.00
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PWA	SALE	400	1.50
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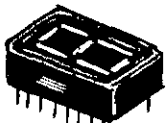
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### 7-SEGMENT READOUTS \$3.95



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A Poly Pak exclusive! Two different types. Both compatible with SN7446, SN7447, SN7448, SN7475, SN7490 and SN74192 IC's. Both with decimats, 0 to 9 numerals and 10 letters. With specs & hookups.

### 16-PIN MICRO MINIATURE

Fits into 16 pin dual in line socket. Life: 350,000 hours. Delivers 700-ft. Lamberts brightness with 5 volts 8 mils per segment. Characters .362" H x .197" W

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For printed circuit board or socket. Life: 100,000 hours. Delivers 6,000-ft. Lamberts with 5 volts 23 mils per segment. Characters .47" H x .26" W.



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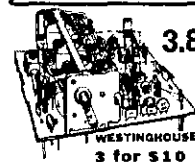
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79¢ Color: Red. For readouts, panel lights, etc. TO-18 case.

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FM 88-108MHz & AM 550-1600Kcs. Sensitive 2 3/4 x 2 3/4 x 1 1/2" module. Can be used with 10.7mc & 456Kcs IF strips & any hi-fi amp. P.C. board. 4-gang variable supply voltage 9V 6 milk. Varactor diode for AFC. Schematics.

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Type F. Screwdriver adjust.

Ohms

- 100  500  2.5K  20K  100K  500K
- 200  1.0K  5.0K  25K  200K  1 Meg.
- 250  2.0K  10K  50K  250K  2 Meg.

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Type G, 1/2" dia. x 1/2" high. Mounts 1/4" hole, with shaft, linear, immersion-proof high freq.

Ohms

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- 250  2.5K  25K  250K  2 Meg.
- 500  5.0K  50K  500K  5 Meg.

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PIV	2Amp*	2Amp	3Amp
50	\$0.05	\$0.05	\$0.08
100	.06	.06	.12
200	.07	.07	.15
400	.09	.09	.22
600	.12	.12	.28
800	.15	.15	.39
1000	.18	.18	.45

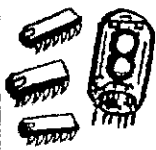
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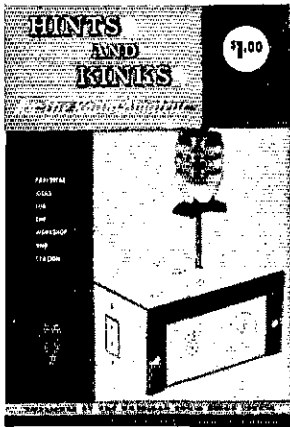


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PAMS: W4PFP, K4MQL, WA4LWV, RM: WB4DAJ.

Net	Freq.	Time/Day	Seas.	QNI	QTC	Mgr.
TPN	3980	1245 M-F	31	1416	166	W4PFP
		1400 S-Sa				
ETPN	3980	1140 M-F	23	521	26	WA4EWW
TN	3635	0100 Dy	31	218	163	WB4DAJ
TSSBN	3980	0030 M-S	27	1714	180	K4MQL
TCN	3980	0200 Th	2	35	0	WB4MPJ
KVHEN	50.7	0200 T	4	21	0	WB4MPJ
MTTMN	28.8	0200 T&F	9	99	0	W4PSN
HAKCN	7268	0150 W&F	5	93	5	WB4QNK
ETVHN	50.4	0100 Th&S	12	62	0	WB4IOB
ETVHN	145.2	0100 W&F	9	33	0	WB4IOB

The new MARA officers are K4HTB, pres.; W4FCC, vice-pres.; WA4PHS, treas. WA4DKR won the "Ham of the Year Award" from the Delta Club for his work on the club's newspaper. K4ZZO called for help via his 2-meter mobile rig to assist victims of a 6-car accident, he was answered by W4OJG who called the police. W4LHF won the 2-meter fm rig given as door prize at the Delta Club's Christmas party. The attendance at the NARC's Christmas dinner was good and everyone had a great time. Traffic: K4CNY 250, W4ZJY 223, W4RLW 213, WB4DAJ 167, W4DMS 161, W4SYE 56, W4WBK 42, WA4GLS 41, WB4USG 39, WN4UWM 36, WA4YFG 31, WB4ANX 30, WB4DYJ 29, WB4PRT 28, WB4MYZ 27, W4PFP 24, W4CYL 21, WB4MPJ 15, WB4JKU 13, K4SJV 12, WA4TWL 12, WB4DJU 8, K4UMW 8, WA4ZBC 8, WA4EWW 7, WB4FVM 7, WB4BZC 2.

## GREAT LAKES DIVISION

KENTUCKY - SCM, Ted H. Huddle, W4CID - SEC: K4YZU, Appointments: WB4PSJ as RM KNTN; K4QW as OU; K4TXJ as ORS. Endorsements: WB4ILF as EC; WA4MEX as OPS; WB4LUR as OBS, RPLs: W4BAZ and WB4PSP.

Net	QNI	QTC	Net	QNI	QTC
KRN	391	38	KYN	395	441
MKPN	631	114	KNTN	272	138
KTN	1466	286	FCATN	58	18
KPON	74	29			

WA4JQS has been active on 6 meters with his new Swan 250. Numerous DXpeditions to mountain tops have resulted in some FB contacts. WA4WOZ has a new 2-meter mobile. Ashland now has a repeater receiver feeding the Huntington, W.Va. repeater. WB4PSP received his General and is becoming a regular traffic hound. W4BAZ reports KYN had its best Dec. QTC in three years. K4UDZ, WA4MXD, W4OYI and K4DWD marshalled Gov. Ford's homecoming parade in Owensboro in Dec. Fellows from Ky. and Ohio have organized the Ohio Valley Teenage Net (OVFN) which meets at 2230Z on 3965. All ages welcome! Traffic: W4BAZ 230, WA4VZZ 182, K4PW 180, WB4PVC 150, WA4JQS 141, WB4PSP 131, WA4WWT 131, WB4PSJ 118, K4UNW 118, W4CID 85, WB4EGR 83, WB4KPE 71, K4MAN 63, W4NBZ 56, W4NHO 56, K4DZM 55, WA4GHO 53, WA4ENH 46, W4OYI 45, K4TRT 41, WN4WCM 41, WB4TFP 39, WB4IGX 33, K4LOL 32, W4CDA 24, WA4AVV 22, WA4MXD 22, W4OXM 20, K4TXJ 18, WA4AGH 17, WA4DYL 16, W4BTA 13, WA4FAF 12, WA4HLW 12, K4AVX 11, WB4MQS 9, K4HOE 8, K4QHZ 8, K4YCB 8, K4VAI 7, WB4AUN 5, WA4WVA 5, WB4GRV 4, K4GGI 1.

MICHIGAN - SCM, Ivory J. Olinghouse, W8ZBT - Asst. SCM: B. Peter Trem, W8KBZ. SEC: W8MPD, RMs: W8JYA, W8WVL, W8RTN, K8RMQ, WARDUL. PAMS: W8ASTN, K8MJK, K8PVC. VHF PAMS: K8ALM, W8WVV.

Net	Freq.	Time/Day	QNI	QTC	Seas.	Mgr.
QMN	3663	2300 Dy	1134	550	93	W8JYA
WSSB	3935	0000 Dy	817	131	30	K8PVC
HR/MEN	3930	2230 S-F	847	467	26	W8ASTN
UPEN	3920	2230 Dy	676	49	29	K8MJK
GLETN	3932	0230 Dy	452	36	28	W8KHK
PON	3955	1600 Dy	991	391	31	K8LNE
PON/CW	3645	2400 M-S	176	24	27	VE3DJO
M6M	50.7	0000 M-S	300	22	23	W8LRIC

The Oakland Co. AREC Net met 5 times with QNI 64 and QTC 9, NCS W8MIQ. SW Mich. weather net met 4 times, QNI 54 with NCS K87WR. The SW Mich 2 and 6-meter nets QNI 74, QTC 7 with 8 sessions. Mich. P.O. net Special Award for Dec. went to W8FZL. W8HAB is a Silent key. New officers for Mason Co. ARC are WA8YEW, pres.; W8BHP, vice-pres.; W8HFN, secy.; WA8ORC, treas.; K8KD, trustee; W8BCRA, act. mgr.; K8JED, AREC net mgr. New directors for CMARC are W8OJL, K8ILL and WA8MVH. Vice-pres. W8BADL is moving to Ariz. and W8KJ was elected to fill the position. The AAK and the SARA clubs have merged and will now be the Shawnee Amateur Radio Assn., Inc. WA8YXE received the last two cards on Dec. 31 for DXCC. K8WVK is



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Working portable is never more enjoyable than when you're working with Yaesu's incomparable FT-101. It's a 30-pound power package, with 260 watts PEP SSB, 180 watts CW and 80 watts AM input power. Plus 0.3 microvolts receiving sensitivity, with a 10 db signal-to noise ratio.

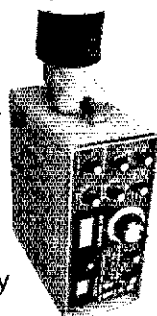
The FT-101 includes a noise blander. And built-in 117 VAC, 12 VDC power supplies. As well as built-in VOX, 25 KHz and 100 KHz calibrators, the WWV 10 MHz band and a high-Q permeability tuned RF stage. Plus a  $\pm 5$  KHz clarifier.

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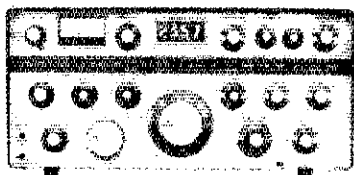
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operating 15 and 40 from Mesa, Ariz. WB8AMI has a new call WA7RZZ. W8KSL is waiting for the confusion to end before going fm. W8GV reports some very good openings on 10 meters and also some good short skip. K8HWW says no more 40-meter beams - his beam came down and the elements came through the kitchen ceiling while he and his XYL were drinking coffee. WA8NYK and W8HID lost their 160-meter verticals in the wind. WA8ZOF is the proud owner of a new AF-67. W8SWN contacted 9M2DQ on 20 meters and renewed an old friendship of seven years ago when Jan was in the Peace Corps and operating 9M2JJ. W8SWN now has 50-ft. tower and boomless Quad due to the help of W8B8YB. W8BAXR, W88LYE, W88FNF, his XYL and 40-degree Dec. weather. Be sure to mark Mar. 17, 18 on your calendar for the Great Lakes Division Convention at Muskegon. Traffic: (Dec.) WA8WZF 320, K8KMQ 402, W8IBX 342, WA8PIM 314, K8ZJU 212, W8B8PY 152, WA8LXY 144, W8GLC 135, WA8SOC 120, K8LINE 114, W8JYA 91, K8DYI 90, W8NOH 86, W8RDU 85, W8ZBT 81, W8RTN 63, W8DT 57, W8MO 55, W88FBC 54, W8LU 53, K8PVC 51, K8WRJ 51, W8WVL 50, W88DKQ 48, WA8ZAV 45, W8WZ 44, WA8ONZ 39, WA8EXR 38, K8MJK 34, W88RYB 31, K8JID 31, K8CPW 30, K8MXC 30, W8TZZ 30, W8SH 29, WA8LNE 28, W8B8HP 27, W88HJ 26, W88FIB 26, W88IPZ 22, W88FUE 21, K8GOU 18, W88DTJ 17, W8ACW 15, W8FX 15, W8VXM 15, W8QBF 14, WA8WVY 14, W88EZ 12, W8IUC 12, K8JHA 11, W8NJM 11, WA8QJ 11, W8SWF 9, W8RMI 8, W8YAN 8, K8KCF 5, K8PIY 5, W8EGR 4, W8NKQX 2, W8BANR 1. (Nov.) WA8VBY 50, K8PLU 15.

OHIO - SCM, Richard A. Fgbert, W8FTU - Asst. SCM & RM; William F. Clausen, W8RMI. SEC: W8OUL. PAM: K8UBK. VHF PAM: WA8ADU.

Net	QMI	QTC	Secs.	Freq.	Time(Z)	Mgr.
OSSBN	3194	1890	77	3972.5	1530/2345	K8UBK
8N	702	558	61	3580	0000/0300	W8RMI
O6MtrN	562	118	62	50.61	0000	WA8ADU
				50.16	0200	
HN RTTY	245	124	31	3605	2400	WA8YUR
OSN	167	84	30	3580	2425	WA8WAK

BPLs for Dec. went to WA8ETX, W8UPH, W8GED, W8CUT, K8ONA, W8QCU, WA8QK, WA8DWL and WA8COA. With much regret we report the passing of WRAL, Ohio SCM of a dozen years. The Henry County RC's new leaders are W88EOD, pres.; WA8CAW, vice-pres.; W88AYN, secy.-treas. The new memorial call of Cleveland's Veterans Administration Hospital is K8ZFR in memory of long-time patient Joe Gizowski who recently joined Silent Keys. Parma RC elected W8DFL, pres.; K8NOW, vice-pres.; WA8ROK, secy.; WA8GLX, treas. Goodyear ARC had a local power company representative as feature speaker in a program titled "Tracking Down Electrical Interference." Dayton ARA is turning its second meeting of each month into a technical discussion and group project session. The Greater Cleveland VHF RC's new officers are K8QNK, pres.; WA8FX, vice-pres.; K8JFX, secy.-treas. Newark ARA elected W88FXD, pres.; K8SDT, vice-pres.; W88FWM, secy.; WA8PH, treas. OVS WA8STX reports some good 6-meter openings to Mass., and the loss of his 80-ft. tower in a windstorm. Another antenna system lost to the wind belonged to ORS W2ASM/8. EC W8EOG reports the Licking Co. ARLC/RACES is operating an open repeater on 28/8E signing W8WRP. W8BE (ex-W8SQU) moved from Cleveland to Fla. and now signs K4SS. The Westpark Radlops Log tells us that the Morse Telegraph Club invites radio amateurs to join its ranks. Write O. Hugh Braese, 1501 West Shields Ave., Fresno, Cal. ORS W8QCU reports that Army MARS no longer desires overseas message traffic. K8JFX has a new WAS. LC W8ARW is vacationing in sunny Fla. and is on the air with a KW sidehand. W8NOK and W3FAF/8 are new ORS appointees. Qualifying for OSSBN Net Certificates are W88BLH, W8DHG, WA8FW, W8IGW, W8WSK, W8BZR, W8ERR, W8BHL, WA8KPN, WA8WVW/8, WA8YRI, WA8ZTE and WA8ZTV. Traffic: WA8ETX 941, W8UPH 653, W8GED 631, W8CUT 481, W8BALU 442, K8ONA 364, W8PMT 313, W8QCU 299, WA8QFK 295, W8RYP 280, W8RMI 279, WA8ZTV 267, W8MOK 254, WA8WAK 248, WA8DWL 239, WA8COA 218, W8GVX 204, K8MLO 191, W88WD 182, WA8QC 178, W8JMD 169, WA8NOQ 156, W8PBS 138, WA8HG 135, W8UDG 135, WA8FW 126, W3FAF/8 112, K8JFK 109, W8CUT 108, W88DQU 108, W8JEL 103, W88LD 103, W8JD 102, W88GVT 96, WA8YF 96, W88BLH 95, WA8WPO 93, WA8AJZ 91, W8GOT 83, WA8ZUK 78, K8NOW 76, WA8YB 75, W8GRG 74, W8BHP 72, W8OZK 72, W8FXD 69, W88GNL 67, K8UOZ 62, W88CLF 59, W8BHL 54, W88FNC 51, K8BFX 48, WA8VWH 48, WA8UP 46, W8UX 44, WA8MH 40, W8OF 40, WA8YX 37, W8ABU 36, W88OK 36, WA8KPN 35, K8QYR 35, WA2ASM/8 34, W8BAJC 32, W8BAKU 29, W8LZE 28, WA8SH 28, K8BYR 27, W88AHP 23, W8LT 23, W8PNP 22, WA8STX 20, K8DHJ 20, W88EOJ 19,

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**HUDSON DIVISION**

**EASTERN NEW YORK** - SCM, Graham G. Berry, K2SJM - Asst. SCM/PAM: Kenneth M. Kroth, WB2VJB. SLC: W2URP. RM: WA2VYS. VHF PAM: WB2YQU. Nets: ESS 2300Z daily at 3,590 kHz and 10 wpm; NYS 0001Z and 0300Z daily 3,675; NY County Net 1400Z Sun., 0045Z Tue.-Fri. at 3,667 kHz. NYSPT&EN at 2300Z daily on 3,925. ECs and asst. ECs Sun. (Schenectady AREA) met at 1800Z on 3,950 kHz. Regret to report K2ONF as Silent Key. Harmonic Hills RL elected K2CJD, pres.; W2WRI, vice-pres.; WB2ISL, treas.; WA2KXM, secy.; W2WRI, trustee; W2WFI, WB2KDE, WB2UYD and WA2JFP/WB2ZEC, dir.; WA2VYS, W2KGV, W2VH, alternates. Novice classes now starting, details from WB2KDE. IBM-Westchester: WB2LGA, pres.; WN2BOT, vice-pres.; W2S2J, secy.-treas. Schenectady ARA Dec. meeting was annual Ladies Night, featured ex-5HMB as speaker. New secy., WB2VPE. New club at State U Albany: WB2UZF, pres.; WB2DXM, vice-pres.; K2ZEL as faculty advisor. Communications Club of New Rochelle elected W2YLE, pres.; WB2XW, vice-pres.; W2DPV, trustee; WB2MOG, secy.; WB2VOB, treas.; K2JOB, WA2VEG, WB2RLS, WB2NOY and K2SJM, dir. Dorland Scout Center, Rye has W2LX as general chmn. for radio activities (station is W2NVB) assisted by W2HVX, W2FKA, W2BPI, W2FGZ, W2EAR and Vice-Director Hudson Div. K2SJO. All FNY appointments of record were renewed effective 1/1/72 and qualified renewals will be automatic at each year-end from now on. New appointments: WA2EAH, W2URP, K2AVP as OPSs; K2AHO, CO Class IV; WB2NOY, OVS. Welcome aboard; other appointments open through PAM, RM, VHF PAM or SCM and applications welcomed. W2ITZ now K2FW active on phone and cw nets. WIBGD/2 named to ARRL Contest Committee by W0DX and wants comments on contest activity from the section. Mail to his W1 address per call book. K2BK has new SR-220 "worked OK first time." WA2HHO used vacation to study for Extra, and thinking about 220 activity. W2KFB speaker all over the place - at Westchester ARA, New York Radio Club and Communications Club of New Rochelle - all talks on "Quad Sound" for the HFer "bugs" with demos. Between talks, he's WARA's 1972 pres. Traffic: WA2VLS 186, W2URP 161, WB2VJB 98, WB2XW 79, WA2HHO 40, WB2KDC 40, K2SJM 37, WA2LXF 36, WA2HGB 32, WB2FWK 25, WA2EAH 14, WA2WGS 14, WA2LXI 10, WA2EAJ 8, WA2OX Y 7, WA2IWL 5, WB2AEO 5, W2OOJ 3.

**NEW YORK CITY AND LONG ISLAND** - SCM, Fred J. Brunjes, K2DGI. SEC: K2OVN. RM: K2UAT. HF PAM: WA2UWA. VHF PAM: WB2RQF.

Bronx	28.64 MHz	50.35 MHz	146.17 MHz
Brooklyn	28.64 MHz	50.35 MHz	146.36 MHz
Richmond			146.88 fm
New York	29.50 MHz	50.48 MHz	
Queens	29.50 MHz	50.20 MHz	145.62 MHz
Nassau	28.72 MHz		145.10 MHz
Suffolk	28.73 MHz	51.51 MHz	146.82 MHz

Note: Nets usually open 2000 local, Mon. My apologies for a somewhat jump of the gun regarding the SCM election results; seems my Wee-Gee board didn't indicate an eleven-thirty opposition candidate. Glad to see those cards and letters coming in on what's happening out there with the troops. New club officers: Staten Island ARA - W2DMW, pres.; K2KQZ, secy.; W2EUY, treas. Nassau Radio Club - WA2EXP, pres.; W2SEU, vice-pres.; K2LCK, secy.; WA2CSF, treas. Suffolk County RC - WB2TSB, pres.; W2JTP, vice-pres.; W2MGV, secy.; K2JDH, treas. Brooklyn College ARS had a membership drive which started with the Feb. 7 meeting at 12:00 noon on the Campus. For information contact Ken Sobel, WB2MQI 1560 East 102 St., Brooklyn, N.Y. 11236. The Dalton School Club station is now active from Manhattan as WA2DBJ. WB2OYV finally has those long awaited DX cards coming his way. WA2SGZ will soon be smoke testing a new HW-101 transceiver. WN2ADH is presently QRT. WA2JZX writes a Ham Radio column for his local Union newspaper. WA2GPT reports that K2UAR has departed Long Island for the open skies of Montana, and WB2DRV as a full fledged "System Control" on the YLISSB system. TuRoro RC invites all interested to join in their roundtable on 29.5 MHz Sun. 11:30 A.M. WA2PMW racked up his 2nd state via recent meteor scatter on 2 meters. New officers at the Red Cross RC in Queens are L. Lutzak, pres.; WN2OUN, vice-pres.; WN2BPC, secy. TuRoro Radio Club has open doors for members, contact via secy. WB2HWI, 29-27 164th St., Flushing, N.Y. 11358. Radio Club at State Univ. at Stony

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Sensitivity.....better than 0.4  
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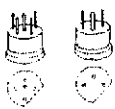
PIV	TOP-HAT 1.5 AMP	EPOXY 1.5 AMP	EPOXY 3 AMP	STUD- MOUNT 6 AMP
50	.04	.06	.12	.15
100	.06	.08	.16	.20
200	.08	.10	.20	.25
400	.12	.14	.28	.50
600	.14	.16	.32	.58
800		.20	.40	.65
1000		.24	.48	.75

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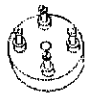


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Brook has new call W2JFG, in honor of the station's former trustee. My thanks to those few heroes (including the Hudson Division Director no less) that are devoting a few hours on Sat. afternoons to help in getting the Amateur Radio Course off the ground at the Hall of Science in Flushing. The program is highly successful as far as students are concerned, unfortunately getting code and theory instructors is the problem. If you can help in any way, contact me or W2TJK. WB2LZN and WB2WJF made BPL. Traffic: WB2LZN 717, WB2WJF 525, W2EC 302, WB2OYV 194, W2HVS 85, WA2PLI 65, WA2MDX 45, K2JFE 26, WB2YIG 25, W2DBO 19, WA2GTE 17, WA2LJS 10, W2PF 7. (Nov.) WB2WJF 302, WA2MDX 15. (Oct.) WB2WJF 427, WA2MDX 24.

**NORTHERN NEW JERSEY** - SCM, Louis I. Antonoro, W2ZZ - SEC: K2KDO. RMs: WA2TAF and WA2BAN. PAMs: WA2TAF and K2KDO.

Ver	Freq	Time(PM)	Days	Sess.	QNT	QTC	Mgr
NJN	3695	7:00	Dy	31	527	428	WA2BAN
NJN	3695	10:00	Dy	31	216	121	WA2BAN
NJSN	3740	8:00	Su	4	5	1	WA2FVH
NJEPFN	3950	6:00	Dy	31	638	706	WA2EAT
PVETN	145710	7:30	Dy	19	57	55	WA2JIM
ECTN	145800	8:30	Dy	26	104	32	WB2LTV

New appointments: W2CTC as ORS, WA2NLP as ORS and OPS. WA2SRQ as ORS, Endorsements: WB2WNZ as OPS, WA2FHU as I.C. for Bayonne and vicinity. K2DEL as GVS, W2BVE and WB2YPO as ORS, WA2TAF as PAM and WA2BAN as RM. WN2DJM is a new ham in Passaic. WB2WID passed the Extra, W2HJK and WB2NOM passed the Advanced. WA2BAN released the following 1971 figures for NJN, Top 5 in QNT: WB2VEJ 647, WA2BAN 435, W2CU 422, WB2DDQ 392 and W2ZEP 380. Top 5 in 2RN functions: WJ 134, WB2VPR 73, K2RXQ 60, WB2DDQ 62 and WB2CDI 50. Top 5 in NCS functions: WB2VEJ 108, WA2BAN 104, K2RXQ 68, WB2DDQ 62 and WB2FHH 51. We wish to congratulate them and say thanks for a great job. W2FPI and W2FJK submitted OO reports. WA2LUT worked Wise, for No. 21 on 144 MHz. WB2KNS, WA2YUT and WA2OGS all in recent CD drill. WA2FVH looking for NCS help with NJSN. Congratulations to WA2SRQ who recently graduated with EI degree. WB2SOR joined Army MARS. WB2POG reports the arrival of their first harmonic. WA2RIU has a new GT-550 and reports working lots of DX. WB2CDI will attend Rutgers in the fall. WB2LW has a new Ten-Tec keyer. W2TP, W2LV and WA2DIG added 2 m gear to their shacks. K2OJD is the newest member of NJDXA. WA2CRF building a new 6-meter linear. WB2KPD is leaving the Navy and planning 6-meter activity. Traffic: WB2AEH 539, WB2RKK 502, WB2DDQ 797, WA2BAN 265, W2ZEP 123, WB2LTV 102, W2CVW 85, W2CU 82, WA2CCF 73, WA2UOO 72, WA2NLP 68, WB2NOM 65, WB2CDI 62, WB2WNZ 60, WA2OMT 54, WA2FVH 48, WB2KNS 41, K2DLL 36, WA2AFL 25, WA2EUX 22, K2KDO 22, W2CJC 17, WA2SRQ 15, WA2JIM 10, K2ZFI 10, K2DOT 9, W2ZZ 8, W2FJK 2.

## MIDWEST DIVISION

**IOWA** - SCM, Al Culbert, K0YVU - SEC: K0LYB, K0OOD has been appointed asst. SEC/RO. WA0QOL is the new EC/RO for Zone 7B. WA0VDX is a new OO appointee. K0HGR and WN0BKG are the parents of a new daughter. Saint Nick left WA0LEN a Heath Frequency Counter which will be handy in his OO work. Congratulations to K0LKH on passing his Professional Engineer exams. Congratulations to the following who were successful in their appearance before the FCC examiner in Des Moines; General Class: WN0BXP, WN0CVX, WN0CZG, WN0FZY, WA0VDT; Advanced: WB0CWL, WA0FEZ, K0JMO; Technician: Mr. Ivan Hand of Cedar Rapids. Upon the recommendation of the TLN net mgr., Section Net Certificates have been mailed to the following for their support of TLN and the NIS during 1971: K0AZI, K0DDA, W0EMA, W0KD, WA0KZL, W0LCX, W0LJ, K0LUZ, K0LYB, W0MOQ, WA0ODB, WA0OIQ, WA0RXX, WA0SSU, WA0VBC, WA0YJW and K0YVU. The Fort Dodge ARC has received the call W0LJ for their club station. With the New Year, we have many new officers to report: Goldfield ARC - WA0VJT, pres.; WA0VKF, vice-pres.; WA0TJD, secy. Univ. of Iowa ARC - WA0QZL, pres.; WB0DSH, veep; WN0BNT, secy. 3900 Club of the Air - W0SRR, pres.; W0LX, veep; W0FZO, secy. North Iowa ARC - K0JZM, pres.; W0NZJ, veep, WA0QOL, secy.; K0RHN, act. mgr. Fort Dodge ARC - WA0HHE, pres.; WA0YYP, veep; WA0YJD, secy. K0LYB has formed a new business for the design and sales of commercial communications systems.

Ver	Freq	Time(Z)	Days	QNT	QTC/Mgr.
Ia 75 Meter	3970	0000	M-S	1255	64W0YLS
Ia 75 Meter	3970	1830	M-S	1633	150K0LYB
TLN (cw)	3580	0030	Dy	145	139K0AZI

Traffic: W0LCX 873, K0OOD 358, K0AZI 125, K0DDA 112.



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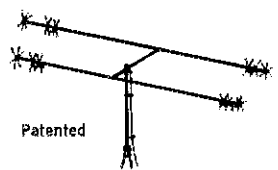


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Total Weight	13 lbs.
Single Feed Line	52 ohm
SWR at Resonance	1.5 to 1.0 max.

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WA0AUX 97, WA0VZH 56, K0YVU 21, K0QKD 17, WA0YJW 17, K0JGI 16, WB0AVV 10, WA0QNZ 9, WA0AIW 6, WA0EJN 2, K0LKH 2.

**KANSAS** - SCM, Robert M. Summers, K0BXI - SEC: K0LPE. PAAL: K0JMF, RM: K0MRI VHF PAM: WA0LKO. Newly elected officers of clubs are - CKARC, Salina: W0HJD, pres.; WA0VYS, vice-pres.; WB0DNI, secy.; treas.; WA0YKX, act.; W0NXD, hamfest chmn.; WA0AFO, board member. Hawatha ARC: WA0KDC, pres.; WA0VSI, vice-pres.; WA0YPR, secy.; treas.; WA0GRM, act. mgr. JCRAC, Johnson Co., Ks: WB0CEP, pres.; W0JIT, vice-pres.; WN0FAO, secy.; W0HAI, treas. Pittsburg Repeater Organization, Inc.: WA0EDA, pres.; W0YTI, vice-pres.; WA0LYU, secy.; K0HSA, treas.; W0MQY, trustee. KS Nebr. Radio Club, Concordia: K0UNE, pres.; WA0SOF, vice-pres.; WA0KDP, secy.; W0WXY, treas. Jayhawk ARS, Wyandotte Co., K0YQA, pres.; W0BHF, vice-pres.; K0BXI, secy.; treas.; WA0PH, K0CZT, WA0HS, WA0WS, W0MCH, WA0ZHL, board members. Wichita ARC: W0BVC, pres.; W0RCS, vice-pres.; W0BBE, secy.; W0ELZ, treas.; WA0UTT, pub. dir. If your club has not been mentioned drop the SCM a line. QRS certificates have been earned by WA2HSP, WA0ZTW and WA0YMK. The new repeater at Hutchinson produced some mighty fine contacts for quite a few. W0BLY has been hitting the repeater regularly from Lawrence, using a twenty-two-element beam 60-ft. high and 10 watts. W0FCL says we are all missing a lot of fun and loads of contacts on the 160-meter band. Anyone interested in NU Sigma Alpha, the amateur radio fraternity should get in touch with W0BHE, the Kans. area representative.

Net	Freq	Time/24	QNT	QTC	Mgr.
K5BN	3420	0040	1242	98	K0JMF
KPN	3420	1245 MWF	230	16	K0JMF
		1400 Su			
OKS	3610	0100	569	261	K0MRI
		0300			
KWN	3920	0001	687	22	WA0LLL

Kans. Weatherman of the month is W0KZC. Top weatherman of the year was W0BGX. Mid-states Mobile Monitor Service reports 1361 QNT and 91 QTC and 26 calls/patches. Traffic (Dec.): K0MRI 442, K0BH 304, W0NH 252, WA0LBB 109, K0JMI 108, WA0JIC 107, K0BXI 102, WA0ZTW 99, W0BLY 92, WA0LLC 90, W0MA 88, WA0TAS 61, W0CHI 59, WA0YKX 48, K0LPE 44, W0PB 39, WA0XI 19, WA0MLL 18, K0GJ 14, W0GR 14, W0FCL 12, W0CZR 8, W0LOW 6, WA0ZP 6, WA0SLV 5, K0ZHO 5, WA0DWH 4, W0DJI 2, W0NFI 2, WA0SR 2. (Nov.) WA0SPV 4.

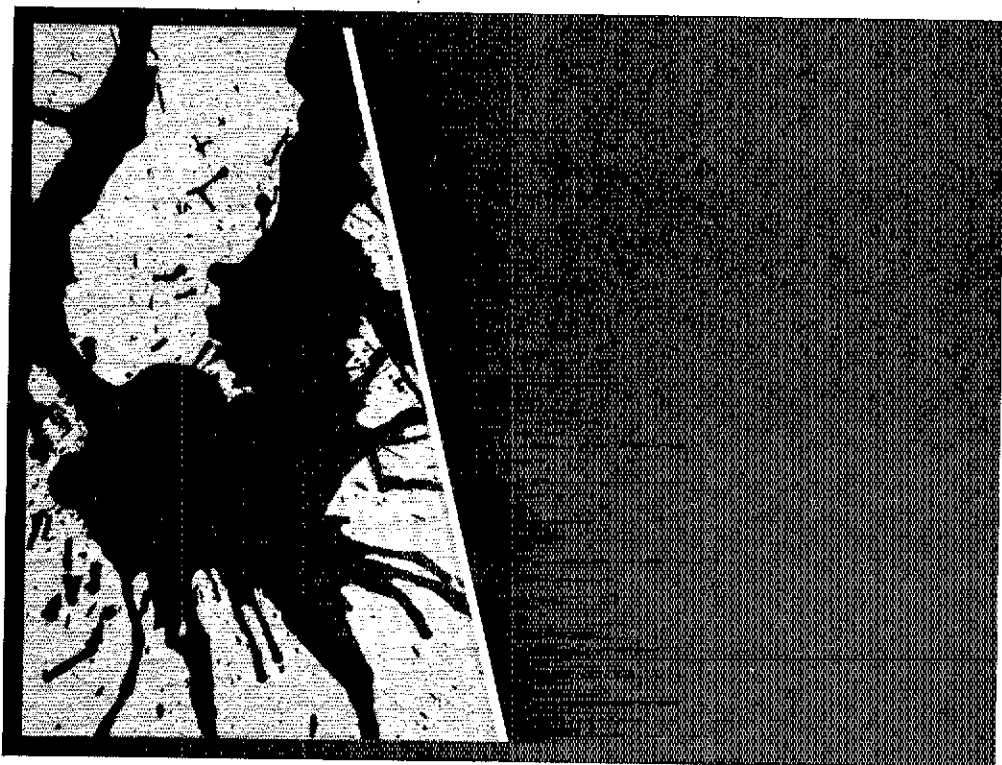
**MISSOURI** - SCM, Robert J. Peavler, W0BV - SEC: W0ENW. New appointee: W0CCK as OPS

Net	Freq	Time/24	Days	Secs	QNT	QTC	Mgr.
HRN	7280	1805	M-F	75	663	108	WA0UPA
W0PON	3963	2300	M-S	26	773	50	WA0FAA
MEN	3963	2330	MWF	14	198	18	K0KUD
M0SSB	3963	2400	M-S	26	1219	86	K0RKH
MON	3585	0100	DY	31	236	141	W0BHI
MON 2	3585	0345	DY	29	166	85	W0BHI
M0C/D/CW	3531.5	1500	SU	5	27	4	K0RKH
MSN	3703	2200	Su	4	26	9	K0BIX
WEN	3980	0130	M	4	11	1	K0BIX
PHD	5045	0130	T	4	118	10	WA0KUH

New officers of the Mid-Mo Amateur Radio Club are W0NL, pres.; K0LVR, vice-pres.; W0BRD, secy.; treas.; K0RPH, WA0UT, K0EY and WA0RBZ, dir. New officers of the PHDARA are WA0KUH, pres.; K0FTT, vice-pres.; WA0EMS, secy.; WA0ZCO, treas.; W0ZSU, publications, WA0SOK, act.; K0HAS, editor. Congratulations to WA0YIT, who passed both General and Advanced Class exam; to CP3RY, who has become WN0GLV; to K0NGJ, who won first place in St. Louis Amateur Radio Club for his SSB Contest work. My thanks go to W0BZP for his excellent QVS reports. Traffic: K0ONK 1635, W0HH 777, W0BV 115, K0YBD 118, WA0HTN 111, W0UD 47, WA0LAA 38, K0BIX 35, W0MKJ 24, WA0KUH 16, K0SGJ 12, W0CCK 11, W0CJ 8.

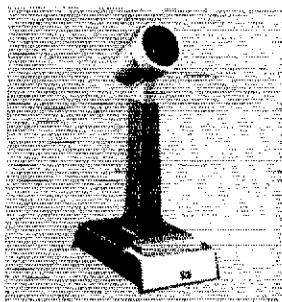
**NEBRASKA** - SCM, V.A. Cashion, K0QAL - A-S, SCM: Velma Sayer, WA0GHZ. SEC: K0ODE. Renewed appointments: WA0DXY and W0VQR as ECS.

Net	Freq	GMT/24	Days	QNT	QTC	Mgr.
NSN I	3982	0030	DY	1416	17	WA0LOY
NSN II	3982	0130	DY	1155	26	WA0LOY
NeB 160	1995	0130	DY	544	282	WA0CBJ
NEB	3590	0300	DY	39	36	W0TOD
NMN	3982	1330	DY	1187	41	WA0JF
WNN	3950	1400	M-S	672	35	W0NIK
AREC	3982	1430	Sa	186	0	W0RZ
CHN	3980	1830	DY	1054	57	WA0GHZ
LEN	1980	2100	M-F	325	12	WA0AUX
NMN*	3982	1330	DY	1210	20	WA0JF
WNN*	3950	1400	M-S	628	11	W0NIK



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\*Corrected net reports for Nov. Note that NEB net meeting time has been moved back one hour. It is hoped that the change will accommodate more QNL. Box butte Co. AREC 2-meter net reports QNL 24, QIC 1 for Dec. Our sympathy to WA0GHZ for the loss of her father. Ak-Sai-Ben ARC has a complete outline of code and theory classes scheduled for 1972 for those interested. WN0FBJ is on the air from Chadron with a DX-20 and SX-99. Congratulations to WBDCAU on making PSIR for Dec. Traffic: W0L0D 159, WA0SCP 139, W0LWF 69, W0DCAU 61, WA0CBI 60, W0T0D 34, WA0BOK 28, W0HOP 27, K0JFN 24, W0SGA 24, WA0OLEX 23, W0VEA 23, W0FOB 20, W0M0Y 19, WA0PXY 19, W0N1K 17, W0DJ0 16, WA0LXB 14, K0HNT 12, WA0YQ 11, WA0G1Z 10, WA0JKN 10, WA0JH 8, K0DGW 7, W0INR 7, WA0LOY 7, WA0JUP 6, W0VYX 6, WA0YGZ 6, W0BGA 5, W0GEQ 5, WA0LRO 5, K00AL 5, WA0E1 4, K0MUF 4, K0ODP 4, WA0PPI 4, W0ZDU 4, W0SWG 2, WA0UGC 2, WA0ZKW 2, W0AGK 1.

## NEW ENGLAND DIVISION

CONNECTICUT — SCM, John J. McNassor, W1GVT — SFC; W1HHR. RM: K1EIR. PAM: K1YGS. VHF PAM: K1SXF.

Net	Freq.	Time/Days	Sess.	QNT	QTC
CN	3640	1900 Dv	67	602	496
CPN	3965	1800 M-S 1000 Su	31	489	248
VHF 2	145.98	2200 M-S	23	99	78
VHF 6	50.6	2100 M-S	23	89	34

High QNL: CN — WA1GGN, WA1GHI, K1EIR, W1KV and W1MPW. CPN — W1GVT, W1MPW, WA1OPB, K1SXF and K1YGS. SFC W1HHR will have the assistance of WA1OPB as Training Officer for all new AREC members — all ECs should report their area SFT activities as soon as possible. Director W1QV appreciates group comments from clubs, etc., but wants also to hear from individual members on matters of amateur interest. Club bulletins indicate a variety of ways to generate interest: Ham of the Year Award, Old Timers Night, Antique Wireless Display, Ladies Night and many others. Taft School ARC made 35 states and 20 countries in one week! Southington ARC held a Christmas/New Years Party with W1GVT. The Murphy Message includes a Manual covering super-tips on DX/Contest work! K1HIF and W1PRT worked as SP6EL and SP6EM during the Christmas Holidays. W1WEE busy on jury duty. Congratulations to: W1EFW for Dec. BPL the hard way; also WA1GGN for Dec. BPL; W1OPZ and WA1OHI for Extra Class; WN1PQI for Novice Class and to W1MPW for High QNL on both CN and CPN! This is the time of year to complete those homebrew projects that you put off all summer long. Remember to use green ink on Mar. 17th QSL cards and a Happy Saint Patricks Day to all! Traffic: W1H-W 759, WA1HEW 302, K1SXF 213, W1MPW 212, WA1GGN 169, WA1GHI 142, WA1KVI 121, W1CIT 102, WA1NTR 95, WA1AW 89, W1GVT 78, W1KV 58, K1YGS 42, W1D1 14, W1QV 14, WA1ZC 12, W1YRH 9, WA1OPB 8, W1CUI 7, WA1NYU 7, W1KAM 5, W1DGL 3, WA1PHE 1.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, WA1P — SEC W1A0G received reports from W1s HKG, LE, K1s NFW, ZUP, DZG; WA1s DXI, MPP, WA1OWO is PAM for 2. EM2MN had 23 sessions, 176 QNLs, 189 QTCs. K1OJQ reports 22 ssb stations checked in to the NEVHFA roundtable on 144.120. W1MWN worked Ga. and Ill; WA1PPE worked WA8PE-B. WA1DFL reports Dec. was the best ever on 6, heard W9s, W0 and W4s. EMN had 520 QNLs, 564 QTC, W1s QYY, OHM and WA1LEY made BPL. W1A0Q has an SB-200 and going after DXCC. W1M1KP enjoyed the hospitality of PY5s CAQ, CRY and OX who handled traffic to his XYL WA1PIT. K1OJQ is on 2 and 220. 432. W1AAI, K1GUG, WA1DRO, W1QXX, E4GGJ/1, W1EZA — all on low end of 2. W1FOA moved to Fla. W1MKN, K1DZC are in the hospital. W1NFP reports 20 has been quiet. W1GM is in Fla. 1-9 RC met at W1UB's. W1EYK is a Silent Key. Our sympathy to K7VXD, ex-W1VIC on the death of his father. W1UOH/2 is in Monroeville, NJ. W1OTN has retired. W1SAI showed a Navy picture about their Satellite Navigation System at the South Shore ARC meeting. W1MPP on 15 and has WAC. W1CMW (received the call 50 years ago) is on 40 cw. WA1PPQ is a YL. New calls: W1s PPI, PPG, PPI; WA1s PPN, PPM, PPO, PPP. K1EPL is new OBS and EC for NE-PPN on 3945. Endorsements: K1OJQ as OBS and OVS; W1MKN, W1RB FCs; W1PFX, WA1JVL ORSS; K1CLM as OPS. W1MSB has an HW-16 and edits the EMN bulletin. W1N1OMM passed his General; has an SB-102. WA1OWO mobile on 2 and 6. Lexington HS ARC. K1JMO had a Christmas "Talk-In." W1ANI looking for "chess" on Sat and Sun. at 7 P.M. on 21355. W1PI worked W1BHD on 2 repeater after 10 years. W1ARC has an HW-10L W1BB endorsed as JO and on 160. W1BDU has a 75A-4 and working DX. WA1JVL gets on at W1MX. W1N10L has Heath keys. W1N1PD in Germany is



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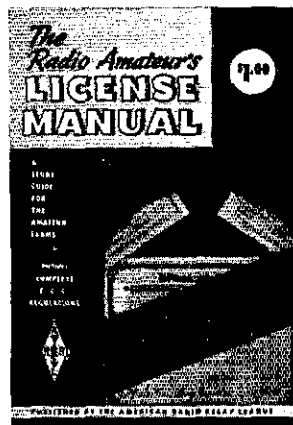
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DJØWE. WICE made PSHR. WA1JWQ is vice-pres. of Middlesex ARC. WA1GFN spoke on power supplies. WA1BAD has a daughter. KIAYA on 2. Anyone know the whereabouts of ex-W1JYJ New Bedford? MARA might was again held by the Massachusetts ARA, with the XYLs bringing the food. W1KCU is now a 2-meter fmer. The Silver Lake Regional School RC is waiting for their call, WA1GAN is in charge. W1MV has a new Drake station. Capeway RC met at WA1NLX's, he has a new HW-12A. Quannapowitt RA held a Christmas party. K1NKP moved to Venice, Fla. WA1GZV is in Montana. WA1GNX, a blind ham spoke of the Norwood ARC. KITZC is editor and K1MER asst. of Whitman ARC's "The Spectrum." WA1S AZF and ETO have an HA-460. MARA 6-meter am repeater is now in operation. W1VDE mobile on 6. WA1CUH is on 2. W1CPB keeps a cw sked with K4BQ, ex-W1CPD. WA1NNL doing an FR job handling traffic for the Cape. Traffic: (Dec.) W1QOY 701, W1OJM 567, WA1EY 543, W1PEX 401. WA1MSK 366. WA1NNL 273. WICE 262, WA1MYK 166, WA1MWN 134, W1DOM 122, K8JLF/1 109, WA1MSB 98, W1NOJMM 96. K1PRB 93, WA1OWQ 90. W1UX 84, WA1IEF 79, WA1BC 71, WA1EQ 61, WA1AG 45, W1DKD 40, WA1AX 39, W1PL 24, WA1NIJ 21, K1UAF 16, K1OJO 12, WA1LAK 10, W1MKN 9, WA1FNM 6, K1HCQ 6, WA1DC 4, K1EPL 4, W1NOTE 1. (Nov.) W1FIN 131. WA1BC 92, W1EMG 54, W1NOJMM 36, WA1DJC 11, W1PJ 5.

MAINE - SCM, Peter E. Sterling, K1TEV - SEC: K1CLL. PAM: WA1FCM. RM: W1BJG. The 18th anniversary of the Northeast Area Barnyard Net, Dec. 9 was celebrated with W1VYA checking-in and giving the net some highlights of it's start. W1EYF played tapes of the voice of W1ZE and others. The entire occasion was enjoyed by all. W1AYI now has remote push-to-talk in his shack and kitchen. W1CTR plans to do the same. WA1FCM finally made BPL. Barnyard Net report for Dec., 750 check-ins, 6 traffic. K1OYB has a new rig on 432 cw and fm. K1MTJ is now operating from K6-Land. New hams in Maine are W1N1PLD, W1N1PNA, WA1PNK, W1N1POO. WA1POZ. Congratulations fellows. K1IIVJ operates from a standing position - not enough room in the shack to install a chair. W1YFH dislocated his shoulder but is recovering rapidly. W1CTR and XYL had both families with them for Thanksgiving. W1GZS operating on 6 meters am is quite active. Traffic: WA1FCM 554, K1TEV 27, W1OTQ 14, WA1JCN/1 1.

NEW HAMPSHIRE - SCM, Robert C. Mitchell, W1SWX - RM: W1UBG. Endorsements: K1BCS as EC and W1EVN as ORS. WA1GCE is back on the air after seven months vacation. EC: K1RSC keeps the NH Emergency Phone Net rolling Sat. evenings on 3945. W1N1HE and XYL were in Puerto Rico for Christmas and met KP4UW. K1NBN of 160 fame is now W6MZW and will be on 160 soon. W1UBG reports NHVNT activity increasing with 189 check-ins and 344 traffic. The VT. gang is now checking-in more often helping the traffic flow smoothly. WA1JTM needs 12 more countries on 80 for 5BDXCC. K2KWL, formerly with the big dish in KP4-land is now W1GCT. New Hampshire's most active 160 man W1CTW worked 35 sections in the 160 test. K1GMW is very active on NHVNT plus EAN assignments. W1DXB is building a new transmitter. WA1CFT is finding 40 and 80 ssb countries scarce for 5BDXCC. Traffic: WA1JTM 689, K1GMW 342, W1UBG 320, K1YMH 227, WA1MXT 145, K1BCS 143, W1SWX 20, W1EVN 8, K1VXX 6, K1WRV 3.

RHODE ISLAND - SCM, John E. Johnson, K1AAV. - SEC: W1YNE. RM: W1YKQ. PAM: W1TXL. VHF PAM: K1TPK. R1SPN reports 31 sessions, 482 ONI, 99 traffic. The Providence Radio Ass., W1OP, recently held their annual meeting and election of officers. The following members were elected: WA1LAD, pres.; W1YNE, vice-pres.; W1KKE, treas.; Domenic M. Malozzi, secy. Elected to the Board of Directors were: W1EYH, K1HZN and Antonio Muto. Elected into office at the Newport County Radio Club were W1GAM, pres.; W1AWG, vice-pres.; W1N1POH, rec. secy.; WA1OSL, treas.; Jim Bartram, ex-W1PDL, corr. secy. Jim had the call several years ago and is waiting for his new 1 call. Many in the R.I. area remember W1JEF who still is active in the Newport Club and regularly drops the SCM a note informing him of club activities. If your club is having some activity drop the SCM a note and see if we can't get you some publicity. Traffic: (Dec.) W1YNE 117, K1QFD 37, K1CEP 30, WA1BBW 4, K1VYC 2. (Nov.) W1YNE 174.

WESTERN MASSACHUSETTS - SCM, Percy C. Noble, W1BVR - SEC: WA1DNB. CW RM: W1DWW. PAM: WA1MB. VHF PAM: W1KZS. The SEC reports the AREC nets still are going well with a total of 9 sessions, ONI 57, traffic 17. WMN held 31 sessions, ONI 187, traffic 26. Top five attendance: W1BVR 31, W1TM 25, WA1LNF 22, WA1EBF 20, K1ZMP/1 15. WMN had 100% attendance on 1RN. W1TM is doing an outstanding job as WMN NCS and WM rep. to 1RN. WA1LNF (14 years old) is now Extra Class! Congrats, Jim. The PAM reports W1BFN held 13 sessions, ONI



**DRAKE**

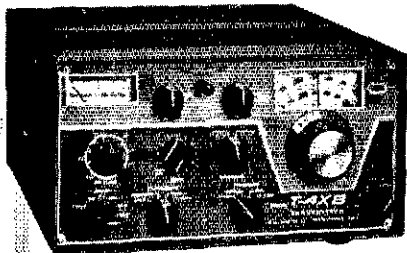
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### THE AMERICAN RADIO RELAY LEAGUE

Newington, Connecticut 06111

53, traffic 19. The VHF PAM and Berkshire Co. EC reports 2-meter fm is going full blast, with 2 repeaters in Berkshire Co. — WA1KFZ and K1FFK. There also is a 6-meter repeater on Greylock — K1FFK. New officers for Northern Berkshire ARC are K2CBA, pres., W1KSD, vice-pres. and secy.; W1YBT, treas. Editor and asst. of their "Squelch Tale" are WA1NOQ and WA1HSO. AD AREC members should check the date of their appointments and if endorsement is needed notify their Co. EC. Hampshire Co. EC W1CSF reports his group has already exceeded 800-man hours at the installation of the repeater on Mt. Lincoln. Received another bulletin from the Mount Tom Repeater Assn. with a review of the first year of the operation of WA1KGR. HCRA reports speakers were WA1HHN and K1PXE with 52 members present. K11JU gave a talk on amateur radio to the 16 Acres Lions Club. The club's 1st call area QSL Bureau will be terminated at the end of this calendar year, congrats to all taking part in this effort. Traffic: K1SSH 442, W1BVR 128, WA1LNF 75, K1ZMP/1 41, W1TM 36, WA1LPJ 33, WA1MPB 16, W1STR 13, WA1DNB 7, W1KZS 2.

#### NORTHWESTERN DIVISION

ALASKA — SCM, Kenneth R. Klopf, KL7EVO — A pair of 2-meter fm open repeaters are in experimental operation daily now on 3/4/94. KL7GNG operates the one in Fairbanks on Pedro Dome with 250 watts out and KL7AIR operates the one in Anchorage in cooperation with KL7USA on Hill 400 at Ft. Richardson. KL7IS checks into 14,292 mornings with his SBL-34. KL7HBD is wintering in Tanana. KL7AEO and KL7BIL have converted surplus GE gear to work the KL7GNG Fairbanks repeater. KL7DP and KL7HCN are using store-bought equipment. KL7GNG is using modified Motorola equipment for both the repeater and his mobile. KL7FGO just about has his antenna farm set up at his new QTH. KL7FHN is digitizing with a counter he is building up. KL7YK's traffic count was 174 for Dec. and passed it with W7BA on 20 phone. KL7CAH waiting to get his sb rig back on the air says his Ranger is doing an FB job. WL7HER and WL7HW are keeping 3735 busy. KL7HLE is having fun on SS1V.

IDAHO — SCM, Donald A. Crisp, W7ZNN — The FARM Net meet each day on 3935 kHz at 0200 GMT. ID RACES meet weekdays on 3491.5 kHz at 1515 GMT. WA7QIG has moved to a new QTH at Idaho Falls and is active on RTTY, cw and ssb. The Eagle Rock Club in Idaho Falls meet each Wed. at 7:30 P.M. 15-year-old W7S8P has a new 432 MHz ATV receiver, home made cw transceiver and is installing a 2-meter station. WA7S3N and XY1. WB0RL are new hams in Mountain Home. W7GHT is sporting a new SB-102. K7NDX, Orofino, was hurt climbing a 1V pole. WA7WV and W7ZNN made a slide picture presentation on ARPSC at the Moscow club meeting. WA7CTS has been appointed state of Idaho Army MARS Director. FARM Net reports 31 sessions, 922 check-ins, 39 traffic handled. Idaho P.O. Net: 13 sessions, 94 check-ins, 6 traffic handled. Traffic: W7GHT 171, WA7BDD 83, WA7CTS 33, W7IY 22, W7ZNN 13, WA7QIG 3.

MONTANA — SCM, Harry A. Roylance, W7RZY — Asst. SCM: Bertha A. Roylance, K7CHA. SFC: W7TYN. PAM: WA7ZR. W7ISA and W7FRB were appointed as OKSs. WA7SIP is a new call in Lewistown. Officers of the Anaconda Radio Club are W7110, pres.; WA7KYQ, vice-pres.; WA7NAA, secy.; K7YNZ, treas.; W7TYN, WN7ROE, K7SJK, board members; WA7MKY, act. mgr. New officers of the Laurel Radio Club are WA7QBH, pres.; WA7NKV, vice-pres.; W71BK, secy.; W71UN, act. mgr. WA7MUU and XY1 have a new 50w. Missoula repeater is finished. W7OIO was made a life member of the Anaconda Radio Club. Montana traffic report for Dec.: 1042 check-ins, 172 formal and 23 sessions. KMC Sparkgap society received \$800 in funds for procuring radio gear. Have had several inquiries on a Montana QSO Party. If interested let me know. Officers of the Sparkgap society are K7LTV, pres.; WA7JDX, vice-pres.; Sue Maddocks, secy.; Larry Moser, treas.; W7ISA, faculty advisor. K7DCH and K7DCI will head up the Glacier-Waterford Hamfest this year. It will be held at Bailey's Landing in Sommers, Mont. We still need news for this column. Traffic: W7EKB 332, K7LDZ 220, WA7JQS 161, W7LBK 34, WA7QBH 29, K7EGJ 22, WA7IZR 20.

OREGON — SCM, Dale T. Justice, K7WWR — SFC: W7HLE. RM: K7GRO. PAM: K7ROZ. New appointment: K7HSJ as OVS. Net reports: WA7GIX reports for the ARRL Net for Nov., 25 sessions, 407 check-ins, traffic 16 and 31 contacts. WA7KIU reports for the OSN for Dec., sessions 23, check-ins 119, traffic 93. W7CPK is back after an absence. New call in Ashland is WA7SNY. W7MLJ has been battling the winter conditions trying to keep his antenna up. WA7FIN handled 354 phone patches to S.F., Asia and Korea. WA7GFF was home for the holidays, as was WB6GRZ (WA7DOX).



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Traffic: (Dec.) K7QFG 411, K7NTS 175, K7OUP 168, K7ROZ 151, WA7IFS 85, WA7KIU 74, WA7NWX 26, K7WWR 22, W7HLF 20, W7LT 17, WA7MOK 16, WA7KRH 7, (Nov.) K7RQZ 256, K7NTS 147, K7IFG 80, WA7IFS 78, WA7BYT 32, K7OUP 25, WA7MOK 16, K7WWR 16, WA7KRH 10, W7HLF 7, W7MLJ 4, W7LT 1, (Oct.) W7CPK 18.

WASHINGTON - SCM, Arthur Henning, W7PI - SEC, W7UWT. RM: W7GYF. PAMS: W7MCW, W7GVC. VHF PAMS: K7BBO, K7IRD. New appointments: K7GGD as OD; K7JFY as OVS and OD. W7KLO and WA7LMO passed Extra Class exam.

Net	Freq.	Time(Z)	QNT	QTC	Sess.	Mgr.
WSN	3590	0245	286	120	31	W7GYF
N1N	3970	1930	1056	241	31	K7VAS
NSN	3700	0300	250	86	31	WA7OCV
NWSSB	1945	0230	861	38	31	K7KPC
WARIN	3970	0145				W7QGP

Boerne Bears ARC in their annual Sweepstakes Trophy Contest with Radio Club of Tacoma won both cw and tone modes. W7QCV transmits WLAW bulletins on facsimile Mon. 9 P.M. on 145.35 am and reports many stations are working to join this FAX group on 2 meters. First Hamfest of the year sponsored by Skagit ARC will be held in Apr. Northwestern Division ARRL Convention site Aug. 19 and 20 will be the Western Washington State Fair Grounds in Puvallup and W7UBA is Convention Chmn. ARRL Pacific Area Staff meeting is scheduled for the Convention too. The Western Washington DX Club is now an ARRL affiliate. The Radio Club of Tacoma has new open repeater in operation, 146.61 in 146.64 out. Brush up on your code on 3728 kHz 5:30 P.M., Mon. through Fri. on cw code net conducted by W7LEC. WA7IKZ has cw code practice Mon. at 7:30 P.M. on 3735 kHz. AREC now has 270 members. W7OZX is again active on PAN and FCC. K7OZA on 80-meter cw worked OH2SZ/MM and PY1DVG. Northwest Amateur Monitoring Service (NAMS) 3970 kHz daily 9:00 A.M. to 5:15 P.M. is proving to be a great success - check in and make your wants known. Traffic: W7BA 1307, W7PI 642, W7KZ 383, W7BQ 264, WA7HR 119, W7JY 117, W7OZX 83, K7OZA 78, WA7OQ 77, W7GYF 74, WA7IMO 72, WA7OBC 72, W7AXT 71, WA7OCV 66, W7MCW 65, W7APS 51, K7OXL 44, WA7EDQ 40, W7BUN 38, K7VAS 37, WA7AVI 20, WA7HCL 17, WA7LOV 15, WA7CYY 12, W7AIB 10, W7HUS 5, W7OCV 5, K7BBO 4, WA7GVB 4, K7GSE 2, K7JRI 2, K7PFR 1.

### PACIFIC DIVISION

EAST BAY - SCM, Paul J. Parker, WB6DHH - Traffic: W6IPW 670, WA6DIL 66, WB6VEW 43.

HAWAII - SCM, Lee R. Weal, KH6BZI - Asst. SEC, KH6BZI. RM: KH6AD. PAM: KH6JN. VHF PAM: KH6GRU. QSL Mgr.: KH6DD. Fcs: KH6GPO, BAS, UKD, GLU, HHG and BZI. RACES Here: Coordinate with Dick Hamada, RO. Serve yourself and your League. Join the field appointees BC, OD, OBS, OPS, ORS et al and develop interdependence.

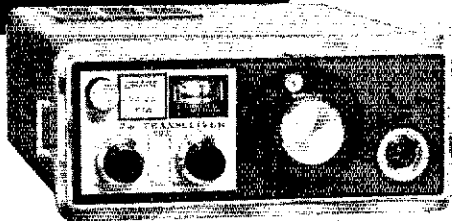
Net	Freq.	Time(Z)/Days
friendly	7,290	2030 M-F
Confusion (patches)	21,360	0001 All
World-Wide Boy Scout	21,360	1800 S
Pacific Interland	14,335	0830 M-W-F
Micronesia	14,335	0800 T-Th-S-Su
Islander	21,111	0600 M-W-S
S.F. Ast	14,320	1200 All
PACDXNET	14,265	0600 T&F
Pacific Typhoon*	14,265	

\*During typhoon alerts, kudos to KH6HHG a new EC appointee. Heard on the 2-meter repeater W4KV1/KH6 and WB4RBP/KH6M. KH6GJV closed down and moved to Calif. KH6HHN now signing K7GM. KH6GHP passed his Extra Class and 1st Radiotelephone tickets. KH6AGB, WB8LJA/KH6, W8AKS are new on the 2-meter repeater. Congratulations to KH6FUY on attaining Life Membership. KH6HDA returned from a visit with his folks in Wash. DCRXW/KH6 in town recently. KH6BZE gained his WAZ. The local Navy MARS repeater is (R) 148.97 (T) 148.410. An additional Army MARS repeater will soon be on at Schofield Bks. Get your report to me by the 1st each month. Traffic: KH6BZI 174, KH6GVP 1, KH6JGP 1.

NEVADA - SCM Leonard M. Norman, W7PHV - SEC: L.L. Mike Blain, WA7BU, 5th Cherry St., Boulder City, NV 89005, W7HP and W9IBV/7 worked Southern Calif. direct on 2-meter sub. K7ICW has a 432 QRO amplifier. K7CS and WA7IVC spend more time with their (hay burners) horses than amateur radio. Sierra Nevada Amateur Radio Society officers: WA7KCD, chmn.; WA7GVF, vice-chmn.; WA7MOB, sec. treas.; K7VYT, W7DNX, WA7IGP, WA7DRU and WA7KOS, public information. Mobile in

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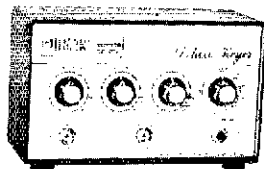
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the west remember WCARS-7255 daylight hours and WPSS-3952 at night. Nev. also has good coverage in the Reno, Las Vegas and Boulder City area on fm 34/94. WA2MEQ/7 has a new Linear. WA7SNH is busy building HT-220s. Traffic: WA2MEQ/7 57.

**SACRAMENTO VALLEY** - SCM, John F. Minke, III, W6KYA - SEC; W6SMU. New appointee: K6KWN as ORS at Lake Almanor. Anyone else wishing a station appointment or league official appointment, contact me. New officers of the GEARS: K6HTM, pres.; W6CKV, vice-pres.; WB6KAI, secy.; W6ICO, treas. New officers of the RAMS: WB6KZN, pres.; WA6UNL, vice-pres.; W6OYS, secy.; W6ICX, treas. I have been asked to list times and meeting places of clubs in the Sacramento area. So, follows a list of active clubs in the section:

El Dorado ARC, 3rd Tue, 7.30 P.M., Camino Firehouse  
North Hills RC, 3rd Tue, 8.00 P.M., Fair Oaks Comm. Bldg.  
Sacramento ARC, 2nd Wed, 8.00 P.M., Private homes  
Radio Amateur Mobile Soc., 2nd Sa, 8.00 P.M., Carmichael Park  
Golden Empire ARS, 2nd Fri, 8.00 P.M., Chico State College  
Nevada County ARC, 3rd Tue.

Additional information as to clubs in the section would be appreciated. I also would appreciate hearing from the clubs in Dunsmuir, Auburn, etc. A group of amateurs in Susanville have organized and applied for ARRL affiliation. Winner of the Calif. QSO Party for this section was WA6JVD. Those Dec. winds sure were breezy. It wasn't unusual to hear of one commenting on antenna damage. Those of you who handle traffic, please report it to me. Write for activity report cards. Phone patches do not count in the traffic count (only in PSHR standings). Traffic: (Dec.) K6KWN 44, WB6OZZ 34, WA6FGU 22, WA6OWH 3. (Nov.) WB6OZZ 28.

**SAN FRANCISCO** - SCM, Hugh Cassidy, WA6AUD - Acting SEC; Al Brodnax. Several clubs were active in the Jan. SET. WB6JQP lost the top of the mast along with his beam in high winds around New Years. A new club in the Santa Rosa area, which meets on Tue., is the Sonoma County Amateur Radio Service (SCARS). W6RNL is active on PCN while W6GGK keeps an eye on WSCARS, Western Public Service Net and West Coast Amateur Radio Service. W6CYO returned to Marin from the Seattle area. W6EAJ reports the wet weather is keeping his water-wheel powered transmitter on the air. W6RO heard WINIM on SKN. W6SLX reports a slow month with 26 weather reports forwarded on the Weather Net and 3 emergency drills. The Marin Club held its installation at the Deer Park Villa in Fairfax in Dec. with WB6UDS as the incoming pres. for 1972. W6TSQ, W6PTS, K6CJO, W6BZUC, WA6AUD, WB6UJO were at the Fresno International DX meeting in Jan. W6BWV participates in the Central Calif. Disaster Net. W6ZC looks for Slow-Scan TV and especially DX. The Greater Bay Area Hamfest is again scheduled for Oct. 1972 in San Mateo. WA6AUD continues his weekly struggle with the West Coast DX Bulletin. K6SRM stepped down as SCM before Christmas. WN6OKG is a new licensee in San Francisco while WA6NLU is up from Southern Calif. to attend Sonoma State. K6PL and WN6DTV are new ARFC members. W6IVG retired from the U.S. Foreign Service is again active from San Francisco. K6ZXS put up a tower and now has TVI problems. WB6KWL lives aboard a boat in the Sausalito area. W6FOA continues to find the nets on the 75-meter band. Several of the North Bay clubs are heading for Skaggs Island to operate the Navy Station there during the Armed Forces Day action. Traffic: WB6JQP 89, W6SLX 29, W6BWV 17, W6RNL 10, WA6AUD 8, W6PZF 6, W6CYO 4.

**SAN JOAQUIN VALLEY** - SCM, Ralph Saroyan, W6JPU - New officers of the Delta ARC are WA6HJN, pres.; WA6HAC, vice-pres.; WA6IRK, secy.; WB6ZPQ, treas. WA6BVC is the new editor of the Delta RC paper. WA6CPP is a director of WCARS. WA6ADZ is taking on a VU fall for 3 years. The Madera ARC held their Christmas party on Dec. 28, 1971 with 23 in attendance. W6GRV is now an Extra Class. FM WEST is holding their 1m conference on June 2, 3, '72 at the Tropicana Lodge. Contact WB6GSH for details. WB6EZR, WA6OGO and W6HAB are on 2 meters fm. A week before the New Year, W6MHD's 2-meter transceiver was stolen from his auto. It showed up on the JPU repeater on New Year's eve, with an XYL operator and no call. WA6WXP held her on the air with sweet talk. W6DPD got a bearing on the signal in the Sanger area. W6QPE alerted the officers in Sanger. WA6WXP, WB6GVO and WA6RLX drove to Sanger, got invited to her party, drove up to the house, alerted the officers and recovered the transceiver. The XYLs boy friend had bought it from another person for \$20.00. This was done with good cooperation of the rest of the JPU repeater group, who stayed off the air until it was over. The one who stole the rig thought it was a CB radio. Traffic: WA6IDR 74, WA6CP 10.

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**THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111**

QS-3-72

SANTA CLARA VALLEY - SCM, Albert F. Gaetano, W6VZT  
 SEC: WA6RXB. RM: WA6LFA. K6IXR has graciously accepted  
 the position as vice-pres. of SCARRA. WA6RXB is the new station  
 manager for W6PIY, the West Valley Amateur Radion Club. Ralph  
 also is the new SEC for the section. Good luck Ralph. As you are all  
 aware by now, WA6LFA has taken over the job of SCM for the  
 section; therefore this is my last report. I would like to take this  
 opportunity to thank all those who helped make this job a pleasure  
 by sending in little tidbits of information for the column. In  
 addition I would like to thank all members of the section who have  
 helped to keep things going in a well represented manner. I'm sure  
 your help to Jim will be as good as it has been to me. 73c. Traffic:  
 W6RSY 1466, W6NW 401, W6YBV 365, W6BVB 313, WA6LFA  
 241, W6DEF 163, W6AUC 65, W6VZT 57, W6IQU 18, W6OII 9,  
 WA6DKF 8.

**ROANOKE DIVISION**

NORTH CAROLINA - SCM, Charles H. Brydges, W4WXZ -  
 SEC: W4EYN. PAM: WB4JMG. RM: WB4PNY. W4ATC is high  
 claimed score in NC QSO Party with 338 contacts. WB4IOJ,  
 operator at the State College ATC, reports a Novice class going well.  
 Congrats to WA4ZLJ, WA4ZLK and WB4CEP on passing Extra.  
 W4FD is fine after operation. WB4NXS working on local CD plans.  
 K4CTA enjoying chasing DX and states on 160. WA4JCS received 20  
 wpm cp from Hu. Governor Scott sent Holiday Greetings via RAKS  
 members and turned on Christmas lights at a base in Germany via  
 radio. K4MC did a good job sending QTC on behalf of our  
 Governor. New officers for Rowan ARS are K4GHR, pres.; K4SHU,  
 vice-pres.; WB4RGS, secy.-treas. The Salisbury repeater covers the  
 Piedmont area 28/in, 88/out. GHR reports a 12-week licensing class  
 at Rowan Tech sponsored by Rowan ARS. Brightleaf ARC "Ham  
 Chatter" had Christmas dinner plans by K4MI and K4SK1.  
 WN4TMU hopes to push traffic from Ridgecrest in summer. K4GQS  
 doing excellent job as OO. Carteret-Craven AREC sponsored a float  
 in Newport Christmas parade. This group had club auction as did  
 the Raleigh ARS. K4SAN is NCS for RARS 2-meter net on 94.  
 K4RJ continues testing from Franklin on 2.3 GHz with Moon  
 echoes and results now are close to those at W3GKP diggings.  
 WA4WZQ active on 6 and 2 with prop reports showing openings.  
 WB4KPD has new HR-2A and reports Eastern NC repeater to go on  
 WITN-TV tower at Grifton. WA4FFW doing fine job as EC for

Alamance Co. Traffic: (Dec.) WB4PNY 543, W4EYN 260, K4MC  
 208, WB4OZL 64, WB4PWZ 60, W4TYE 53, W4UWS 53, W4WXZ  
 47, W4RWL 45, WB4NRZ 34, K4VBC 29, WA4KWC 27, K4EZH  
 20, K4COG 19, K4GHR 16, WA4VNV 16, WB4HGS 12, WB4SPC  
 12, W4ACY 11, WA4JCS 9, K4TTN 6, WA4UQC 6, W4EFL 4,  
 WB4TNC 4, WB4MK1 3. (Nov.) W4RWL 31, W4EFL 4, WA4KWC 4.

SOUTH CAROLINA - SCM, Mrs. Elizabeth Y. Miller, WA4EFP  
 SEC: WA4ECI. Asst. SEC: W4WQM. PAM: W4JSD. RM: K4LND.  
 WB4MCI did outstanding job hosting Spartanburg Club at Christmas  
 meeting. She also has vanilla flavored antenna tower foundation  
 with tricycle and odd car parts thrown in for body. W4BUW reports  
 the amazing discovery that a beam always works better if installed  
 in winter. We too have made a pleasant discovery: Some people  
 actually do read these reports. If you like 'em, fellas, please keep  
 the news items coming in. You tell me, so I can tell it here. The SC  
 SSBN continues to meet daily on 3915 kHz. W4MTK is the new  
 mgr. since the resignation of W4JSD because of temporary  
 inactivity. W4WQM will collect NCS reports through June. Net time  
 is 2300Z. SCPN meets on 3930 kHz at 1600Z Mon. through Sat.  
 and on Sun. at 1230Z and 1930Z. Early CN is at 2300Z, and late  
 CN at 0200Z, both daily on 3573 kHz. K4LND is manager for the  
 early net and WB4ETF for the late net. SSBN 143. Traffic: W4NTO  
 78, K4OCU 52, W4MTK 40, WB4TCK 11, W4BUW 7.

VIRGINIA - SCM, Robert J. Stagle, K4GR - Asst. SCM: A.F.  
 Martin, Jr., W4THV. SEC: WA4PBG. Asst. SECs: WA4JF,  
 WB4CVY. RMs: WA4EUL, WB4NNO, W4SHJ. PAMs: WA4FGC,  
 WA4YXK. BPLs: K4KNP, WB4FJK, WB4KSG. W4SQO went to  
 Tampa for Christmas. W4YZC eyeballed with WB4NNO - reports  
 YK3ACS/W4, WB4UYD, K4OD, WB4RDV, W4DIW, W4AAU and  
 WB4SGV voted into PVRC. W8VDA/4 going to Cincinnati for a  
 visit. K0PIV/4 received five Heathkits for Christmas! Got a problem  
 - when W4TF hands XYL K4LMB 19 messages for relay, how do  
 you count them? WB4DRB has 2-watter out of mothballs for SKN.  
 WB4KBJ working hard on antenna farm. Dir. W4KFC visited  
 Southern Peninsula ARC, NVRC, Alexandria RC, PVRC and took in  
 Straight-Key Night. WA4WQG has 2918 counties, W4JUJ 2471;  
 W4JUJ has all counties in 12 states and 35 lacking one! W4GEO  
 worked his 200th country, had twin boys and is complaining of  
 household chores! WA2BLX/4 activity suffering from overtime.  
 W4THV says new homebrew Ultimate works well. WN4WLK reports

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(Please see the other side of this page for an application for membership in ARRL and 12 issues of QST)

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

QS-3-72

15 states confirmed on 40 with indoor antenna. W4KAO restricted to late VSBN. WB4OXD has completed new shack. WB4NVJ reports VARA activities. Beautiful work by K4JDK. K4UKT/K4IIV, W4KBY on 6 fm saved a potential suicide on Dec. 30. OO W4HM shifting QTH to Va. Beach. Report from PAVHFS. WB4PCK reports Va. Post Office Net meets Tue. at 2215Z on 3905; Va. Salt Mine Net on 3947 at 0715 and 1615 Mon.-Fri.; VSBN at 1800 and 2200 EST daily on 3935; VSN at 1830 and VN at 1900 daily on 3680. Traffic: (Dec.) K4KNP 695, WB4FJK 571, W4SQO 404, WB4SGV 319, WB4KSG 305, W4UO 268, W8VDA/4 206, K4KA 166, K0PIV/4 156, W4BFD 138, WB4SK 123, W4TE 121, WB4KIT 111, WB4DRB 106, W4YZC 95, WB4KBJ 87, WB4RDV 86, W44JF 85, W4KFC 82, WA4TGC 75, K4FSS 61, K4LMB 35, K4GR 31, W4LQO 31, K4CQP 22, WB4PCK 18, W4GEO 15, WA4WQG 15, K4JM 12, WB4QAO 10, WA2BEX/4 9, W4MK 8, WB9BX/4 7, W4THV 6, W4DM 4, W4N4LK 4, WB4EAE 3, W4JUI 3, W4KAO 2, W4KX 2, K4JYM 1. (Nov.) K4JYM 4.

WEST VIRGINIA - SCM, Donald B. Morris, W8IM - SEC; W8NDY. RM: W8BBBG. PAMS: W8DUW, W8IYD, K8CHW. Phone Net Mgr.: W8PQS. CW Net Mgr.: W8CYB. WVN Phone Net, 3995 at 2300Z daily. CW Net, 3570 at 0007. W8BEKG has Drake TR-22. W8BMV made PSHR and BPL, also is quite active with Novice Net and 8RN. W8BBMW has new linear and a tower in good location. W8NDY worked 60 miles on 2-meter fm with 1-watt mobile rig. W8WCK attended State RACES meeting in Charleston. W8MIS is inactive. I regret to report the passing of W8ZO. Wheeling 2-meter coverage improved by moving antenna site to WTRF tower. State Radio Council meeting and election of officers held Mar. 4 in Charleston, Kanawha ARC and St. Albans CD group held combined meeting. W8CKQV working on 420 MHz TV. W8AFRO, W8BFMG and W8BMV are new FCs. W8JM visited Weirton area amateurs. WVN CW Net, 136 stations passed 212 messages and Phone Net with 481 stations handled 146 messages. Novice Net with 17 stations had 164 messages. W8DXF made PSHR. W8NLGF active on 21 MHz working DX. Traffic: W8BBMV 512, W8DXF 312, W8CYB 209, W8NDY 146, W8PQS 84, W8BLGF 62, W8WCK 41, W8IWX 31, W8IM 30, W8OKG 20, K8QEL 16, W8DUV 14, W8GDP 10, W8BYT 9, W8SDX 8, W8KWL 7, K8BCF 5, W8NIF 5, W8RCK 5, W8BAK 4, W8BBG 4, W8FPZ 4, W8OPM 3, K8ZDY 3, K8HUH 2, K8QOL 2, W8YWK 2, W8BADH 1, W8CKX 1, W8EEO 1, W8EMJ 1, W8ETF 1, W8GWR 1, K8HID 1, W8KAN 1, W8QEC 1, W8AUNP 1, W8WEJ 1.

### ROCKY MOUNTAIN DIVISION

COLORADO - SCM, Clyde Penney, WA0HLQ - SEC; WA0QOY. RM: W0LRN. PAMS: W0AWG, W0CXW, K0IGA, W0LRW. Congratulations to the newly-elected officers of the Boulder Amateur Radio Club, who are Bill McCaa, pres.; WA0WNX, vice-pres.; WA0ZON, secy.; K0KJN, re-elected treas. In the 1970 judging of ARC publications by the Amateur Radio News Service, "Zero-Beat" publication of the Pikes Peak Radio Amateur Assn. won first place honors in the "Best Editorial" category, and tied for third place honors in the "Technical Articles" category, while "Grid Leak" publication of the Pueblo Ham Club tied for second place honors in the "Club Activities" category, and won honorable mention in the "Best Editorial" and "Technical Articles" category. Congratulations to both clubs. K0LZD and W0LRW received their Advanced Class licenses; WA0EBJ his General Class. Congratulations to W0CCB on his WAS certificate. WA0EBJ has a new Vibroplex Bug. WA0SIG is enjoying his HW-101. Net traffic for Dec.: SSN QNI 303, QTC 224, informals 32, time of 1036 minutes for 31 sessions. CTN QNI 245, QTC 60, time of 683 minutes. Hi-Noon QNI 1160, QTC 88, informals 119, phone patches 9, phone calls 5, time of 1068 minutes for 30 sessions. CCN QNI 218, QTC 118 for 31 sessions. Traffic: (Dec.) K0ZSQ 1294, W0WYX 723, W0LQ 224, WA0ZWA 210, K0JSP 165, W0LRN 150, W0LRW 127, W2TPV/0 93, W0IW 92, WA0SIG 71, W0LCE 56, W0NZL 46, W0CCB 31, WA0YGO 28, WA0NFO 27, K0IGA 25, W0UAT 16, W0CQJ 9, WA0YH 7, W0BY 5, WA0HLQ 2, W2RZYK/0 2. (Nov.) WA0MNL 77, W0CQJ 73, W0CXW 20, WA0ISM 10.

NFW MEXICO - SCM, James R. Prine, W5NUI - SEC; W5ALR. PAM: W5NON. GO: W5ONO, K5MAT. OVS: W5BHN, W5SCSO in Las Cruces is active on 2-meter meter, WB8JMI at WSMR has a new 75-meter dipole with excellent signal. The long skip has demonstrated the value of operator skill on the Roadrunner net in getting the traffic through. The cooperative effort of all net members has been most rewarding. W5BWW with the aid of W5ITP has constructed a delta loop antenna for 15 meters with the results exceeding expectations. Special thanks to W5JNC as anchor man NCS on the breakfast club 3903 kHz 1230Z each week

day morning. Traffic: K5MAT 239, K5DAB 108, W5RE 96, W5NON 40, W5NUI 34, W5MYM 27, W5PDY 21, W5DMG 18, W5DAD 16, W5WVY 11, W5SMY 4.

UTAH - SCM, Carroll F. Soper, K7SOT - SEC; W7WKF. RM: W7OXX. The new pres. of the Ogden Amateur Radio Club for 1972 is WA7FVO. WA7HCQ has new Kenwood 1-599, R-599 and Collins 30L1, which helps put a signal on the air that is most respectable in the DX bands. W7GPN is in the process of re-registering Weber County amateurs in RACES/ARPS. The Utah CD is issuing new licenses to all RACES stations - anyone interested contact K7SOT. A public service to the men of the job corps was accomplished through the delivery and originating of messages at Christmas. The Beehive Utah Net reports QNI 1006, QTC 74. Traffic: K7HLR 266, W7OCX 250, W7EM 137, WA7HCQ 97, WA7FVO 85, W7IOU 54, W7GPN 18, WA7MEL 14, K7CLO 9, WA7FS 6, W7HKC 4.

WYOMING - SCM, Wayne M. Moore, W7COL - SEC; K7NOX. W7OBE has some new gear including a new tower and beam courtesy of W0MVA. WA7RKA has a new transceiver. New calls in Casper are W8SBN (N.Mex.) waiting his 7 call; W7N7SRH and SOY, and W7N7SRH. W7N7SRH and SOY lost their home in Dec. because of a fire and now are living in Red Butte Village, visiting them is W6WVY. In Dec. K7TAL and WA7RRV assisted in getting help for an auto accident on Shirley Rim. At the second meeting of the newly formed Fremont County Amateur Radio Society officers for the year were elected with WA7OEC as pres. Send me your nominations now for the PICON award for 1971. Traffic: W7SDA 115, W7TZK 80, K7SLM 64, W7HNI 60, K7VWA 56, W7YVW 33, WA7MNC 28, WA7NHP 17, WA7OEC 12, K7WRS 8, K7AHO 4, W7RPV 4, WA7RKA 3, W7NKR 2, K7TWK 2.

### SOUTHEASTERN DIVISION

ALABAMA - SCM, James A. Brashear, Jr., WB4FKJ - SEC; W4DGH. RM: W4IFU. PAM: W4WLG. The AENM net members elected K4ROR as NM; WA4GQS was the previous NM. W4NSDN made BPL for the third time; passed Advanced Class exam and is waiting on last state confirmation for WAS. A belated welcome to WA4YBT who recently moved into the section. ECs be sure you report emergency activities, plans, drills, etc. to the SEC. Red Cross Director of Disaster Services, Mr. "Skipper" Lepich and other Red Cross officials declared that the communications test on Dec. 11 '71 was an "unqualified success." There were a total of 54 stations, representing 25 Red Cross Chapters participating. The Birmingham ARC operated W4BCC in the Birmingham Civic Center to publicize the Birmingham Centennial; the station was on the air for about 30 hours and worked about 1200 stations. WB4SVH has an HW-101 and now QNI AENM and AENT, sb. Because of RNS and CAN duties, he has changed the OBS schedule to Tue., Wed. and Thurs. New officers of Mobile ARC are W4SLJ, pres.; K4DBP, vice-pres.; W4VYI, secy.; W4OCU, treas. The Huntsville ARC set up stations in a local Mall before Christmas and handled approximately 90 messages. Appointments: WB4IFY as EC. Endorsed: K4HJK as EC and OVS. Traffic: W4SVH 366, W4SVX 231, WB4EJ 220, WB4KDI 213, W4HFU 199, WB4JMH 171, W4NSDN 157, WA4VEK 140, WB4THU 111, WB4NLK 106, K4AOZ 50, WB4OKT 31, WB4VKW 11, K4IJM 7.

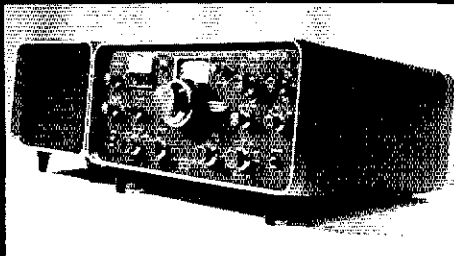
EASTERN FLORIDA - SCM, Regis K. Kramer, W4ILE - SEC; W4IYT. Asst. SEC: W4SMK. RMs: W4OMG and K4FHY. PAMS: W4OGX 75 and W4SDR 40. Congratulations to all Florida traffic handlers. Dec. '71 was a record shattering month! QFNs 1150 QNI, 994 QTC for 62 sessions with a rate of .505 lead the way. Likewise Gator Net surpassed all previous records, 365 sessions in 1971 totaling 4585 QNI and 3124 QTC. Fla. Midday Traffic Net led the sb nets in Dec. with a walloping daily average of 33.6 QNI, 15.4 QTC, 27 sessions. Total reported traffic for E. Fla. 12649, up 2873 or 23 percent over Dec. 1970. Leading the pack were BPLers W3CUL/4, W3VR/4, W44JH, WB4OMG, WB4NCH, W4ILE and W3FBN/4. Making PSHR, reflecting their operating versatility and equipment were K4FAC, WB4VOS, WB4PFG. Sorry to lose W4LEP back to W2-Land. New appointees: K4GFW as OO and OPS; W8BZY/4 as ORS and K9FWT/4 as OVS. W4ILAW is a super active club in West Palm, featuring international goodwill tours, 160-meter contest operators, Novice classes and good traffic reps on the nets. The Gold Coast F.M. Assn. programs a Gold Coast F.M. Emergency Net Thur. at 7 P.M. using their repeater - input 146.22, output 146.82. Contact W4CYF or W4OJA for information. Daytona Beach Amateur Radio Assn. (K4BV) sponsors an FB newsletter radiating their friendliness and esprit-de-corps! - ditto W4DUG the Tampa ARC. The Dade County ARPS (W4FIW) is publishing an exceptionally fine bulletin called Solid State, under the able leadership of WB4OYA and WB4ONR. With K4FMA and his

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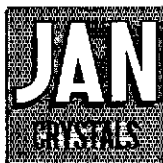
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co-workers at CH-6 TV the DCARPC and ARRL are well publicized in the Dade County area. DXers— add to your SBDXC — and don't forget to turn in your points for aggregate club endeavors. Traffic: (Dec.) W3CUL/4 4759, W3VR/4 752, WA4JH 666, WB4OMG 524, WB4NCH 453, W4ILE 423, WB4HKP 410, WB4QVO 388, WB4AIW 370, K4EAC 327, W4DOS 309, WA4NBT/4 253, W4LDM 243, W4FPC 232, W3FBN/4 167, W4SDR 127, W4DVO 123, WB4PNG 110, K4JWM 100, WB4GHD 99, W4BM 85, K4GJ 84, WB4TPJ 80, WB4SKJ 78, W4NGR 71, WA4VCK 71, WA4IDH 70, WB4HJW 69, W4IAD 66, WA4SCK 63, WB4VOS 57, W4IA 55, W4SMK 49, W4IYT 46, WA9JSX/4 46, WB4FL 45, K4COO 38, K4EYN 38, WA4BGW 35, W4FFP 33, W4GJU 31, K4HEX 31, WA4RUE 31, W4LSR 29, K4EJW 28, K4KE 25, WA2AL/4 24, WB4FUJ 23, K4BLM 21, K4EBE 20, W4BCZ 18, W4DFP 18, K4OER 18, WB4SZS 18, WA4CJO 17, W4OGX 16, W4EH 15, WB2NGI/4 15, WB4PWD 15, WN4RCO 15, K4SCL 15, W4TJM 15, W4ZAK 15, WA4UQO 14, WB4JSK 13, K4MV 13, K4IOP 12, W4SME 12, WB4TAF 12, W4OOH 11, WB4AID 10, K4DWW 7, K4SIH 7, K4GEW 6, W4NTE 6, W4LK 4, WB4QID 4, WA4EYY 2, W2JH/4 2, WB4QFH 1, W4SCY 8 (Nov.) WA4SCK 276, K4HEX 22, K4NE 19, W4SME 18, K4GEW 8, W4LK 4, WB4PSY 4. (Oct.) WA9JSX/4 23.

GEORGIA — SCM, A.J. Garrison, WA4WOU — Asst. SCM: John I. Lane, III, K4BAI. SMC: WA4VWV. RMs: K4BAI, WB4SPB. PAMs: K4HQI, W4LRR.

Net	Freq.	Time(Z)/Days	QNI	QTC	Mgr.
GSN	3595	0000/0300 Dy	916	427	K4BAI
GTN	3718	2300 Dy	111	90	WB4SPB
Ga. SSB	3975	0100 Dy	899	68	WB4DMO
Ga. Cracker	3995	1300 Dy	94	12	WA4IQU

Plans are nearing completion for the Columbus, Ga. Hamfest, tentative date Apr. 9. W4LRR reports 2-meter openings in the western states during Dec. Members of the Augusta Radio Club will provide communications again this year (Apr. 6-9) for the Augusta National golf club during the annual Master's tournament. It is no longer necessary to return your appointment certificates to your SCM for endorsement, we're using a "stock-on" label method. BPL: WB4MWC. Traffic: WB4SPB 152, WB4MWC 149, K4OSL 139, WB4QGN 137, W4LEP 130, K4BAI 120, WB4RUA 108, WA4RAY 81, W4CZM 66, WA4MB 61, W4PIM 58, W4RNL 55, K4NM 43, WA4WOU 42, W4FDN 24, W4BFQ 13, W4JMJ 9.

WESTERN FLORIDA — SCM, Frank M. Butler, Jr., W4RKH — SEC: W4IKB. RM: K4LAN. RTTY: W4WEB. PAM: W4NOG.

Net	KHz	Time(Z)/Days	QNI	QTC
WFBN	3957	2300 Dy	31	758
QFN	3651	0000/0300 Dy	62	—

Pensacola: K4DOT received his Advanced Class ticket and is working for 1st phone. W4NOG ran 148 phone patches in Dec. W4JLW renewed as OPS. The 6-meter net continues active on 50.7 MHz. New calls in town are WB4YBO and WN4YCX. The FARA Christmas party was a lot of fun for all. The club has a new HW-16 Novice station. Fort Walton/Eglin AFB: K4CLM is the new Okaloosa County EC, W4BVE renewed as ORN. W4TAL and WB4VZH joined the West Fla. Phone Net. Near EARS club (meeting 1st Tue. of each month) officers are K0TRV, pres.; WB4TPR, W4RKH, WB4GYX and W4UNV. The Playground ARC has plans for a new club house and the 2nd Annual Swapfest will be held Mar. 18-19. Chipley: W4IKB teaches a class at Chipola Jr. College for Advanced Class and commercial FCC tickets. Section Net Certificates were issued to WB4SBD, K4VYF, K4LAN and WB4LEL. Traffic: WB4SBD 170, K0BAD/4 131, WB4LFL 37, WB9FUZ/4 32, W4NOG 22, W4IKB 18, W4RKH 15, W4FDJ 7, WB4TPR 5, WB4NHJ 4.

### SOUTHWESTERN DIVISION

ARIZONA — SCM, Gary M. Hamman, W7CAF — The Southwest Ham Roundup and Frasco will be held in Tucson on Apr. 29 and 30. The Hamfest sponsored by The Old Pueblo Radio Club will be held at the Ramada Inn. Pre-registration by Mar. 31 is \$7.50, which includes a banquet and admission to all activities. Contact W7MGF or W7EAH for more information. The Phoenix-Tucson annual softball game is tentatively scheduled in Casa Grande on Apr. 9 with the usual pot-luck lunch at 1:00 P.M. preceding the game. Newly elected officers of the Arizona ARC are W4NKL, pres.; W7DRR, pres.-pres.; W4TOOB, secy.; K7JWB, treas.; W4OVN, act. mgr. Prescott High School now has an ARRL affiliated club with W47MMK as pres. The Arizona Repeater Assn. provided communications for coordinating pre-game and half-time activities at the Fiesta Bowl. The ARA is sponsoring license classes in Phoenix. Contact K7KEQ for more information. The ARA now meets in the DeVry Bldg. at 24th St. and Highland in Phoenix on the 4th Tue. at



7:30 P.M. Congratulations to K7NTG on making BPL. Section Net Certificates were earned by K7EMM, WA7HIT, WA7JCK, WA7KOE, K7MTZ, WA7NQA, K7NTG, W7OUE, WA7OVN, K7RLI and K7WUG. Traffic: (Dec.) K7NTG 508, K7NHL 475, K7MTZ 238, WA7MAD 70, K7LMM 62, WA7OVN 59, WB2HLI/7 27, K7GLA 21, W7CAF 20, W7PG 19, K7RLT 18, WA7JCK 17, W7WGW 15, W7OUE 14, WA7KQE 9, WA7NQA 6, K7WUG 6, K7RDH 5, W7LLO 1. (Nov.) W7PG 11.

LOS ANGELES - SCM, Eugene H. Violino, W6INH - I want to take this opportunity to thank the SCN gang for the wonderful help during the holiday rush. W6DSP recovering in the hospital from heart attack. W6DQX busy working DX and also as member of League's Contest Advisory Committee. OBS W6BHG is transmitting latest bulletins on 3.6 kHz and 147.954 MHz. The 2-meter frequency was changed because of repeater interference. WB6BBO went back east for the holidays. WB6PAV joined the ARRL Intruder Watch checking mostly cw violators which he finds are mostly U1 stations. WN6IGX will soon be back on the air. Santa Clarita Club elected W6WKN, pres.; WB6DIT, vice-pres.; WA6PMP, tech. chmn. W6MLF has been doing double duty on NTS this past busy season. W6MAB still handling patches when he can for folks in Antarctica. The Western Public Service System elected WB6MDN, pres.; W6OAW, vice-pres.; WB6GHS, secy. W6GFO was on vacation for a month. W6OI reports he has been an EC for over 20 years and meets on 28.680 sb Tue, 7:30 P.M. local time. WA6SNK attended the Swan Company open house at Oceanaside. W6MLZ was active as publicity chmn. for the yearly SAROC hamfest at Las Vegas. WB6ZAO has new mobile fm transceiver and has been on the County RACES Net. K6LA moving station after 20 years. W6AM ux mobile 2 meters as well as 14 MHz. WB6PKA trying to work DXCC on 80 meters during skip season. WA6ZKI active on MARS and SOWP nets. K6QPH is leaving the L.A. section for the Orange section. WA6DHM worked the DX Contest on 20. WA6QQL still working on the new Linear. WB6GKG doing a big job on 2-meter nets, also is stepping up his code speed. I can use a few more PSHK reports with your regular reports. K6ASK almost lost antenna during recent winds, also having receiver troubles. WA6AJJ fixed his DX-60 for vfo says no hum or drift. WA6HNY has been directing his attentions toward new designs of equipment in the hf bands and would like to contact others interested in this field. WB6YIZ moved to new QTH. K6UYK planning an SCN meeting at his Newport Beach resort. WB6ZTI QRL holiday Post Office work. SAROC was a huge success so many W6s there couldn't count 'em. It is with sorrow that I announce the passing of W6DSP, one of the local pioneers and long time member of the Crescenta Valley Radio Club. Traffic: (Dec.) WB6ZVC 538, W6INH 534, W6MLF 459, WB6BBO 416, WA6QQL 281, K6UYK 272, W6QAE 238, WB6HG 152, W6OLO 145, W6LYY 122, W6USY 76, WA6ZKI 67, WB6GKG 66, W6LVC 63, WB6YIZ 44, WB6DH 30, K6CL 25, K6LA 22, WB6ZTI 20, W6HUS 19, WA6DHM 17, W6AM 6, K6ASK 3, K6QPH 2. (Sept.) W6GFO 15.

ORANGE - SCM, Jerry L. Verdurt, W6MNY - Asst. SCM: Richard W. Birbeck, K6CID. SEC: WB6CQR. RM: WB6AKR. Congrats to WB6VTK and WA6TVA on making BPL for Dec. Santa Claus blessed W6TB with a "Bird" wattmeter and WB6AKR with a 32S-3 transmitter and power supply. W6MNY and WB6ZOK are new Mon. night alternate liaisons from SCN to Mission Trail Net. WN6MBG obtained his RCY and Code Proficiency 10 wpm certificates and joined the Newport ARS. New members of the Orange County 40-meter AREC Net are WB6YHP and WB6IAD. Congratulations to the following recommended by LC WA6TVA to receive a Section Net Certificate for their traffic participation on the 40-meter AREC Net: WA6AAO, WA6BPM, W6CPB, WA6LYS, W6NH, WB6YHP, WA6ZLI, WB6ZTN. New officers of the Fullerton RC are WB6DJR, pres.; W6MBA, vice-pres.; WN6LMC, secy.; K6ATK, treas.; W6MIN, W6RLI, W6CRW, board members. 1972 officers for Orange County ARC are WA6FH, pres.; WB6ONU, vice-pres.; WA6OBM, secy.; WB6TBU, treas.; W6NGO, activities; WB6WOO, TVI chmn.; WB6FKD, public rel.; WA6OBM, RE editor; WB6VOV, membership; WB6CQR, WB6HHC, board members. Victor Valley ARC officers are WB6GAN, pres.; WHHT/6, vice-pres.; W6LPX, secy.-treas.; W8BTK/6, activities; W6TTR, trustee for K6QWR; WN6CFJ, sgt.-at-arms; WB6APC, novice coord.; W8BVJ/6, MARS coord.; W6JPK, RACES RO. WB6EAI reports the Troy High ARC meets every Wed. after school in room 308. Citrus Belt ARC conducts code and theory classes for Novice on Tue. and Thur. at 7:9 P.M. in the San Bernardino County Library Bldg., 104 West 4th St. Volunteer instructors are WB6FTT, WB6HZS, W6BBY, K6SJA and K6ERH. PSHK: WA6TVA 46, W6MNY 36, WB6AKR 15. Traffic: (Dec.) W6ISC 192, W6MNY 192, WB6VTK/6 186, WA6TVA 154, W6WRJ 66, W6QBD 51, WB6AKR 27, K6GGS 24, WB6ZOK 9, W6CPB 7, W6BUK 2, W6B/1. (Nov.) WB6NBV 6, WB6ZOK 5.

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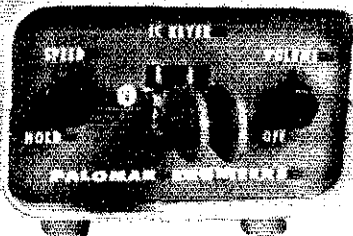
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SAN DIEGO - SCM, Paul C. Thompson, W6SRN - Asst. SCM; Art Smith, W6UNI. SEC: W6TAL. Your active participation in area organizations, net and NTS operations. ARFC, League appointments and individual progress in amateur activities is a real indication of the strength of this section. The 2-meter AREC group held communications for the SD Marathon 26-Mile Run. This year's ECs are: Central, W6UGA; Eastern, W6OEX; Southern, W6GBF; Northern, K6HAV; Imperial, K6CXR. Contact these stations for information on section activity or your SCM. Feb. activities included the Glider Meet, American Walk and Emergency Power exercise. Speaker at the El Cajon Club was WA6PCY regarding amateurs and highway emergencies assistance. WB6DPV had contest slides at North Shores. ARRL films were the bill at IVARA. Palomar is meeting in Vista. SDDX held their meeting the last Wed. of the month. SDFM now boasts 80 plus members. New equipment for K6ROB, WA6TIW, WB6PJ, WA6HCU and WA0HTC/G. New call W6G0HR. New General for W6WJQ. K6HAV reworking matchbox. New beam for WB6RMG. New transceiver for W6TQX. Thanks to W6UJO for handling the WAMO award. Traffic: (Dec.) W6VNO 778, W6BGF 730, WA6AMK 406, W6IOU 307, W6IRU 220, WB6HMY 206, WB6VKY 105, W6YKJ 78, W6DEY 52, W6SRK 12, WA6COF 7, K6PM 4, K6CXR 2, W6MAR 1, W6TAL 1. (Nov.) WA6AMK 271.

SANTA BARBARA - SCM, D. Paul Gagnon, WA6DEI - SEC; W6JTA. RM: W6UJ. PAM: K6EVO. W6UJ reports the Lompoc/Vandenberg CD was activated Dec. 18 when an airplane cut power lines and a 2-hour blackout occurred. 2-meter and 75-meter frequencies were manned by WB6QLY, W6UJ and WA6KRA using emergency power. WB6VGC reports receiving assistance while mobile from K6YLO and the WA6ZRH repeater during the Dec. flooding and mudslides in the Carpinteria area. I had meetings with the Mike and Key RC and the Ventura County RC in Dec. Many new ARFC members were recruited. The new pres. of the Canajo Valley RC is W6GEB. WB6WKC is the newly appointed IC for the Santa Barbara area. K6PHT has a new Signal One CX-7A and is erecting a 60-ft. tilt over tower in Thousand Oaks. WB6MXM has a new Swan 500CX and works DX from Oxnard. WB6PGK is doing a fine job net controlling the section net on Wed. at 8 P.M. on 3935. Our traffic totals over 1000 in Dec. Congrats men! WA6CXD is on 2 meters in the Morro Bay area. K6YLO reports a new repeater in Ventura Co. is WA6SIN located on Sulphur Min. 1146. 28/146.880 1950 cycle tone burst required. Larry's XYL is now WA6NTP and enjoying 2-meter fm. PSNR: WB6MXM 48, WA6DEI 44. Traffic: (Dec.) W6JIA 470, WA6DEI 323, WB6MXM 129, WA6WYD 34, WB6PGK 21, WA6MBZ 15, WA6PEF 6, W6MQF 3, W6UJ 2. (Nov.) W6MQF 3.

### WEST GULF DIVISION

NORTHERN TEXAS - SCM, L.F. Gene Harrison, W5LR - Asst. SCM: Frank A. Sewell, Sr., W5ZU. SEC: WASVJW. Asst. SEC: WASKHE. RM: W5QZG. PAM: W5B00. WASVJW new SEC digging into new appointment. W5NPEF, Key City ARC, Abilene considering spring swapfest dates in order to reduce conflict with other activities. W5BCYS is the Shelby County EC. OO WASKHE made 17 observations in Dec. W5HSO reports the NoWesTex Emergency Net held 28 sessions, 157 messages, 462 check-ins. San Angelo. Tex. Goodfellow AFB resident WA6SLU5 accepted OO appointment. The Temple ARC meeting Dec. 9 and 28 had excellent turnout. SCM found Gordon Fogg's OPS under stack of mail. W5TJ Kilgore ARC reports low-band inter-mod problems. Richardson WK held election of officers and A. Prose Walker, ICC man spoke on Jan. 10. Irving ARC met at FURRS Cafeteria during Christmas, also investigating CD possibilities. Navy (MARS) NoLa says let's get ready for hurricane season. See SCM for information on Intruder Watch. Our PAM needs help. Anyone wish to volunteer? WASKHE recently asked Hq. to petition FCC regarding dividing "license fee." WASUGR no longer Net Mgr. NTFN. W5SDDB is a Silent Key. W5SHX sent activity report. WSAJ visited SCM during holidays. Regret to announce cancellation of WSLGY's OBS appointment. W5MNY Gregg County EC interested in emergency activities. Repeater activity Ft-W-Dallas area reports good openings of late. K5ZCD and W5CEV in process establishing two ATV stations using RCA CMU-15B transmitter strips and W6ORG's video modulator (kt carrier) on 440.0 MHz. WASVJB reports 4-B openings 12/4 and 5/71 on 30.307 with 1-watt transmitter. OO W5KYD had 31 observations in Dec. SFCJ shows 317 AREC members NTEX. Traffic: W5QRI 210, WASVJW 157, W5LR 39, W5IAR 21, W5PBN 15, W5F1X 6, K5SXO 4.

OKLAHOMA - SCM, Cecil C. Cash, W5PML - Asst. SCM: Joe M. Schlosser, WASIMO. SEC: WASFSN. RM: W5RB. PAMS: W5MTX, WASWHV, K5DIE and WASZR0. Two very faithful



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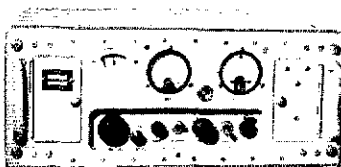
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give to the March of Dimes

also claimed VE7GR with broken arm by falling. VE7HI many years licensed now is Class A. The Friendly Parts Wireless Assn.; Spufflers and Oil Country ARC, Fort St. John are new clubs. The Vancouver ARC Christmas dinner was well attended. Penticon ARC turns out an informative paper. I would not want to be the judge and decide which of the BC club papers are the best. VE7QT, BC's Civil Defense Coordinator for amateur radio reports good progress. Traffic: VE7BLO 125, VE700 63, VE7LL 45, VE7TT 32.

**MANITOBA** — SCM, Steven Fink, VE4EQ — SEC: VE4WC. WARC operated a station at the Garden City Shopping Center Christmas week. VE4NW is the new Elm Flon EC and VE4EA, who also made BPI and PSHR, is now ORS. VE4QF is an NCS on the CIARA Net and VE4ST is NCS on the Ont. Trilliums Net. VE4EO now is VE7VZ and VE4PS now is VE4HQ, while VE4IG has moved to Winnipeg and VE4FT to Brandon, both from Churchill. Congrats to VE4BY on a new junior op. VE4MG has become an award hunter. VE4YL has changed her call to VE4KX, that of her late OM. VE4MP has been appointed Asst. Director for Manitoba. MTN: 29 sessions, 142 QNL, 338 QJC (record high), MIPN: 30 sessions, 1153 QNL, 45 QTC. Traffic: VE4EA 291, VE4RO 114, VE4KE 80, VE4FQ 66, VE4KO 56, VE4DJ 55, VE4YC 47, VE4CR 14, VE4HF 13, VE4UG 11, VE4HR 8, VE4NE 8, VE4WT 5, VE4LJ 4, VE4HS 4, VE4QJ 4, VE4AP 3, VE4PA 3, VE4YO 3, VE4LN 2, VE4OP 2, VE4RB 2, VE4SE 2, VE4SW 2, VE4XN 2, VE4RS 1, VE4KR 1, VE4NW 1.

**MARITIME** — SCM, W.D. Jones, VE1AMR — Asst. SCM: Clarence Mitchell, VO1AW, SEC: VE1HI. New appointment: VE1ASJ as GO and OVS. I regret to report VE1AHV and VE1VR as Silent Keys. The HARC executive for 1972 includes VE1XW as pres. and VE1AFN as secy. VE1RY had an enjoyable trip to G-Land visiting RSGB Hq. and the KW plant, Madawaska Co. in NB is no longer a rare Co., activity is supplied by VE1QJ, VE1ARN and VE1AQR. Chess players, look for VE1ARN on 14.160 MHz around 1730Z. Congratulations to VE1TS for 25 years of ham radio. A 2-meter DX trophy? Yes — The Ross Clements 2-Meter DX Trophy — can be competed for by all VE1 and VO amateurs. For a copy of the rules contact VE1AMR. Indications are that the VE1BMSA operation was a big success. On Christmas day a presentation of a suitably inscribed silver tray was presented to VO1AA and his XYL for 23 years service as QSL manager for the VO amateurs. The VO boys are planning a charter flight to Europe in June. Congratulations to VO1CV on being the first VO to be awarded WANB. APN reports sessions 29, QNL 138, QTC 174. Traffic: VE1AMR 150, VO1CA 125, VE1ARB 122, VE1RO 102, VE1DB 25, VO1GO 13.

**ONTARIO** — SCM, Holland H. Shepherd, VE3DV — We no longer have the services of VE3EWD as SEC. The duties will be handled temporarily by the SCM until such time as we obtain the right man. Public service and the SEC are synonymous and it is hoped that the present Ont. ECS will pick up the challenge and nominate someone to fill this important post. We regret to report three Silent Keys for Dec.: VE3BYO, a White Canary and a longtime member of OPN; VE3GG and VE3AQQ. After nearly 14 years of monitoring 3760 kHz for the travelling public, VE3GG and VE3GX are finally getting a break with the sponsorship by the RSO of the Ontario Amateur Radio Service (ON(ARS) which began operation on Jan. 8 on 3775 kHz from 7 A.M. to 6 P.M. Net Mgr. is VE1BC with VE3UGO as asst. We would like to suggest to ONTARS that they extend their range by taking advantage of the NTS Nets in Ont. PAM VE3CRW is considering holding Sun. sessions of OPN. Dec. traffic totals in 1971 were considerably higher than in previous years. Congratulations to the following new OPS appointees: VE3ERD, VE3EGV, VE3OZ, VE3GR. The Kitchener-Waterloo ARC has adopted a new emergency plan and have put together a group which includes EMO, GRS and the members of KWARC. Traffic: 1 Dec. VE3DV 286, VE3ERU 276, VE3EX 167, VE3AWL 150, VE3DPO 124, VE3ARS 117, VE3GN 115, VE3GV 111, VE3ASZ 87, VE3EWD 55, VE3CO 48, VE3ATR 35, VE3ADU 28, VE3GIG 26, VE3EBC 25, VE3GT 24, VE3BPC 21, VE3OZ 19, VE3HI 17, VE3ERG 17, VE3CRW 12, VE3BLB 9, VE3BSF 6. Nov. 1. VE3AWE 88, VE3EWD 8.

**QUEBEC** — SCM, Joe Unsworth, VE2ALF — DCC has extended call of VA2UN for another six months. The club reports 20K QSOs since July '71. QSL Mgr. is WA2GHK. VE2AGP has realized her DXCC! SO, all confirmed! VE2WM has temporarily taken over SEC for VE2BIZ. The QR net reactivated some very inactive VE2s and VE3s and NCS for the week are VE2s ALE, IF, ZD, ZH, ADZ, DU and GA from Sun. to Sat. on 3.775 MHz at 0030 GMT, with Swap net on Wed. at 0130 GMT. New calls on 2-meter fm are VE2ADZ and VE2RP. VE2BRE, now is VE2RO and VE2AKI now signs VE200. VE2NF is now heard on 2 meters. Directors for VE2RM,

1972 are VE2s JO, BU, ALE, AWO, DEA, BRP, BMQ and APT. VE2A13 and XYL of VE2JO both had operations in Jan. Another new call heard on 2 meters is VE2EP. Repeater VE2ZO from downtown Montreal now located at St. Sauveur, Quebec with much greater coverage and VE2XW to a new location on Mont St-Bruno along with permanent Hydro power. Traffic: VF2DR 154, VF2RP 68, VE2BVY 40, VE2A1F 30, VE2APT 24, VE2EC 21, VE2RO 16, VE2DLG 14.

SASKATCHEWAN - SCM, Barry Ogden, VESBO - The VES nets are going great guns with more and more being added to the roll call each month, making 1971 somewhat of a record for net participation. Also noted is the fine way that various VEs are filling-in to call the roll and thus get their feet wet. Lots of fun isn't it? Prince Albert is finally getting enthused about 2 meters with brave souls VESFB and VESGM trying to dig up capacitors that will fit inside the LF cans FB! Lots of DX heard on 75 late in the evening for those who usually shut off the rigs after net. Can anyone explain "one-way-skip" or is it that the front end RF stage needs replacing? Have had several inquiries on this topic. Let's hear from anyone who has any unusual tales to tell that might be of interest to others. Traffic: VESGL 133, VESQS 98, VE55K 33, VESBO 23, VE5HP 12, VESKF 11, VESQJ 7, VESKE 6, VESKN 6, VESYR 5, VESIT 4, VESLG 3, VESDN 2, VESSE 2, VESPS 2, VESGE 2, VESBW 1, VESKI 1, VESLN 1, VESQO 1. QST

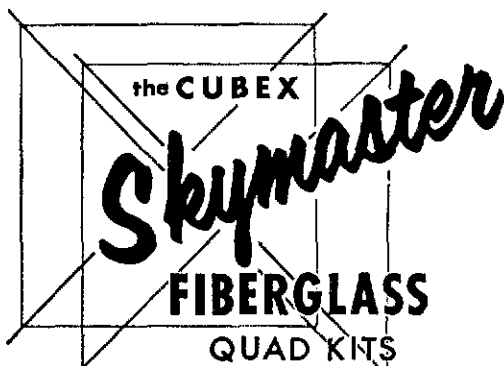
## How's DX?

(Continued from page 97)

graphic rumble offered by Poland's PZK, saw WA1DJG, Ws 8VSK 08MM, WA3ENM, WB4NRI, and W4KXV scoring in that U.S.A. sequence while VE1AE and VO1CA won and placed for Canada. Top ten on the home team were SPs 6TQ 9DH 8ECV 9PT 6ASD 3ACB 2DVH 9DOV 9EFP and 9AFS in that order. Winners per country include DJ7HZ, DM3FEL, EA2CR, F9NF, G3ESE, GCSAGA, GM3MHG, GW3SLY, HASFA, JA3KUC, LA1OA, 1Z2DC, ODSLX, OE3AX, OH6LF, OK2BDE, OZ4HW, PA0VB, PY7AEW, SM7ID, SV0WOO, UAs 2DC 3QO 9FAL, UB5MZ, UC2OR, UD6DGG, UF6DA, UH8BO, UM8FZ, UK6DAC, UO5AP, UP2OQ, UQ2PP, UR2OD, VK3AHO, YO2AVP, YU1MOL, and 9Y4NN. This year's edition of the SP Test, if you've survived the ARRL go, comes off the first weekend of next month. (W1YL)

**HEREABOUTS** - Completed my Novice tour with 72/63 countries worked/confirmed. Hope "How's" continues to list DX stations worked by WNs. Such information is most encouraging and also causes more DX to visit the Novice bands. (WB4SIJ) . . . Let's all listen more. I'm bewildered by so many W/Ks calling CQ DX right on top of DX CQs. (WB4VKW) . . . The attendant flap of a new harmonic's arrival nearly beclouds the fact that 10 shows good signs of DX life, 15 remains very respectable, 20 bears the brunt well, and 80 looks like fun here in BC. (VE7s BAF BZY) . . . Soaring QRM levels have me thinking in terms of 572Bs and hoisting the quad higher. (K4SD) . . . Correction - ET3USC, not KC6BT, made 120 for me. (W5BZK) . . . First 21-MHz QSO was Colorado on an indoor wire so watch out, DX! (WN4WLK) . . . The overseas and local gangs alike will miss the fine fist and friendly QSOs of W3QT, recently a silent key. The Colonel's logs go back some fifty years. (WA3ATX) . . . Wish more DX stations would work their pile-ups in a systematic manner. Call-area breakdowns help a lot when QRM gets severe. (R3YVN) . . . ZL3JO on 15 was a pleasant surprise but I'm still hungry for Hawaii near 21.120 kHz to complete my WAS. (WN0ELM) . . . KV4AM reports six kiloQSOs as KS4CJ on Swan Isle in December. (WCDXB) . . . XE1J may score from the Revilla Gigedos this month. (NTDXA) . . . Generally improving 160-meter conditions are the rule elsewhere but KL7HKE says increasing aurora borealis activity makes DX difficult on 1.8 MHz from Fairbanks. (W1BB) QST

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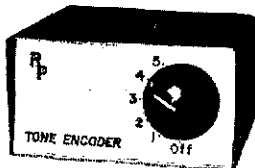
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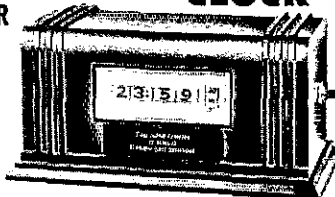
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COLLINS R388/UR 5-30.5 Mc. WBK, excellent, \$325; 8T175B/U frequency meter, 85-1000 Mc. new, calibration book, modulation \$45. Safety belt/Lanyard, \$21.50. Hand-talkies \$148.94 Mc. \$60. Prop pitch rotors, \$65. Signal gener. G/R 609B 9.5 Kc, 30 Mc. \$125. Link, 1000 Monroe Terr. Monroe, CT 06468

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FOR SALE: SX-100 receiver A-1 \$150, manual, 200W Johnson Invader a-m - cw ash \$150, manual, fixed & variable vacuum capacitors, HV chokes, condensers, & parts. Microphones 2-3047L & Xrf \$25. Send for list. Must reduce 40 years accumulation. W8BBV, P.O. Box 722, York, PA 17405

HEATHKITS professionally wired, tested. Send for quote. Parrish, 306 W. Amherst, Melbourne, FL 32901

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FOR SALE: Globe King 500A FB 500 watt cw transmitter \$110, with spare set of tubes, WRL 755A VFO \$20. Hallcrafters SX-100 receiver \$85. All with original instruction books. All equipment now on the air. Pick up only. W8CVA, Don Baker, 4606 Wickford Dr. E., Sylvania, OH 43560. 419-882-4581

FOR SALE: Radio Shack DL-150A receiver \$50 or best offer. W2PML, 1335 Siegfried Pl., Bronx, NY 10465. (212)597-4717

FOR SALE: BC-453, 190-550 kHz (QSER), like new, unmodified, \$16.95. BC-454 receiver, 3.0-8.0 MHz, modified, ready to use, \$7.95. BC-458 transmitter, 5.3-7.1 MHz, unmodified, excellent, \$9.95. All sent post paid to U.S. W50E, 1721 N. Tierny Rd., Fort Worth, TX 76112

FOR SALE: SB301 with cw filter, \$225; SB401 with crystal pack, \$225; SB610 scope, \$60; SB630 console, \$60; SB600 speaker, \$10. All excellent - will demonstrate any mode any band any time. K3TML, 27 Sheldon St., Wilkes Barre, PA 18702

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WANTED: Allied Knight-kits sweep/markers/generator KG-687 and color bar generator KG-685. Any state of assembly OK but they must be complete with all parts, construction and operating manuals. Walter Rupp, 117 Essex South, Lexington Park, MD 20653. 301-863-9253

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COLLINS 75S3B \$575; 32S3 and 516F2 \$690; 312B4 \$150; all very clean about 1 year old. Henry 3K \$729. Collins 32V3 \$100. Will ship. Peter Mazarrelli, 656 South St., Newburgh, NY 12550

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HEATH SB-102, cw filter, HP-23A supply, sell \$460. In use since June, 1971. Pitman, W1LY, Daren, CT 06820

FOR SALE: KW station: Hallcrafters HT32A, Squires Sanders SS1R, Heath Warrior. All delays interconnecting cables. Excellent condx. On the air daily. \$450 takes all. Call or write: B. R. Berger, W4ZVRR, 53 Mountain Rd., Verona, NJ 07044. Phone: (201) 857-0244

GALAXY V ps, Electronic Keyer many accessories like new. 379 Adams Ave., West Hempstead, NY 11552. (516) 489-5899

WANTED: Lafayette HA-410 ten meter transmitter - Bob Aberle, W2QPP, 33 Falcon Dr., Hauppauge, NY 11787

HEATH 58-102, cw filter, HP-23A, supply, SB-600 speaker, electro-voice 638 mike, 1W-18 VTVM, 1P-28 capacitor checker, all new and assembled IT-27 tube checker, kit, will assemble, Swan 250C, 6 meter transmitter 117KC supply excellent. TV and Radio repair books. Make offers. Larry D. Tucker, WB9CLO, RFD 1, Leland, IL 60531. 815-495-9140

SELL: Heath Mohawk, George Hopkins, 516 South Bailey, Apt. 3, Jacksonville, AR 72076, (501) 982 1282

BSEF seeks overseas work anywhere. Broad experience, languages, homebrew type. Rekey, WA9ZAI, 1339 Lunt Ave., Chicago, IL 60626

NEW factory sealed Elmac 3-500Z, socket & chimney \$40. Used 4-1000A \$20. Express charges collect. W5DZ, 1040 Southwood, Waco, TX 76710

DRAKE TR-3, AC-3, mint condition, original owner, \$390. Hallicrafters SX-71, \$75. Heathkit GR-54, \$50. Benny Spicer, 10023 Hawkins Ct., Indianapolis, IN 46229

TELETYPE: Model 14 repair, \$28; Model 14 TD, \$25; tape for 3000, 40 rolls, \$8; AN/SCG-1 send/receive converter, \$145. Jim Cooper, POB 73-Q, Paramus, NJ 07652

SELL: 758-3B, 329-3 w/ds (mint condition), 2Kw 3-1000 linear, TA-33, HO-10 scope, cables, etc, \$1800. Mike Coulter, K4GUC (EX-W2UCU), 1133 SW 7th St., Boca Raton, FL 33432

HEATH HW32A transmitter wired by Electronic engineer perfect \$79 brochure. 20 meter gamma matched two element beam \$12. WA5PBX 5011 F St., Lufkin Rock, AR 72205. (501)686 7504

WANTED: SB402, SB200, SB610, W2UGM, 66 Columbus Ave., Closter, NJ 07624. 201-768-1884

6M sst transmitter 14-54 MHz \$60; 6M linear LN \$65; Tapetone skywiper receiver 6-2-220-432 w/accessories a-m/usb, etc. \$250; Hallicrafters S-27 27-145 MHz receiver w/pandaptor \$95; Swap vhf/uhf list, s.a.s.c. W4API, Box 4095, Arlington, VA 22204

SELL: Collins 30L1, \$290; Heath SB-401, with crystal pack, \$235; SB-303 \$240. All above like new. HQ-180C, excellent, \$175. Eugene Snelke, WB1YQ, 35 Farmanway Dr., Richboro, PA 18954. Tel: (215)-355-2641

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SELL: Collins 75S3B \$50.00; Drake R4B \$50.00; matching speakers. L. Misch, 1390 W. 85, Cleveland, OH 44102. Tel: (216)281-5550

YAESU FLdx400 transmitter. Excellent condition. No trades. \$230 prepaid. Frank Connelly, WA1PMD, 2100 Stanley St., Apt. 411, New Britain, CT 06053

ALLIED A-2516 receiver, new \$95. Eico 723 transmitter, \$30. W2ZRDH (516)-334-4288

HW 100, D-104 & G-stand, HP-13 M/supply dc & HB ac supply, AD \$300, K4FNT, C. W. Moore, 227 Castle Dr., W. Columbia, SC 29169

APACHE Xstr, \$60, needs some work, but still using. Bill Kahle, WA9SZY, East Bristol Rd., Yorkville, IL 60560

SELL, or trade International frequency meter FM5000 with oscillators for vhf fm marine band new condition \$325. Will trade for 75A-4 or vhf fm gear. W1ZZF, 13 Cindy Circle, Milford, CT 06460

WANT clean Collins 514-4; also Drake C-4; with manuals and original shipping containers. No junk! First letter give each serial number, condition, price; also once for both, if have both. Watson, 700 West Willow St., Long Beach, CA 90806

WANTED: Hallicrafters HA-2 or Swan TV-2, B. C. Philip E. Reilly, 7431 Thunderbird Rd., Liverpool, NY 13088

SELL: Swan 350C transceiver and 117XC power supply - both in excellent condition. Lester Rabe, Route 3, Liberty, IL 62347

WANTED: Drake R4B, T4XB, power supply. Cash for rig in good condition. Prefer one in the \$600 range. Tom Self, 205-377-2262, Rockford, IL 61136

TOWER: 39 foot Vestro plus all hardware. Never uncrated. Worth \$600. will take best offer over \$400. and deliver 100 miles. WA6RWM, 4952 Santa Rita, Richmond, CA 94803

FOR SALE: Lamplan 105B frequency meter, measurements model 111 crystal calibrator. W7HZY, P.O. Box 621, Hadlowton, MI 49036

SELL: SB-101 & HP-23 \$365; SB-301 \$235; R4B \$315; 75A-2 \$160; Eico 717 keyer & browne paddle \$50; all mint. TS-175 80-1000 Mc, Fq Mtr \$32; 3600-6-3600 Xfmr at 1 amp and 110V/220 ps \$28. All bob. W0AHL, Rev. Bittner, 814 4th St. S., Virginia, MN

HEATH HW101 with cw filter, factory aligned, and HP23 supply \$300. Hallicrafters HA6 and ac bk up \$130. NCA3 and AC \$175. Philip Schweitzer, W9GFC, 4536 N 50 St., Midwaukee, WI 53278

POSTPAID! Heathkit HW-32A, \$80; Johnson 300 watt "Matchbox" with SWR meter, \$45; Central Electronics 10B, \$40. All offers considered. Bill Worthington, WB4LIS, 3032 Boxwood Dr., Montgomery, AL 36111

SELL: Antique radio parts and tubes from the early 20s. Send for list, W9FJK, 2118 6th St., W. Uaua, WI 54401

DRAKE TR-3; DC-3; AC-3; and MS-3. Mint condition \$425. Teundab 10 M beam 3 element, gamma match, plytubular const. w/east alum. fittings - \$45. WB9YU

MOYOROLA A43-G recently aligned, 146.94 crvstals, 30 watts, Lassen gain antenna, cables. Complete fm mobile! \$75. Jeff Greiger, Macalester College, Saint Paul, MN 55105

SELL or trade: B&W 5100-B, 515B-B, \$135. DX-35, VF-1 \$30. Esakta 35mm SLR; 58mm F2, Jena; slide copier, bellows, \$30. Want: sst transmitter, K4GVV, 2816 Broadview, Huntville, AL 35810

AMPEX 7500 color video tape recorder in perfect condition. Complete with tapes. Send for complete list. Will deliver within 500 mile radius. Cost \$2,300.00. WB2GKF, Stanley R. Nazimek, Jr., 506 Mount Prospect Ave., Clinton, NJ 07012

COLLINS 3283 & 516F2 \$600, 75S-3B \$475, modulator for Viking LW - offer, Swan \$60 & SL 400-12 \$325, Heath HX-20 \$95, Oman 400 gen. \$75. Want: T4XB, AC-4, filter for R4B (See Jan 72 QST), W64J, 1149 Heatherstone, Sunnyvale, CA 94087. Tel: (408) 736-8358

OLDIES but goodies - Viking Valiant \$130; Invader 2000/pwr supply \$325; SX101 MK3 speaker \$120; Matchbox \$60; 32V1 xmr \$75; NC400 rec and sprk \$250; NCA3 transceiver with ac, w/s \$175; BC221 freq mtr \$35; complete S-line station 2 mtr thru 80 mtr like new \$2500. Shipping & transportation can be arranged. Earle Davis, 3025 North Valley View, Orange, CA 92665. AC714-637-3505

SELL: Gonset GSB-100 xmr, GSB-101 linear, A 1200 watt PWR 60 watt cw package. Loudspeaker MKIII heavy duty vibrator. Collins 3 el. wide spaced 20 mtr beam, orig. cost over \$400, asking \$75. 136F-1 noise blanker, 351-D2 mobile mount, plate xformer and choke for 30S-1, SM-1 ad static T-3 mks. Want CC-2, F455Q-5, K9D7Z, (312)969-5169, 4420 Prospect, Downers Grove, IL 60515

WANTED: HQ140X receiver must be in excellent condx. For sale: HQ129X receiver with manual and speaker mint condx. \$80 or best offer. Bob Lannen, W3BIN

SALE: MTS Prog-Line transceivers (all accessories) same as QST 6/71 article. Excellent condition \$125. T-20/ARC-5 (3 to 4 MHz VFO), 60 watt ac power supply, plug in crystal oscillator, 4 Neve crystals, 80 or best offer. WA1JKN, RFD 1, Box 106A, Gales Ferry, CT 06335 or 203-464-0225

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75 meter HW-12 sst transceiver and mobile power supply, \$100. Dick Verlan, WB4LUC, 8709 Greendale Rd., Alexandria, VA 22310. Phone: 703-971-4248

WANTED: P&H VFO-matic or equivalent to permit transceive between KWS-1 & 75A-4. W2JKN, Buddy Robins, 4665 Iselin Ave., Riverdale, NJ 10471. Tel: 212-548-5114

WANT: tower, crank up & hlt over - Want antenna log - periodic or mono bander for 20 meters, Telex, etc. Bob Kemp in book or in good condition. Contact: Edward P. Lubowicki, 543 Middlesex Ave., Metuchen, NJ 08840

WANTED: coils G, H, J, for HRO-60 receiver. Kenneth Eriksen, Nabby Rd., Brookfield, CT 06804. 775-3770 evenings

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COLLINS 75S-3 like new \$350. Richards, P.O. Box 132, Windham, NY 12496 518-734-3898

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PL-172/8295 tube, New. \$95 or? Dick Wilder, W2ZCZ/3, Box 7523, Pittsburgh, PA 15213

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KMM-2 516F-2, REL tuning exc. \$600. Hunter bandit 2000 \$225. W436-W0KKB, 75. Want 516F-1, KW4-1 mobile mount. Jim, W6ESJ, 415-697-4494

SELL: Polycorn 62B, 6 and 2M transceiver: clean, best offer. Need F4551-05 75S-1 filter. Dick Shongut, W2QFR, 25 Cameron Pl., New Rochelle, NY 10804

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SR400, \$550; 2B, 2AQ, 2AC, \$180; Realistic DX-150, \$80. All as new with manuals and cartons. Near offers considered. K4DLQ 606-272-4789 (40502)

HEATH SB-101 with ac p.s., well wired, no scratches - \$375. Cush Craft 3 element 15 meter beam \$16, Cornell-Dubilier TR-44 \$35, Rohm 10ft tower \$25 - Have all manuals, WA2FKK, Steve, 12 Sanderson, W. Caldwell, NJ 07006. 201-226-8919

HEATH SB401 \$250; SB300 with filters \$240; DX-60 with xtals \$40; Knight R100 \$25; Hustler 4-BTV 10-80 mtr vert ant with tripod base \$45. Will accept offers. J. Boll, WB9CJZ, 2633 S. East St., Appleton, WI 54911

VHFers: Sell Allied fm communications receiver high/low band, model A-2589, \$40. Parts: beam lever, \$15. Ameco VFO model 621 for 50, 144, and 220 MHz, \$25. Drake WV-4 wattmeter, \$50. Knight P2 SWR/power meter, \$15. Hy-Gain LA-1 lightning arrester, \$10. Dow Key DK-60 relay, 110 vac coil, \$8. Drake TV-1000 low pass filter, \$10. Bill Smith, K0CER, 3900 East 24 St., Sioux Falls, SD 57103

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SX-99 \$80. Low mileage. A. Helfrick, 115B Linn Dr., Verona, NJ 07044, 201-239-9283

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WANTED: Heath SB-110A, SB-500, and SB-640. W0LKF, 8448 Meadow Ln., Leawood, KS 66206

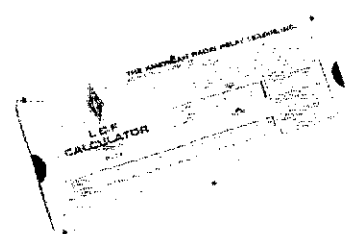
SELL: NCX-500 with ac supply/speaker. Excellent condition; little used. \$270 or offer. K7EXG, John Vandenberg, 616 South Ashley, Ann Arbor, MI 48803

WANTED: transmatch Drake MN-2000. WAQ1LY, Crane Lake, MN 55725

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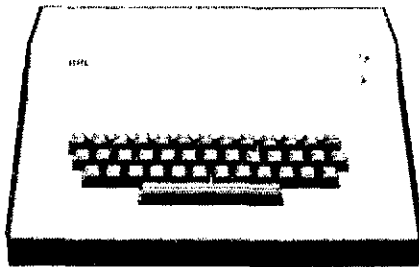
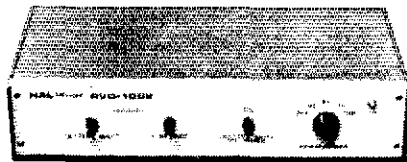
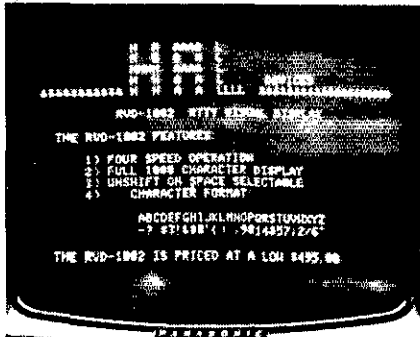
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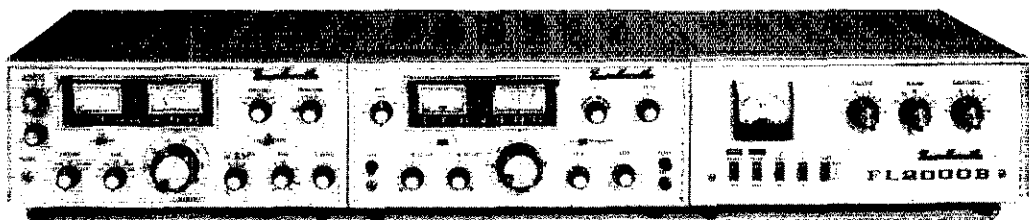
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Alltronics-Howard Co. ....	137
Amateur Electronic Supply .....	118,120
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American Radio Relay League Handbook .....	Cov.II
Hints & Kinks .....	124
League Emblem .....	138
License Manual .....	135
Membership .....	143
Publications .....	144
U. A. R. ....	135
V. H. E. ....	122
Antec Company, Inc. ....	141
Barker & Williamson .....	150
Bauman Sales, Inc. ....	141
Camp Albert Butler .....	152
Computer Measurements .....	127
Cornell University .....	152
Cubex Co. ....	151
Curtis Electro Devices .....	141
Cush Craft .....	128
James Co., The Ted .....	142
Digi-Key .....	141
Drake Co., R. L. ....	137,139,141,143
EIMAC, A Division of Varian .....	Cov.IV
Electronic Distributors .....	147
Electro-Voice, Inc. ....	119
E. S. Electronic Labs .....	148
E-Z Way Products, Inc. ....	149
Fair Radio Sales .....	150
Gotham .....	117
HAL Devices .....	116,158
Hallcrafters Co., The .....	1
Ham Radio Center .....	139
Harrison Radio .....	160
Heath Co., The .....	112,113
Henry Radio Stores .....	5
Hi-Par Products .....	137
Hi-Gain Electronics .....	2
International Crystal Mfg. Co., The .....	7
JAN Crystals .....	146
KW Electronics .....	146
Lattin Radio Laboratories .....	139
Millen Mfg. Co., The James Mini-Products, Inc. ....	114 132
National Radio Institute .....	147
Palomar Engineers .....	148
Payne Radio .....	126
Pearce-Simpson .....	131
Pennwood Numechron .....	152
Pickering Radio Co. ....	137
Poly Paks .....	123
Radio Amateur Callbook, Inc. ....	134
Rectifier Components Corp. ....	151
Robot Research .....	121
R P Electronics .....	152
Savoy Electronics, Inc. ....	4
Scott's QSL Service .....	137
Shure Brothers Inc. ....	133
Simon Side Band Company .....	149
Skylane Products .....	140
Spectronics .....	125,159,Cov.III
Standard Communications Corp. ....	129
Star-Tronics .....	148
Swan Electronics .....	115
Trigger Electronics .....	136
Unadilla Radiation Products .....	121
Unique Products .....	142
Valparaiso Technical Institute .....	149
Vangurden Engineering .....	152
Van Sickle Radio Supply .....	141
Van's W2DLT .....	139
W1FLX QSL Designs .....	152
W3KT QSL Service .....	140
Weinschenker, KJDPJ, M. ....	130
World QSL Bureau .....	139



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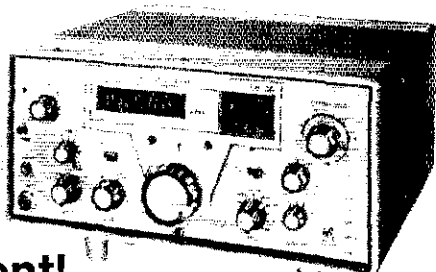
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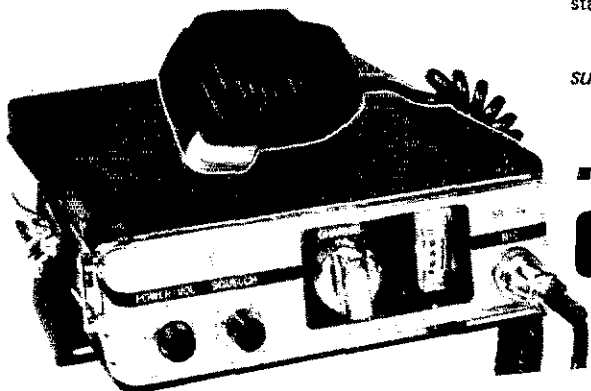
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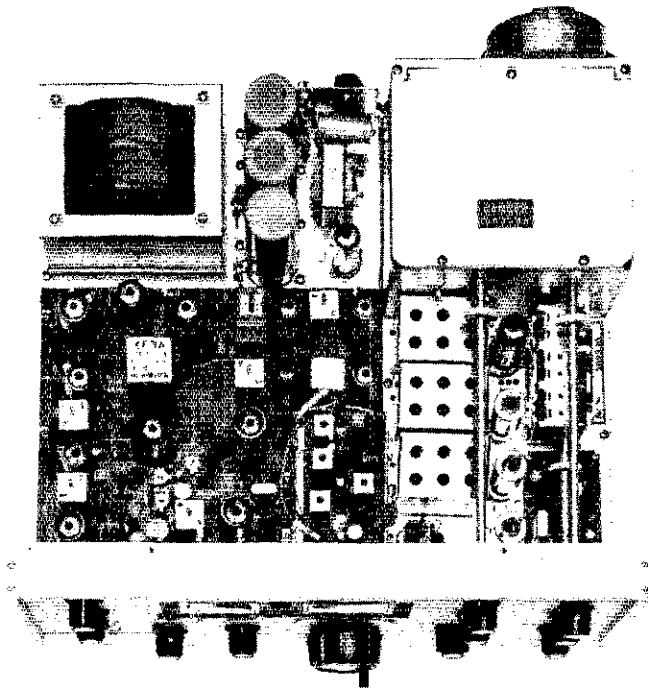
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