

September 1967

75 Cents

QST

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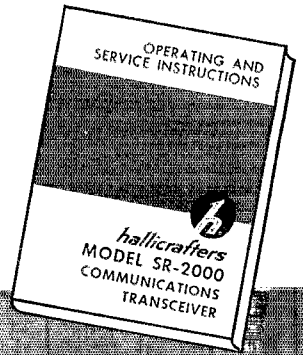
amateur radio



SPECIAL JOURNAL OF THE ARRL



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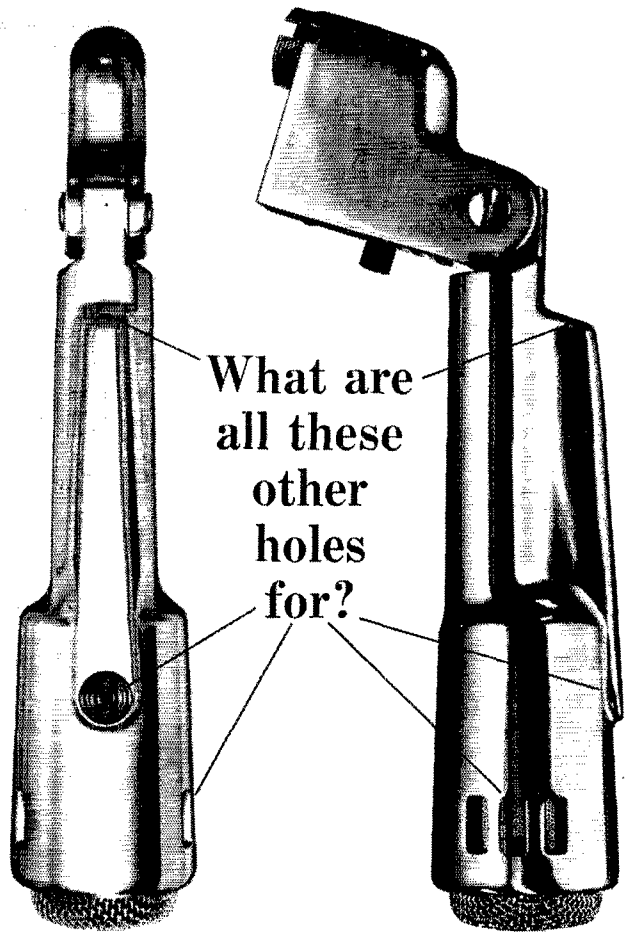
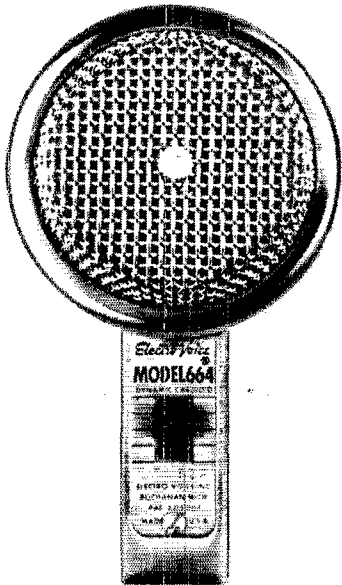
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Specifications in brief . . . Special Features: Patented Receiver Offset Control (RIT) permits ± 2 kc adjustment of receiver frequency, independent of transmitter, for round-table, net or CW operation. Hallicrafters exclusive Amplified Automatic Level Control. **Frequency Coverage:** Full coverage provided for 80, 40, 20, 15 and 10 meters. Upper, lower sideband and CW operation. All crystals provided for 28.0 to 30.0 mcs. **General:** Dial cal., 1 kc. Linear gear drive with less than 1 kc readout. Adjustable IF noise blanker. Provision for plug-in external VFO/DX adapter. Built-in VOX plus break-in CW and PTT. Built-in CW sidetone. Hi-Low power switch for SSB.* 2.1 kc 6-pole crystal lattice filter. S-meter-RFO-AALC and final screen metering.* Two-speed blower. 100 kc crystal cal. VFO covers 500 kc. **Transmitter Section:** Two 8122 output tubes. Variable PI network. Power input, 2000 watts P.E.P. SSB; 1000 watts. CW. Carrier and unwanted SB suppression, 50db; distortion products, 30 db. Audio: 500-2600 cps @ 6 db. **Receiver Section:** Sensitivity less than 1 uv for 20 db S/N. Audio output, 2W.; overall gain, 1 uv for 1/2 W. output. **SR-2000 transceiver—\$995** amateur net, **P-2000AC Power Supply—\$395** amateur net.

*Meters for final plate current and voltage built into P-2000AC power supply. Also Hi-Low power switch, and loudspeaker.



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 for?

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near the rear is another hole for the lows, with an even longer path and more filtering that delays only the bass sounds, again providing almost 20 db of cancellation of sounds arriving from the rear. This "three-way" system of ports insures that the cancellation of sound from the back is just as uniform as the pickup of sound from the front—without any loss of sensitivity. The result is uniform cardioid effectiveness at every frequency for outstanding noise and feedback control.

Most other cardioid-type microphones have a single cancellation port for all frequencies. At best, this is a compromise, and indeed, many of these "single-hole" cardioids are actually omnidirectional at one frequency or another!

In addition to high sensitivity to shock and wind noises, single-port cardioid microphones also suffer from proximity effect. As you get ultra-close, bass response rises. There's nothing you can do about

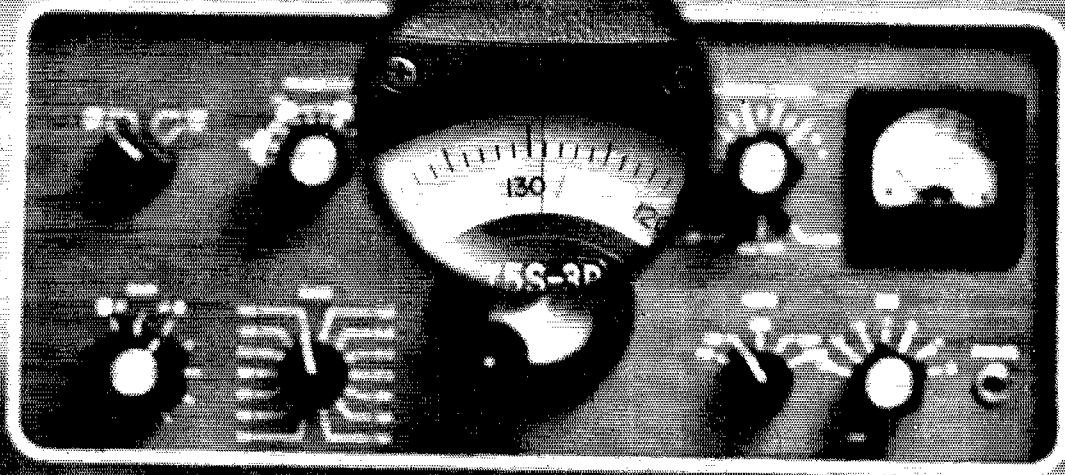
this varying bass response—except use a Variable-D microphone with multi-port design* that eliminates this problem completely.

Because it works better, the E-V 664 Dynamic Cardioid is one of the most popular directional microphones for demanding communications applications. To learn more about Variable-D microphones, write for our free booklet, "The Directional Microphone Story." Then see and try the E-V 664 at your nearby Electro-Voice microphone headquarters. Just \$85.00 in satin chrome or non-reflecting gray.

*Pat. No. 3,115,207

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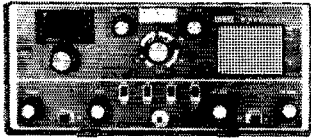
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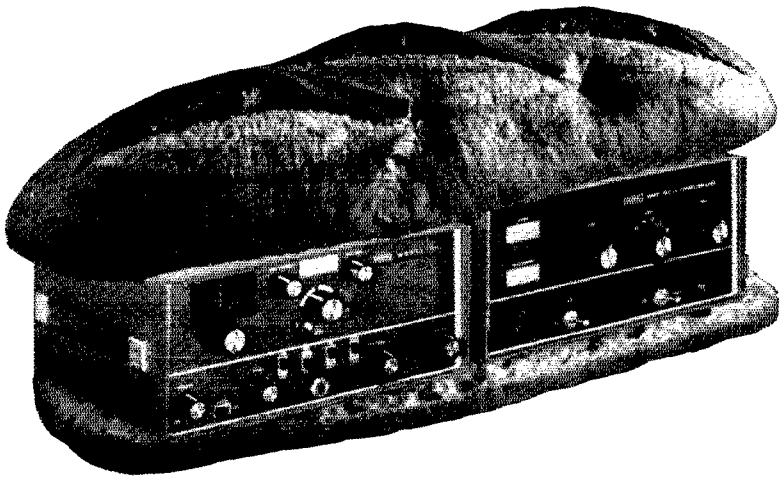
OUR COVER

No, the ARRL hasn't landed its own instrument package on the moon. It's an integrated circuit, the type used in the article on page 11.

SBE



torpedo! hero! submarine!



The words may be different depending upon where you live but the meaning is identical—a delightful sandwich—lots of goodies tucked into a small space—and always, most for your money.

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QTC*

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de Stuart F. Meyer, W2GHK

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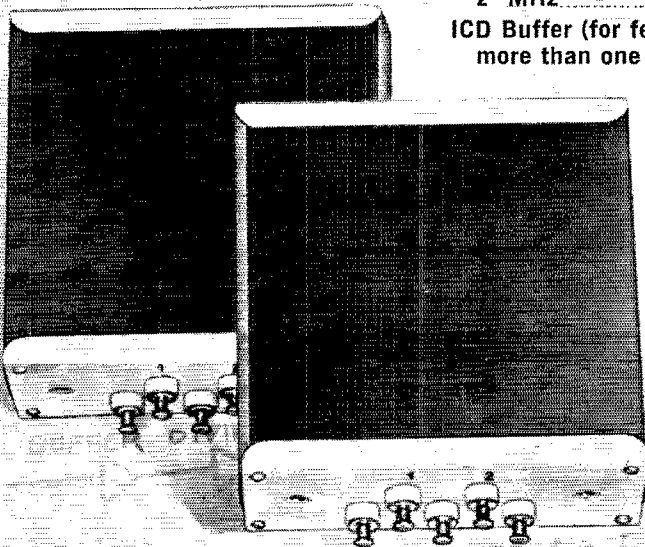
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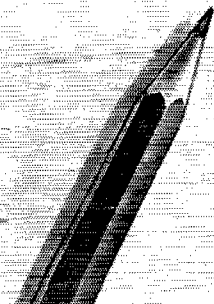
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52403
Vice-Director:

New England Division

ROBERT YORK CHAPMAN W1QV
28 South Road, Groton, Conn. 06340
Vice-Director: Bigelow Green W1EAE
11 Law's Brook Rd., South Acton, Mass. 01771

Northwestern Division

ROBERT B. THURSTON W7PGY
7700 31st Ave., N.E., Seattle, Wash. 98115
Vice-Director: R. Rex Roberts W7CPY
837 Park Hill Drive, Billings, Mont. 59102

Pacific Division

HARRY M. ENGWICHT W6HC
770 Chapman, San Jose, Calif. 95126
Vice-Director: Ronald G. Martin W8ZF
1573 Baywood Lane, Napa, Calif. 94558

Roanoke Division

VICTOR C. CLARK W4KFC
12927 Popes Head Road, Clifton, Va. 22024
Vice-Director: L. Phil Wlecker W4ACY
4821 Hill Top Road, Greensboro, N. C. 27407

Rocky Mountain Division

CARL L. SMITH W0BWJ
1070 Locust St., Denver, Colo. 80220
Vice-Director: John H. Sampson, Jr. W7OCX
3618 Mount Ogden Drive, Ogden, Utah 84403

Southeastern Division

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Vice-Director: Albert L. Hamel K4SJH
220 N.E. 25th Street, Pompano Beach, Fla. 33064

Southwestern Division

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Vice-Director: Thomas J. Cunningham W6PIF
1105 East Acadia St., El Segundo, Calif. 90245

West Gulf Division

ROEMER O. BEST W5QKF
P.O. Box 1656, Corpus Christi, Texas 78401
Vice-Director: Ray K. Bryan W5UYQ
2117 S.W. 61st Terrace, Oklahoma City, Okla.
73159

"It Seems to Us..."



THE OLD MAN

September starts out with ARRL Founder's Week, honoring in particular the man whose brainchild the League is; the man who guided its destiny as president for 22 years; the man who, in a fraternity whose male members are all known as Old Man, stands out as *The Old Man* — Hiram Percy Maxim, 1AW.

HPM was born in Brooklyn, N. Y. on September 2, 1869, the son of Sir Hiram Stevens Maxim (who invented the Maxim machine gun) and nephew of Hudson Maxim, inventor in the field of high explosives. As could be expected with such illustrious ancestors, our Maxim graduated from Massachusetts Institute of Technology in 1886, a practicing engineer at the advanced age of 17! Moreover, he proceeded to live up to his inheritance in a number of fields, with 59 patents to his name. The most famous of his inventions is of course the Maxim Silencer — not only the gun silencer of Prohibition fame, but its much-more-civilized cousins on internal-combustion engines, air conditioners, and compressors. There was even one which would shut out noise yet permit circulation of air through an open window.

Maxim was nearly as intrigued with amateur movies as amateur radio, and founded the Amateur Cinema League, serving as its president as long as he lived. Aircraft interested him intensely too; he helped start the Aero Club of Hartford and served for years as Chairman of the Hartford Aviation Commission, helping to develop Brainard Field, the city's airport until after WW II.

While in his early twenties he motorized a tricycle, and that got him into the auto business. He started the motor-carriage department of the Pope Manufacturing Co. in Hartford, makers of the famous Columbia cars, first gasoline and then electric. Probably the first auto race in the country featured Maxim in the Columbia against a Stanley; Maxim won — the Stanley couldn't be started!

Later he ran the Electric Vehicle Company in Hartford, and eventually established the Maxim Silencer Company, the latter still in existence albeit now as part of another corporation. Incidentally, Maxim gets credit for shifting American cars from right-hand to left-hand drive.

Astronomy, yachting, the Naval Reserve, the Society of Automotive Engineers, the American Society of Mechanical Engineers, the Executive Committee of MIT Alumni, the Hartford Engineers Club and two popular books also occupied a share of HPM's attention.

The Chief entered amateur radio in 1910 when his son Hiram Hamilton acquired an interest. He was past forty when he learned the code. Their first station, excellent for that day, used the self-assigned call SNY. With the coming of the law HPM became 1WH and later had special-station license 1ZM. The call 1AW and his famous rotary spark Ol'Betsy came along after the first World War.

The story of our ARRL beginnings has been often told; how Maxim foresaw the need for national unity in amateur matters, sought carefully for a basis for organizing, found it in the idea of relaying and then, with the collaboration of that brilliant Hartford youth, Clarence D. Tuska, launched our League, first as a committee within the old Radio Club of Hartford, then on its own as of May 1914. The following year he and Tuska started our magazine *QST*.

Our editorial last month touched on another facet of Maxim's personality: his delightful wit and keen sense of the foibles of fellow amateurs. Anonymously HPM turned out a score of stories signed "The Old Man" turning the glare of publicity on all sorts of "Rotten." The greatest impact arose from the tale, "Rotten QRM" which fattered our beloved Wouff Hong, the Rettysnitch, the Uggerumph and other choice concoctions.

Yet all this only touches on the accomplishments of our founding father. Those readers whose appetites have been whetted may consult: *Two Hundred Meters and Down*, by Clinton B. DeSoto; *Fifty Years of ARRL*, compiled from 1964 issues of *QST*; "The Editor's Mill," April 1936 *QST*; *Genius in the Family*, and *Life's Place in the Cosmos*, all by HPM, and *Horseless Carriage Days* also by HPM.

And all will want to join in saluting Maxim, Tuska and the host they lead, during this "Founders Week, 1967."

QST

League Lines . . .

Last call for nominating petitions in eight divisions holding director elections this autumn. See page 68.

Early response to our concurrent survey of CB clubs and amateur clubs to explore potential areas of mutual interest indicates (1) a substantial desire among these CB groups to learn more about amateur radio, (2) a willingness on the part of most ham clubs to supply help and guidance -- tempered by some skepticism as to how many Cbers are really potential hams. The evidence so far seems to suggest a real opportunity to attract interested prospects into the ranks of amateur radio with help and encouragement from amateur clubs. We'll report more fully when all the returns are in.

Congress briefly interrupted its busy end-of-July calendar and with unanimous consent passed a bill permitting foreign Boy Scout amateurs to operate K7BS and K7WSJ at the worldwide Jamboree in early August. Congressional cooperation was outstanding, a tribute to BSA and ARRL.

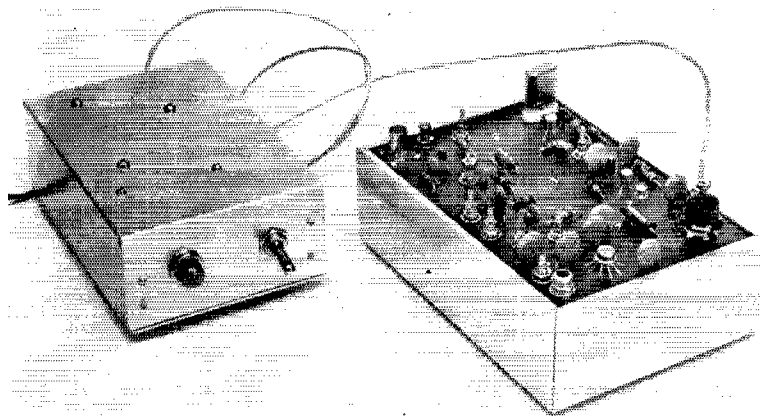
Still the amateur's best bargain . . . League membership is the open door to getting the most out of amateur radio -- for every ham, whether he's interested in rag-chewing, traffic-handling, DX, contests, experimenting . . . or is just getting started. How is your selling job doing? Get a buddy to join today. We need him and he needs us.

Deadline for Charter certificates is past, but Life Membership is still available at one-time dues of \$130 or eight quarterly payments of \$16.25. Write Hq. for application forms and join some 300 already in the new class.

DXCC . . . new ARRL Awards Committee rules clarification on DXpedition credit is designed to update requirements in keeping with expanded DX activities, and to assure validity of DX credits before they are granted. Committee now requires supporting evidence for DXpedition operations prior to crediting contacts; previous policy was generally to accept reasonable assurance that operations were as claimed until and unless contrary evidence was presented. Documentation will be required both of license status and actual presence at claimed locations.

Now and then someone proposes volunteer or \$1-per-year hams become FCC official monitors for more discipline on the bands. It still isn't feasible under FCC rules, as the Commission again indicates in a recent proceeding in another field -- "the employment of unpaid personnel by the Commission for monitoring purposes is not a proper matter for rule-making action nor does it appear to be in accordance with the standards, procedures or requirements of the Federal Civil Service System." 00s are still the backbone of the amateurs' proud tradition of self-policing.

Why not join the official team? Field organization appointments are open in many sections -- ORS, OPS, OVS, OBS, in addition to 00, to qualified League members. Check your SCM (page 6) for requirements and availabilities.



A look at the completed 2-meter etched-circuit FET/IC converter and its 12-volt a.c.-operated power supply. The converter is at the right, mounted in a Vector case. The power supply is at the left and is housed in a 4 x 5 x 2-inch aluminum chassis. It has a bottom plate to which four rubber feet have been attached.

A Low-Noise Converter For 144 Mc.

A Solid-State Project for the Advanced Builder

BY DOUG DeMAW, WICER

BECAUSE of the above-average complexity of this project, beginners are cautioned to weigh their ability and experience in building ham equipment before tackling this job. It is recommended that the less-experienced constructor cut his teeth on the FET converter project described in an earlier issue of *QST*.¹ Some knowledge of home-style etched-circuit processing is also helpful if one is to build this unit.

Because attention has been given to those points that are often weak spots in v.h.f. converter performance, this circuit "delivers the

goods" where rigid requirements are to be met. The integrated-circuit i.f. amplifier stage has a manual gain control which makes the converter useful with receivers that suffer from poor sensitivity on 28 Mc., or with those that are hotter than the proverbial pistol. A noise figure (n.f.) on the order of 2.5 db. is possible with this circuit, providing the operator with a better n.f. than is really necessary on this band — a rather comforting thought. Voltage regulation is applied to the crystal oscillator stage, thus assuring the user of better-than-average frequency stability. Since FETs are used in the r.f. and mixer stages of the converter, cross-talk and overload problems are virtually nonexistent.² Standard components are used throughout, and an etched-circuit board serves as the chassis. As a one-shot item, or as a club project, this unit is easy to fabricate if undertaken by an experienced builder, or if assembled under the watchful eye of a seasoned constructor.

*Assistant Technical Editor.

¹ DeMaw, "FET Converters for 6 and 2 Meters," *QST* May 1967, page 11.

This 2-meter converter was designed with the experienced v.h.f. builder in mind. It offers low-noise performance, gain-controlled i.f. amplification, adequate frequency stability, and good overall gain. An i.f. of 28 Mc. was chosen to make the converter compatible with today's ham-band-only receivers, thus permitting the lower half of the 2-meter band to be tuned between 28 and 30 Mc. on the station receiver. The circuit makes use of FETs, bipolar transistors, and an integrated circuit.

The Circuit

A standard cascode configuration makes up the r.f. amplifier section of the converter, Fig. 1. Two junction-type FETs, Q_1 and Q_2 , comprise that part of the circuit. Although the circuit was quite stable without neutralization, L_{14} was included in the interest of securing a low noise figure. Q_1 and Q_2 have separate d.c. feed, making

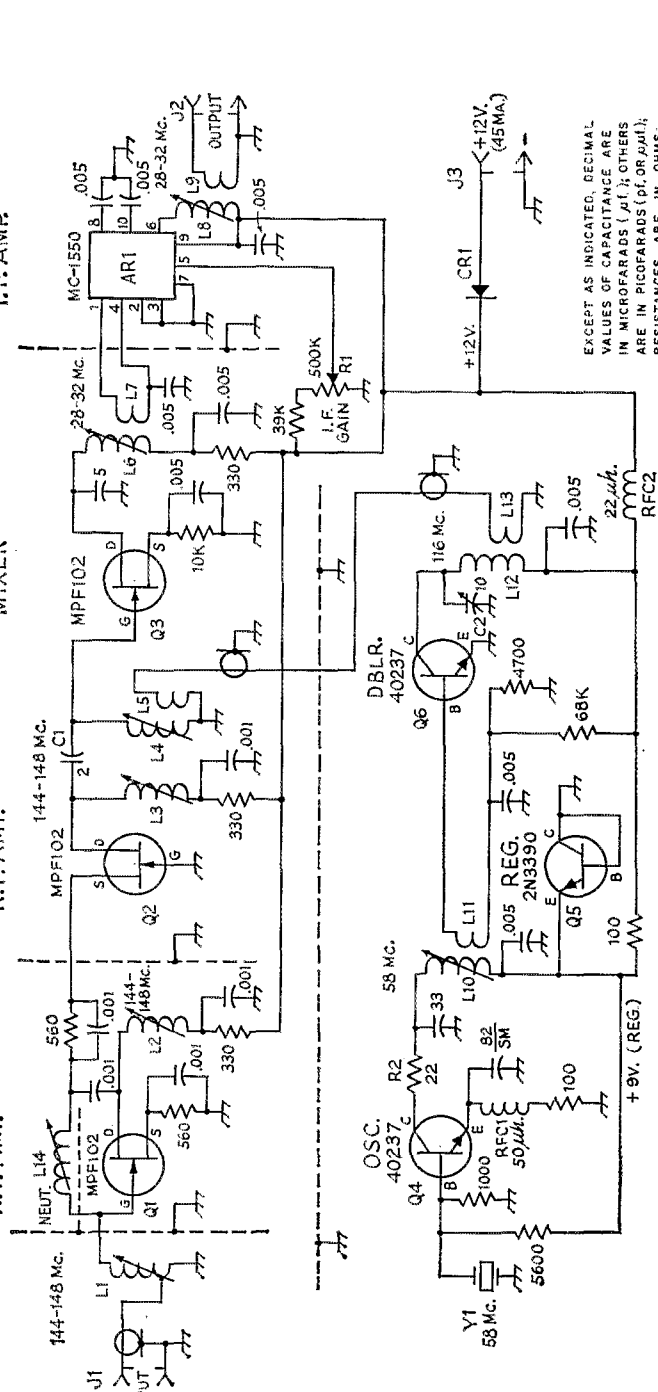
² The dynamic characteristics of FETs make them less subject to cross-talk and overload than bipolar transistors.

R.F. AMP

R.F. AMP

MIXER

I.F. AMP



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μf); OTHERS ARE IN PICOFARADS (pf OR pμf); RESISTANCES ARE IN OHMS; K = 1000

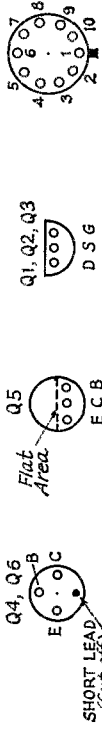
SM = SILVER M/C A

Fig. 1—Schematic of the converter. Fixed-value resistors are 1/2 watt composition. Fixed-value capacitors are disk or tubular ceramic unless stated otherwise.

- L₁₂—5 turns No. 20 tinned copper wire (or enam.), 5/8-inch diameter, 3/8 inch long.
- L₁₃—2 turns small-dia. insulated hookup wire inserted in cold end of L₁₂, 1/4-inch dia.
- L₁₄—9 turns No. 24 enam. wire, close-wound on same style form as L₁₀.

- Q1—Q6, inc.—For text reference purposes.
- R1—500,000-ohm control, linear taper.
- R2—For text reference.
- RFC1—50-μh. r.f. choke (Millen J-300-50).
- RFC2—22-μh. r.f. choke (Millen J-300-8.2).
- Y1—58-Mc. third-overtone crystal (International Crystal type FA-5).

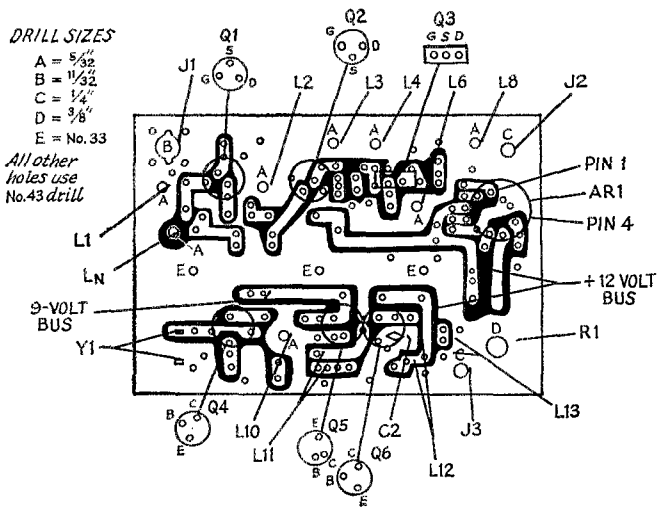
BOTTOM VIEWS



- L₂—4 turns No. 24 enam. wire to occupy 3/8 inch on same type form as L₁.
- L₃—5 turns No. 24 enam. to occupy 3/8 inch on same type form as L₁.
- L₄—4 turns No. 24 enam. to occupy 3/8 inch on same style form as L₁.
- L₅—2 turns insulated hookup wire over ground end of L₄.
- L₆, L₇—Slug-tuned, 1.6 to 2.8 μh. (Miller No. 4503).
- L₇, L₈—Three-turn link over cold ends of L₆ and L₅. Use small-diameter insulated hookup wire.
- L₁₀—5 turns No. 24 enam. wire to occupy 3/8 inch on Miller 4500-4 slug-tuned form.
- L₁₁—2-turn link of small-dia. wire over cold end of L₁₀.

- AR1—Motorola MC-1550 integrated circuit (see text and Fig. 2).
- C1—Gimmick capacitor consisting of two 1-inch lengths of insulated hookup wire, twisted 6 times. A 2-pf. fixed-value ceramic capacitor can be substituted.
- C2—10-pf. piston-type trimmer (Centralab 829-10).
- CR1—Silicon diode, 50 P.R.V. or greater, at 200 ma. or more.
- J1—BNC-style chassis connector.
- J2, J3—Phono jack.
- L1—6 turns No. 24 enam. wire to occupy 3/8 inch on slug-tuned form, 1/4 in. dia.; (Miller 4500-4) tap 1/4 turns above ground end.

Fig. 3—Layout of the etched-circuit board. The red lines show where the key components are mounted and indicate the way the semiconductor leads are indexed. This is a bottom view of the board (copper side). The inked-in areas represent the sections of the board that have been etched away. The white areas are the copper strips that remain.



it unnecessary to select transistors with similar characteristics as might be required were they series-connected. A bandpass circuit, $L_3C_1L_4$, couples Q_2 to the mixer, Q_3 .

The oscillator chain consists of three bipolar transistors, Q_4 , Q_5 , and Q_6 . Q_4 operates in a third-overtone circuit and provides output at 58 Mc. The high frequency of Y_1 was chosen to reduce the number of multiplier stages required, and to cut down on harmonic frequencies which might cause spurious responses and "birdies" in the output of the converter. R_2 , a 22-ohm resistor, was added because a parasitic condition was noted while tuning L_{10} . Adding the resistor cured the problem. Link L_{11} couples the oscillator output to the base of Q_6 , which serves as a doubler to 116 Mc. A two-turn link, L_{13} , connects to another two-turn link, L_5 , on the mixer coil (L_4) to provide 116-Mc. injection to the mixer.

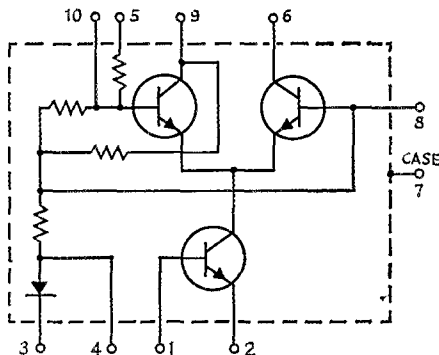


Fig. 2—Representative schematic of the Motorola MC-1550 integrated-circuit module. The chip contains three bipolar transistors, four bias resistors, and a bias-network diode. Other ICs of similar design should be suitable in the circuit of Fig. 1 provided proper changes are made in the base connections and the etched-circuit layout. Also, other types should have an upper-frequency rating of at least 60 Mc.

Transistor Q_5 acts as a Zener diode, regulating the oscillator's d.c. supply at approximately 9 volts. The collector and base leads of Q_5 are grounded in this application.

Output from the mixer, Q_3 , is at 28 Mc. The i.f. amplifier stage uses an integrated-circuit device, AR_1 , which is shown in representative schematic form in Fig. 2 so that the experimenter can substitute other brands, containing similar circuits, if desired. More on that later. Stage gain is controlled by applying a positive bias to terminal 5 of the integrated circuit by means of R_1 . This element of AR_1 normally has a.g.c. applied to it when used in the i.f. circuits of TV and f.m. receivers. As the movable arm of R_1 is brought closer to ground the gain of the i.f. amplifier increases. R_1 varies the gain from zero to roughly 30 db.

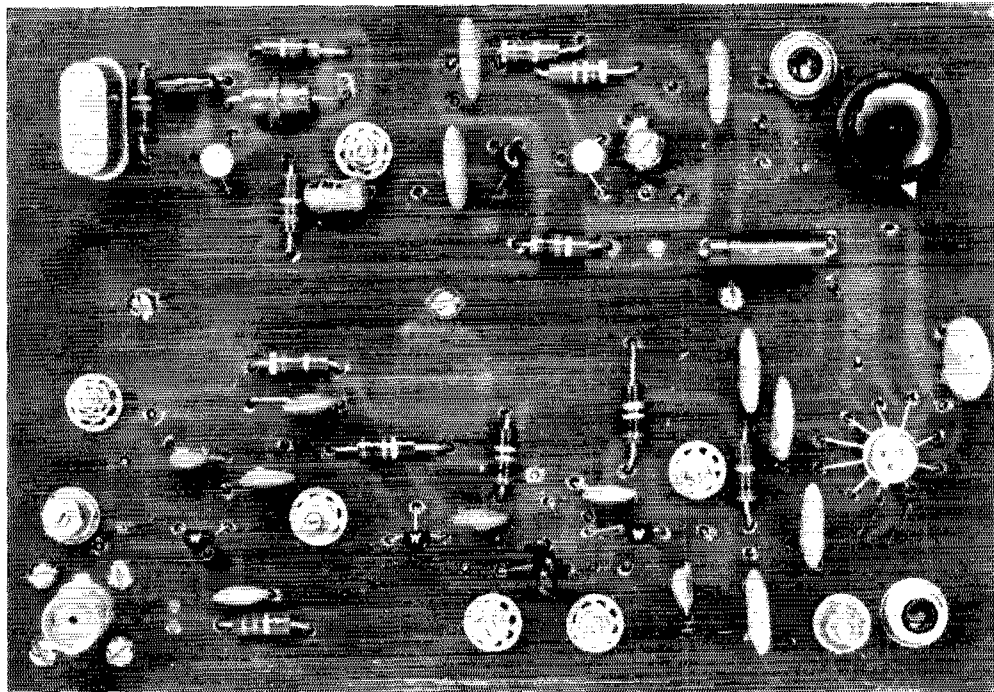
Diode CR_1 , an ordinary top-hat type rectifier, is used in series with the d.c. feed to the converter. When connected as shown — anode toward the power supply — the transistors cannot be damaged if the polarity of the power supply is wrong. CR_1 acts like an open circuit when the negative terminal of the power supply is connected to its anode.

Overall r.f. stability is enhanced by the use of decoupling networks between stages, and through the use of flashing-copper shields between some of the tuned circuits. An aluminum shield divides the etched-circuit board down the center and isolates the r.f. and mixer stages from the oscillator chain.

The Etched-Circuit Board

A $4\frac{1}{2} \times 6\frac{1}{2} \times \frac{1}{16}$ -inch copper-clad phenolic circuit board (Vector CU65/45-1) is used as a chassis for the unit.³ The basic pattern — not to scale

³ The Harris Co. of 56 East Main St., Torrington, Conn. states that they will supply etched-circuit boards for QST projects. Write them for information on availability and prices.



A head-on view of the top surface of the etched-circuit board. The i.f. gain-control knob is at the upper right. The input jack for the 12-volt supply is just to the left of the gain control. The i.f. output jack is at the lower right, and the r.f. input jack is at the lower left on the board. The IC is located at the far right, just above the i.f. output connector.

— is given in Fig. 3.⁴ Etch-resistant material, such as Vectorsist rub-on transfers, can be used to protect the portions of the board that aren't to be removed. Various brands of etch-resistant paints are available for this purpose and can be used with equal effectiveness. The author used ordinary dime-store quality exterior black enamel paint, applied to the board with an artist's brush. After allowing a 24-hour drying period, the etching process was carried out and the paint proved to be excellent as an etch-resist material. After the etching was completed, the paint was removed by rubbing the board with steel wool.

The choice of etchant solution is up to the builder. If desired, a Vector 27XA etched-circuit kit can be purchased for this project. It contains

the etch-resist rub-on transfer stock, the etchant powder (2 bags), one $4\frac{1}{2} \times 6\frac{1}{2}$ copper-clad circuit board with perforations, and one board of the same size and style but without holes. The kit also includes plastic bags in which to do the etching, circuit-board layout paper, and complete instructions. The author used Kepro E-1PT solution, a ferric-chloride preparation, which was purchased for under \$1 from Allied Radio Corp. The E-1PT stock contains a pint of working solution. A one-gallon quantity is available as item E-1G.

During the etching period, which takes between 30 and 45 minutes, the circuit board should be thoroughly immersed in the solution. Frequent agitation of the solution is necessary to assure even and complete etching of the copper. The temperature of the solution should be maintained between 90 and 120 degrees F. Lower temperatures result in slow etching action, some-

⁴ Scale templates which show where the key parts are mounted are available from ARRL for 25 cents. Send SASE.

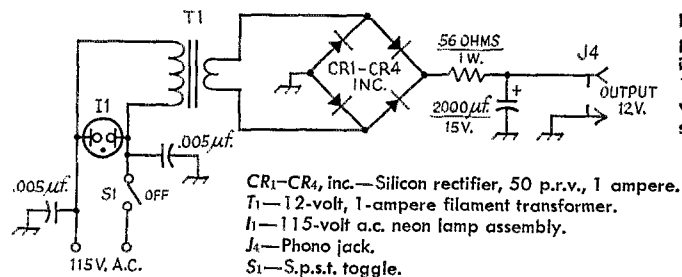
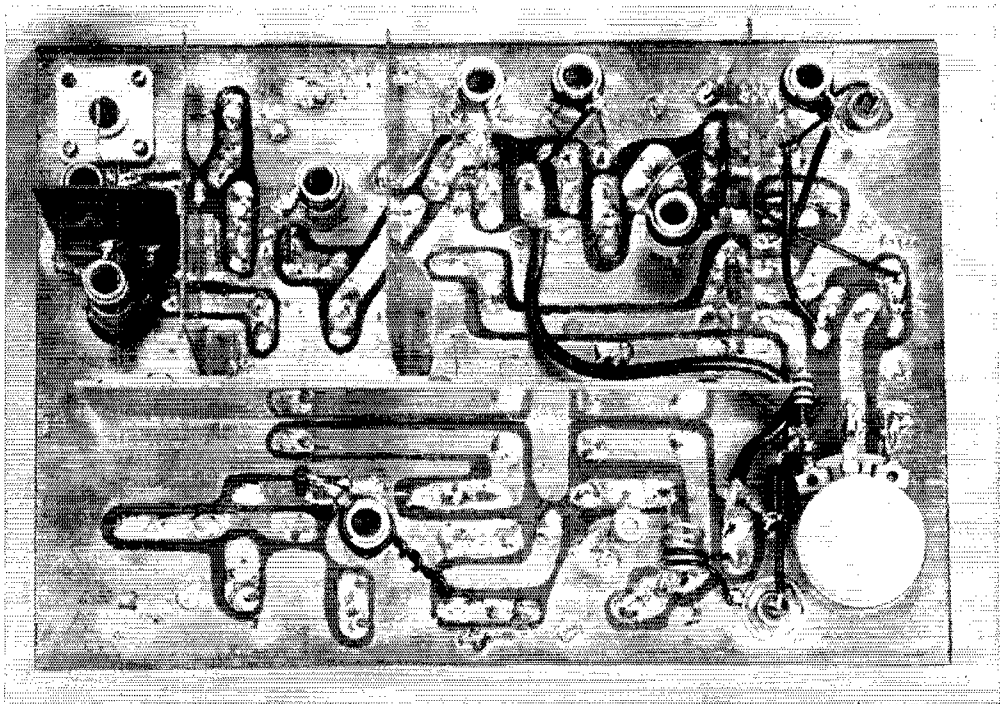


Fig. 4—Schematic of the converter's power supply. The 2000- μ f. capacitor is electrolytic, others are disk ceramic, 1000-volt units. The 56-ohm resistor was selected to give the proper power-supply voltage when used with the circuit of Fig. 1 (12 volts d.c.)



Bottom view of the etched-circuit board. Wiring has been completed and the general layout is apparent. The i.f. gain control and 12-volt power jack are at the lower right. The input circuit and r.f. stages are at the upper left. The mixer is at the upper center, and the IC i.f. amplifier is at the upper right. The oscillator chain extends along the lower portion of the board. The interstage shields are in place, but are difficult to identify in this photo.

times requiring several hours to get the job done. A standard heat lamp, spaced approximately 15 inches away from the etchant bath, will maintain the desired temperature. A 5 × 7-inch photographic tray can serve as a container for the bath, and a low-cost darkroom thermometer will keep track of the temperature of the solution. *A word of caution:* Prevent the chemicals from coming in contact with the skin or eyes. It is a good idea to wear rubber gloves when processing etched-circuit boards. If the solution makes contact with one's skin, it should be washed off at once to prevent irritation.

After the unwanted sections of the copper are removed, the board should be taken from the solution and given a thorough rinse in clear water. Next, the etch-resist material should be removed by rubbing the copper side of the board with steel wool. Rinse again to make certain that no strands of steel wool remain on the circuit board. They could cause short circuits.

Once the board is etched and cleaned, the holes can be drilled as specified in Fig. 3. A 100-watt soldering iron—or larger—will be required when soldering the copper shields to the circuit board. It will be necessary to cut away those portions of the shields which might come in contact with ungrounded sections of the etched circuit. A nibbling tool is useful for this. Since patterns are not given for the shields, some cut-and-try effort will be necessary. Ordinary

plumber's-style flashing copper was used for the shields in this model. Light-gauge brass could also be used. The center shield is made from aluminum stock and is bolted to the circuit board with 4-40 hardware. All shields are 1½ inches high.

Assembling the Converter

Fig 3 shows the layout of the under side of the circuit board (copper-clad side). Key components are labeled on the drawing to show their placement. The positions of the various semiconductors are given to show where the individual leads of each are connected. Once the key parts are installed, it should become apparent where the rest of the parts will be placed. The text photos will also help the builder to determine where the small parts go.

Miniature coax cable is used between L_5 and L_{13} . A tightly-twisted pair of insulated hookup wires would no doubt serve as well in that part of the circuit. The 22-ohm resistor in the collector circuit of Q_4 is mounted between the coil terminal of L_{10} and the collector strip of that stage.

Power Supply

A 12-volt d.c. power source is required to operate this converter. Because the circuit draws approximately 45 ma., battery power does not appear to be the most practical answer to the power supply problem. An a.c. operated

12-volt supply is recommended for fixed-station use. The circuit used by the author is given in Fig. 4. The complete assembly is housed in a 4 × 5 × 2-inch aluminum chassis which is enclosed by an aluminum bottom plate. Rubber feet were added to the bottom plate to prevent damage to table tops.

If portable operation is anticipated, the converter can be powered by eight size-D flashlight cells, series-connected, to provide several hours of intermittent use. Needless to say, a 12-volt auto battery could assure many more hours of portable or mobile operation. If mobile operation is planned, it would be prudent to connect an 18-volt Zener diode between the positive terminal of J_3 and ground, thus protecting the transistors from transient peaks which commonly occur in the automotive electrical system. Such voltage spikes often exceed the safe maximum-voltage ratings of the transistors being used. Under normal conditions, the Zener will not conduct.

Checkout and Testing

Before applying the operating voltage at J_3 , a very thorough check for short circuits between sections of the etched circuit should be instituted. Make certain that pigtailed or small blobs of solder do not form bridges between the copper strips.

If available, a v.h.f. signal generator should be connected to J_1 for initial testing and alignment. The output of the converter, taken from J_2 , should be fed into a communications receiver that is capable of being tuned from 28 to approximately 30 Mc. With power applied to the converter, tune in a signal at approximately 145 Mc. (29 Mc. on the main receiver dial). Adjust L_1 , L_2 , L_3 , L_4 , L_6 , and L_8 for maximum output from the converter. If the signal cannot be found, chances are that the oscillator, Q_4 , has not started. If this is the case, adjust L_{10} until a slight increase in noise is evident, indicating that Q_3 is receiving injection voltage. The slug in L_{10} should be set approximately three turns toward minimum inductance from the setting at which the crystal "kicks" in. This will assure reliable starting of the oscillator each time the converter is turned on. C_2 should be adjusted for maximum converter output.

L_4 should be adjusted with the aid of a noise generator.⁵ It should be set for the best n.f. possible. Adjustment of the input tap on L_1 will also have a marked effect on the noise figure. The tap point given for L_1 proved to be optimum for this model and will be satisfactory in most instances. There will be some interaction between L_1 and L_{14} , requiring two or three adjustments before optimum results are secured.

A reasonably flat response from the converter can be realized over a two-megacycle range. It is necessary to stagger-tune the r.f. and mixer coils, as well as those in the i.f. channel. The author tuned L_1 for best noise figure at 144 Mc.

⁵ Guentzler, "The 'Monode' Noise Generator," *QST*, April 1967.

L_2 was peaked at 144.5 Mc., L_3 was tuned for a peak at 145 Mc., and L_4 was optimized at 145.5 Mc. Those wishing to operate in other parts of the 2-meter band can use a similar tuning procedure. L_6 was tuned for maximum response at 28.5 Mc. The i.f. output coil, L_8 , was peaked at 29.9 Mc. The converter response is flat within 3 decibels from 144 to 146 Mc. when tuned in this way.

After the tuneup is completed, adjust R_1 through its range. If AR_1 is functioning correctly, the converter gain should vary markedly from one end of the control's range to the other.

Performance

Cross-talk and overload immunity are good with this circuit. A 100,000- μ v. signal failed to swamp the front-end of this converter. On-the-air tests when the band was heavily occupied with strong local signals—some very strong signals that were within two or three blocks of the test location—proved the converter to be free of the aforementioned problems. No "birdies" or other spurious responses could be found when tuning across the lower two megacycles of the 2-meter band. The converter was being used with a Collins 75A-1. When the unit was fed into a Collins 51S-1, no spurious signals could be found when the entire 144- to 148-Mc. range was tuned. The oscillator stability was good, permitting the converter to return to the same receiving frequency each time it was cycled. Line voltage changes had no noticeable effect on the oscillator stability.

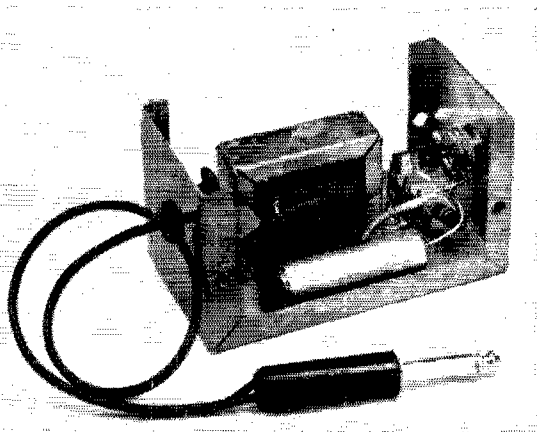
Some Final Comments

This circuit is by no means the final word in 2-meter equipment. The builder may wish to try other types of transistors in the various stages. Similarly, a Zener diode can be substituted for the transistor at Q_6 , although the low-cost G.E. transistor specified does a good job of regulating the oscillator supply voltage. The MC-1550 (AR_1) costs approximately \$4.25. Other brands of ICs could no doubt be used in that part of the circuit, and at slightly less cost. Although the author did not have an opportunity to try one, an RCA CA-3028 seems like a "natural" for that part of the converter. It is quite similar to the MC-1550 and sells for \$1.55 in single lots. Although other types of JFETs could be used for Q_1 , Q_2 , and Q_3 , it is doubtful that anything available will give better performance when comparing cost (90 cents each) with noise figure and gain.

The writer used one of the modern-style Vector printed-circuit chassis bases to house this converter. These boxes are supplied in sections, enabling the user to fabricate a variety box sizes and shapes. The side channels are grooved to accommodate printed-circuit boards. This box was made up from one pair of Fram-Loc rails which measure 2 × 6½ inches (Vector SR2-6.6/062) and one pair of rails which are 2 inches high and 4½ inches long (Vector SR1-4.6/062).

(Continued on page 146)

Clicks And Chirps — Let's Clean 'Em Up!



BY LEWIS G. McCOY,* WIICP

Got key clicks or chirps? Bothering other hams? Afraid of getting cited by the FCC? Read On!
And incidentally, read footnote 1.

HAVE you got clicks or chirps? Many newcomers have and don't know it. For that matter, so do many hams who have been licensed for some time — and they *should* know it.

We recently went through one month's reports from ARRL Official Observers to see which violations of FCC regulations were the most common. Out of some 1000 notices sent out by OOs, over half were for clicks and chirps. The notices were divided fairly equally between Novice and General Class license holders. General Class license holders, at least, should be experienced enough to check their own signals periodically. Novices, however, are new to the game and may not know *how* to check, or how to cure the problem if it does exist.

Chirp

When a transmitter is keyed the r.f. output is turned on and off. Hopefully, the frequency will stay constant while this is being done. Unfortunately, in many transmitters, the oscillator frequency shifts slightly at the instant the key is closed, which causes the output signal also to shift frequency. This is true of all keyed oscillators, both self- and crystal-controlled. In a crystal oscillator, just how much the frequency changes in going from full off to full on depends on many factors, but the important point is that nearly all

crystal oscillators will shift frequency to some degree. This shift causes a chirp on the signal going to the antenna. How bad, or objectionable, the chirp is depends on how much the crystal frequency changes.

Another cause of chirp is poor line-voltage regulation. When the key is closed the transmitter puts more load on the a.c. line and this, in many cases, causes the line voltage at the power supply to drop. This in turn causes the d.c. voltages out of the power-supply filter to drop. Any voltage change at the plate or screen of the oscillator tube is likely to cause the frequency of the oscillator to shift slightly, causing a chirp on the transmitted signal.

How To Check For Chirp

One way to find out whether you have chirp is to ask another ham to listen to your signal. The only trouble with this method is that you never really know for sure how good or bad your signal is. Many hams are inclined to be uncritical, as well as too polite, and rather than hurt your feelings, don't pass along an accurate report.

You can check your own signal simply by listening to it. However, it isn't as simple as just tuning to your frequency and listening; there are certain precautions you must take. First, disconnect the antenna from the receiver. Turn down the r.f. gain control to the point where your transmitter signal doesn't overload the receiver. If you have a dummy load of the 50-ohm type, connect it to the rig. However, *don't* use a light-bulb load; the resistance of the light bulb changes as the filament heats up when the key is closed, and this leads to

* Novice Editor

¹ Credit for suggesting the key-click filter goes to Ted Crosby, W6TC, of HBR receiver fame. It isn't so much that Ted wants credit as that he wants c.w. operators in his area to get rid of their blankety-blank clicks! Tnx, Ted.

false results. If you don't have a dummy load, do your testing on the air — but pick a time and frequency when you won't be interfering with other amateurs.

Tune your receiver to zero beat with your transmitter while holding the key down. (For the benefit of the Novice who doesn't know what zero beat is, as you tune through a c.w. signal with your b.f.o. on, you'll first hear a high-pitched note which gradually gets lower in pitch until the tone goes below audibility and then rises again as you continue tuning. The center of the silent region between the two lowest tones is the zero-beat point.) Now tune off zero beat slightly so that you hear a low beat tone — about the lowest tone you can hear comfortably. Next, make slow dashes with your key. If the transmitter has no chirp, you won't be able to detect any change in the beat tone when the key makes contact at the beginning of the dash, nor during the dash itself. If your signal *does* chirp, you'll hear a "yoop" in the beat note — most likely right at the beginning of the dash, but possibly at the ending as well. For a further check, tune the receiver to the same tone on the other side of zero beat: this will make the frequency shift reverse itself (that is, the chirp will be a frequency shift upward instead of downward, or vice versa, depending on which side of zero beat you selected first). The sound of a chirp is quite different on the two sides of zero beat, and very small chirps can be detected this way. A really chirpless signal will have the same sound, with keying, with the receiver tuned to either side of zero beat.

An even better check can be made by tuning to a harmonic of your transmitting frequency. The second harmonic will multiply the frequency shift two times, the third harmonic three times, and so on. Still another, and excellent, method of checking for chirp or clicks, is to have a local ham operate your station while you operate his. This gives you the opportunity to hear your signal as others hear it, and to be your own judge.

How To Cure Chirp

In Novice transmitters it is common procedure to key a transmitter by opening and closing the tube cathode circuits to ground. When the cathode circuits aren't completed to ground (chassis) the transmitter is not putting out r.f. When the key is closed, the cathodes are connected to ground and the various stages are working. A typical transmitter keying circuit is shown at Fig. 1A.

A simple way to get rid of chirp in this type transmitter is to let the oscillator run during transmitting periods, keying only the amplifier and buffer stages. If the oscillator isn't turned on and off, the frequency will remain fairly constant, thereby getting rid of the cause of the chirp.

The only real drawback to this type of keying is the problem of switching the oscillator off and on when going to receiving or transmitting. However, a very simple modification of your transmitter can be made to permit "one-switch" operation. This circuit is shown in Fig. 1 at B. It con-

sists of installing a single-pole, three-position switch S_1 on the transmitter panel. The oscillator cathode lead that is connected to the key-jack line is removed from the line and connected to the arm of the newly-added switch. In the first position of S_1 , the keying is the same as it was before. In the second position, the oscillator alone can be turned on for spotting your own frequency, a handy addition to your operating setup. Of course the key would be left open for this. In the last position, the oscillator cathode is connected to a position on S_2 , a double-pole, double-throw switch mounted at some convenient location on the operating desk. S_2 is used as a transmit-receive switch. In the transmit position, the oscillator cathode is connected to chassis ground via one arm of S_2 . The other arm is used to turn on an antenna changeover relay. When S_2 is switched to standby, the oscillator cathode is opened and the antenna relay shifts to receive. This makes an ideal operating setup — and gets rid of the chirp. Alternatively, a switch with multiple contacts can be used at S_2 to mute the receiver, turn on a monitor, and so forth. Some hams use a foot switch for S_2 , leaving their hands completely free.

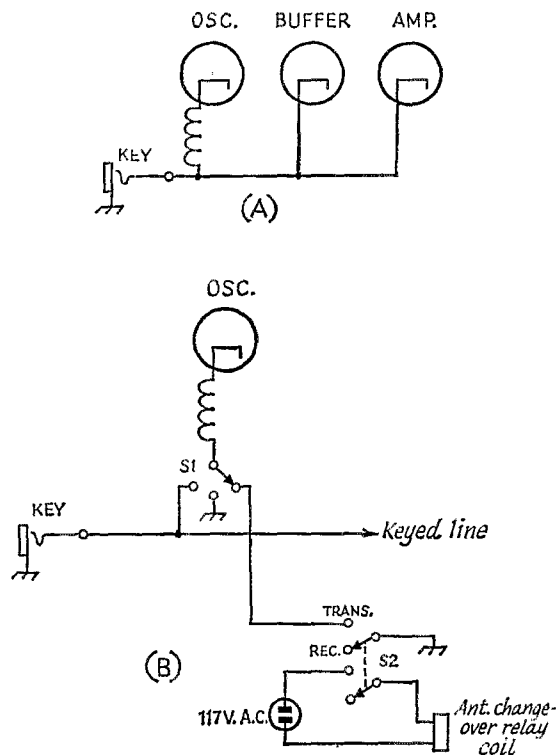


Fig. 1—A—circuit of a typical cathode-keyed Novice transmitter. B—method for modifying cathode-keyed transmitters for amplifier keying.

S_1 —Single-pole, three-position switch (Malloy 3215J or similar).

S_2 —Double-pole, double-throw toggle switch.

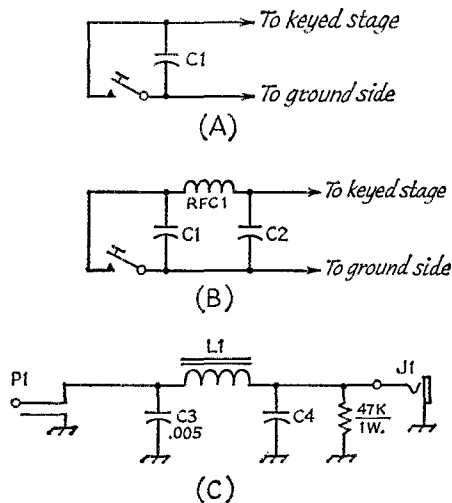


Fig. 2—Two methods of making "r.f." click filters (A and B). See the text for appropriate values for the components. C—circuit for a key-click filter.

- C₃—0.005- μ f. disk ceramic.
- C₄—0.5 to 1.0 μ f., 250 volts, paper; see text.
- J₁—Phone jack, open-circuit type.
- L₁—Approximately 1 henry. (Knight 54A1479 or 54A4703, or similar); see text.
- P₁—Phone plug.

Clicks

While the state of the art is such that one shouldn't have chirps, normally a chirpy signal won't cause interference to other stations. However, this isn't true of clicks. A c.w. signal with clicks can cause considerable interference to many stations. Probably all hams who operate c.w. have experienced interference from clicks. This is one type of signal that nobody should be proud of and should do his best to clean up.

A recent *QST* article² provides a comprehensive discussion of how clicks are generated, and it is highly recommended reading to anyone interested (and we all should be!) in the "why" of clicks. Briefly, when a transmitter is keyed, the power output rises very rapidly to its full value and just as quickly drops to zero when the key is opened. The resultant short rise and decay times produce spurious signals (clicks) on both sides of the signal frequency. Depending on how sharp the rise and fall of the signal is, clicks can extend out several kilocycles on each side of the signal frequency.

In some instances, it is possible to hear clicks from a station as far away as 100 kc. This is usually due to a low-frequency parasitic oscillation being generated along with the fundamental signal. Still another type of click is caused by v.h.f. parasitics. These clicks usually are close to the signal frequency and tend to sound garbled, as if the basic signal were modulated.

Clicks from parasitics are unusual, and must be cured by eliminating the parasitic. The most com-

mon clicks are those caused by the steep rise and fall of the keyed signal. In order to eliminate the click, it is necessary to slow down the rise and decay time.

In addition to the type of click that goes out on the air and causes interference to distant stations, we have another type, more of a local nature. These are called "r.f." clicks. When you close and open the key, you are keying a certain amount of current. This current causes a spark at the contacts, and the spark, in turn, causes a brief burst of r.f. energy to be generated. This click is similar to the type that comes from turning a light switch on and off. The r.f. click can be heard in broadcast receivers and, if bad enough, can be seen on a TV screen. Its range is usually limited to a few hundred feet, but it can cause interference problems to neighbors. You can check for these clicks by using the setup described above for checking chirps, but tuning to a frequency well away from your transmitting frequency (even on another band) and using a short piece of wire as a receiving antenna. If present, the "r.f." clicks will be heard practically anywhere you tune the receiver.

How to Check for Clicks

In order to check your signal, you must first get rid of the "r.f." type click. In your own station, these clicks usually will mask the clicks that go out on the air with the signal.

Fig. 2 shows some simple filters that can be installed at the key contacts to eliminate sparking. The simplest circuit, A, consists of a small disk ceramic capacitor, C₁, mounted on the key terminals. If this doesn't prove to be sufficient, the circuit at (B) should be used. Try values from 0.001 to 0.01 μ f. for C₁ and from 0.5 to 2.5 mh. for RFC₁. In particularly stubborn cases another capacitor of similar value to C₁ should be installed at C₂. This filter circuit should be mounted as close to the key contacts as possible.

Once the r.f. spark is eliminated you are ready to check for on-the-air clicks. Again, an excellent method of checking is to swap stations with another ham. However, if this isn't possible, you can make the tests by yourself. Use the chirp-checking set up described earlier. Tune your signal to zero beat. Reduce your r.f. gain so that you have a reasonably strong signal but one that doesn't overload the receiver. If your receiver has various settings of selectivity, set the selectivity switch to the widest possible bandwidth.

Once you've set up the receiver in this fashion, turn off the b.f.o. and open and close the key slowly. You should get a change in the background noise, but this is normal. If there is any trace of a click when opening or closing the key, you'll have an on-the-air click on your signal.

Getting Rid Of Clicks

For the common cathode-keyed type of transmitter used by Novices, a simple shaping filter,

(Continued on page 146)

² Grammer, "Why Key Clicks?," *QST*, October 1966.

Forced-Air Cooling of Transmitting Tubes

Some Considerations in the Selection of a Suitable Impeller

BY WILLIAM I. ORR,* W6SAI

MOST electronic equipment generates heat, and this heat must be removed or the equipment will eventually burn up. The heat may be removed by radiation, conduction or convection¹, or by a combination of these methods. This article examines forced-air cooled systems (an efficient form of convection cooling), which are used in commercial transmitting equipments up to the level of tens of kilowatts and, in amateur gear, up to the so-called "two-kilo-watt p.e.p." level. Generally speaking, from 20 to 70 per cent of the primary power drain of electronic equipment is dissipated in heat emitted from tubes and components, and the resulting temperature rise must be held within reasonable limits to insure satisfactory life for both the tubes and the other parts in the equipment.

The Air System

Two typical forced-air cooling systems for a power tube are shown in Figs. 1A and 1B. They consist of an air blower, or impeller; a conduit to guide the cooling air to the tube, or a pressurized chassis; the heat radiator of the tube; and an air exhaust exit. By stretching the imagination only a little, this air system can be compared to the electrical series circuit of Fig. 1C, in which each component in the air system is represented by a resistor which has a potential drop across it corresponding to the *back pressure* or resistance²

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¹ Quinn, "The Stanley Steamer," *QST*, May, 1966.

² The resistance offered to the flow of air may also be expressed in terms of "pressure drop" or "static pressure."

We live at the bottom of a vast ocean of air. This invisible, life-supporting elixir provides the equipment designer with an inexpensive and efficient cooling medium for heat-generating devices, such as transmitters and receivers. Over the years, electronic equipment has grown more sophisticated and compact, and the problem of removing heat from the gear has become acute. Until someone miniaturizes the watt, heat-exchange systems will remain one of the major problem areas of equipment design. Aspects of forced-air cooling systems are discussed in this article.

that the original component offers to the flow of air. The sum of the back pressures in the air system must add up to the total pressure of air supplied by the blower, just as the sum of these voltage drops in the electrical analogy must add up to the generator voltage. The blower in the air system corresponds to the generator in the electrical system, of course.

The electrical analogy suffers in that the back pressure across a component in the air system does not strictly follow an equivalent of Ohm's Law for electric potential drops. Instead, the

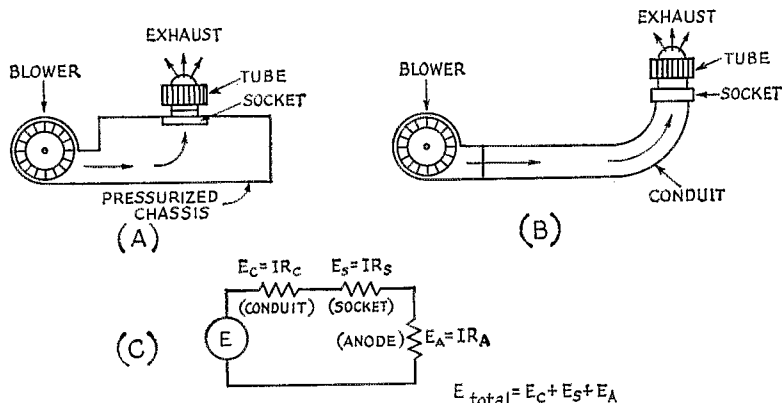


Fig. 1—A forced-air cooling system. In A, the blower is mounted directly on the chassis which is used as a plenum chamber. Air is exhausted past filament and plate seals of the tube. In B, the blower is mounted at some distance from the tube, and cooling air is conducted to the tube via a conduit or hose. C indicates an electrical analogy of the forced-air system. The blower is represented by generator E, and various unavoidable back pressures are represented by voltage drops across resistors R_C and R_S. Useful work (cooling the anode) is represented by voltage drop (E_A) across the tube.

back pressure across an air-system component varies approximately as the *square* of the airflow rate (volume per unit of time). Thus, if the volume demand is doubled, about four times the pressure will be necessary to meet the increased requirement. Even though the analogy is inexact, the transmitter designer who is comfortable in the presence of Ohm's Law for series circuits can gain insight of the action of pressure drops incurred in a forced-air cooling system.

The problem to be solved is that of determining the size and characteristics of an air blower that will satisfy the temperature limitations imposed upon a particular tube type by the manufacturer, and reconciling these limits with available blowers. Maximum operating temperatures and air requirements of forced air cooled transmitting tubes are generally supplied in the data sheet, or provided upon request by the tube manufacturer. This simplifies the problem considerably, as few engineers have the equipment or time to run temperature checks on transmitting tubes. Blower data, too, is supplied by the numerous impeller manufacturers. It remains, then, to translate this available and unfamiliar data into the proper hardware for the system at hand.

Tube Cooling Requirements

Forced-air-cooled transmitting tubes, such as the 4CX250B, 4CX1000A and similar external-anode tubes, require cooling air to be passed from base to anode³. Unless otherwise specified in the data sheet, cooling air should flow as long as the tube filaments are lighted. The external anode cooler of tubes of this family is usually composed of a number of copper fins arranged in a circle about the anode core, with the air passing vertically across the surface of the fins. An exchange of heat takes place between the fins and the passing air, the moving air extracting heat from the anode core and holding overall anode temperature at or below the maximum limit. As the air is impeded in its flow through the interstices of the anode structure, a back pressure is created, caused by friction of the air against the fin surfaces, and by turbulence of the air in the anode passages.

The cooling airflow requirement for transmitting tubes may be expressed in terms of the ratio of watts of anode dissipation to tube temperature (in watts per degree Centigrade) as a function of either the mass airflow rate in pounds of air per minute, or the volumetric airflow rate in cubic feet per minute⁴. This information may be expressed in graphic form (Fig. 2), enabling the design engineer to determine the actual cooling-air requirement in terms of specific tube temperature and system back pressure.

³ Large convection- and radiation-cooled glass tubes (4-400A and 4-1000A, for example) also require forced-air cooling to hold seal temperatures within prescribed limits.

⁴ Precise calculation of airflow in cubic feet per minute must take into account air humidity and barometric pressure. Equipment builders often design for a mythical user living in Denver, Colo., who operates the equipment on a hot, humid day.

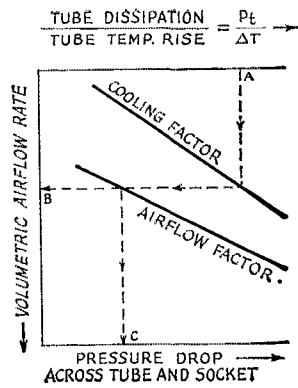


Fig. 2—Allowable temperature rise and dissipation (A) of power tube determine airflow rate (B) from laboratory measurements. Pressure drop (C) across the tube and socket may be measured by a manometer device. The interlocking relationship of cooling requirements may be expressed in graphical form, as shown here.

The total heat to be removed is determined from a study of the operating characteristics of the tube, and includes plate and filament dissipation (plus grid and screen dissipation where applicable). Maximum element dissipation rating is normally given in the data sheet. The operating temperature rise of the tube is found by taking the difference between the maximum measured tube temperature (at the hottest point of the tube) and the maximum inlet air temperature expected. The air requirements expressed by the plots of the cooling factor and the airflow factor are usually given as a pressure drop across the tube and socket expressed in inches of water, and a corresponding volumetric airflow is defined in cubic feet per minute (c.f.m.). This information is necessary to determine the size and speed of the blower required to provide the proper airflow through the system. Volumetric air flow may be calculated or determined by experimental means.

Air-Pressure Measurements

Air pressure in a forced air system may be defined in terms of an equivalent weight of water.

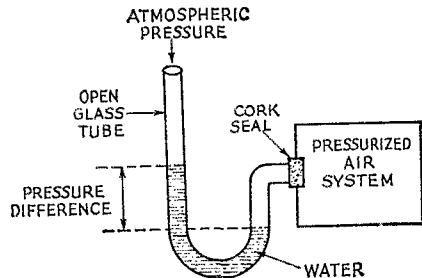


Fig. 3—A simple manometer compares system static pressure with atmospheric pressure. In this drawing, air flows at right angles to manometer input, i.e., into or out of this page. Pressure difference is expressed in "inches of water." Placement of manometer to avoid turbulence in the system should be determined by experiment.

System Pressure Drops

Pressure drop in an air system is caused by physical obstruction to the flow of air, or by turbulence in the air. In the case of a tube anode which contains many fins over which the air must pass, the pressure drop is intentional and useful. Other system drops caused by air friction, pressure drops in the hose or socket, or a change in the air velocity in the system, are undesirable and not useful. All pressure drops caused by these factors must be added to the pressure drop of the tube and socket. Drops caused by an abrupt change in the cross-sectional area of a system include *both* expansion and contraction drops for variations in conduit area, and are additive. While these values may be calculated for a system of known dimensions, it is beyond the scope of this article to cover such calculations. Suffice to say that when the overall pressure-drop and airflow requirements are determined, it is possible to match the requirements to the blower characteristics to achieve satisfactory system cooling.

Blower Characteristics

Air blowers come in many shapes and sizes and some are "good" and some are "poor." The most commonly used impellers in air cooled systems are *squirrel-cage (centrifugal) blowers*, and *axial fans*. The important characteristics of an air cooling system are the relationship between blower-outlet back pressure (in inches of water) and the airflow (in cubic feet per minute), and these characteristics determine the blower to be used. It is foolhardy to determine the "good" air impellers from the "poor" impellers by intuition.

Graphs of typical squirrel-cage blower performance for various units are given in Figs. 4, 5 and 6. The areas under the curves are regions in which the blower does useful work. It can be seen that as the back pressure rises, the efficiency of the blower decreases until, at some critical value of back pressure, the blower ceases to function as a useful device and merely "wind mills" the air about the impeller blades and cavity. This is termed "blower cutoff." Blowers vary to a great degree in their ability to cope with back pressure: low speed, open axial fans are the least efficient, while high speed squirrel-cage devices have somewhat higher efficiency.

Squirrel Cages and Axial Fans

The typical squirrel-cage blower has a multi-bladed impeller wheel rotating within a tightly fitting housing.⁵ Small units normally have the discharge edge of the blade inclined forward, in the direction of rotation. The inexpensive axial fan, on the other hand, has a few, large, wide blades (usually four), slowly rotating in the open air or in a short housing section. More expensive vane-axial impellers have more blades (five or six) and rotate at higher speeds.

⁵ The most efficient centrifugal blowers have a housing which closely fits the edges of the rotor. Excessive air gap between the rotor and the rim of the housing destroys the ability of the blower to work into back pressure.

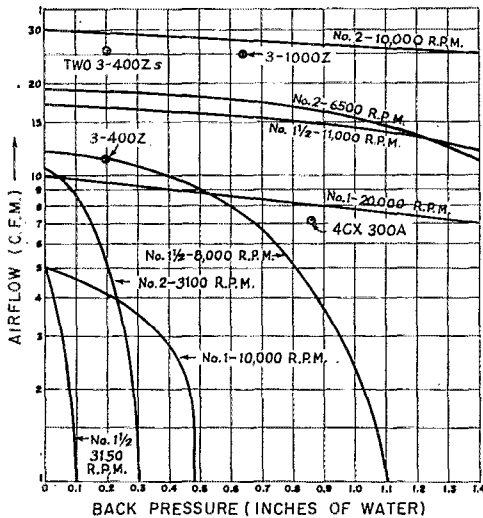


Fig. 4—Typical performance data for No. 1, No. 1/2, and No. 2 centrifugal blowers. Performance of blowers of different sizes and speeds can be compared with the cooling requirements specified for various tube types. Notice that requirement points are shown for a pair of 3-400Zs as well as for a single tube. If the requirement point falls on or below the performance curve for a particular blower, that blower will give adequate cooling under the conditions outlined in the text. The curves show that blower efficiency drops rapidly after a critical value of back pressure is reached, and that the blower "wind-mills" (reaches zero output) at high values of back pressure. High-speed blowers can withstand more back pressure than can low-speed units (notice the curves for 10,000- and 20,000-r.p.m. blowers).

(The weight of a uniform column of water 27.7 inches high is 1 lb. per square inch of column base area.) The measurement is made by means of a *manometer* whose readings are expressed in inches of water (Fig. 3). A simple manometer for shop use may be constructed of a short length of 1/4-inch glass tubing bent into a U shape, with one end left open to the atmosphere. The opposite end is inserted in the air system in proximity to the tube socket and *at right angles* to the airflow. Optimum position should be determined by experiment so as to make sure that the manometer is not influenced by eddy currents in the airstream. The bottom portion of the manometer is filled with water and, if the air pressure in the cooling system is equal to atmospheric pressure, the water will rest at equal heights in both vertical sections of tube. Under this quiescent condition, no air moves through the system or, if it moves, it encounters no back pressure. However, if a difference of pressure between the atmosphere and the inclosed air system is created by a blower, the water will be forced up towards the open end of the glass tube by the back pressure of the air moving through the system. The pressure within the duct or plenum, as compared to atmospheric pressure, may be noted by measuring the difference in height (in inches) of the two water columns, as shown in the illustration.

Squirrel-cage blowers are often cataloged according to impeller wheel diameter and rotational speed. Thus a No. 2½ blower has a wheel diameter of 2½ inches, and may be available in a number of speeds, of which 2800, 3100, 6000 and 9000 r.p.m. are common off-the-shelf values. For a given wheel size and design, the c.f.m. delivered is proportional to blower speed, as is the ability to withstand system back pressure. Using the electrical analogy again, it may be said that the "voltage regulation under load" (ability to overcome back pressure) of any blower increases as the impeller speed increases. Unfortunately, as the impeller speed increases, the air noise, motor noise, vibration and unit cost also increase. While a 2800-r.p.m., or even a 6000-r.p.m. squirrel-cage blower may have a tolerable noise level, many 15,000-r.p.m. blowers create sufficient air noise to deafen even the most dedicated DX-contest operator.

Examination of the blower curves shows that a "trade-off" exists between rotational speed and wheel diameter and, generally speaking, a large impeller wheel running at moderate speed will be more satisfactory and less noisy than a smaller wheel running at a somewhat higher speed.

Inexpensive axial fans deliver large volumes of air at rather low rotational speeds and are generally fairly quiet, but suffer more than do squirrel-cage blowers from the effects of back pressure (Fig. 7). *Most small, low-speed axial fans and squirrel-cage blowers cannot move sufficient air into moderate values of back pressure to properly cool modern external-anode transmitting tubes, and their use should be tempered with caution.*

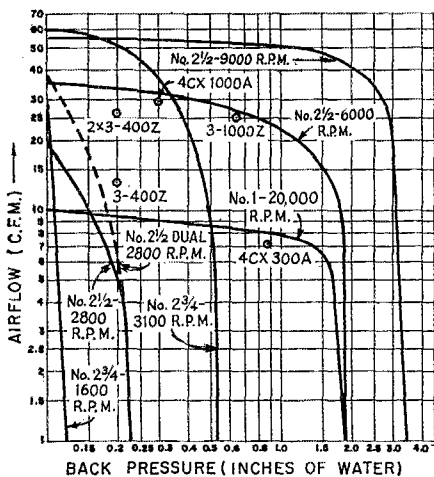


Fig. 5—Typical performance curves, similar to those of Fig. 4, for No. 2½, No. 2¾, and dual No. 2½ blowers. Notice that the No. 2½ 6000-r.p.m. blower will handle the cooling requirements of all of the tube type indicated, since the requirement points fall below the curve for this blower. "Wind-milling" is clearly indicated by the rapid drop of airflow to an unacceptable rate at the higher values of back pressure. Also notice that the use of dual blowers provides more airflow than a single blower of the same type at low back pressures, but does not project the "wind-milling" point.

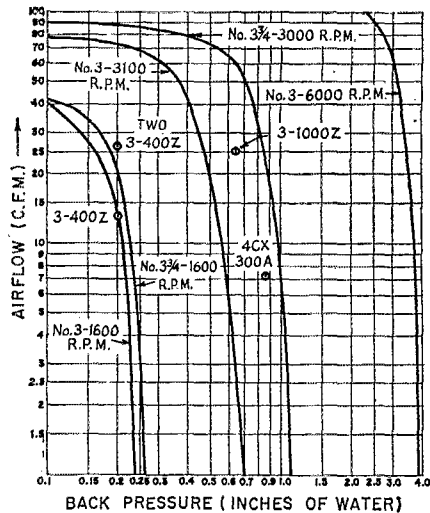


Fig. 6—Typical performance data for 3-, 3½- and 3¾-inch blowers. The low-speed (3100 r.p.m.) No. 3 blower cannot deliver the required flow of air into the back pressure offered by 3-1000Z or 4CX300A cooling systems. The 6000-r.p.m. unit, however, will handle the requirements of any of the tube types indicated, or, in fact, a pair of any of these tubes. Notice that doubling the speed of the blower more than triples the back-pressure capability. Although catalog-rated at "50 c.f.m.," the No. 3¾ 1600-r.p.m. blower is suitable for only low values of back pressure. When the speed is increased to 3000 r.p.m., the same-size blower will handle any of the tubes indicated.

Designing a Forced-Air Cooling System

An application of this design data, as a practical exercise, is the determination of a proper blower to cool a 4CX300A external-anode tetrode in an air-system socket, operating at various values of plate dissipation and 250° C. (maximum) anode temperature. If the ambient (room) air temperature is taken to be 50°C., airflow requirements to hold the tube temperature rise below 200°C at sea level, and at an altitude of 10,000 feet are graphed in Fig. 8. (These curves are based on figures taken from the data sheets for the 4CX300A and 4CX300Y.) If full 300-watt plate dissipation is desired at sea level, the air system must provide 7.2 c.f.m. of air at the socket of the tube under a combined tube and socket pressure drop of 0.58 inch of water. At an altitude of 10,000 feet (where the air is thinner), cooling requirements rise to 10.5 c.f.m. at a corresponding back pressure of 0.85 inch.

The additional pressure drops of the cooling system including back pressure developed by the cabinet structure, may be substantial, and must be added to the drop determined for the tube and socket. Unless a manometer is used to check the operation of the complete system, the additional back pressure caused by the duct coupling the blower to the tube and socket is a matter of speculation. If a pressurized chassis is employed having a large, internal open area (plenum chamber) into which the blower works, the additional system back pressure will be obviously less than if the blower has to force air through a flexible

hose and around large under-chassis components. Experience has shown that it is generally safe to estimate an additional 50-percent back pressure requirement when the blower works directly into a reasonably clear pressurized chassis area, and this is the most common situation in amateur practice.

Taking the 50-percent extra back pressure requirement as par, an additional back pressure of 0.29 inch of water must be overcome for a total back pressure requirement of $0.58 + 0.29 = 0.87$ inch of water for the system. The use of an inexpensive manometer to verify this educated estimate is recommended in the design of new equipment.

Turning to the squirrel-cage-blower data charts, it can be determined that a No. 1 wheel running at 20,000 r.p.m., or a No. 2 wheel running at a speed of 6500 r.p.m. will do the job, as will a No. 2½ wheel operating at 6000 r.p.m.⁶ A No. 3 wheel operating at 6000 r.p.m. is more than satisfactory. The No. 3 wheel running at 3100 r.p.m., however, is unsatisfactory, as the graph of Fig. 6 indicates that the impeller "wind-mills" above approximately 0.6 inch back pressure, and that its output falls rapidly to cutoff zero slightly above this figure. In the interest of minimum noise it would seem prudent to choose a No. 2½ blower running at 6000 r.p.m. to properly cool the 4CX300A with a suitable safety margin. If blower size is a problem, it may be necessary to use a No. 2, higher speed blower at some increase in noise level.

Glass Tubes

Large glass transmitting tubes (above approximately 200 watts plate dissipation) require moderate amounts of cooling air passed over the filament and plate seals to hold the seal temperature below a safe maximum value. As a large quantity of heat is dissipated by infrared radiation from the hot anode, the air requirements of the glass-style tube are usually less than that amount required for an equivalent value of dissipation from an external-anode tube whose anode temperature is limited by the insulator seal. Proper cooling of the glass tube requires that the air pass over the filament seals and then be guided past the glass envelope by a chimney. The chimney must be transparent to infrared radiation from the tube. Lastly, the air passes over the plate seal and is exhausted from the system.

The 3-400Z zero-bias triode, for example, requires 13 c.f.m. at a back pressure of 0.13 inch at the socket, while the 3-1000Z requires 25 c.f.m. at a back pressure of 0.43 inch at the socket. While the amount of air required is of about the same quantity for comparable values of plate dissipation in external-anode tubes, the back pressure demand is considerably less for the glass envelope design, as the air is not required to flow through interstices of a cooling anode.

⁶ The curves shown in Fig. 4 and those following, apply to specific models. All models of the same size number and rotational speed (even those of the same manufacturer) do not necessarily have the same performance ratings.

Referring again to the blower and fan charts, it can be seen that a 3-400Z may be adequately cooled by a No. 2 blower (6500 r.p.m.), or a No. 2½ blower (3100 r.p.m.), when a 50-percent margin is allowed for extra system back pressure. Two 3-400Zs will require twice the c.f.m. at the same back pressure, or a total of 26 c.f.m. at a system pressure of 0.2 inch. In this case, the No. 2½ blower (3100 r.p.m.) would suffice.

A single 3-1000Z requires 25 c.f.m. at a system back pressure of 0.64 inch (including the 50 percent safety factor), and a single No. 2½ (6000 r.p.m.) blower will do the job.

Either a single 3-400Z, or a pair, may be cooled by a 4-inch axial fan (2800 r.p.m. or higher), as such a device will work into a back pressure of about 0.2 inch. The 3-1000Z, however, cannot be properly cooled by the axial fans listed in Fig. 7.

In all of these examples, full plate dissipation is assumed, and the proper air-system socket and chimney for the tube in question is employed.

The unknown factor in the determination of the overall air-system requirement is the additional back pressure caused by the conduit system or plenum chamber arrangement. This is the reason that the tube manufacturer is reluctant to specify a particular blower for a given tube, as he does not know the characteristics of the overall air system to be used. If the blower works into a reasonably clear under-chassis area sealed for air leaks, and the air is exhausted through the tube socket, the safety factor of about 50 percent in back pressure mentioned earlier should be satisfactory. If, on the other hand, the blower is placed at some distance, with a connecting hose to the socket, blower requirements may rise by a factor of ten or more. *The only safe way to determine the actual requirements of a given air system*

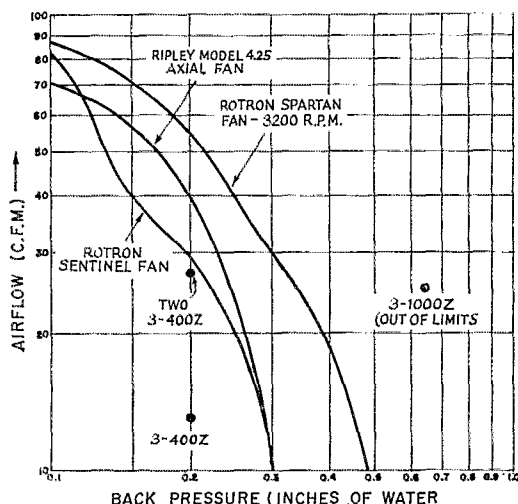


Fig. 7—Performance data for typical small axial fans. Medium-speed axial fans are suitable for a single 3-400Z, or a pair of this type. Axial fans must operate into a plenum chamber that transmits the air to the tube socket without introducing prohibitive additional back pressure. Tube data shown includes 50% extra back pressure, as discussed in the text.

TABLE I

Air requirements and suggested blower data for various air-cooled tubes. Data is given for single tube, with 50 percent back-pressure allowance.

Tube Type	Socket	Chimney	C.F.M. ⁵	Back Pressure (In. Water) ⁵	Blower Size	R.P.M.
3-400Z	SK-410	SK-416	13	0.2	3	1600
3-1000Z	SK-510	SK-516	25	0.64	2½	6000
					3¾	3000
4-400A ¹	SK-410	SK-406	13	0.25	3	3100
4-1000A ²	SK-510	SK-506	25	0.64	2½	6000
					3¾	3000
4CX250B ³	SK-600 Series	SK-606 Series	6.4	1.12	2½	6000
4CX1000A 4CX1500B ⁴	SK-800 Series	SK-806 Series	22	0.3	3	3100
5CX1500A	SK-840 Series	SK-806 Series	47	1.12	3	6000

¹ SK-400 socket requires 14 c.f.m. at 0.37 inch.
² SK-500 socket requires 25 c.f.m. at 0.9 inch.
³ Data applies to 4X150A for 250 w. dissipation.
⁴ Air requirement for 1000 w. dissipation.
⁵ Sea level requirements.

is to make back pressure measurements with a manometer.

When in doubt as to the air-system requirements, it is wise to provide an oversupply of air at somewhat greater back-pressure values than estimated by a study of system requirements. It is impossible to damage a tube by too much air, unless the tube is blown out of the socket by the air blast! All low-speed blowers and axial fans should be avoided, too, unless a manometer is used to check out the system under full tube-dissipation conditions.

A summary based upon a 50 percent back-pressure safety factor for various tube and blower combinations is given in Table I.

Tube Temperature Measurements

Measurement of tube temperature is possible, and the most reliable technique is to use a thermocouple attached to the tube. A somewhat simpler technique for the radio amateur is to determine tube-surface temperature by the use of temperature-sensitive paint.⁷ The paint is applied in a very thin coat to the tube and dries to a powdery finish after application. At its critical temperature, it melts and virtually disappears. After subsequent cooling, it has a crystalline appearance which indicates that the surface with which it is in contact has exceeded the critical temperature.

Reliable temperature measurements can be made with temperature-sensitive paint only if it is applied in a very thin coat over small areas of the surface to be measured. The substance as

⁷Temperature sensitive "decals" are also available

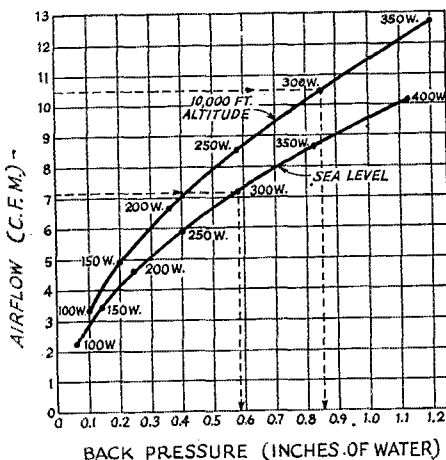
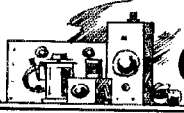


Fig. 8—Typical curves indicating how the cooling requirements increase with an increase in tube plate dissipation. These curves are for a 4CX300A mounted in an air-system socket. The dashed lines point out how the airflow requirements also increase with altitude because of the thinner atmosphere.

supplied by the manufacturer is too thick for use in the presence of forced-air cooling and must be thinned, using only the thinner recommended by the manufacturer. The paint is applied with an air brush or atomizer (or with an aerosol dispenser) in a well-diluted spray, as the amount required to produce a reliable indication is virtually unweighable. A convenient set of equipment for using the temperature-sensitive paints is an atomizer with several vials, each equipped with an airtight cap. One vial may be filled with thinner for cleaning the atomizer, while the re-

(Continued on page 148)



A SOLID-STATE AMPLIFIER/MODULATOR

2 Watts of Audio for the Experimenter

THIS little audio assembly, a follow-up to an earlier item in "Gimmicks and Gadgets"¹ was part of a 6-meter solid-state portable station shown on the front cover of July 1966 *QST*. The transmitter, a 1-watt phone rig, aroused considerable reader interest.

This amplifier/modulator is a modified version of the front-cover unit. An output transformer and terminal block have been added, making possible the selection of two output impedances, 3.2 and 24 ohms. Formerly the circuit was useful only as a modulator, but now it can serve as an audio amplifier as well, matching into a nominal 4-ohm speaker impedance. The circuit operates from 12 volts, d.c., and draws approximately 500 milliamperes. Up to three watts of output are available before significant distortion occurs. Inexpensive transistors are used in the circuit.²

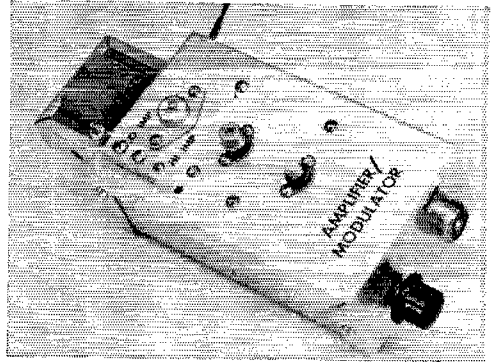
The Circuit

A schematic diagram of the unit is given in Fig. 1. The input circuit is designed to match a low-impedance microphone. The author uses an HA1 dynamic earphone from a surplus telephone handset. A good impedance match results and the microphone's output is ample for developing the required audio power. If a high-impedance microphone is to be used, the circuits of Figs. 2A and 2B offer a means by which to match the microphone to the input transistor, Q_1 .

The connection between the base of Q_1 and

¹ "Gimmicks and Gadgets," *QST*, June 1967.

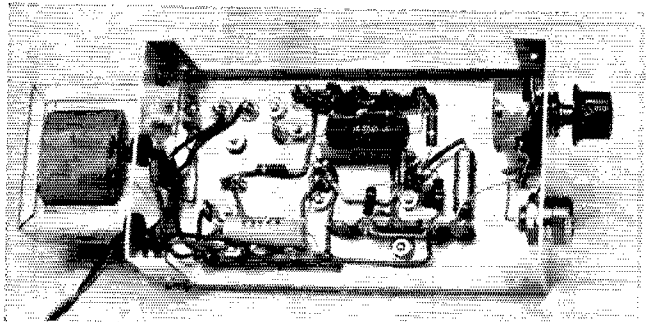
² This series of RCA transistors is listed in the industrial version of the Allied Radio catalog and can be ordered by the RCA numbers. The 40231 costs 47 cents, the 40309 70 cents, and the 40310 sells for \$1.21.



Top-front view of the audio assembly. The output transformer is mounted on the rear wall of the case. The terminal block at the left rear of the chassis is used as connector for the speaker or for the transmitter being modulated.

the emitter of Q_3 provides negative d.c. feedback which assures bias stability over a wide range of operating temperatures. Emitter resistor R_2 is somewhat rare as far as junk-box availability is concerned. The easiest way to obtain one is to make it yourself, by winding 73 inches of No. 32 enameled copper wire on a 1-watt, high-value (1000 ohms or greater) resistor as a form. Nichrome wire is available in various per-inch resistances, and could be used instead; also, Allied Radio Corp. sells a 1-ohm, 3-watt resistor which will work satisfactorily. If a hand-wound unit is used, the wire can be scramble-wound on the resistor body and the pigtailed of the resistor

Underside of the amplifier/modulator. The layout is not critical. D.C. supply is brought in by means of the twisted hookup wires at the lower left of the chassis.



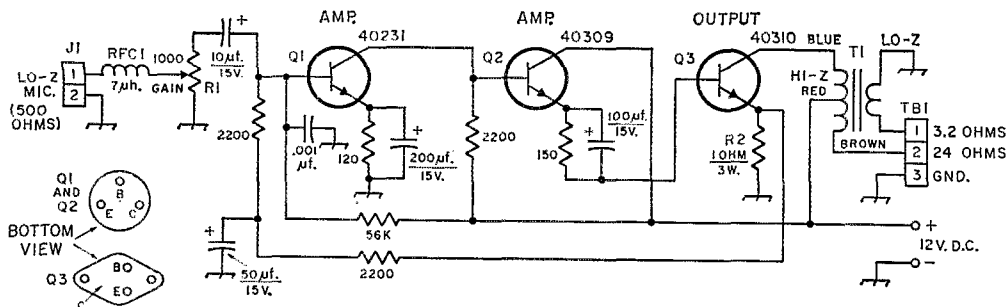


Fig. 1—Schematic of the amplifier/modulator. Polarized capacitors are electrolytic, others are disk ceramic. Resistance is in ohms, $K = 1000$. Resistors are $\frac{1}{2}$ -watt composition unless otherwise noted.

J1—To mate with microphone.

R1—1000-ohm audio-taper control.

R2—See text.

RFC1—7- μ h. choke (Ohmite Z-50 suitable).

T1—6-watt transistor output transformer; primary, 48 ohms, c.t., secondary, 3.2 ohms (Lafayette Radio 33R8578).

TB1—Insulated terminal strip (Millen E-302).

used as tie points for the ends of the wire.

Output from the microphone is amplified by Q_1 and is then fed to the output stage, Q_3 , through emitter-follower Q_2 . Q_3 operates Class A, hence the high value of current drawn by the modulator. T_1 has a 48-ohm, center-tapped primary, lending itself to practical use as a modulation transformer with a one-to-one impedance ratio. When used as a modulator, the unit should look into a secondary load of approximately 24 ohms. This means that the transistor (or transistors) being supplied with modulated d.c. should take a combined current of 500 ma. d.c. A mismatch as great as two to one is tolerable, however, giving some latitude in the design of the final stages of the transmitter.

A homemade modulation transformer having separate primary and secondary windings and a tapped secondary, offering a host of impedance-matching possibilities, was built and tried by the author. An old 8-watt, tube-type output transformer was used as the foundation. The windings were stripped from the cardboard

bobbin and a new primary having 150 turns of No. 24 Formvar-insulated wire was wound. A layer of Kraft paper was added, then a secondary winding consisting of 225 turns of No. 24 Formvar wire was scramble-wound on the bobbin. The secondary was tapped every 25 turns, up to the last 50 turns, to provide the multimatch feature. Although a voice-coil winding for 4-ohm speakers was not added, a third layer consisting of 62 turns of No. 24 enameled wire could have been included for that purpose.

Although the circuit is designed for use with a 12-volt d.c. supply, it can be operated safely with as much as 14 volts applied. It will perform nicely with as little as 6 volts, but at reduced output.

Construction

The amplifier/modulator is built on a $2\frac{1}{8} \times 3 \times 5\frac{1}{4}$ -inch Minibox. Rubber feet were added to the bottom cover to prevent damage to table tops or other surfaces upon which it is placed. Transistor sockets are used for Q_1 and Q_2 . Q_3 is

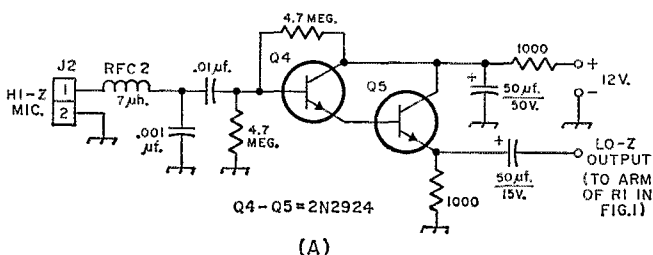
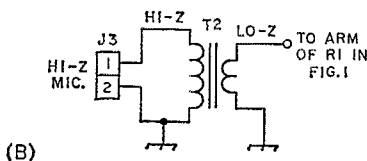
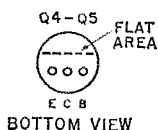


Fig. 2—Alternative input circuits for high-Z microphones. Capacitors with polarity marking are electrolytic; others are disk ceramic. Resistances are in ohms, $K = 1000$; resistors are $\frac{1}{2}$ watt composition. A—Darlington

hookup, a modified version of the WB6FDR/WA2AED Hint and Kink in November 1966 QST. This circuit, if used, should be built on the same chassis as the circuit of Fig. 1. J_2 is same type as J_1 of Fig. 1. RFC2 is same as RFC1 of Fig. 1. B—Transformer coupling. T_2 can be any transistor input transformer with a primary impedance of 20,000 ohms or more and a secondary impedance of 500 or 1000 ohms. An Argonne AR-100 would be satisfactory. T_2 should be mounted near Q_1 of Fig. 1, and on the same chassis.



attached to the chassis for heat-sinking purposes, but is insulated from it by the mica washer that comes with the 40310. A thin layer of silicone grease is used between the chassis and the mica spacer, and between the spacer and Q_3 . This results in better heat transfer between Q_3 and the chassis. Although it is desirable to use the grease, it isn't a requisite.

Operation

As a modulator, this unit can be used with any solid-state transmitter whose power input is 6 watts or less. Since it is capable of as much as 3 watts output, 100-percent modulation should be possible. If the transmitter does not present a load that is within the 2-to-1 mismatch ratio mentioned earlier, Q_3 may be damaged by high audio peak voltages. If the transmitter runs less

than a couple of watts of input, chances are that its modulating impedance will be somewhat higher than 24 ohms, and in such case less audio will be required for 100-percent modulation. A 24-ohm, 2-watt resistor can be connected between the 12-volt bus and terminal 2 of TB_1 , to provide the modulator with a suitable load. This will help to prevent damage to Q_3 . Keeping R_1 adjusted for only the amount of audio needed will also help protect Q_3 when a mismatch exists.

As an audio amplifier, this unit can be connected to a 4-ohm speaker and used as an audio channel for a receiver, as a mobile p.a. system, or as a low-power amplifier for musical instruments. Because of its high current drain, it is not recommended for use with a dry-battery pack.

—WICER

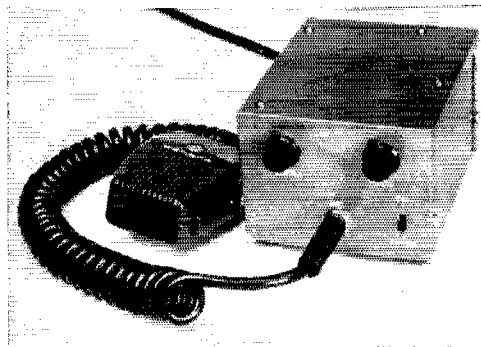
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A Handy Speech Amplifier-Clipper

BY CHARLES UTZ,* WIDEJ

IF you have been thinking of adding an audio clipper to that v.h.f. rig or need a preamplifier for that microphone that is low on output, the following is just what is needed.

The circuit (Fig. 1) uses three transistors. When no clipping is used, the transistors work as straight amplifiers. Gain for the circuit is adjusted by R_2 . The maximum gain is about 15 db. if R_1 is set just below the clipping point. To use the circuit as a clipper, R_1 is adjusted for the amount of clipping desired. The silicon diodes, CR_1 , CR_2 , will begin clipping at an audio level of about 0.6 volt peak. Q_3 makes up for the gain lost by clipping.



The speech-amplifier/clipper is contained, with battery supply, in a 3 × 4 × 5-inch Minibox.

*39C Salmon Brook Dr., Glastonbury, Conn. 06033.

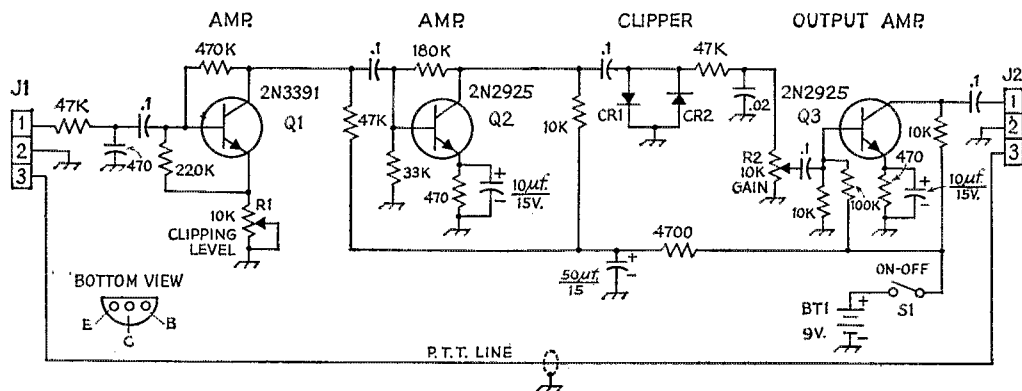


Fig. 1—Circuit diagram of the speech-amplifier/clipper. Decimal-value capacitances are in μf ; others are pf.; capacitors with polarity indicated are electrolytic; 0.1- μf . capacitors are paper (Sprague 4PS-P10); 0.02- μf . capacitor is disk ceramic. Fixed resistors are $\frac{1}{2}$ -watt; resistances are in ohms (K = 1000).

CR_1 , CR_2 —Any type silicon diode.
 J_1 —3-conductor microphone jack.

J_2 —3-terminal strip (Millen E-303).
 R_1 , R_2 —10,000-ohm control, linear taper.

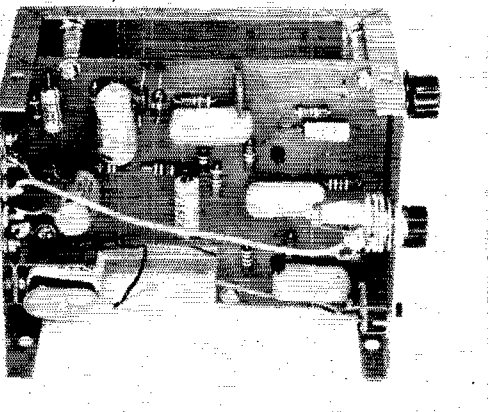
Construction

The clipper is built in the top of a 3 × 4 × 5-inch Minibox. The input jack, audio gain control and clipping control are mounted on one end, with the output strip on the other end. A three-terminal strip is used for the output connection to permit the clipper to be used with a push-to-talk microphone. Cables can be made up to fit the type of input connector used on the transmitter.

The remainder of the circuit is mounted on an etched circuit board.¹ A Vector board can be used by those who do not wish to make up an etched board. The battery is held in place with a Keystone No. 95 battery clamp. The circuit board is mounted on 1-inch spacers. Rubber feet prevent the cabinet from scratching desk tops.

In use, R_1 is adjusted to the desired level of clipping and R_2 is set for the audio output level needed for full modulation of the transmitter. The adjustment may be made either with an oscilloscope or by on-the-air checks. **QST**

¹ A full-size template for the etched circuit board is available for 25 cents from the American Radio Relay League, 225 Main St., Newington, Conn. 06111.



Inside view showing the etched circuit board. The clipper diodes are near the upper edge of the board in this view. Q_3 is at the left, Q_2 is at the right, and Q_1 is below Q_2 with a paper capacitor in between.

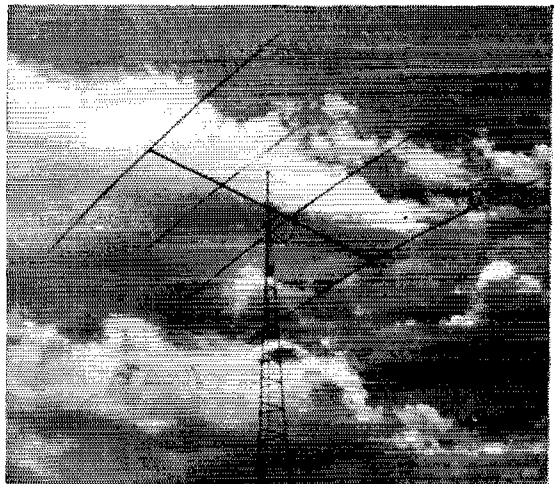
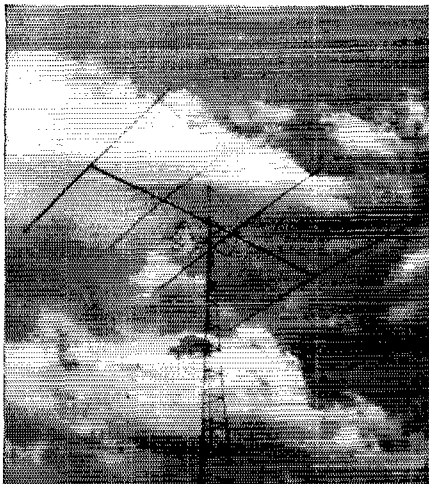
Strays

Old time radio historian? If so, you might be interested in attending their meet to be held at the Ford Science Museum in Dearborn, Sept. 23. As an annual event, old time hams, wireless operators and collectors from all over the country convene once a year at a large public museum for a program describing development and operation of early radio gear including demonstrations. Their Guest of Honor this year will be Mrs. Edwin Armstrong, widow of Maj. Armstrong. For additional information write Link Cundall, W2QY, 69 Boulevard Pkwy., Rochester, N. Y. 14612.

The Puerto Rico Amateur Radio Club will hold its own Field Day operation from 0001 GMT on Sept. 2 until 2400 GMT on Sept. 4. The club station, KP4ID, will be located at San Lorenzo, P. R. for operating on all bands and modes. Contacts with KP4ID during this activity will be confirmed through a special QSL card.

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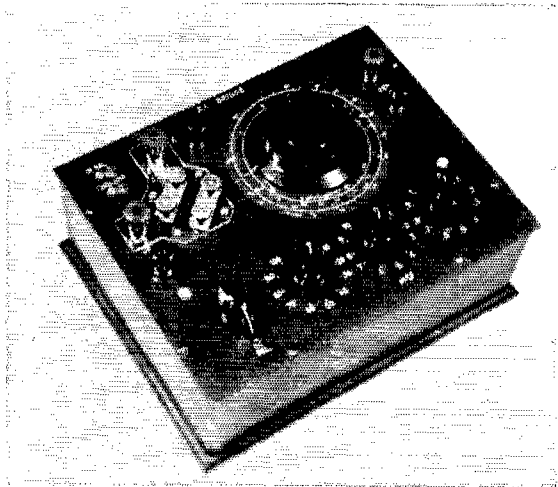
The RSGB QSL Bureau will be closed from September 9 to October 9. It is requested that no cards be sent to arrive at G2MI between these dates.



ZS6AOU has an interesting way of using his antenna on 15 and 20 meters. Three of the elements are telescoping and are extended or retracted by air pressure. A relay switches gamma matches for either band.

An Admittance Bridge for R.F. Measurements

The layout of components is shown in this view of the bridge. The "hot" binding posts for the generator and unknown, along with the screw terminals for the shorting bars, are on a plastic plate mounted over an opening in the panel at the upper left. The two capacitors for initial adjustment of balance (C_2 and C_3) are in the extreme upper left corner. The d.c. balance control is at the lower left.



BY FRANCESCO CHERUBINI,* IIZV

With a modest amount of ingenuity and workshop effort, many seemingly difficult projects can be brought to a successful conclusion. In this article IIZV describes an easily-built admittance bridge that will permit measurement of resistance, capacitance, and inductance along with complex impedances. The ham transmitter can be used for the signal generator.

AFTER reading a recent *QST* article¹ on the measurement of $R+jX$, I must agree with the reasons given on why impedance bridges are so seldom used by hams. I have been faced with many of the problems mentioned. During the past two years I have examined several commercial bridges so that I could study the circuits used in their design. Finally, I have built a simplified version of an admittance bridge which has given me rather good results. The bridge can be used for measuring complex impedances, r.f. resistance in the 10- to 1000-ohm range, capacitance from 0 to 500 pf., and can be calibrated for various inductance ranges, 1 to 50 μ h. being chosen in this case.

The fundamental circuit, shown at A in Fig. 1, is a balanced resistive bridge with the arms

having the values shown. An unknown resistance or reactance connected across one arm, such as R_3 , will unbalance the bridge. Balance may then be restored by connecting the identical value of resistance or reactance across R_4 . The setup for resistance measurement is shown at Fig. 1B, where R_s is the calibrated standard resistance which is adjusted for balance when the unknown resistance is connected at X. Capacitance measurements are made by using a calibrated standard capacitor, C_s , as in Fig. 1C. For inductance measurements the standard capacitor is connected across the unknown, Fig. 1D, and adjusted for parallel resonance at the frequency of the generator, Q . Since the impedance of the parallel resonant circuit is usually quite high compared to 1200 ohms, the detector will show a null, indicating that balance has been restored. The inductance may then be calculated from the known frequency and capacitance.

In the bridge shown in the photographs, the capacitor scale is calibrated both in picofarads and in microhenrys, the latter calibration being for a generator frequency of 7120 kc. This frequency was chosen because it gives the following simple relationship between inductance and capacitance:

$$L \text{ in } \mu\text{f.} = \frac{500}{C \text{ in pf.}}$$

The calibration can be extended to other inductance ranges by using a different generator

* Via Flaminia 695, Rome, Italy.

¹ Doyle, "Amateur Measurement of $R = jX$," *QST*, June 1965.

frequency. For example, if 14,240 kc. is used the 7120-kc. readings will be divided by 4, and if 3560 kc. is used the readings will be multiplied by 4.

In the practical bridge circuit, Fig. 2, provision has been made for balancing out stray capacitances (by means of C_3) and for balancing out the minimum capacitance of the standard capacitor, C_1 (by means of C_2). Three resistance decades, 10–100, 100–1000, and 1000–10,000 ohms, can be placed in parallel with R_4 or cut out entirely, and C_1 may be connected in parallel with either R_4 or R_3 , or disconnected. The parallel components of complex impedances may be measured by using whatever combination of these connections makes the detector show a null.

The way to obtain reliable results with resistance decades is to avoid putting the resistors in series. Using *parallel* resistances reduces stray inductance to a minimum. Stray capacitances are of no consequence since they are balanced out by C_3 . The construction of the bridge is simple, and no special items are required. However, it is preferable to use precision resistors of the metalized variety because the values are accurately known.

How It's Built

The bridge is built on a Masonite panel to which copper sheeting has been added to serve

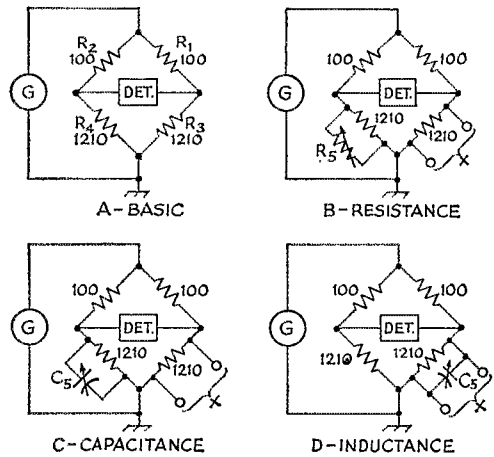


Fig. 1—Basic circuits of the admittance bridge.

as a ground bus for the circuit. The resistors in the decade-switch assemblies, Z_1 through Z_3 , are connected from the switch terminals to the copper plate with short leads, no more than one quarter of an inch in length.

The high-potential X terminal, J_1 , (Fig. 1) and the GEN. terminal, J_3 , are mounted on a Plexiglas plate to reduce losses. For the same

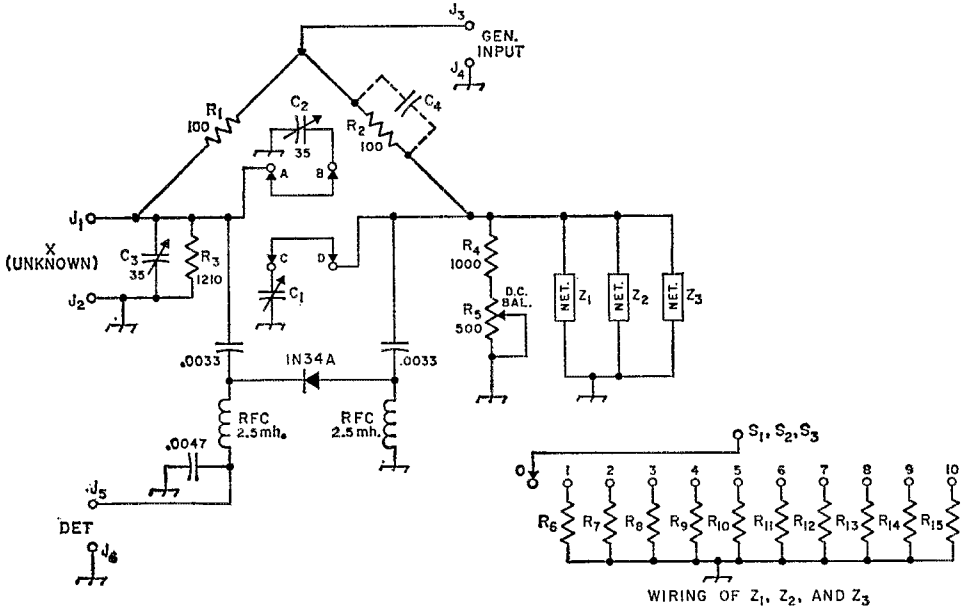
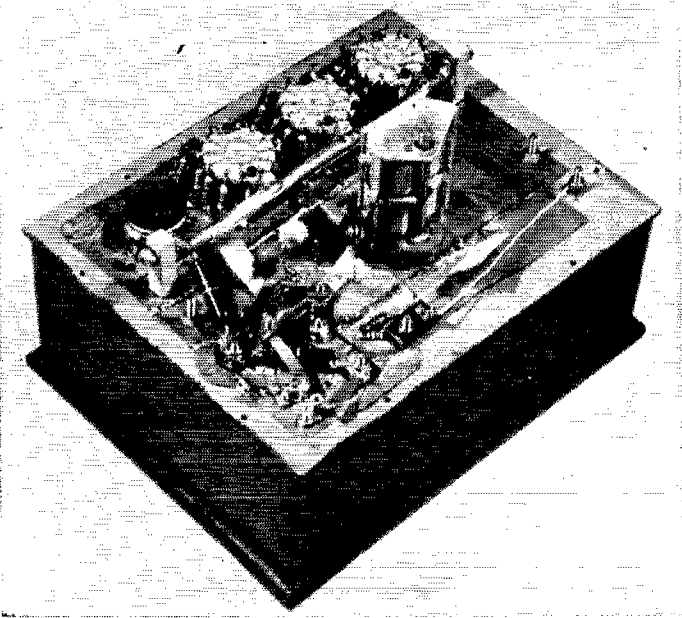


Fig. 2—Circuit of the admittance bridge. Decimal values of capacitances are in $\mu\text{f.}$, others are in pf. ($\mu\text{p.f.}$); fixed capacitors are ceramic. Resistances are in ohms.

- C_1 —App. 500 pf. (value not critical). A dual-section 250-pf. per-section variable such as the Millen 28250 may be used by connecting the sections in parallel.
- C_2, C_3 —35-pf. midget variable or air trimmer.
- J_1, J_3, J_5 —Binding post, red ("hot" terminals).
- J_2, J_4, J_6 —Binding post, black (ground terminals).
- R_1, R_2 —100 ohms. 1 watt composition (see text).

- R_3 —1210 ohms, $\frac{1}{2}$ watt, 1% tolerance, film type.
- R_4 —1000 ohms, $\frac{1}{2}$ watt, composition.
- R_5 —500-ohm carbon control, linear taper.
- R_6 – R_{15} , inc.— $\frac{1}{2}$ -watt, 1%—tolerance film-type. See Table I for values.
- S_1 – S_3 , inc.—Ceramic rotary, 1 section, 1 pole, 11 positions. S_1 is in Z_1 , S_2 in Z_2 , and S_3 in Z_3 .



Internal layout of the bridge showing the conductance decades, Z_1 , Z_2 , and Z_3 at the upper right. R_1 is just to the left of the decades. Capacitor C_1 is in the center of the panel. Strips of copper are used for intercircuit connections to keep lead inductance to a minimum.

reason, the connectors for capacitors C_1 and C_2 (terminals A , B , C , and D) are mounted on the same sheet of insulating stock. Four terminals, mounted at the corners of a square, and two shorting bars are used at A , B , C , and D instead of a switch because I feared that a rotary switch would introduce too much stray inductance. Another attempt to reduce stray inductance in the circuit resulted in the use of a $\frac{1}{4}$ -inch diameter copper bus, fixed to the panel with two ceramic standoff insulators, to which the movable-contact terminals of switches S_1 , S_2 , and S_3 are connected with $\frac{1}{4}$ -inch lengths of $\frac{1}{4}$ -inch wide copper strip. The high-conductance range decade assembly, Z_1 , is mounted nearest to the D terminal of the bridge circuit. Wherever possible, use wide strips of copper for circuit connections, keeping the length of each lead as short as possible. This will help to keep stray inductance to a minimum.

The case for the bridge is a wooden box taken from an old 1925 model radio set. The box is not screened, but I believe that thorough shielding should be recommended to avoid external r.f. pickup.

Testing

During the initial testing it is necessary to ascertain whether a perfect match exists between resistors R_1 and R_2 . This can be checked by connecting a 1.5-volt battery to the generator terminals, J_3 and J_4 , with the negative terminal of the battery connected to J_4 . Next, connect a low-range d.c. voltmeter from terminal A to terminal D . A perfect null should be possible by adjusting R_5 . If R_1 and R_2 are now interchanged, the null should remain the same without changing

the setting of R_5 . If a close match is not obtained, other resistors should be tried. Usually a matched pair can be selected from an assortment of four or five 5-percent resistors. The null should occur when R_5 is near the mid-range setting, and the null position should be marked on the panel for future reference.

The next step is to remove the two shorting bars from terminals A , B , C , and D and connect an r.f. source to J_3 , J_4 . The r.f. generator should be able to deliver five to ten volts of r.f. at the chosen frequency. I used 7120 kc., but 14 Mc. or some other h.f.-band signal can be chosen. Adjust C_3 for a null as indicated by a v.t.v.m. or 20,000-ohms per-volt voltmeter connected across J_5 and J_6 . Now reconnect the jumper bars as in Fig. 1 and set C_1 , the main tuning control, for a near-minimum capacitance. (My bridge uses a minimum-capacitance setting of 20 pf. so that C_1 can be used as a calibrated capacitor for other measurements I may wish to make.) Adjust C_2 for a new null; this is the condition that establishes the "O" setting for C_1 .

If a 28-Mc. generator frequency is used, it may be necessary to add a small capacitance (C_4) across R_2 in order to secure a null. In my case, a 2.2-pf. capacitor was needed at 28 Mc.

Proper operation of the bridge can be checked by measuring an assortment of small resistors and capacitors of known value. If the capacitor has not previously been calibrated, it should be done by comparison with an accurate standard if the builder has access to one. Otherwise, a reasonably-accurate calibration can be made by using 2-percent-tolerance fixed mica capacitors of various values (using as many as are available) within the range of the instrument. The induc-

TABLE I

Assembly	Resistor Value (ohms)									
	R_6	R_7	R_8	R_9	R_{10}	R_{11}	R_{12}	R_{13}	R_{14}	R_{15}
Z_1 High-Conductance Range	100	50	33.3	25	20	16.7	14.3	12.5	11.1	10
Z_2 Medium-Conductance Range	1000	500	333	250	200	167	143	125	111	100
Z_3 Low-Conductance Range	10,000	5000	3300	2500	2000	1670	1430	1250	1111	1000

Table I—Resistance values for the three conductance decades. See Fig. 1 for types used. Off-standard values can be secured by using series or parallel combinations of available units. For example, for 25 ohms, a 27-ohm and a 330-ohm resistor can be placed in parallel. Depending upon the accuracy desired, a value such as 33.3 ohms can be changed to 33 ohms, which is standard.

tance scale can be added by calculation, as outlined earlier.

Using The Bridge

A low-power transmitter can be used as the r.f. generator², but to prevent damage to the bridge, some form of attenuator should be placed between the output of the transmitter and the input of the bridge. The transmitter can be loaded into an incandescent lamp or other dummy load and a small quantity of r.f. picked off the load for use with the bridge. A 2-watt noninductive resistor whose value is between 1000 and 5000 ohms can be inserted between the dummy load and the input terminals of the bridge to get the attenuation needed.

A vernier drive on C_1 will enable the builder to spread the calibration over 360 degrees, which would not be possible with a direct-drive system. I used a capacitor which has a 3:1 vernier drive.

As the three resistance decades are in parallel, the switch calibrations are in terms of conductance rather than resistance. This permits direct addition of the readings to find the actual value being measured. The range of Z_1 is from 0 to 100 millimhos in steps of 10 millimhos (the open position of S_1 is 0); Z_2 covers 0 to 10 millimhos in steps of 1 millimho; and Z_3 covers 0 to 1 millimho in steps of 0.1 millimho. If, for example, the bridge is balanced with S_1 at 1, S_2 at 7, and S_3 at 4, the conductance of the unknown resistance at X is $10 + 7 + 0.4 = 17.4$ millimhos. The conductance reading can be converted to resistance by dividing it into 1000. In this example $1000/17.4 = 57.5$ ohms.

For making resistance and capacitance measurements at r.f. the shorting bars should be as shown in Fig. 2 — that is, one bar from A to B ,

and one from C to D . The capacitor dial and all switches should initially be set at "0", in which case the indicator should show a null before the unknown is connected. After connecting the unknown, balance should be restored by manipulating the conductance switches and C_1 . If the impedance being measured is complex, the bridge indicates the conductance and susceptance, the latter measured in terms of shunt capacitance which can be converted to mhos, if desired, by the formula

$$B = 2\pi fC$$

with appropriate regard for the units (if f , the generator frequency, is in megacycles and C is in picofarads, B will be in micromhos).

If a null cannot be obtained with the shorting bars connected as above, the unknown is inductive. When this is the case the bars should be connected between A and C and B and D , respectively. C_1 then indicates inductive susceptance, which can be calculated from the capacitance reading as above, with the knowledge that it is of the opposite kind to capacitive susceptance. Or the measured capacitance can be converted to inductance (parallel component) by the usual formula relating C and L for resonance at the generator frequency.

When measuring very low impedances it is essential to keep the leads between the bridge and the unknown very short. Otherwise, large errors will be introduced by the lead inductance.

Finally, the r.f. signal should have very low harmonic content. An appreciable harmonic percentage can obscure the null and make exact determination of balance very difficult, especially if the unknown is a complex impedance.

The good results I have gotten from this admittance bridge have been well worth the work it took to build it. If you have frequent need for such an instrument, you will find this circuit easy to build and operate, I'm sure.



²A low-power crystal-controlled oscillator should serve as an r.f. source should the builder wish to have a permanent unit on hand. *Editor.*

The Swiss Quad at ZS6PP

Rotatable Antenna with Phased Elements

This antenna, designed originally by HB9CV, has not yet received widespread attention in the Western Hemisphere. Measurements made by the designer indicate that its performance is superior to the conventional two-element quad, while the structure is much simpler and sturdier.

BY E. P. TOWERS,* ZS6PP

IN a worldwide survey of 60 DX-minded hams,¹ the majority rated the quad as the "Number One" antenna. However, as we all know, this antenna is more difficult to construct and erect than a conventional Yagi beam. It is for this reason, presumably, that it is not in such general use as its reputation would lead us to expect.

After conducting extensive experiments, HB9CV was so successful in simplifying the construction and design of the quad that he filed a patent application in 1960 for an entirely new concept of this antenna, and named it the "Swiss Quad."² Since then, the design of this antenna has been treated in additional articles by others.³ Reference to this previous material is recommended for full information.

In constructing a Swiss Quad for 20 meters, the author found that he had to modify and adapt details suggested by these articles. In response to requests from other hams around the world for information on his design, these notes from his own experience and that of others who have constructed similar antennas are presented. Due acknowledgment is made here to the inventor and to the authors of earlier articles.

Refer to the sketch of Fig. 1 for a general idea of what the Swiss Quad looks like. It differs from the conventional quad electrically in that both elements are driven — with a phase difference of 180 degrees. Construction is simplified by making the horizontal members of aluminum

tubing sufficiently rigid to support the weight of the vertical members, which are made of wire, thereby eliminating the customary spreaders. Additionally, the horizontal members are bent in such a manner as to provide the desired element spacing without the need for a boom.

The author's antenna is fed with coax line and gamma match, as shown in Fig. 2.

Supporting Mast

The vertical members are 230 inches long for 14,250 kc. Thus the supporting mast must be about 20 feet long, plus sufficient length at the bottom for mounting in a rotator socket or tower

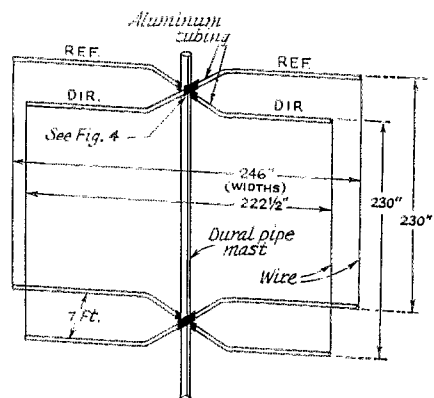


Fig. 1—The Swiss Quad antenna needs no spreaders or boom. Dimensions shown here are those used by the author for a center frequency of 14.25 Mc. See Table I for suggested dimensions for other frequencies.

* P.O. Box 783, Johannesburg, Republic of South Africa.

¹ Ross, "How DX Kings Rate Antennas," *QST*, January, 1964.

² Baumgartner, "The Swiss Quad Beam Aerial," *E.S.G.B. Bulletin* (England), June, 1964.

³ DL-QTC (Germany), October, 1964.

Amateur Radio Bulletin (Australia), April, 1965. *Radio ZS* (Republic of South Africa), August, 1965.

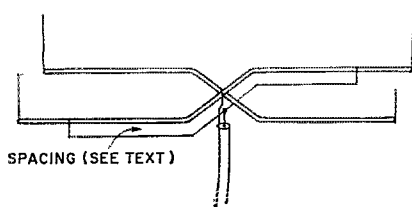


Fig. 2—Matching system for coax line. The outside conductor of the line is connected to the ground lug on the lower element bracket. The center conductor is connected to the center point of the gamma matching section.

bearing. It may also be desirable to add rigidity to the antenna by extending the mast 2 or 3 feet above the top horizontal members so that the outer ends of these members can be guyed to the mast with nylon cord. In any event, it will usually be necessary to splice sections of tubing together to obtain the necessary mast length. A method of splicing that the author found satisfactory is illustrated in the sketch of Fig. 3. Sections of 2-inch 10-gauge dural tubing were used for the mast. Further strength can be added by applying a self-guying or truss system to the mast. However, the author did not consider this necessary.

Mounting Brackets

The horizontal members are fastened to the mast at the cross-over points by means of two brackets (one for the top set, and one for the bottom set). The brackets are made up of three pieces of aluminum or steel angle, as shown in Fig. 4. An alternative that would avoid welding would be to use wider angle stock which would provide space for attaching the element-supporting angles individually to the mast with U bolts and serrated yokes. If this method is used, care must be taken to make sure that the two angle pieces are oriented at exact right angles to each other. (The welded arrangement assures this automatically.)

The antenna elements must be insulated from the brackets. To accomplish this, the author cut sections of flexible 1-inch polyethylene pipe to

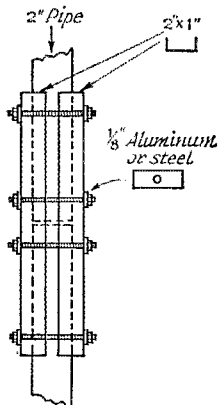


Fig. 3—One satisfactory method of splicing mast sections.

lengths slightly longer than the bracket. The pipe was then slit lengthwise so that it could be spread and forced over the $\frac{1}{8}$ -inch aluminum tubing of the elements. The angles should be notched as shown to allow the clamps (gear-type, stainless steel) to secure the elements firmly. The top bracket can be mounted permanently on the mast before assembling the antenna. Mounting of the bottom bracket should be postponed until later.

Elements

The sketch of Fig. 5 shows the dimensions of the horizontal antenna members used by the author for 14,250 kc. All four members are made identical. Forty-five degree bends are made at equal distances from the centers of a 16-foot length of $\frac{1}{8}$ -inch 18-gauge aluminum tubing which forms the center section. (Borrow a conduit bender from your local electrician, or have

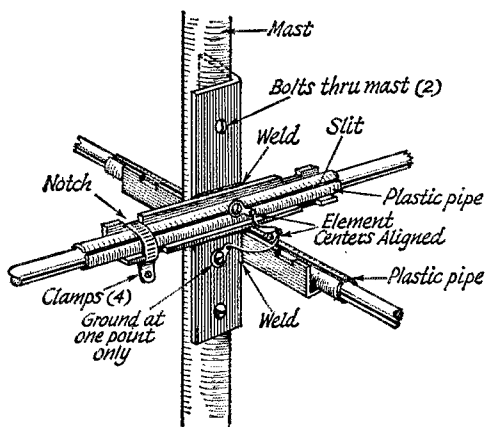


Fig. 4—Suggested mounting bracket for horizontal sections. See text regarding insulation.

him do the job; otherwise, the tubing is sure to kink when the bends are made.) The ends are slit to take extensions of $\frac{3}{4}$ -inch 16-gauge tubing. The junctions are secured with stainless-steel gear-type hose clamps. The ends of the extensions should be flattened and drilled for screws that will be used to fasten the horizontal members and the vertical wire members together. The extensions are not added until final assembly.

Assembly

The assembly can be started by laying the mast, with upper bracket attached, across the tops of a pair of stepladders at least 5 ft. high. Clamp the top pair of horizontal members not too tightly in the bracket while their positions are adjusted so that the members cross each other at their exact centers. Then twist the members in the bracket, if necessary, so that they lie in the same plane, at right angles to the mast. Clamp the members firmly in this position while hole centers are marked at the exact centers, and in the mast bracket, as shown in Fig. 4. Drill the

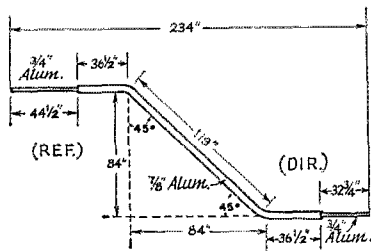


Fig. 5—All four horizontal members are identical. Dimensions shown are for a center frequency of 14.25 Mc. Notice that end extensions are not of equal length. See text for proper orientation in mounting.

holes for sheet-metal screws, attach soldering lugs, line up the members accurately again, and tighten the clamps. Wire the three lugs together with the shortest possible leads. Do not allow the leads to touch the bracket at any point. The author found this precaution necessary to obtain a satisfactory matching adjustment.

The end extensions can now be added, and the telescoping adjusted to give the widths shown in Fig. 1. The two extensions in each element should be maintained at equal length, of course. Give all four ends of the horizontal sections a slight upward bend to help compensate for the weight of the vertical wire members.

The vertical wires can be made of No. 14 copper wire, or stranded wire of equivalent cross section. No. 8 aluminum TV ground wire is also suitable. If solid wire is used, stretch the kinks out, and try to avoid reintroducing them during the assembly. Measure off the vertical lengths shown in Fig. 1. Mark the wires plainly at the measured length, then add several inches for adjustment. Attach the top ends of the wires securely to the ends of the top set of horizontal members. Then spray all connections with acrylic, or apply other suitable protection against corrosion, or loosening of the securing bolts.

At the center of the clearest available space, drive a section of pipe whose inside diameter is slightly larger than the outside diameter of the mast into the ground. Swing the mast vertically and insert the bottom end into the pipe. If an extension can be added temporarily to the mast to bring the lower horizontal members at step-ladder height above ground, so much the better. (It may be necessary to guy the mast temporarily with rope.)

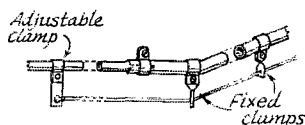


Fig. 6—Matching sections are made of insulated wire supported on aluminum clamps attached to horizontal members. Matching sections should be spaced from antenna elements by about $1/200$ wavelength.

TABLE I

Freq. Kc.	Height	Reflector Width	Director Width	Spacing (0.1λ)
28,500	116	121.5	110	41.3
21,200	156	161	148	55.5
14,150	234	246	222	83.5
7,050	470	493	443	168

All dimensions are in inches, and are based on a design reflector perimeter of 1.148 wavelength, and director perimeter of 1.092 wavelength, suggested as optimum by HB9CV. Width is the overall length of the horizontal members, as indicated in Fig. 1. Height should be adjusted for antenna resonance at the desired center operating frequency.

Temporarily clamp the bottom mounting bracket to the mast, while the mounting and adjusting procedure described previously for the upper set of horizontal members is repeated for the bottom set. Be sure that the longer extensions are on the same side of the mast as those of the upper set, and that the sets are lined up as accurately as possible in the same plane. At the conclusion, give the ends a slight downward bend.

Attach the vertical wires temporarily to the bottom horizontal set at the measured points. Then slide the bottom bracket down on the mast until the vertical wires are reasonably taut, and reclamp the bracket.

Adjustment

The author made the matching section of 3-conductor plastic-insulated electrician's house wire, conductors in parallel. The wire was spaced about $1/200$ wavelength (about 4 inches for 14 Mc.) from the elements by means of a series of aluminum clamps spaced at intervals, as shown in Fig. 6. (In some other instances, it has been necessary to use either wider or closer spacing to obtain a match.) The insulation was removed from the wire only at the ends for connection to the adjustable clamps, and at the center for connection to the feed line. Notice that the matching taps must be made at equal distances from the cross-over point. The distances from the taps to the ends of the horizontal members will not be equal because of the difference in lengths of the reflector and director members.

The matching taps were set initially about halfway between the bends and the ends of the horizontal members. A short length of line terminated in a loop of 2 or 3 turns of wire was connected to the feed point. Resonance was then checked by coupling a grid-dip oscillator to the loop. All four lengths of the vertical wires were then adjusted equally until the g.d.o. showed resonance at the desired center frequency. The bottom bracket was then repositioned to bring the vertical wires taut, and the bracket was fastened permanently in place.

The line was then connected and the matching

(Continued on page 142)

Although the filter described in this article was designed particularly for 10-meter TVI requirements it is, like all low-pass filters, useful on all transmitting frequencies below the cutoff frequency. The circuit is simple and the components are inexpensive.

A TEN-METER HARMONIC TVI FILTER

BY EDWARD E. WETHERHOLD,* W3NQX

THE increasing activity in the 10-meter band is very likely to cause an increase in TVI, because of the large number of color TV receivers now in use and because of their susceptibility to 10-meter harmonic interference. In addition to the picture carrier at 1.25 Mc. above the low edge of the TV channel, the color TV signal also has a color subcarrier region 4.8 Mc. from the low end of the channel. In TV Channels 2 and 6 both these carrier regions are susceptible to 10-meter second- and third-har-

* Honeywell Inc., Annapolis Operation, Test Instruments Division, P. O. Box 391, Annapolis, Maryland 21404

monic interference.¹ Because of this, there is less opportunity to avoid harmonic interference by choice of operating frequency than was previously possible with the black-and-white TV receivers.

For the case of a 10-meter transmitter having excessive second- and third-harmonic radiation, a low-pass filter placed in the 50-ohm coaxial transmission line between the transmitter and antenna is probably the easiest way to obtain the necessary additional harmonic attenuation to eliminate TVI. An article describing the design and construction of such a low-pass filter was presented in *QST* last year²; however, this design was intended primarily to provide high attenuation throughout the entire v.h.f. TV bands and also at 40 Mc., a common TV intermediate frequency. Because of a 50-watt 10-meter power limitation the design was not entirely suitable for general 10-meter use.

In view of these facts, it appears that a new low-pass filter design intended especially for 10-meter application would be useful. In this article a filter is described which requires only two tuned sections and which, in addition to providing 50 db. attenuation at all frequencies above 55 Mc., can also be adjusted to provide more than 65 db. at any particular second or third harmonic of the 10-meter transmitter. The insertion loss in the passband is less than 0.5 db.

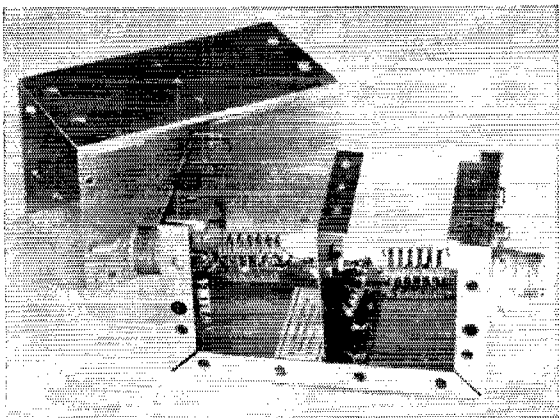
Design Requirements

The second and third 10-meter harmonics fall in the frequency bands of 56.0 to 59.4 Mc. and 84.0 to 89.1 Mc., which also are in the center of TV Channels 2 and 6. To obtain maximum harmonic attenuation, a filter having attenuation peaks at about 57.7 Mc. and 86.5 Mc. is required. The filter cut-off frequency should be several megacycles above 29.7 Mc. to assure that a slight mistuning of the filter will not cause unwanted attenuation in the passband. For this reason, a cutoff frequency of not less than 32 Mc. is desirable. Since the filter is intended to be used in a 52-ohm coaxial line having a low v.s.w.r. the v.s.w.r. caused by the filter should also be low, and a value of about 1.5 for the filter appears reasonable. In addition to the performance characteristics, the filter should be simple and inexpensive to construct. The filter shown in the photograph is suitable for use with transmitters having power outputs up to 200 watts.

¹ Figure 23-3, page 566, *Radio Amateur's Handbook*, 1966.

² Welsh, "An Effective Low-Pass Filter," *QST*, January 1966.

The filter fits easily into a 2¼ × 2¼ × 4-inch Minibox. A center partition has been added to shield the two tuned circuits from each other. C₂ and C₄ are mounted inside L₂ and L₄, respectively. Power may be applied at either end and output taken from the other; the filter is insensitive to direction of power flow.



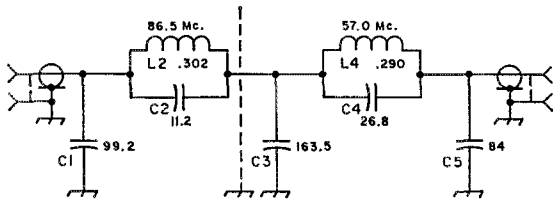


Fig. 1—The filter circuit diagram. Capacitances are in pf. ($\mu\text{mf.}$); inductances are in μh . The capacitors are fixed ceramic, selected as described in the text, and the inductances are made from Miniductor.

Design Procedure

The procedures and tabulated data presented in *Simplified Modern Filter Design*³ were used in the design of this filter. Since two tuned sections and a v.s.w.r. of 1.5 or less were desired, the many available design choices in the book were restricted to those found in Table A4-6, which contain the normalized elliptic-function tabulations for a filter with two tuned sections, a passband ripple of 0.1 db., and a v.s.w.r. of 1.35.

In this table, there are data for eight different filter designs with minimum stopband attenuation (A_s) values ranging from 35 to 70 db. in 5-db. increments. The optimum choice of filter values is made after noting the ratios of the desired filter frequencies, f_{∞} (cutoff frequency), f_1 (No. 1 peak attenuation frequency), and f_2 (No. 2 peak attenuation frequency). These are 32.0/57.7 and 32.0/86.5 = 1/1.8 and 1/2.7, respectively. Examination of the tabulated peak-attenuation frequencies normalized to f_{∞} shows that there are attenuation peaks occurring at 1.765 and 2.682 times f_{∞} for the data associated with a filter having $A_s = 50$ db. For all practical purposes, this is just what is desired! If the cut-off frequency is adjusted to 32.3 Mc., to zero in on the center of the 10-meter harmonic bands, $f_1 = 57.0$ Mc. and $f_2 = 86.5$ Mc. These are sufficiently close to the required peak-attenuation frequencies previously chosen.

To obtain the actual filter component values of the $A_s = 50$ db. filter, the tabulated normalized capacitance values for C_1 through C_5 are multiplied by $1/R\omega$, where $R = 52$ ohms and $\omega = 2\pi f_{\infty}$, and the tabulated normalized inductance values for L_2 and L_4 are multiplied by R/ω . The filter schematic and calculated component values are shown in Fig. 1.

Filter Construction

The inductors for L_2 and L_4 are both obtained from a two-inch length of B & W Miniductor, Type 3002, having a $\frac{1}{2}$ inch diameter and a pitch of 8 turns per inch. Both coils have between $5\frac{1}{4}$ and 6 turns. All capacitors are tubular ceramic Centralab type TCZ (zero temperature coefficient), 600 v.d.c., with a capacitance tolerance of $\pm 2\%$. (These capacitors are listed on page 306 of the Industrial Electronics Catalog No. 67 of Newark Electronics Corporation, Chicago.) The capacitors are connected in series or parallel to obtain the calculated capacitance values

within a few percent. The values of C_1 (99.2 pf.) and C_4 (26.8 pf.) are realized with single standard (100 pf. and 27 pf.) capacitors; however, the values of C_2 , C_3 , and C_5 each require two capacitors. The value of C_2 is most conveniently achieved by connecting two 22-pf. capacitors in series; the value of C_3 is achieved by paralleling 100-pf. and 62-pf. capacitors; and C_5 is achieved by paralleling 22-pf. and 62-pf. capacitors.

The filter is housed in a natural-aluminum Bud Minibox, $2\frac{1}{4} \times 2\frac{1}{4} \times 4$ inches, with an aluminum partition centered in the box to provide isolation between the two tuned circuits. Holes for sheet metal screws are liberally placed around the perimeter of the box and its cover (see photograph) to prevent leakage of the undesired harmonics from the filter. Also visible in the photograph are the angle brackets at each end of the box which provide a base to which the cover ends may be fastened, thus closing the seams which would otherwise be open. It might be possible to eliminate the end brackets by substituting a sheet of aluminum foil taped over the two end seams after the cover is in place.

After the two coils have been cut from the Miniductor stock, center the resonating capacitors inside their respective coils. One at a time, place the tuned circuits temporarily in the box and tack-solder them between the SO-239 connector and the feedthrough connector (Chemelec⁴ Type 69001-0500). Using a calibrated grid dip meter, resonate the tuned circuits at f_1 and f_2 by trimming the Miniductor. The resonating capacitor will have to be unsoldered and resoldered during this process. Although placing the resonating capacitors inside the coils may be questioned as being poor practice, this arrangement is convenient for minimizing capacitor lead length, and the filter performance does not appear to be adversely affected.

The tuned circuit consisting of the 0.290- μh . coil and 26.8-pf. capacitor should be resonated as accurately as possible to 57.0 Mc. to assure good centering of this attenuation peak in the second-harmonic frequency band, and also to assure that no undesired attenuation will be introduced into the 10-meter passband, which would occur if the circuit were resonated inadvertently at a frequency below 55 Mc.

After the tuned circuits have been individually resonated in the box, install them permanently and add the shunt capacitors, C_1 , C_3 , and C_5 . This completes the construction of the filter.

³ Geffe, *Simplified Modern Filter Design*, John Rider Publisher, New York.

⁴ This insulator can be obtained from Newark Electronics Corp., Chicago, Ill. Stock No. 42F554, for 53 cents.

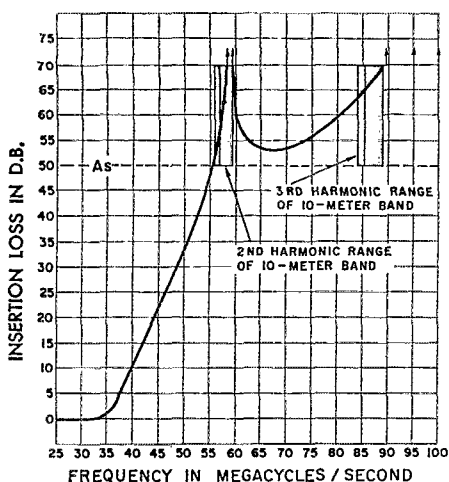


Fig. 2—Measured insertion loss vs. frequency for the filter shown in the photograph. The arrows indicate insertion loss in excess of the measurement capability of the test equipment.

Filter Performance

The filter was evaluated in a 50-ohm system with a frequency counter to provide an accurate indication of frequency, and the resulting insertion loss is shown in Fig. 2. The distinguishing characteristic of the typical double-section elliptic-function filter is evident in the attenuation response by the presence of the two peaks at the resonant frequencies of the tuned circuits.

In spite of carefully tuning the 57-Mc. circuit, it peaked at 59 Mc.; nevertheless, the peak was positioned close enough to the center of the ten meter second-harmonic region to provide the desired attenuation. The actual frequency of the 86.5-Mc. circuit could not be determined with the test setup used, but the 10-meter third-harmonic attenuation is in excess of 63 db. Of particular interest is that the passband attenuation was too low to be measured in the test system employed and the minimum stopband attenuation was in excess of 50 db., as was to be expected when a filter design having a passband ripple of 0.1 db. and A_s of 50 db. was selected.

From measured forward- and reflected-power measurements of 100 and 5 watts with the filter in a 50-ohm system, the v.s.w.r. of the filter was calculated to be 1.58, which is not too far from the theoretical value of 1.35. Actual operating tests indicated that with the coils specified, the filter may be used with a transmitter output power of 200 watts if the v.s.w.r. level on the transmission line is low. At 200 watts, the coils run hot to the touch, but if a larger wire size is used for L_2 and L_4 it may be possible to use a higher power level.

Acknowledgments

The author wishes to thank Harry Lee for performing the metal work in the modification of the Minibox, and in particular the author wishes to acknowledge his gratitude to Philip Geffe for authoring the book which made this filter design possible. QST



Win a Trip Around the World¹

Radio hobbyists all over the world are being invited to participate in a contest sponsored by the Canadian Broadcasting Corporation, Expo 67, Lufthansa, and Radio Amateur du Quebec, Inc.

Based on an extension of "Man and His World," the contest asks participants to think about 'Man and Other Worlds' and requires them to interpret a rather unusual message. It consists of 375 dots and dashes sent continuously without normal telegraphic conventions. Anyone may receive it and licensed amateurs are asked to retransmit the message to others. As an incentive, a second trip around the world prize is offered to the person who transmitted the message to the winner.

What do you do when you have received it? The 375 characters constitute a message in a form which could be from another civilization. It must be translated into a meaningful message and the winner will be the person who does this to the satisfaction of the jury.

There are no requirements of age or nationality. Write out the message and mail it to Box 283 Montreal, Quebec. Include the name and address of

the person you received the message from. The contest closes at midnight GMT, September 30, and mail will be received until midnight GMT, October 10. The winners will be announced at the Youth Pavilion at Expo 67 on October 25. Air travel for the winners is being provided by Lufthansa and expenses for 30 days will be supplied by the CBC.

In case Canadian radio amateurs are wondering about the part of their licence that refers to "coded messages" the Department of Transport has been consulted and has advised that, with the message preamble, the contest does not contravene the regulations. [EDITOR'S NOTE: The contrary is true in the U.S.; FCC rules do not permit its amateur licensees such transmissions.]

— . . . —

1967 QCWA QSO Party Results

Earl Reichman, W8NBK, is the winner this year making him a three-time winner. Earl gets to keep the plaque for good this time. The five highest scores were W8NBK 303, W6ZPX 266, W4BGO 251, W3-EIS 222, and W9VZP 173. A certificate of proficiency was also presented to W8NBK for the most U.S.A. contacts. VE3DU won a certificate for the most contacts made by a foreign QCWA member.

¹ Reprinted with permission from *Electron*, July 1967.

Choosing Batteries for Portable Ham Gear

A Survey of the Booming Small-Battery Market

BY EDWARD P. TILTON, WHDQ*

As far as sources of power for portable work are concerned, amateur radio has turned a full circle. Once we depended almost entirely on batteries. Then, for a long time, we sought methods for avoiding their use. Now, with transistors taking over the burden of portable operation (and doing it with much-improved overall efficiency) batteries are once again a hot item in the ham radio picture.

But with what a difference! In this writer's early work with 5-meter gear it was not uncommon to go mountain-topping with 30 pounds or more of batteries: No. 6 dry cells for filament supply, and up to 180 volts of heavy-duty B batteries — with accent on the "heavy." No wonder we were happy when mobile work with vibrator supplies and genemotors became the order of the day!

Even with all their weight and bulk, dry batteries were none too satisfactory with vacuum tube rigs. Filament tubes were fussy about operating voltage. In the first few minutes everything worked fine, but soon the filament voltage would sag, and with it the filament emission. Efficiency dropped off rapidly, and signal quality and strength suffered. Transistors have changed this situation markedly for the better. Total power drain for a given output is much less, and more important, the actual operating voltage is less critical. There is nothing to be kept hot in a transistor. Sagging voltage, therefore, means only somewhat reduced output. In the 50-Mc. transistor transceiver described in February and March *QST*,¹ receiver performance and signal quality remain unimpaired with as much as a 35-percent change in voltage. There may be a loss of 3 db. or so in power output as battery voltage drops, but the signal remains stable and well-modulated, so the level change is hardly noticeable.

The almost universal switch to transistors for portable electronic equipment and the extensive use of cordless appliances have multiplied the demand for small batteries. Manufacturers are bringing out new types of batteries and improving the old ones. At least five different basic dry cells are now in production, and rechargeable batteries are available in many shapes and sizes. This is something of a bonanza to the portable worker, and especially to the mountain-topping v.h.f. enthusiast.

* V.h.f. Editor, *QST*.
¹ "50-Mc. Transistor Transceiver, Mark II," February and March, 1967, *QST*.

What Voltage?

We have to decide on voltage and power levels before we select specific battery types. For a self-contained transistor rig in the lowest power bracket, up to perhaps 100 milliwatts output, 9 volts is probably optimum. There are several sizes of batteries in this voltage range, or we can make up our own from penlite, C or D cells. If we go no higher than 9 volts we can still use amplitude modulation with most inexpensive transistors, whereas going to 12 rules out some of the best transistor buys where a.m. is involved.

A 12-volt system is attractive for the next step upward in power. We can still use small cells in series if we want light weight, but we have the considerable advantage of being able to plug into the car's cigarette lighter for power, when we're operating from any point that can be reached by road. Then, too, there are some nice rechargeable 12-volt packs, complete with chargers. These are highly reliable, and economical on a long-term basis. A transistor rig like the one referred to above will work well on 9 volts or 12, but if you cut corners on transistor costs you may be stuck with the lower voltage as a maximum. Particularly if you are going to use a.m., take a good look at the maximum-voltage rating of the transistors, before you settle on a 12-volt system.

About Dry Cells

The first practical cell, developed by Georges Leclanche in 1868, was a carbon-zinc affair similar in principle to the flashlight cells we find in every drug, hardware and electrical store today. This basic cell which bears the inventor's name in texts on batteries is still used in most dry batteries. For many ham applications it is hard to beat, when cost, performance and weight are considered with care.

The inventor might not recognize his brain-child today, for carbon-zinc cells are supplied in countless shapes and sizes, singly and in series. There are special electrolytes for high-current and low-current applications, and modifications for use under extremes of high and low temperature. Ingenious mechanical innovations make possible compact and lightweight batteries that Leclanche and other pioneers in the battery field never dreamed of.

The Leclanche Cell has some stiff competition from newer cell designs that look alike externally but have very different electrical characteristics. We will consider each briefly, but first we should

say that there is no truly "dry" cell. All have some kind of electrolyte which is basically a liquid, combined with other substances to produce a gelatinous or semisolid state. They are dry only in the sense that the electrolyte does not slop around in the container. There are also some liquid-electrolyte cells that can be used interchangeably with dry cells, as they have leak-proof cases and the need for gas venting has been eliminated.

Cells are classed as *primary* (electrochemical sources of power, incapable of being recharged appreciably) and *secondary* (storage-type, rechargeable). The principal properties of five types of cells in the "dry" category are summarized below in table form.

It is obvious that there is no one "best" battery or cell. Furthermore, there is no one satisfactory method of rating batteries. You have to examine the nature of the service they are to be called upon to handle. Take our 50-Mc. transceiver again as an example. If you take it on an occasional Sunday afternoon walk, and operate no more than a few hours at a time, the chances are that the ubiquitous hardware-store D cell will be your best buy. The transmitter's peak drain at 12 volts, about 300 ma., is well within their capabilities for the short periods that a ham transmitter is actually on the air at such times. The receiving drain, some 30 ma. or so, is nothing to a set of D cells. Under occasional use of this sort, the recuperative powers of D cells will keep you in business for many pleasant outings, at very moderate cost.

Cell Name	Type	Voltage*	Distinguishing Properties
Carbon-Zinc	Pri.	1.5	Low cost. Available in many types, everywhere. Recuperative. Voltage drops gradually with use. Limited temperature tolerance, high and low.
Alkaline-Manganese &	Pri.	1.5	Good for high-drain uses. Wide temp. tolerance. Long shelf life. Higher unit cost.
Mercury	Pri.	1.35, 1.4	Near-uniform voltage through useful life. Good at high temp., poor at low. Long shelf life.
Silver-Oxide	Pri.	1.5	Uniform voltage. Good at low temp. Excellent shelf life. Superior for very small cells.
Nickel-Cadmium	Sec.	1.25	Excellent performance; long life. Low cost-per-hour over long term.

* No-load voltage. Operating voltage under recommended load about 10 percent lower.

For work around the clock in a v.h.f. contest your choice may be different. Mercury cells will give you uniform power output, and last at least three times as long. They'll cost three times as much, but this may not be a factor in your choice of them. Alkaline-manganese cells are capable of up to ten times the total power drain of D cells of the Leclanche type, especially in constant heavy-current applications, and the cost is much less than ten times as much. The alkaline-manganese cell is also available in types that can take considerable recharging.

Still considering the same load, if you are willing to make a fairly high initial investment you can get wonderfully dependable service from a nickel-cadmium battery pack and a charger. Put it on the a.c. line the night before you leave on your trip, and it will carry you through many hours of heavy-duty operating, with practically uniform voltage level. For frequent portable work with fairly heavy current drains the nickel-cadmium battery may give you the lowest cost per hour.

Maybe you're thinking of a wrist radio, a la Dick Tracy. Such devices are much more than far-fetched cartoon creations today, thanks to the transistor and the silver-oxide cell. The latter excels in terms of milliwatts per cubic inch. It is fine for small low-drain devices such as electric watches and hearing aids, and may have ham applications as a bias source, among other things.

What Size Cell?

The voltage of a cell depends on its chemical makeup, not its size, but its power-delivering capability is related to size. Again, as with cell type, we cannot say that any one size cell is "best." Which will serve us best depends on space and weight limitations, intended load, and type of service. For purposes of comparison we'll consider three readily-available sizes, the penlite or AA cell, the C (medium-size) and the D (large-size) flashlight cells. Others can be estimated by their relative size, for a given cell makeup.

In the carbon-zinc cells (the kind everybody has in stock) the AA cell has a recommended maximum current drain of 25 ma. The C cell is most useful for under 80 ma., while the D size is recommended for loads up to 150 ma. This is not to say that you can't use penlite cells at 100 ma., or D cells for anything from 1 ma. to 1 ampere. It depends on how much stress you place on weight, long life and other factors. The tables below, taken from information supplied by Union Carbide (Eveready) will help you to make an intelligent choice. This manufacturer sums it up thus: "The ampere-hour capacity of a Leclanche Cell is not a fixed value. It varies with current drain, operating schedule, permissible minimum voltage, temperature, and storage period of the cell prior to use."²

² "Eveready Battery Applications and Engineering Data," Union Carbide Corp., 270 Park Avenue, New York 10017. Price \$4.95.

ESTIMATED HOURS OF SERVICE
AT 70° F

A.A. Cell

Schedule Hrs./day	Drain Ma.	Minimum Permissible Voltage		
		0.8 v.	1.0 v.	1.2 v.
2	2	350	300	250
2	10	54	43	32
2	50	5.5	3.5	1.1
4	2	310	270	220
4	10	49	40	28
4	30	10	7.8	3.4
12	2	320	260	200
12	10	48	37	24
12	30	9	5.9	2.9

C Cell

2	10	275	220	140
2	30	100	74	60
2	100	23	17	7.8
4	10	310	240	
4	30	96	68	
4	100	20	10	
12	10	330	250	180
12	30	90	64	30
12	100	18	8	3.5

D Cell

2	30	210	175	135
2	100	57	45	29
2	300	11	7	2
4	30	220	185	125
4	100	50	36	22
4	300	8	3.5	2
24	30	200	115	65
24	100	32	18.5	9.6
24	300	6	3.5	2

Union Carbide and others offer at least four different carbon-zinc cells in some sizes, for applications such as photo-flash, high-temperature, low-temperature and continuous-duty service, in addition to the general-purpose cell for which the table figures apply.

Alkaline Cell Performance

Rating of alkaline and mercury cells is not so complex, as the nature of the load has less effect on their capacity in milliamper-hours. Here is what can be expected from an alkaline penlite cell, in hours of life, for any service from continuous operation on down:

Drain Ma.	Minimum Permissible Voltage	
	0.8 v.	1.0 v.
10	190	155
30	59	45
150	8.5	5.3

It can be seen from comparison with the carbon-zinc table that in continuous use, or nearly so, an alkaline AA cell lasts about 4 times as long at 10 ma., and more than 6 times as long at 30 ma. It would be unwise to attempt much work with 150-ma. loads with conventional cells, but with the alkaline penlite cell the operating life reaches practical figures.

An alkaline D cell would have no economic advantage at a 30-ma. load, and would be just beginning to pay off at 300 ma. Its cost per milliamper-hour of life would be best in heavy service at 500 ma. or more.

Rechargeable Alkaline-Manganese Cells

A secondary cell of the alkaline-manganese type is a fairly recent outgrowth of research with alkaline cells. It cannot be recharged almost indefinitely, in the manner of the nickel-cadmium or lead-acid battery, but its relatively low initial cost may make it attractive for some applications. An alkaline secondary D cell has a 2-ampere-hour rating, when discharged at a 500-ma. rate to an operating voltage of 1.0. It should be recharged to something around 25 percent more than the amount withdrawn. The recommended charging rate is 250 ma.

When used in roughly this way the cell can be recharged 25 to 35 times before its operating voltage will drop below 0.9 in any 4-hour discharge period. It has a very large reserve in the early phase of its useful life, but this reserve capacity drops off with repeated charging, or use for very heavy current drains. The extent of useful life depends to a considerable degree on how critical the application is as regards operating voltage. In operation of a transistor transceiver where the actual voltage is not too critical, secondary alkalines might prove to be quite economical for the fellow who uses his rig frequently.

Rechargeable alkaline batteries are available in several sizes and voltages, the minimum cell size being the D type. Two larger cells have ampere-hour ratings of 3.2 at 0.8 amp. and 4.0 at 1.0 amp., using 1.0 as the terminal voltage.

Qualities of the Mercury Cell

As previously stated, an outstanding feature of the mercury cell is its almost constant operating voltage throughout useful life. Because of this, and its freedom from the need to recuperate in the manner of other primary cells, its performance potential can be stated clearly in milliamper-hours, almost without regard to the type of service. There is some relation between the cell size and the maximum recommended current drain, but this is much less critical than with other types. The suggested current range for a mercury penlite cell, for example, is 0 to 200 ma. When discharged to 0.9 volts under a 25-ma. drain this cell has a service capacity of 2400 ma.-hours. This will vary slightly for other drains up to 200 ma. or so.

Mercury D cells are recommended for currents up to one ampere, and at 250 ma. they have a

14,000-ma.-hour rating. It can be seen from this that seven or eight mercury D cells in series would keep our 50-Mc. transistor transceiver running at full tilt for a long, long time. Of special interest is the discharge curve for a mercury D cell at a 250-ma. load, Fig. 1. Note that the operating voltage has dropped off only 0.2 volt after 40 hours of service, and only 0.3 volt after nearly 60 hours. Now 250 ma. is the peak load our 50-Mc. transistor rig draws at around 10 volts, and it draws this only at peaks of modulation. Then, remember that the transmitting load is on only a fraction of the total operating time, and you begin to see the true potential of the mercury cell for v.h.f. mountain-topping. One set would take an avid enthusiast through a whole summer of weekend operating, with near-uniform performance, whereas carbon-zinc cells would be done-in after heavy use in one contest session.

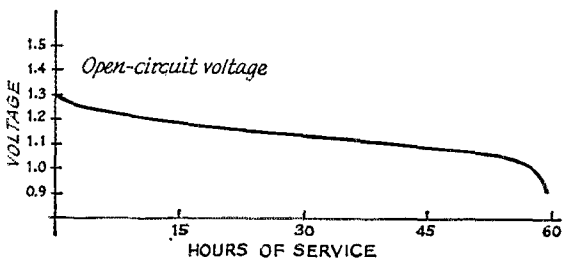


Fig. 1—Operating voltage of a Mercury D cell when connected to a load with an initial current of 250 ma. Note that the cell voltage is above 1.0 out to nearly 60 hours of continuous duty. In amateur service the load is nearly always intermittent, so operation of equipment like the 50-Mc. transistor transceiver used as an example in this discussion would be spread over many outings.

Mercury cells are made in many sizes, and packaged in many voltage combinations. The cells are also made with a choice of two electrolytes. One has an open-circuit voltage of 1.35, and is intended for voltage-reference work. It has almost perfect uniformity of voltage, out to nearly the end of life, at low current drains. The other, more-used, has an open-circuit voltage of 1.4. Its discharge curve, shown in Fig. 1, is still very much flatter than that of other primary cells. The polarity of a mercury cell is opposite to that of other types of cells of similar physical appearance.

There is really only one thing to watch for with mercury batteries: don't plan on using them in cold weather for anything but very light drains. They just about stop working below 40 degrees Fahrenheit. Carbon-zinc cells are also restricted as to temperature, though not so severely. For very wide temperature ranges the alkaline cell is very superior, among moderately-priced power sources.

Silver-Oxide Cells

If your problem is the maintenance of a constant voltage at currents from a few micro-

amperes to perhaps 10 ma., the silver-oxide cell is for you. This "1.5-volt cell" has an operating voltage of 1.5, and it stays that way until its curve reaches the brink of drop-off. A silver-oxide pellet about $\frac{1}{2}$ inch in diameter and less than $\frac{1}{4}$ inch high will deliver a substantially constant voltage of 1.5 at a drain of 1.5 ma., for 60 hours. At 2.5 ma. the voltage is a shade lower, but constant for 40 hours. At 100 microamperes an even smaller cell delivers 1.5 volts with a curve as flat as a tabletop, for 1000 hours of service.

The Nickel-Cadmium Battery

Draw up your own list of desirable characteristics for a portable source of d.c. power. When you're through you will have come close to describing the nickel-cadmium battery. Ni-cad cells have been used extensively for more than 50 years as unsealed batteries, but recent developments have made possible a sealed version with the same qualities. They will stand considerable abuse, work well at low temperatures, and are not harmed by over-charging or being left run-down. Voltage is relatively constant under various loads, and throughout the discharge cycle. Naturally, they are expensive initially, but their long life and universal applications make them an attractive investment for the amateur who is going to do a lot of field work.

Nickel-Cadmium batteries are available in an almost infinite variety of package shapes and sizes, with capacities of 20 milliampere-hours to 23 ampere-hours. One large company lists 58 cell designs, and then combines some of these in packages delivering 6, 9 and 12 volts at normal operating levels. For purposes of comparison with other cell makeups we'll stick to the familiar AA, C and D sizes.

There are minor variations in size and capacity within the various categories, but the ampere-hour capacity of the AA cell is about 0.45, for the C cell 1.2 and the D cell 2 plus. Obviously a charged-up stack of D cells (or a packaged equivalent thereof) will take our 50-Mc. transceiver through a solid weekend of operation. C cells would do for most excursions, and even the penlite (AA) size is practical, if you don't mind recharging a bit more frequently.

Recommended charging rates are related to size. Battery capacity in ampere- or milliampere-hours is usually quoted for a 10-hour discharge period. The recharge cycle should be at about the same rate, but for roughly 13 hours. Example: The AA cell with a 450-ma.-hour capacity has a 10-hour discharge rate of 45 ma. It should be recharged at no more than 45 ma., for about 13 hours. Similarly, a C cell with 1.2-ampere-hour capacity should be recharged at a maximum current of 120 ma.³ Longer charging at lower rates is permissible, and the cell will not be harmed by excessive time on-charge, so long as the charging rate is kept below the rated maxi-

³ Burgess Engineering Manual, Burgess Battery Company, Division of Servel, Inc., Freeport, Illinois. Price \$1.00.

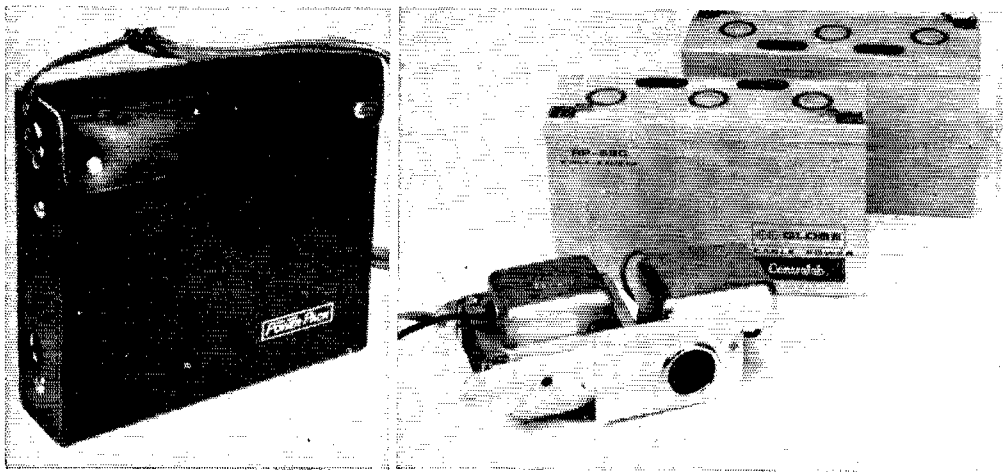


Fig. 3—A new 12-volt battery and charger pack, complete with leather carrying bag, delivers currents up to 4 amperes with an 8-ampere-hour capacity.

mum. A ni-cad cell is not hurt by being left discharged, and it is tolerant of wide temperature excursions.⁴

Chargers

The battery can be recharged from any d.c. source of voltage higher than the rated voltage of the battery, provided a suitable limiting resistor is connected in series with the load. If your portable battery is 12 volts or less you can charge it from your car's cigarette lighter, on the way to your portable operating site. A very simple charger for a.c. line use can be made to take along on extended trips, or to be used at home. It need be no more than is shown in Fig 2.

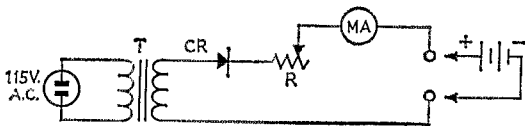


Fig. 2—Simple battery charger circuit. This arrangement using a halfwave rectifier is suitable for charging currents up to about 0.5 ampere. A full-wave bridge rectifier is recommended for higher currents. Information on component values is given in the text.

The secondary a.c. voltage of the transformer, T, should be about twice the d.c. voltage of the battery, and the current rating about twice the desired charging rate. The diode, CR, should have a current rating greater than the intended charge current, and its p.i.v. rating should be 1.4 times the a.c. secondary voltage, plus the battery voltage. The resistor, R, may be made variable if different battery voltages are to be taken care of, or it can be arrived at experimentally by checking for the value which will yield the desired charging current when the system is connected to a discharged battery. The meter is

⁴ For more detail on Ni-cad batteries, see Craven — "The Nickel-Cadmium Cell," July, 1965, *QST*, p. 82.

desirable, as a check to be sure that the proper current is being maintained, but it could be made plug-in and used mainly for set-up purposes. More information on chargers and charging methods may be obtained from battery manufacturers.^{2,3}

Battery-and-Charger Packs

Use of battery-powered appliances, broadcast receivers, TV sets and whatever has made a considerable market for battery-charger combinations. One unit recently put out for this market is the Centralab CRL-1200 Power Pack, shown in Fig. 3. This is a 12-volt 8-ampere-hour lead dioxide battery, with gelled electrolyte, equipped with a charger designed especially for the battery.

This pack is capable of supplying intermittent loads as high as 40 amperes (480 watts) for brief intervals. It also works well with low drains, and is claimed to be markedly superior to the nickel-cadmium battery as to self-discharge in storage. Its high-current qualities make it usable for portable power tools, or short-term use of moderate-power ham rigs designed for mobile service. It will power an SR-46 or a Communicator III for an hour or so, for example, and most 12-volt sideband setups that are all or mostly transistorized are well within its capability.

The battery units are the maker's RP-680 6-volt packs. These fit one above the other in a leather pack, with built-in charger. Also of interest is the RP-626, a 2.6 ampere-hour 6-volt unit which is an exact replacement for four D cells in physical size.

The 12-volt pack, as shown, weighs 9.5 pounds, which is twice the total weight of our transistor rig, but for easy walks not too far from car transportation it is no problem, what with its convenient shoulder-sling design. Fully charged, it would run the 6-meter rig (on *transmit*) continuously for 40 hours!

(Continued on page 144)

Technical Correspondence

GATE-DIP OSCILLATOR

Technical Editor, *QST*:

Next to a v.t.v.m., probably the most useful test instrument for the amateur experimenter is the grid-dip oscillator, or one of its variations. In the past few years, several solid-state versions of the g.d.o. have appeared in the literature and commercially. Although the convenience of battery operation is an advantage of the transistor units, their performance has not been comparable with the more classic tube circuits. This is because the transistor oscillator must be forward biased for its operation, while the tube units run at a bias level which is dependent upon the amplitude of the oscillation. The tube oscillators take advantage of the d.c. characteristics of the active device, as well as the properties of a marginal oscillator.

The performance of a tube unit along with the convenience of the transistor oscillator may be realized simultaneously in a solid-state circuit utilizing a junction field-effect transistor. The "gate-dip oscillator" used by the writer is shown in Fig. 1. The dual variable capacitor is a typical transistor radio type with the larger capacitance section (130 pf.) used on the gate side of the tuned circuit. A dual-section 365-pf. variable has also been used in a breadboard circuit. Plug-in coils are used to cover the range of 3 to 200 Mc. A sensitivity control has been found to be unnecessary. In the author's unit, a remote v.t.v.m. is used in preference to a built-in meter. However, a 200- μ a. meter in series with the 47K gate-leak resistor would provide similar results.

The extreme simplicity and overall good performance make this circuit very attractive for the

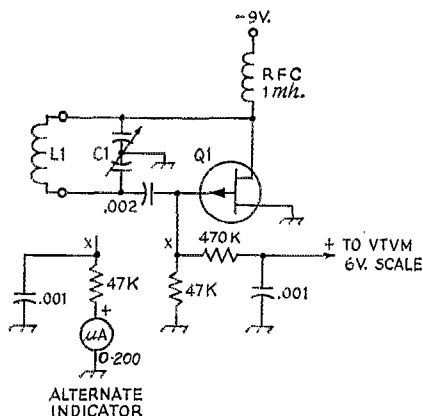


Fig. 1—"Gate-dipper" circuit. Resistances are in ohms (K=1000); capacitances are in μ f.

C₁—Dual-section variable; see text.

L₁—Plug-in coils for required ranges.

Q₁—P-channel junction FET (Fairchild 2N4342, 2N4360 etc.).

experimenter. Further, it may be feasible to convert an old-fashioned tube unit to a more desirable solid-state circuit with a minimum of effort.—*Wes Hayward, W7ZOI, 1801 11th Ave. N.W., Puyallup, Washington 98371.*

INDOOR DIPOLE

Technical Editor, *QST*:

It is becoming quite evident that both newcomers, like myself, and old-timers living in apartments are experiencing some problems with antenna systems. As most landlords are *extremely* reluctant to allow quads, beams and verticals and, in an unfortunately large number of cases, even dipoles and "invisible long-wire" antennas, several articles have been written dealing with "indoor-outdoor" antennas such as the "windowsill vertical."¹

I, too, am faced with the seemingly insurmountable problem of living in an apartment where any permanently-mounted outdoor ham antenna is strictly verboten. To compound the problem, the screens in our apartment windows do *not* slide up or down and furthermore can not be removed without being damaged. Naturally, the landlord looks with disfavor on holes being punched in his screens. Consequently, I have been literally forced to utilize an indoor dipole.

The dipole is simply constructed. The feed line is a section of RG-8/U soldered to a 10-foot section of RG-59/U (used from floor to ceiling—about 7 feet—due to its much lighter weight). The dipole runs at right angles from each side of a glass insulator and ends in a fold as shown in Fig. 2. It is attached to the wall by a piece of string, a seemingly crude (but efficient and lightweight) insulator, and a picture hanger. The dipole uses No. 14 wire and is initially constructed for 10 meters. Extensions for 15, 20

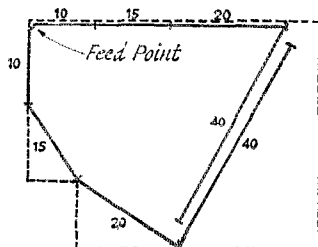


Fig. 2

and 40 meters are built on in series by using No. 14 wire. Each extension is attached to the preceding one by an alligator clip. In this fashion one can easily switch from 40 to 10 meters simply by removing two clips.

Obviously, very few rooms will be large enough to support a straight 40-meter dipole, and mine is certainly no exception. The dipole actually is allowed to fold back upon its other leg but operates quite well. Although the layout would appear to be inefficient, I have managed to get halfway to DXCC, including several countries worked during a DX contest where I had to compete for QSOs against stations with beams and linears.

So take heart, all you apartment dwellers!—*Michael A. Lintner, W13BGV, Stratford Apts., L-10, Shipley & Naamans Rds., Wilmington Del. 19803.*

(Continued on page 138)

¹ McCoy, "A Windowsill Semivertical," *QST*, June, 1967



Hints and Kinks

For the Experimenters



MOBILE ALARM

WITH varying degrees of merit, many ideas have been offered for the protection from theft of mobile transceivers. Some of the suggestions have proved to be rather expensive for the average mobile operator, and other ideas have been found to be ineffective since in many cases the transceiver could have been removed by the time the alarm sounded. In addition, many amateurs have been reluctant to install systems wherein the horn or alarm continues to sound after once being activated.

Imagine that you and your XYL or YL are enjoying a show or dinner when a break is attempted. A policeman or some other well-intentioned passerby will probably raise the hood and disconnect the horn relay wire if he can find it or start yanking at other wires until the alarm stops. What a mess when you return to the car!

If he has a mind to do so, the policeman could decorate your windshield with a ticket for unnecessary horn-blowing, and this could mean a ten- to fifteen-dollar fine. Meanwhile you have no protection until you return to the car and reconnect the loose wires and reset the alarm.

The ideal protection system is one which is actuated before the sneak thief has the opportunity to remove partially or wholly the equipment he is trying to steal. The following suggestions overcome the disadvantage of the alarm sounding continuously or for long intermittent periods until turned off manually.

Visit your nearest electronic parts distributor and ask for a Tapeswitch ribbon switch type BP. This device is $\frac{9}{16}$ inch wide by $\frac{3}{32}$ inch thick and can be purchased in various lengths up to 120 inches. It will close a circuit when a pressure of only eight ounces is applied at any point. Each "press-at-any-point" ribbon switch is supplied with 18-inch leads.

Solder an 18-gauge insulated flexible wire to each lead. Then place the ribbon switch under the width of the seat covers. Next, connect one side of any good toggle switch to one lead of the ribbon switch and connect the other side of the toggle switch to the ground side of the horn relay. Attach the remaining lead from the ribbon switch to the other side of the relay. The toggle switch can now be concealed in any convenient location such as under the dash or hood. When you leave the car, throw the switch on and you are in business.

When the thief sits on the seat, the weight of his body will activate the ribbon switch, and the horn or alarm will sound off loud and clear just as long as he stays in the car. Since a sneak

thief needs to work quickly and quietly, he will take off like a bird when the horn sounds.

An alternative system, but one not as sure, uses a "press-at-any-point" switching mat, model CVP 623. The mat measures 6 inches wide by 23 inches long and is $\frac{3}{8}$ inch thick. It is supplied with 18-inch leads and requires only 5 pounds of pressure to activate. This mat can be placed under your present car mat and the leads run in the same manner as the ribbon switch.

The total cost of a 24-inch ribbon switch should be under \$4.00 and the switching mat should not run over \$6.00. — *A. J. Peterson, W2MPS*

MOUNTING AIR-WOUND COILS

MOUNTING commercial air-wound coil stock can often times be a difficult task, especially if rigidity of the assembly is important. Fig. 1 shows how a piece of insulating board or unclad circuit board can be snug-fit into the inside of a piece of coil stock. The board is installed just above or below opposite pairs of polystyrene ribs. A sufficient amount of the board is allowed to protrude from each end of the coil to permit steatite insulators to be used as mounting feet for the entire assembly. Epoxy cement can be used to secure the board in place. In the model shown, a link was made from larger-diameter coil stock than the main coil and cemented in place over one end of the inductor. — *WICER*

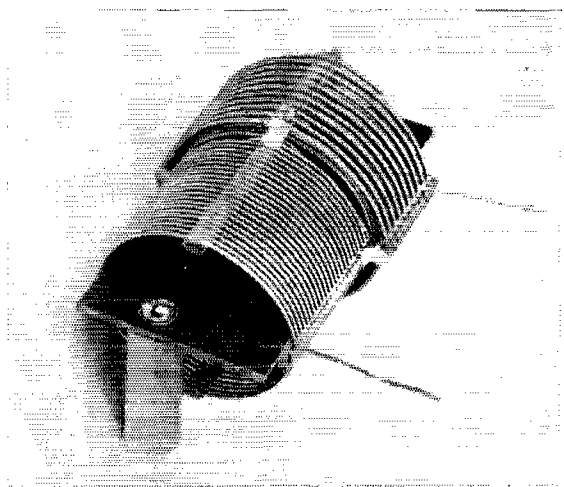


Fig. 1—WICER's method of mounting air-wound coils.

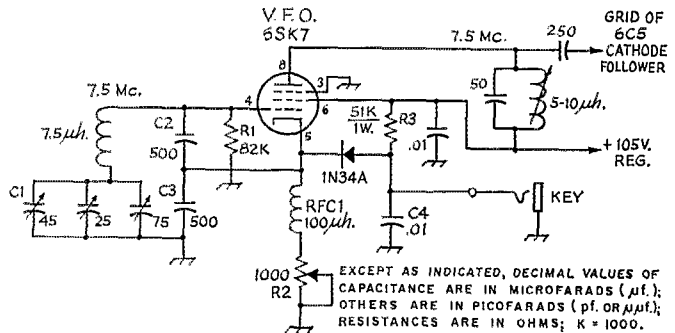
OSCILLATOR KEYING

OBTAINING satisfactory oscillator keying has its problems as pointed out in the *Handbook* section on that subject. Cathode, blocked-grid and screen keying of the writer's 7- to 7.5-Mc. v.f.o. all produced detectable chirp at the fourth harmonic. Even more bothersome was the cyclical heating and cooling of the oscillator tube caused by the cathode current change from zero milliamperes with the key up to ten milliamperes with the key down. This was evidenced by a slow drift in frequency during the first thirty seconds of each transmission until the oscillator temperature stabilized at a new value. Although operation of the oscillator at low screen and plate voltages with a high value of grid-leak resistance minimized these difficulties, it did not eliminate them.

The keying system shown in Fig. 2 solved the chirp and cyclical drift problems. Plate current, screen current and hence total cathode current remain unchanged during key-up and key-down conditions. The oscillator is a conventional series-tuned Colpitts in an electron-coupled arrangement. With the key up, the 1N34A diode is biased in the conducting state, effectively putting C_4 in parallel with C_3 . This reduces feedback below the value needed to sustain oscillations. When the stage stops oscillating, no grid current flows and grid-leak bias becomes zero. However, the flow of current from ground to B-plus through cathode resistor R_2 , RFC₁, the 1N34A diode and R_3 biases the cathode sufficiently to limit tube current to the normal operating value. When the key is depressed, the 1N34A diode is biased in the nonconducting state, C_4 is effectively disconnected from the cathode, and feedback increases to its normal value causing oscillations to begin. Grid-leak bias rises to its normal value also, but simultaneously the cathode bias is reduced by the cutoff of diode current. The value of R_2 is adjusted experimentally to produce no change in total tube current between key-up and key-down states.

With thermal dissipation held constant, no change in oscillator frequency results from extreme changes in the duty cycle. Other precautions of good v.f.o. construction must be observed, of course. — Charles E. Rüter, WB2ZNT

Fig. 2—Circuit diagram of WB2ZNT's keying system. C_1 is a negative-temperature coefficient ceramic trimmer and C_2 and C_3 are silver mica. Other fixed capacitors are disk ceramic. R_1 is ½-watt composition and R_3 is 1-watt composition. R_2 is a linear taper control. RFC₁ is 100 μ h.



AMPLIFIED A.L.C. FOR THE HT-32B

THE amplified a.l.c. circuit shown in Fig. 3 can be used to prevent flattening in the final amplifier stage of the Hallicrafters HT-32B transmitter. This circuit is essentially the same as that used in the HT-46 and described on pages 45 and 46 of *QST* for August 1966.

In my unmodified HT-32B, flat-topping would occur at an audio level control setting of 2 or higher. After installation of the amplified a.l.c. circuit, the level control could be turned up to 6 before the final amplifier started acting up.

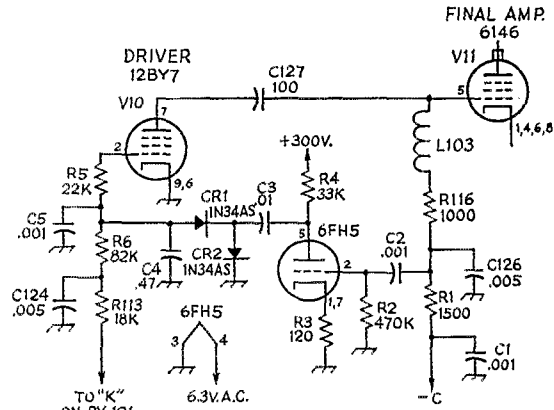
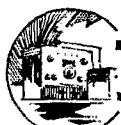


Fig. 3—Diagram of the amplified a.l.c. circuit WA3HLW added to his HT-32B. C_{124} , C_{126} , C_{127} , L_{103} , R_{113} , R_{116} , V_{10} and V_{11} are original parts. Resistances are in ohms ($K=1000$) and resistors are ½ watt. Decimal-value capacitors are in μ f. and others are in pf. Capacitors are ceramic except for C_4 which is paper tubular.

Although it would be nice if the level control could be used over its full range, I find that with my microphone I never turn the control beyond a setting of 6, since background-noise pickup becomes objectionable above this point.

The entire assembly including tube and socket are mounted under the chassis on spare lugs of the terminal strip immediately forward of choke L_{127} . R_5 and R_6 replace the original 100,000-ohm driver grid resistor, R_{111} . The rest of the wiring is straightforward and should be obvious from the schematic. — M. E. Lundfelt, WA3HLW

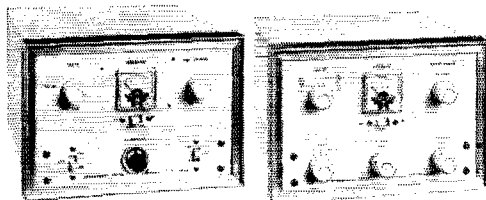


Recent Equipment



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

International Crystal SBX-9 S.S.B. Exciter and SBA-50 Mixer-Amplifier



For the 6-meter enthusiast interested in venturing on s.s.b., there are now at least six different commercial setups to choose from. The usual offering is a complete transceiver, but many amateurs have suitable receivers that they don't wish to duplicate. Some hams have a so-so interest in the 50- to 54-Mc. band and others don't have too much money to invest in sideband gear. A possible answer for many of these people is the International Crystal SBX-9.

The SBX-9 Exciter

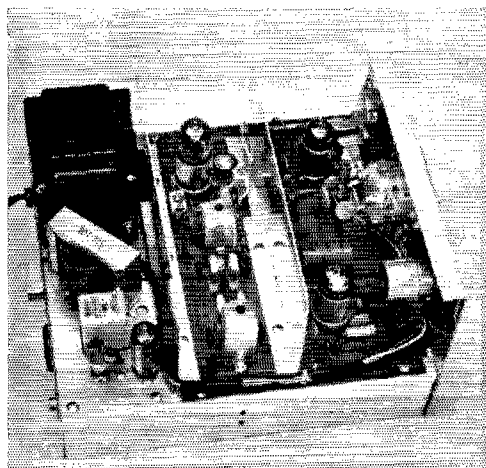
The SBX-9 is a 9-Mc. crystal-controlled filter-type s.s.b. exciter that is capable of both upper and lower sideband output. It develops sufficient excitation (0.5 volt r.m.s. across 50 ohms) to fully drive a 6-meter mixer-amplifier such as the International Crystal SBA-50, but since the SBX-9 operates at 9 Mc. rather than

50 Mc., its use is not restricted to the 6-meter band. It can be mated with a suitable mixer-amplifier to provide s.s.b. capability on the lower frequencies. An example of such a setup is shown in Fig. 1. Here a 5.0- to 5.2-Mc. v.f.o. is used to heterodyne the 9-Mc. s.s.b. output of the SBX-9 to 3.8 to 4.0 Mc.

The SBX-9 is diagramed in block form in Fig. 2. Depending on whether upper or lower sideband operation is desired, either an 8998.5-ke. or a 9001.5-ke. crystal is switched in the grid circuit of the carrier oscillator, V_2 . The oscillator output is fed to the control grid of a 7360 balanced modulator, V_3 . Arriving at the deflection plates of V_3 is the modulating signal from a high-impedance microphone and two stages of audio amplification. The double-sideband suppressed-carrier signal developed in the plate circuit of the balanced modulator is fed into a four-crystal half-lattice filter (two half-lattice sections connected back-to-back) which clips off the unwanted sideband. With this filter and balanced-modulator, the exciter is rated to have 45 db. or more of carrier suppression and a minimum of 40 db. of unwanted-sideband suppression. From the filter the desired sideband goes to the grid of a fixed-tuned linear amplifier, V_4 . The output from V_4 is link coupled to a phono jack on the back of the exciter chassis.

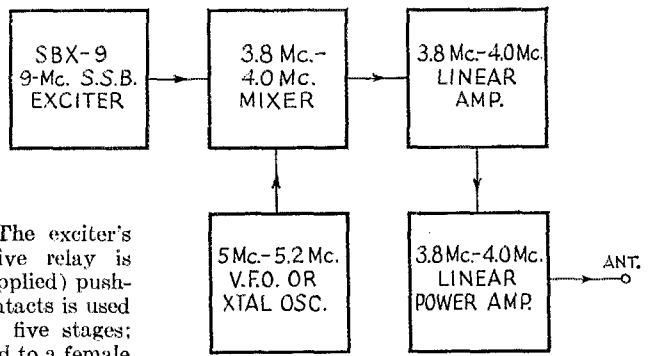
The high-voltage section of the power supply employs a semiconductor full-wave rectifier followed by a pi filter. A half-wave rectifier and a filter capacitor are used with the 6.3-volt filament winding to provide d.c. voltage to operate a push-to-talk relay. The exciter is protected by a 2-ampere push-to-reset circuit breaker in one of the primary leads of the power-supply transformer.

There are only four switches, two potentiometers, one meter and a microphone connector on the front panel of the SBX-9. The on-off switch is mounted on the back of the MIC GAIN control. Advancing the control turns the power supply on and increases the level of signal reaching the grid of the second audio amplifier once



Top view of the SBX-9 exciter. The carrier oscillator and audio stages are at the right, the balanced modulator and crystal filter are in the center, and the linear amplifier and power supply are at the left.

Fig. 1—An example of how the SBX-9 exciter can be used to obtain an s.s.b. signal in the 3.8- to 4.0-Mc. range.



B-plus is applied to the stage. The exciter's four-pole double-throw send-receive relay is actuated by a microphone (not supplied) push-to-talk switch. One set of relay contacts is used to switch B-plus to the exciter's five stages; the other three sets, which are wired to a female connector on the rear of the chassis, can be employed to control external devices. Possible applications include receiver muting, antenna relay switching and power supply control.

A slide switch labeled XTAL selects either the 8998.5-kc. crystal for upper sideband operation or the 9001.5-kc. crystal for lower sideband operation. A 0 to 100 microammeter is used in an r.f. voltmeter circuit to monitor the output of the amplifier stage, V_4 . To prevent damaging the meter during initial tune-up, two degrees of

advanced until the meter reads 30 on voice peaks. That's all that needs to be done.

There is one printed-circuit board in the SBX-9 and most of the stages in the exciter are constructed on it. This results in an especially clean and neat layout. With the exception of the aluminum front-panel escutcheon, the exciter exterior is white with contrasting black decals. The escutcheon is unusual in that it is not bolted to the case but it is held in place by spring tension.

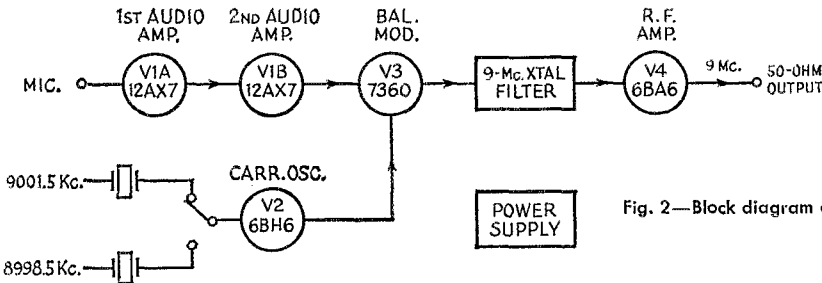


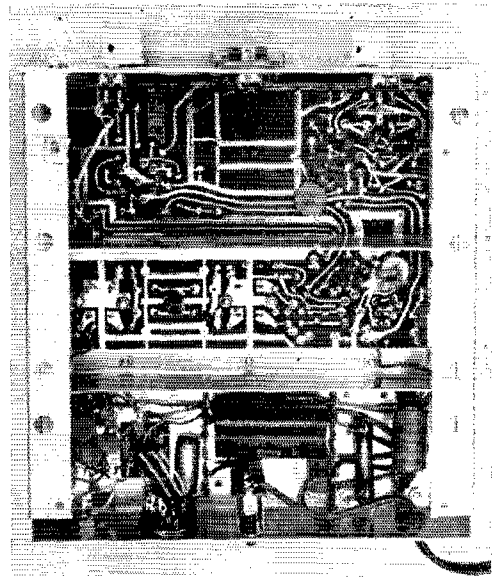
Fig. 2—Block diagram of the SBX-9 exciter.

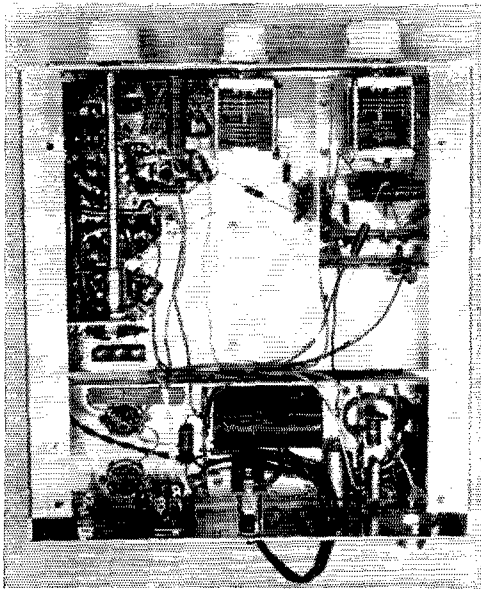
meter sensitivity are provided by a METER SENS switch. In the LO position the switch shunts the meter with a 27-ohm resistor. In the HI switch position the meter is allowed to run as is.

A BALANCE control and a TEST switch are the two remaining items on the front panel. The BALANCE control, a 10,000-ohm potentiometer in the deflection-plate circuit of V_3 , is used to adjust the balanced modulator for maximum carrier suppression. By unbalancing the balanced modulator, the TEST switch permits a carrier signal to pass through V_3 for tuning equipment driven by the exciter.

Operating the SBX-9 is no chore. With the METER SENS switch at LO, the exciter is keyed and the BALANCE control is adjusted for a minimum meter reading. Then the METER SENS switch is moved to HI and the BALANCE control is re-adjusted. Finally the meter sensitivity switch is returned to LO and the MIC GAIN control is

Bottom view of the 9-Mc. s.s.b. exciter. From left to right at the bottom of the photograph are the output connector, accessory socket, push-to-reset circuit breaker and line cord.





Bottom view of the 50-Mc. mixer-amplifier. Along the bottom of the photograph from left to right are the 9-Mc. input connector, accessory socket, 2-ampere circuit breaker, line cord and 50-Mc. output connector.

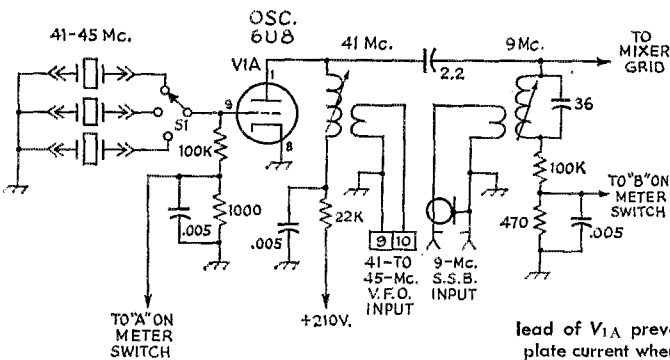
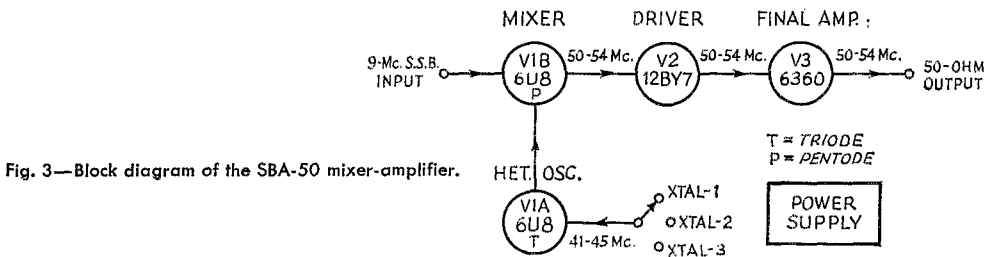
SBA-50 Mixer-Amplifier

The SBA-50 is a 6-meter mixer-amplifier for use with any 9-Mc. s.s.b. exciter, such as the International Crystal SBX-9, that will develop 0.5 volt r.m.s. across 50 ohms. Together, the

SBX-9 and the SBA-50 are capable of producing a 10-watt output signal when a single audio tone is applied to the exciter. The two units can be used to feed a 6-meter antenna or to drive a high-power linear amplifier.

A block diagram of the SBA-50 is shown in Fig. 3. V_{1B} is used to mix the 9-Mc. sideband output from an external exciter with a signal in the 41- to 45-Mc. range. The 41-Mc. signal may be obtained from either an external v.f.o. or from V_{1A} , a crystal oscillator employing third-overtone crystals. As shown in Fig. 4, a choice of one of three crystals is made possible by a three-position switch in the grid circuit of the oscillator. The three crystals, which are furnished with the equipment, are supplied at frequencies specified by the buyer. When a v.f.o. is used with the SBA-50, the crystal oscillator is not converted to a buffer stage as is done in many simple transmitters. Instead the oscillator is disabled by turning the crystal-selector switch to any one of its three positions and removing the crystal used in that position. The output from the v.f.o. is link coupled from an accessory socket on the back of the chassis to the oscillator plate circuit. From here the v.f.o. signal is capacitively coupled to the control grid of the mixer.

The 50- to 54-Mc. sum frequency of the 9-Mc. sideband signal and the 41- to 45-Mc. crystal-oscillator or v.f.o. signal is selected in the mixer plate circuit and link coupled to a tuned circuit in the grid of the driver, V_2 . Link coupling is also employed between the plate circuit of V_2



International Crystal SBX-9 S.S.B. Exciter

Height: 5 $\frac{5}{8}$ inches.
Width: 8 $\frac{3}{4}$ inches.
Depth: 9 $\frac{1}{2}$ inches.
Weight: 12 pounds.
Power Requirements: 117 volts a.c., 60 cycles, 36 watts.
Price Class: \$125.
Manufacturer: International Crystal Mfg. Co., Oklahoma City, Oklahoma.

International Crystal SBA-50 Mixer-Amplifier

Height: 5 $\frac{5}{8}$ inches.
Width: 8 $\frac{3}{4}$ inches.
Depth: 9 $\frac{1}{2}$ inches.
Weight: 13 pounds.
Power Requirements: 117 volts a.c., 60 cycles, 37 watts.
Price Class: \$115.
Manufacturer: International Crystal Mfg. Co., Oklahoma City, Oklahoma.

and the grid circuit of the final amplifier, V_3 , and between the output circuit of V_3 and the SO-239 coaxial connector at the rear of the chassis. The final amplifier is a 6360 dual tetrode in a push-pull arrangement. Fixed bias is applied to both the final and driver stages. To ward off possible instability, 10-ohm resistors are used in the control- and screen-grid leads of V_3 .

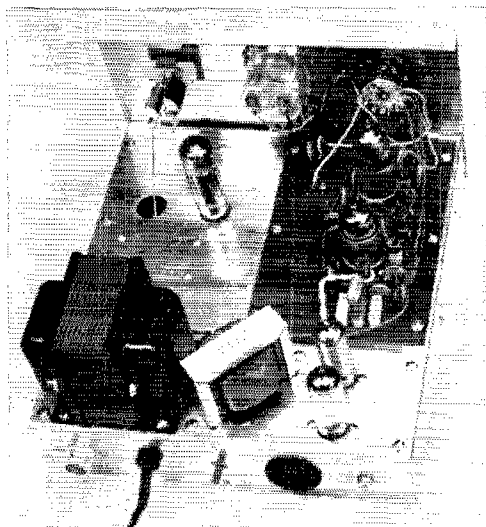
The plate and screen supply is a full-wave circuit using silicon rectifiers, a pi filter and two 0B2 voltage regulators. It supplies unregulated B-plus for the plates of V_2 and V_3 and regulated voltage for the plates of V_1 and the screens of V_{1B} , V_2 and V_3 . To provide bias for the driver and final amplifier, one side of the plate-transformer secondary is connected to a two-section RC filter through a half-wave rectifier. The center tap of the full-wave transformer is not connected directly to the negative side of the circuit, but is wired to one of the contacts on the accessory socket at the rear of the unit. Full voltage is not applied to the tubes until

the center tap is grounded to the chassis by an external device, such as the push-to-talk relay in an SBX-9. The power supply is protected from overload damage by a 2-ampere push-to-reset circuit breaker.

There are three switches, three capacitors and one meter on the front panel of the SBA-50. As mentioned earlier, the XTAL switch selects one of three crystals to establish the frequency of the heterodyne oscillator. The PWR switch, a slide type, opens or closes the primary circuit of the power transformer. Although filament voltage is applied upon closing the switch, full B-plus is not available until the plate-transformer center tap is grounded as mentioned previously. A 0 to 100 milliammeter and a two-pole six-position switch are used to monitor the various stages in the mixer-amplifier. In each of the first four switch positions the grid current of a different stage is metered. In the fifth position of the switch an r.f. voltmeter circuit is established to give a relative indication of the output of the final amplifier. In the last switch position the meter is disconnected from all circuits in the unit. The three remaining controls on the front panel are all variable capacitors: PA GRID TUNE, PA PLATE TUNE, and PA LOAD.

Operating the SBA-50 is just about as simple as running the SBX-9. After the two units have been connected together and allowed to warm up, the exciter is put in the TEST position to provide a carrier for tune-up. With the SBA-50 meter switch in the PA GRID position, the PA GRID TUNE capacitor is adjusted for a maximum indication on the meter. Then the meter switch is moved to RF OUT, and the PA PLATE TUNE capacitor and PA LOAD capacitor are peaked. Once the meter switch in the SBA-50 and the TEST switch in the SBX-9 have been turned off, the exciter mixer-amplifier combination are ready to generate an s.s.b. signal on 50 Mc.

The SBA-50 and the SBX-9 look quite similar from the outside. Both cabinets are painted white and measure the same size, and the aluminum escutcheons are identical. Even the seven components on each front panel are laid out in like manner. Inside the SBA-50, as in the SBX-9, a printed-circuit board is employed. With the exception of the power supply and the final amplifier, all the stages in the mixer-amplifier are constructed on this board. — WYDS



Top-chassis view of the SBA-50. The tube standing alone at the upper left is the 6360 final amplifier. To its right on the printed-circuit board are the mixer, heterodyne oscillator and driver stages. The power supply occupies the lower portion of the photograph.

How To Win The 1967 C.W. SWEEPSTAKES

BY DONALD G. ROSS,* W2JMZ

IT WAS during the 1965 C.W. Sweepstakes that Jack first began to doubt his personal and station contest performance capabilities. As in years past, he found himself progressively falling behind other contestants in stations worked. Irritated, he promised himself an objective analysis of the entire situation after the contest was over, but while events still were fresh in his mind.

Jack was pretty rough on himself. After considerable soul-searching, he concluded sadly that he lacked the innate ability, the proper equipment and the requisite stamina to be among the high scorers nationally. "Might as well admit it at last," was his candid comment. But one startling fact emerged that formerly had escaped his notice. To his amazement and chagrin Jack realized that he had *always* competed with a handicap, one that no program of self-improvement or station updating ever could modify. He was condemned forever, he felt certainly, to the ranks of the "also rans."

Problem

His handicap was a matter of "bauds." The *Handbook* defines the baud as the basic code element. A dot is one baud, a dot and a space is two bauds, and a dash is three bauds. The space between letters is three bauds, and between words, seven bauds. W2, followed by any combination of the letters J, M and Z contains a total of 61 bauds. W4, followed by any combination of the letters N, S and A, for example, has but 41 bauds total. At a sending speed of 24 w.p.m. the difference of 20 bauds amounts to one full second — one second longer for the W2 to send his call letters than for the W4 to send his. At the 200th contact level the accumulated disadvantage to the W2 is over 3 minutes, or about 3 contacts.

Jack was cursed, you see, with call letters that took too long to send. Don't go away! Our friend's birthdate happens to be July 11th, the longest in the year in terms of bauds. In JUL 11 there are 75 bauds. In FEB 5 there are but 39 bauds, the difference of 36 bauds representing nearly a 6 minute penalty at the 200th contact level, probably from 4 to 8 contacts. Even worse, Jack would be asked frequently for fills on the birthdate, as under QRM conditions the JUL was confused for JUN, or the 11 as 1 with a repeat for the 1. Jack's birthdate was killing him!

* Mossy Brook Rd., High Falls, N. Y.

No wonder he could not win. Other contestants had an edge with fewer "bits" of data to transmit than poor Jack. In each exchange they'd pick up a second or two, or more, on him. After a few hours they'd be ahead noticeably and increasing the margin with each passing hour. Now, Jack is not complaining. That's not the purpose of this tale. He would prefer that some chap with an impossible call like WB0JJJ/0 (129 bauds) do the screaming about inequities of competition.

Solution

No, this concerns itself with what Jack decided to do about the rather fatal limitations of his personal inefficiency and the odds stacked against him. He found the solace he sought in the old adage, "Don't fight 'em, join 'em." In fact, he perceived a way of combining the spirit of the adage with a cunningness and a vindictiveness that at first blush shocked him for its audacity. He decided he would assist some other ham to win in 1966 by providing that fortunate ham with a measure of "one-upmanship" that would stun the perennial SS leaders when word got out as to how they had been "taken." Such a Good Samaritan's role, he rationalized, would provide him all the satisfaction due.

His plan was twofold. First he had to obtain the cooperation of an amateur whose call letters, birthdate, section and first year licensed would result in a minimum baud total and consequently an advantage. To qualify the candidate needed a good record in former SS contests, transceiver operation of a full gallon, and an antenna farm tuned up and rarin' to go. He'd have to reside in the 4th, 5th or 6th call area and have a call using short baud letters such as U, N, I, T, E, D, A and S. Birth month could be FEB, SEP or DEC with a 4th, 5th or 6th date, and first licensed in a year using the numerals 4, 5 and 6.

Jack finally narrowed down his consideration to a ham from the Virginia Section. VA is short in baud count and in the 4th district. It is on the populous east coast and near the mid-west, so 80-c.w. operation would rack up a lot of points, and strategically located to use the short and long skips to the west on 20 and 15 meters for the multipliers.

While the manhunt was on, Jack had the second phase of the program in high gear, the development of a transistorized control system utilizing computer techniques to automate most of the exchange and log-keeping operations. A tape recorder logged all transmitted and received preamble exchanges, the only written records kept being the stations-worked sheets to avoid duplicate contacts. Contest log sheets would be prepared by playing back the tapes and extracting the data after the contest.

The automatic CQ SS and QRZ SS devices eliminated much tedious hand sending. The most difficult part of the development was the Exchange Transmitter with variable speed control, including a digital clock having visual and numerical code output. Touch-button control was

employed throughout, even to the facility of being able to set any portion of the exchange preamble for repeat sending, a nicety under QRM Conditions.

Application

While receiving an exchange, the operator listened carefully. If copied by ear okay, then surely the recorder was logging it. Fills could be obtained by resorting to the hand electronic keyer and acknowledged with a QSL. Then the touch-button for either CQ SS or QRZ SS would be actuated and another call would go out on the air automatically. The operator would use the hand keyer to acknowledge the next station calling, touch the Nr Advance button and Exchange Transmit button in sequence, and then enjoy another leisurely drag on his cigarette as space age technology and "one-upsmanship" teamed flawlessly to make him a winner.

It took six months to perfect the Automated SS Control Unit. Details are withheld pending investigation for patent protection. Meanwhile he had found his "man," a Virginian called Pete. Pete was wild about the possibilities and pledged full cooperation. Surely one of the slickest coups in amateur annals was nearing its logical and fitting climax—the winning of the 1966 C.W. Sweepstakes.

The Automated SS Control Unit was packed tenderly into Jack's car and driven down to Virginia two weeks before contest time and interconnected with Pete's regular station gear. Put through its paces on a dummy load, Jack and Pete were in ecstasy. It was terrific! Jack's contribution to the partnership was nearing its end, as regulations do not permit human assistance during the contest. One thing remained for him to do — the honor so richly his alone!

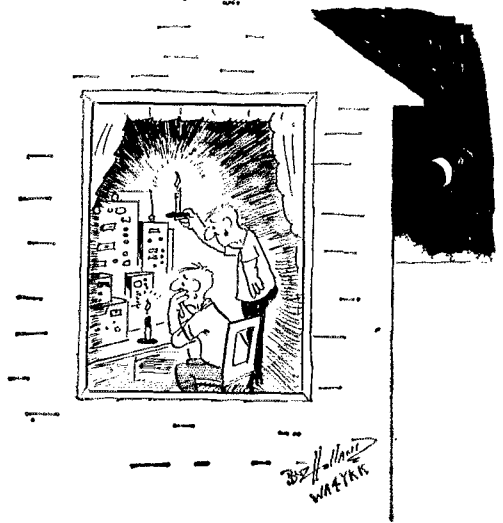
Results

On November 19, 1966 at the precise moment, 2200 GMT, Jack caressed the CQ SS touch-button and they were off and running! W1AST came back, was acknowledged with the hand keyer, the Nr Advance button was actuated to read out Nr 1, the Exchange Transmitter button was touched, and the coded exchange poured out into the dusk on 3508 kc. like a thundering passage from a Beethoven symphony, 1000 watts of it! W1AST's reciprocal exchange was Q5 so it was captured in tape storage. A fast QSL, then the QRZ SS button . . . W1CSM was the 2nd . . . W2JMZ the 3rd . . . K2IRZ the 4th . . . On and on it went like clockwork, digital clockwork, in fact. Pete was all smiles. It was almost like stealing!

Two hours later Pete's total was higher than that of any station worked to that moment. At the 3-hour mark 80 was jumping but, more important, the lead seemed a respectable 14 over any stationed monitored so far. Already contestants were tiring from the torrid pace as evidenced by keying errors and forgetfulness.

At 0210 GMT it happened. One moment on top of the world, the next staring incredulously

"AND THEN IT HAPPENED..."



at the dying glow of a pilot lamp. An awkward pause of utter silence, then Pete's labored, "What lousy luck!" Power had failed. Those gorgeous, lovely ionosphere smashers, those 1000 watts, every one of them was dead!

Equally dead was their chance to win, although this would not become apparent until after an eternity of some 8 hours — 8 hours of agonizing nail biting before power was restored. Too late. Even 2 hours could not be made up in a short contest. Their long anticipated victory had been snatched from them by a freak accident, a trailer truck sideswiping and toppling a power pole with its distribution transformer to the ground. Only one section of this Virginia community was affected but, as bad luck would have it, the lateness of the hour, and . . .

Thus ended Jack's quest for accomplishment in masterminding the winning of the 1966 C.W. Sweepstakes. In all his planning, he overlooked the one detail that was the undoing of his accomplice, Pete. He failed to include in his specifications the requirement of an emergency generator! Amen. He admits he never thought about it.

Wait 'Til Next Year

Jack's thought a lot about it since. Recently Pete wrote that he was set for 1967, generator and all — that is, barring a rules change outlawing automation. Jack will have one in the car, just to play safe, when he heads south next November. They figure that, despite this story of their misfortune, nobody will be able to construct a similar Automated SS Control Unit in time before the 1967 C.W. Sweepstakes to compete with them on even terms.

Could overconfidence, perhaps, prove their downfall in 1967? Being old-fashioned and slow to accept progress, the author is, nevertheless, wishing them bad luck (ouch!) in the '67 classic.

QST

A Cliff-Dweller's Antenna Farm

BY JACK WICHELS,* WB4GAH

MANY of us in the amateur radio fraternity (and, for the gals, the sorority) enjoy the advantages of what realtors like to call gracious and luxurious garden apartment living. Such benefits as may be derived from "cliff-dwelling," unfortunately, do not normally include an environment suitable for clean ham antennas.

Two major problems exist in many apartment house antenna plans: where and how to put up what kind of antenna; and lease restrictions prohibiting the erection of "exterior radio aerials." Another problem, not always insignificant, has to do with the XYL's ideas on the relative compatibility of ham gear with the living room decor. A solution to this last item, like the text books say, is cheerfully left as an exercise for the reader. We all have our own problems!

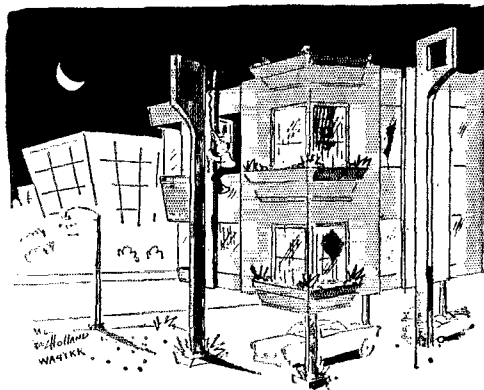
We moved into this apartment of ours last fall, after I successfully steered the XYL into one on the top floor — "After all, with a third-floor apartment, we won't have to listen to any heavy-footed neighbors above us." Besides, whatever one ends up with as an antenna, one must get it up in the air a few feet.

Once settled, I examined our new living quarters for possible antenna sites suitable for 40, 20, and 15 meters. The patio — a reinforced-concrete-with-aluminum-railing extension off the living room facing the Washington Beltway — was first given serious consideration. This ridiculous thought was soon discarded as being completely unrealistic after the XYL expressed a few well-chosen remarks about living rooms turned into ham shacks — "You're not going to wallpaper my living room with QSL cards!"

During a short period when the XYL was out of town, I set the final location for the new ham shack upon my 2 × 4-ft. desk in the main bedroom and somehow successfully exercised squatter's rights upon her return. This location was not without its price: XYLs seem to have great difficulty sleeping at 2 o'clock in the morning with the c.v. monitor chirping, the bug rattling,

*2742 Hartland Road, Apartment 201, Vienna, Virginia 22180.

Are you faced with the dim prospect of staying off the air because of apartment-house living? Here is the story of one who successfully achieved three-band apartment operation for less than a dollar without any band-changing antenna adjustments.



and the change-over relays clicking. One XYL I know, who shall remain nameless lest I appear henpecked, even occasionally makes the OM QRT in the middle of midnight QSOs.

The patio antenna site was now about 50 feet of RG-58/U from the shack. I still faced the where-to-put-the-antenna-farm problem. ("You're surely not thinking of running your wires through my hallway, are you?" "Of course not! That idea never entered my mind!")

The bedroom had an aluminum-framed, side-sliding window, with a snap-in aluminum screen. Drilling holes for a feed-through was out of the question. So as not to disturb the exterior appearance of the place, removal of the screen was also unacceptable. Nevertheless, the mesh size was large enough to push regular hook-up wire through the screen without expanding the mesh to let the flies inside. The window could always be kept open a few inches to provide fresh air.

My installation plan now called for running RG-58/U from the transmitter to the window frame, grounding (?) the shield to the frame with a C-clamp from the tool box, and hanging 33 feet of hook-up wire from the coax inner conductor, through the screen mesh, and down along the outside wall — thus giving me a quarter wavelength on 40 meters, and a three-quarter wavelength on 15. After completing preliminary (soldering and taping) operations, I carefully uncoiled the spool of wire and lowered the antenna outside the window. Back to the drawing board! — the last 10 feet of the antenna was laying in disarray on the ground below. Our initial estimate of the window height above the grass had been in error by some 20 feet. Now what?

The adjoining bedroom window (of our own apartment, luckily) is about 20 feet to one side of our "feed-through" screen of the first window. Necessity being the parent of something-or-

(Continued on page 148)

1967 VE/W Contest Announcement

September 23-25

THE Montreal Amateur Radio Club invites all W and VE amateurs to participate in the 1967 VE/W Contest. This year the contest period will run from 2300 GMT Saturday, September 23 to 0200 GMT Monday, September 25.

Two winners will be announced; high U.S. scorer and top Canadian, and a certificate goes to the high scorer in each ARRL section.

How about more phone activity this year? It is suggested that phone stations look for each other near the following frequencies: 3810, 7210, 14,280, 21,400 and 28,600 kc. The highest phone only and c.w. only scores will be listed in the results.

All entrants are requested to follow the log format shown below. MARC regrets that pre-printed log forms are not available from the club or ARRL. Come on, VEs and Ws, let's have more activity and more logs this year.

Rules

1) *Eligibility:* The contest is open to all amateurs located in the ARRL sections listed on page 6 of this *QST*. Multiple operator stations may enter; however their scores will be listed separately and will not be eligible for awards.

2) *Contest period:* All contacts must be made during the period from 2300 GMT Sept. 23 to 0200 GMT Sept. 25; Only 20 hours total operating time may be used in this period, however. Times on and off the air must be shown in the log. Time spent listening counts as operating time.

3) *Bands:* All bands and modes for which the participant is licensed may be used. A station may be worked once on phone and once on c.w. on each frequency band. C.w. and phone are separate, requiring separate logs.

4) *QSO:* W/Ks will work only VE/VO stations and vice-versa. W to W, and VE to VE QSOs do not count. Valid points can be scored by contacting stations not working the contest if complete exchanges are made. The

exchange consists of QSO number, RS or RST report, and ARRL section for W/Ks, geographical areas as listed below for VE/VOs.

5) *Scoring:* Count two points for each completed exchange. Incomplete contacts do not count. For final score: VE/VOs multiply: total points \times ARRL sections \times power multiplier.

W/Ks multiply: total points \times Canadian areas \times power multiplier \times 10 (The factor of 10 has been arrived at by multiplying the ratio of U.S. sections/Canadian areas by the ratio of U.S. logs/VE logs received for the last two contests.)

6) *Power multiplier:* All stations using d.c. power inputs of 200 watts or less during the entire contest use 1.5; all others use 1.

7) *Canadian Geographical Areas:*

	Prefix	Abbreviation
Newfoundland	VO1	NFLD
Labrador	VO2	LAB
Prince Edward Island	VE1	PEI
Nova Scotia	VE1	NS
New Brunswick	VE1	NB
Quebec	VE2	QUE
Ontario	VE3	ONT
Manitoba	VE4	MAN
Saskatchewan	VE5	SASK
Alberta	VE6	ALTA
British Columbia	VE7	BC
Yukon	VE8	YU
Northwest Territories	VE8	NWT

8) *Reporting:* Follow the sample log shown below. Log forms are not available from MARC or ARRL. Single operator stations may not have assistance from any other person during the contest.

9) *Awards:* The overall contest winner wins a handsome trophy. In addition the winner in each ARRL section receives a certificate. Awards to Canadian winners will be to the section leaders. The top phone only score and top c.w. only score will be listed separately. The section certificate will go to the highest score.

10) *Deadline:* All logs must be postmarked no later than midnight, November 6, to be eligible for awards. Please make sure that your call and section are printed on each page and on the top left hand corner of your envelope. Logs cannot be returned. Mail logs to J. C. Cunningham, VE2CK, 1125 Marlatt Street, Montreal 9, P. Q., Canada.

QST

VE/W CONTEST LOG 1967

Call....W4SVJ....

Mode....C.W....

ARRL Section....GA.....

Power Input....150 W....

Freq. Mc.	Times On/Off GMT	Time of QSO	Sent				Received				New Sec. Wkd.
			Nr.	Station	RST	Section	Nr.	Station	RST	Section	
14.050	on 2300	2300	1	W4SVJ	579	Ga.	1	VE2NE	579	Que	1
"	"	2302	2	"	589	"	2	VO1CA	589	Nfld.	2
"	"	2308	3	"	589	"	1	VE8MA	559	NWT	3
"	off 2313	2312	4	"	559	"	1	VE7AIC	549	BC	4

Total Operating time: 13 min.

Bands used: 14 Mc.

Sec. 4 Points 8

Claimed score: 4 QSOs \times 3 (points per contact) \times 4 (different sections worked) \times 1.5 (power multiplier) \times 10 (ratio of U.S./Canadian sections by logs received during last two contests) = 480 points.

I hereby state that my station was operated strictly in accordance with the rules of the contest and governmental regulations, and I agree that the decision of the contest committee of the Montreal Amateur Radio Club, Inc. shall be final in all cases of dispute.

Signature..... Call.....

V.H.F. QSO Party Announcement

September 9-10

AS WE GO to press, it's late July and we've just concluded the wrap-up on the June VHF QSO Party results (elsewhere in this issue). Check them first and then make your plans to participate in the third ARRL VHF-only event of this year, the September 9-10 VHF QSO Party. This affair gets under way at 2 p.m. (1400) your local standard (not daylight) time Saturday September 9 and runs through 10 p.m. Sunday, September 10.

This contest is open to all amateurs in the ARRL field organization who can work 50 Mc. or above. VES will count as a separate multiplier in addition to the section list on page 6 of this QST. Exchange section and count one point for each complete exchange on either 50 or 144 Mc.: two points for contacts on 220 or 420 Mc.; three points for contacts on higher bands. The sum of these points multiplied by the sum of sections on all bands gives you your final score.

Tips: Portables are urged to sign properly to avoid possible disqualification; make sure your reports clearly indicate your call and section, time in GMT, band, call and section of station worked; single operator means no aid in any station function such as operating, logging, spotting etc. Include your photos and suggestions for improvement of the contest and make sure your entry is postmarked no later than Oct. 3, 1967.

Rules

1) The contest starts at 2:00 p.m. Local Standard Time, Saturday, Sept. 9 and ends at 10:00 p.m. Local Standard Time, Sunday, Sept. 10. All claimed contacts must fall within this period and must be on authorized amateur frequencies above 50 Mc., using permitted modes of operation. Contacts between stations in different time zones can be counted only when the contest period is in progress in both of the time zones concerned.

2) Name-of-section exchanges must be acknowledged by both operators before either may claim contact point(s). A one-way exchange, confirmed, does not count; there is no fractional breakdown of the 1-, 2-, or 3-point units.

3) Fixed-, portable- or mobile-station operation under one call, from one location only, is permitted. A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOT).

While no minimum distance is specified for contacts, equipment in use should be capable of real communications (i.e. able to communicate over at least a mile).

Contacts made by retransmitting either or both stations do not count for contest purposes.

3) Scoring: 1 point for completed two-way section exchanges on 50 or 144 Mc.; 2 points for such exchanges on 220 or 420 Mc.; 3 points for such exchanges on the higher v.h.f. bands. The sum of these points will be multiplied by the number of different ARRL sections worked per band; i.e. those with which at least one point has been earned. Reworking sections on additional bands for extra section credits is permitted. Cross-band work does not count. Contacts with aircraft mobile stations cannot be counted for section multipliers.

4) Foreign entries: all contacts with foreign countries (such as Mexico and the Bahamas) count for score. All foreign countries are grouped together, and a multiplier of no more than one (per band) may be claimed for contacts with all foreign stations worked. Foreign stations may only work stations in ARRL sections for contest credit. Foreign stations will give their country name.

5) A contact per band may be counted for each station worked. Ex.: W2EIF (S.N.J.) works K1YON (Conn.) on 50, 144 and 220 Mc. for complete exchanges. This gives W2EIF 4 points (1 + 1 + 2) and also 3 section-multiplier credits. (If W2EIF contacts other Conn. stations on these bands, they do not add to his section multiplier but they do pay off in additional contact points.)

6) Each section multiplier requires a complete exchange with at least one station. The same section can provide another multiplier point only when contacted on a new v.h.f. band.

7) Awards: A certificate will be awarded to the high-scoring single-operator station, (no aid in operating, logging, spotting, etc.), in each ARRL section. In addition, the high-scoring multi-operator station will receive a certificate in each section from which three or more valid multiple-operator entries are received. Certificates will also be given to the top Novice in each section where three or more such licenses submit logs and to Novices in sections of less than 3 entries, who in the opinion of the Awards Committee, displayed exceptional effort. Awards Committee decisions will be final. QST

SUMMARY OF CONTACTS, V.H.F. QSO PARTY

STATION... W1AW ARRL SECTION... CONN

Freq. Band (Mc.)	(GMT) Date Time	Station Worked	Section	Record of new Sections for each band					Contact Points
				50	144	220	420	other 121.5	
50	1901	W4GJO	E FLA	1					1
	1905	K8MMM	OHIO	2					1
	1915	W6PFP	IOWA	2					1
	1920	K1UQA	OHIO						1
144	2001	W2TKL	ENVY		1				1
	2008	K2NYC	ENVY		2				1
220	2210	W1QW7	W MASS				1		2
220	2217	W2W8B/2	WNY			1			2
220	2300	K2UYH	NNJ					1	3
144	2310	K2UYH	NNJ					3	1

(Enter below on last sheet used)

Band	Contacts	Points	Mult.
50 Mc.	4 x1 ²	4	3
144 Mc.	3 x1 ²	3	3
220 Mc.	1 x2 ²	2	1
420 Mc.	1 x2 ²	2	1
Other 121.5 Mc.	1 x3 ²	3	1
TOTALS	10	14	9

Check one: Single operator
 Multiple operator

Calls of operators having a share in above work. W1S, Q1S, WPR, NPG

Power input.....
 Transmitter.....
 Receiver.....
 Antenna.....

CLAIMED SCORE: ...14... x ...9... =126.....
 (Points) (Mult.) FINAL SCORE

I hereby state that I have abided by the rules specified for this contest and that, to the best of my knowledge, the points and score as set forth in the above summary are correct and true.

Signature..... Call..... Address.....

Sample log and summary form giving an example of how to score. You can obtain these log forms free by writing to ARRL Communications Dept., 225 Main Street, Newington, Conn. 06111.

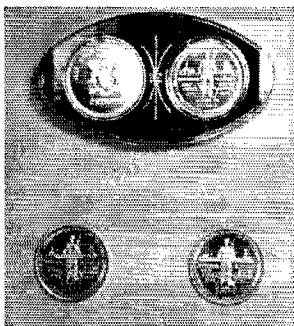
Seventh World-Wide RTTY Sweepstakes

October 14-16, 1967

The Canadian Amateur Radio Teletype Group, CARTG, is pleased to announce, as a centennial project, their sponsorship of the 7th World-Wide RTTY DX Contest. This contest will be devoted entirely to increasing the interest and skill of all radio amateurs in RTTY. CARTG wishes to thank the S.S.B. and RTTY Club of Como, Italy, for permission to use their exchange points table and zone chart. Thanks too to the Centennial Commission of Ottawa.

Rules

- 1) Test period 0200 GMT Oct. 14 to 0200 GMT Oct. 16.
- 2) Bands used will be 3.5, 7, 14, 21, and 28 Mc.
- 3) Points: All two-way contacts with stations in ones own zone will receive two points. Two-way contacts with stations outside ones own zone will receive the points stated in the exchange-points table (below).
- 4) Stations may not be contacted more than once on any one band. Additional contacts may be made with this



Here's an idea of what the centennial medallions look like. They'll be awarded to top three scorers. Additionally, the top ten high scorers will receive special centennial certificates as well as special certificates for the top Canadian station score and the most contacts with Canada. All submitted logs showing over 10 entries will receive the Centennial Citation.

station on different bands, and a 100 point bonus is allowed for each contact after the initial one. The 100 point bonus commemorates Canada's 100th birthday (1867-1967).

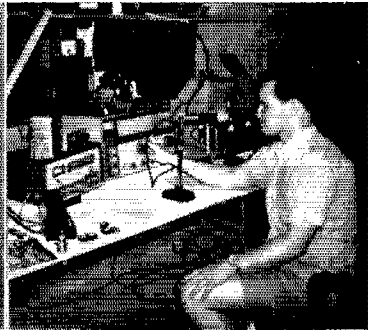
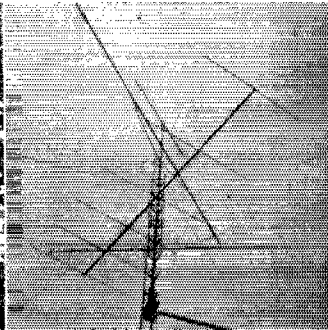
- 5) A multiplier of one is given for each country contacted, including your own. The same country may not be claimed again on a different band.
- 6) Scoring: Total exchange points times the number of countries worked equals final score.
- 7) The ARRL Country List will be used (except that KL7 KH6 and VO will be considered separate).
- 8) Messages will consist of number, RST, time in GMT, zone number and country.
- 9) Logs must contain bands, number, times, calls, zones, countries and exchange points claimed.
- 10) Logs and score sheets go to the Canadian Amateur Radio Teletype Group, 3CBRT, 85 Fifehire Road, Willowdale, Ontario, Canada. They must be received no later than November 25, 1967. (In rare isolated places the deadline will be more flexible.)



EXCHANGE POINTS TABLE

		CORRESPONDENT zone																																									
		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	32	33	34	35	36	37	38	39	40		
YOUR zone	1	2	14	10	13	16	18	22	20	25	30	36	37	39	21	22	19	20	17	11	25	29	29	22	22	16	28	25	31	39	35	14	36	25	29	34	39	40	47	44	15		
	2	14	2	15	8	7	16	16	12	16	23	24	30	30	12	14	16	19	20	19	19	25	31	26	30	28	35	35	40	50	50	25	47	14	21	21	28	33	36	37	6		
	3	10	15	2	8	11	9	13	14	18	21	28	28	30	26	28	27	29	27	21	32	37	39	32	31	24	37	33	40	43	35	11	32	29	35	35	42	48	50	52	20		
	4	13	8	2	3	2	9	10	8	12	18	22	25	27	19	21	23	26	26	22	26	33	37	32	34	30	40	38	44	50	40	38	44	20	40	21	28	26	33	40	41	44	14
	5	15	7	11	3	2	9	9	6	10	17	20	24	25	18	20	22	26	26	24	35	32	38	33	35	31	41	40	45	54	46	22	41	19	27	24	31	38	39	42	13		
	6	18	16	9	8	9	2	4	7	10	12	19	19	21	27	29	31	34	33	29	34	40	46	40	40	33	46	42	49	47	38	17	32	28	36	30	37	44	43	48	22		
	7	22	16	13	10	8	4	2	4	6	8	15	15	17	26	29	31	35	36	33	33	40	47	42	44	38	50	46	53	49	40	22	34	26	34	26	33	40	38	44	22		
	8	20	12	14	8	6	7	4	2	5	11	15	18	19	22	24	27	31	32	30	29	35	42	38	42	37	47	46	51	54	44	24	38	21	30	23	30	38	36	41	13		
	9	25	16	18	12	10	10	6	5	2	8	10	14	15	23	25	29	33	35	34	29	35	43	41	45	41	50	50	55	52	45	28	38	21	30	23	27	35	32	38	21		
	10	30	23	21	18	17	12	8	11	8	2	9	7	9	31	33	37	41	43	41	36	42	51	49	52	45	58	52	54	44	37	28	31	28	36	24	29	38	31	38	29		
	11	36	24	28	22	20	19	15	15	10	9	2	9	7	26	28	33	36	41	43	30	34	42	45	51	52	49	55	49	42	41	37	35	22	29	16	20	28	33	29	27		
	12	37	30	28	25	24	19	15	18	14	7	9	2	3	35	37	41	45	49	48	39	42	49	53	58	50	52	52	48	37	33	32	27	31	37	34	27	33	33	34			
	13	39	30	30	27	25	21	17	19	15	9	7	3	2	33	35	40	43	48	49	37	39	46	50	56	53	50	52	48	46	34	34	35	29	29	34	21	24	30	34			
	14	21	12	26	19	18	27	26	22	23	31	26	35	33	2	3	6	10	14	18	7	14	21	19	25	27	27	30	32	42	49	34	55	5	10	15	19	21	26	26	6		
	15	22	14	28	21	20	29	26	24	25	33	28	37	35	3	2	5	9	13	18	6	11	18	17	23	27	25	29	30	39	47	36	54	6	7	15	18	19	25	24	8		
	16	19	16	17	23	22	31	31	27	29	37	33	41	40	6	5	2	4	8	13	6	10	15	12	18	22	21	24	26	36	42	33	49	10	9	20	21	21	27	25	9		
	17	20	19	29	26	26	34	35	31	33	41	36	45	43	10	9	4	2	5	12	7	8	12	8	14	19	17	20	22	32	38	32	45	14	10	22	22	20	27	23	12		
	18	17	20	27	26	26	33	36	32	35	43	41	49	48	13	8	5	2	7	12	12	6	11	14	15	16	20	15	16	20	30	35	29	40	13	15	27	28	24	31	27	14	
	19	11	19	21	22	24	29	33	30	34	41	43	48	49	18	13	12	7	2	18	19	12	16	10	10	9	16	15	20	30	32	31	36	23	23	34	30	38	33	16			
	20	25	19	32	26	35	34	33	29	29	26	30	39	37	7	6	6	7	12	18	2	6	14	14	20	26	21	26	25	34	43	39	49	8	3	15	16	15	22	20	12		
	21	29	25	37	33	32	40	40	35	35	42	34	42	39	14	17	10	8	12	19	2	9	11	17	24	16	21	20	28	37	40	43	14	6	18	16	11	19	15	19			
	22	29	31	39	37	38	47	46	42	43	51	42	49	46	21	18	15	12	16	14	9	2	6	10	18	17	13	11	21	29	36	35	22	14	26	22	15	22	16	24			
	23	22	26	32	32	33	40	42	38	41	49	45	53	50	19	17	12	8	6	10	14	11	6	2	6	13	8	12	14	24	30	31	37	22	29	26	21	28	22	20			
	24	22	30	31	34	35	40	44	42	45	52	51	58	56	25	23	18	14	11	10	20	17	10	6	2	8	6	6	10	20	24	26	30	28	22	35	33	25	32	25	25		
	25	16	28	24	30	31	33	38	37	41	45	52	50	53	27	27	22	19	14	9	26	24	18	13	8	2	13	9	15	23	30	18	27	32	28	41	40	33	40	33	25		
	26	29	35	37	40	41	46	50	47	50	50	49	52	50	27	25	21	17	15	16	21	16	7	8	6	13	2	6	5	16	22	31	29	29	21	31	29	21	27	20	29		
	27	25	35	33	38	40	42	46	46	50	52	55	52	52	30	29	24	20	16	15	26	21	13	12	6	9	6	2	7	15	18	25	25	34	27	40	35	27	32	26	30		
	28	31	40	40	44	45	49	53	51	55	54	49	48	46	32	30	26	22	20	20	25	20	11	14	10	15	5	7	2	10	17	31	24	34	25	36	30	22	26	19	34		
	29	39	50	43	52	54	47	49	54	52	44	42	37	37	42	39	36	32	30	30	34	28	21	24	20	23	16	15	10	2	9	15	32	42	33	39	31	24	24	24	44		
	30	35	50	35	44	46	38	40	44	44	45	37	41	33	34	49	47	42	38	45	32	43	37	29	30	24	30	24	30	22	18	17	9	2	14	7	51	42	17	40	33	29	48
	31	14	25	11	20	22	17	22	24	28	28	37	32	35	34	36	33	32	29	31	39	40	36	31	26	19	31	25	31	15	24	2	22	39	42	46	53	52	56	51	28		
	32	36	47	32	40	41	32	34	38	38	31	35	27	29	55	54	49	45	40	36	49	43	35	37	30	27	29	25	24	32	7	22	2	57	48	47	42	38	34	33	50		
	33	25	14	29	21	28	26	21	21	28	22	31	29	5	5	10	14	18	23	8	14	22	22	28	32	29	34	23	34	42	51	39	57	2	9	10	14	18	22	23	10		
	34	29	21	35	28	27	36	34	30	30	36	29	37	34	10	7	9	10	15	21	3	6	14	16	22	28	21	27	25	43	42	42	42	48	2	13	12	18	16	16	16		
	35	34	21	35	26	24	30	26	23	20	24	16	34	21	15	15	20	22	27	33	15	18	26	29	35	41	33	40	36	39	47	46	47	10	13	2	7	15	15	19	20		
	36	39	26	42	33	31	37	33	30	27	29	20	27	24	19	18	21	22	28	34	16	16	22	26	33	40	29	35	30	31	40	53	42	14	12	7	2	8	8	11	24		
	37	40	33	48	40	38	44	40	38	35	38	28	33	30	21	19	21	20	24	30	15	11	15	21	25	33	21	27	22	24	33	52	38	18	12	15	8	2	7	5	28		
	38	47	36	50	41	39	43	38	36	32	31	27	24	24	26	25	27	31	38	22	19	22	22	28	32	40	27	32	26	24	3												

JUNE V.H.F. QSO PARTY



Derry West, about five miles west of Toronto, was the scene of operations by the **VE3ASO/3** crew. The group operated 50, 144 and 432 Mc. totalling 205 contacts with a multiplier of 22. On the left is VE3FIB on 432 Mc. using a *Handbook* transceiver (beating the problem of feedline loss!); in the center are the radiators—15 elements on a 28 foot boom on 144 Mc., 6 elements on a 20 foot boom for 6 meters, 19 elements on a 9 foot boom for 432 Mc., and 8 elements vertically polarized for two meter wide-band f.m.; on the right is the two-meter post with VE3FIC at the helm.

Final Results

COMPILED BY ELLEN WHITE,* W1YYM

THE June 10-11 ARRL V.H.F. QSO Party now becomes part of the recorded history of amateurs interested in the contest phase of "The World Above 50 Mc." It was a fine weekend with 406 VHFers reporting activity, with the usual weather, generally good conditions and good results from most portions of the ARRL field organization.

How do you report a contest? Well, you start with the scores, add the flavor of the "Soapbox", highlight prominent band-multipliers in a box, write captions, indicate significant single-band section leaders, etc. One of the most useful suggestions along these lines came from W6GDO. Jay suggested that once a station meets the required minimum multiplier on any one band that we show his multipliers on all bands. This doesn't require more room and would be useful in comparing operating practices across the country. Good suggestion OM, we'll give it a try herewith and judge its usefulness by the reaction of the participants.

Those versatile single operator section leaders using bands ABCDE include K1YON WB2MRK W6GDO WA6GYD W6ZDO K7ZIR and W0EYE. Awards for a winning operation on bands ABCD go to WA2FGK W3CGV K31PM and K6KLY. A certificate winning combination for bands A B and D was posted by WA4CGA K4SUM WA5KPU K7ICW W8CVQ K9AAD and VE3ZZZ. The popular 6 and 2 meter com-

bination paid off for W1DOM W1GKJ K1GYT W1JJO/1 K1TPK K1ULZ WB2SIH WB2UVB WA3CBC WA3CFK/3 WB4DQW W4EPV K4HQI K4QPJ WA5DXA W5HDE/5 K6UJG W7CJN WA7FHG WASBTW WA9JFM K9KFR K0FKJ and WA0FLL. Six meters alone was successful for WA2JOQ WA4STJ W4UIS/8 K5s EZG IPV K6RCK/7 WA6ZQU WA8OXC W9ECV/0 K0GJX/VE4 WA0MRH/0 W0PFP K0RDF and VE7AXM. K6VYP won with 50-144 and 220 Mc. while WA6YYM topped his section all on two meters and W6PUZ did it solo on 432 Mc. VE2HW had the distinction of being the only winner using just 220 and 432 Mc.

The top ten scores, single operator, span the country and include K31PM WA2FGK K3WJB K1TPK WA8OXC W6GDO W0EYE WA9JFM WB2MRK WA5KPU. In the multiple-operator category we find many of the hill toppers that give this contest a unique character and supply welcome multipliers as well; for example, W1MHL/1 W3CCX/3 W2PEZ/2 WB2FKJ/2 WA2WEB/2 W2UFT K2CEH/2 WASBCA W2GKR/2 and WA2CJK/2.

Handsome new awards are schedule for mailing on September 15, 1967—stand by OMs!

Soapbox

"The most encouraging thing noted here in R.I. was the fine showing of stations using a.s.b./c.w. on scatter. On a 'closed' band, I picked up sections like S. C., Tenn., Ohio and Ind. on 50 Mc. c.w." — *K1ABR*. "This was the first on-the-air work by the Talcott Mountain VHF Society. Location was the abandoned Nike Site which will soon become

*Deputy Communications Mgr., ARRL.

the Talcott Mountain Science Center (See June, 1967 QST). Operation was from generator power and with temporary gear and portable antennas. Eventually a much better station will be in operation at this fine location. The surprise of the contest was a 1215 Mc. QSO with WA2BAH/1, 63 miles, with APX6s at both ends." — *W1HDQ* for *K1RAR/1*. "Learned several things, namely; 75 watts peak just won't do the job on 2, s.s.b. is the coming thing on 6 and I must have c.w. available for the September party!" — *W1HLL*. "Our group was happy to work 50 stations on c.w. on the four bands. We've never had such beautiful warm weather on Mt. Wachusett." — *K1YLU/1*. "Good conditions prevailed except for a few noisy thunderstorms. Of the 17 sections worked, 16 were on phone. Antenna only 25 feet high and 100 feet above sea level. The measured r.f. at the antenna is 40 watts phone and 125 watts c.w." — *K1HTV*. "Spent two hours Saturday evening complying with Murphy's Law when the 2-meter modulator quit. Two meters consistently excellent from this QTH." — *K1TPK*. "Disappointed in not making a 2-meter contact in my own section of Vermont." — *W1EXZ*. "There were more black flies than contacts." — *W1DRO/1*. "I am sick and tired of not working Vermont in the QSO Parties. I am going to Mt. Equinox in the September party and will operate single operator again as WA2FGK. I'll have high power, big antennas on all bands up to 1296 Mc. and will take on all schedules. I'll see everyone from Vermont in September." — *K2LNS*, *opr. WA2FGK*. "Amazingly consistent 2-meter DX." — *WB2MEO*. "One complaint is operators who do not say where they are tuning and then do not tune their own frequency." — *WA2VAZ*. "Two severe lightning storms in E.N.Y." — *W2HFF*. "My main gripes, where were E. Mass. and Del.? The only strong signal from E. Pa. was K3IPM. I plan to travel to Vermont for September." — *WB2WIK*. "My first contest, a new experience and a lot of fun but where was New England?" — *WB2ZQR*. "The contest was a smashing success both in operation and equipment. That new beam is fantastic, all I need now is a half-way decent rotator to turn it." — *WB2MYK*. "Spent all my spare time this year on 432 Mc. so South Jersey would be available. Not much activity from Conn., N. H. or Vt. which are usually represented. I'm sure conditions weren't that bad!" — *W2BLV*. "Didn't spend enough time on 432 or 144 and my biggest mistake was not being able to go on 220 — live and learn." — *W2JKL*. "The best two days of my entire ham career." — *WN2YRD*. "Improved everything over last year but our six-meter performance. Surprised at the absence of activity from Vermont and Quebec on 144 Mc. At least three of us will attempt at least a 6 and 2 meter operation from VE2 in September." — *W2UFT*. "One of the best parties the Audubon Radio Club has experienced with scatter activity the best ever heard." — *WB2TBQ/2*. "The band was closed to sporadic E from our location except for a short while on Sunday afternoon. North and South Texas, along with Mississippi, were our only skip sections." — *W3ZGI/2*. "Thanks to the cooperation of the hospital, my OM WA2GRV and K2DUR (no steak bet this year, I managed to get on two)." — *WA2SOO/2*. "Since we operated only one band, it is sort of natural that we make this comment, but it may be worth asking 'the gang' about. How about giving recognition to single-band stations say in the September contest." — *K2YNT/2*. (How about your ideas on this fellas? — ed.) "We had more fun than points." — *W3AWA/3*. "An exciting contest, complete with the usual equipment breakdowns." — *WA3GLP/3*. "Where were Md., D. C. and Va.? 220 Mc. was an experiment and although only 3 contacts were made it proved its worth — those extra sections can really help." — *K3ERM/3*. "My favorite contest. Highlights were: the W. Va. station on two who came back on c.w. when I couldn't copy his prefix, the northeast stations (particularly N. Y. C.-L. I.) which were giving me about a contact every 2 minutes on Sunday night." — *WA3CBC*. "Learned something about obstacle gain technique. I operated on a hillside 6.7 miles due north of the Delaware Water Gap. The elevation was 650 feet with many surrounding hills over a thousand feet high. Getting a signal over the Kittatinny Mountains was difficult." — *W2MEO/3*. "The Pack Rats operated in Sumneytown, Pa., 35 miles n.w. of Philadelphia. Beams for all five bands were mounted on 40 ft. towers. We didn't do as well on 2 as last year due to a drop in power input from 500 watts to 100 watts. Likewise we had no s.s.b. on 6 meters which cost us quite a few contacts. The coordinator for this event was K3ZPN assisted by W3CL



K6IBY of the Orange section was one of the southern California actives enjoying good conditions on both six and two. Joe runs 900 watts input on both bands. The six meter antenna is a 9-element array on a 30 foot boom up 55 feet. Radiators for two meters include a ground plane plus a 16-element J-slot. The new panel on the rack is planned for kilowatts on 144, 220 and 432 Mc.



Six-meter specialist **W9ECV/6** operated in Kansas, topping the Midwest Division listings with a single band effort, 97 two-ways in 32 sections. Mark runs a full gallon, 4-400A's in push-pull. The panel on the shelf is the receiving converter and Collins-type noise blanker. A credit line for the photo goes to his 9-year-old son David.



Eleven-year-old **Guy Benne WN9TKW** took second slot in the active Illinois sections with 120 exchanges on two. He used a homebrew two-meter Handbook transmitter and an SX-101, plus a 9-element array. The station serves the rest of the family too, WA9JKT and W9ETK!

and starting at 50 Mc., the team captains were K3DUW W3LHF WA3CAG K3UJD and K3BPP. — W3CCX/3. "The fellows down in the valley were really working the DX when we could barely hear it here on a 3300 foot mountain in the extreme s.e. portion of Tennessee. The mosquitos made more contacts than we did." — WB4ASA/4. "The six-meter transmitter was the W1CER solid state affair in June QST. It works f.b." — K4NTD. "Activity was real slow from this area. About the best conditions although the fewest contacts of any contest in recent years." — W4A8VA/4. "Better equipment than last year, but conditions not as good. On six we worked most sections on early morning scatter." — K4GWY/4. "Local activity up to par but mountain-topping and surrounding state activity off." — K4HQI. "We had to spend the night in the shack without blankets because of a bear outside, hi!" — WA5DOP. "Two meters poor and the lack of local interest a disappointment." — K5BDQ. "The short opening Sunday provided the interest in this one and convinced me that s.s.b. is a must. Sideband stations were heard for two hours before the band opened for a.m. and for nearly as long after it had apparently closed." — WA5AUA. "Contest interest was greatly increased due to good meter openings and the loud loud signals of the mountain-top stations." — W6CGM. "Next contest I'll be transceive on 6 meters too! 20-meter SS practices should apply to a band that sounds like 20!" — W6GDO. "This is the first time I've been on 5 bands." — W6GYD. "Rats! Maybe in September I'll have a v.f.o. and a couple of beams." — W6TFC. "I had a group all lined up to operate from 8200 ft. near Reno, Nevada, with my other call of W7BYF. SNOW in June! Look for us in September." — W6DOR. "The threatening weather apparently kept a number of mountain toppers at home. Contest time

started with a bang for 50 Mc. with single hop openings into nearby states. No rattlesnakes this year although one horned-toed lizard was captured and released." — K6TJL/6. "Heard K7RKH in Utah very good on s.s.b. and c.w. on 2 but couldn't work them." — K6HMS. "Barstow, Cal. is remote from the major v.h.f. areas and completely surrounded by mountains. I point my beam at 10,000 ft. Mt. Baldy and bounce off that peak. Note the 220 Mc. activity in this year. I worked 26 stations on that band, all vertically polarized to get away from radar QRAM." — K6VYP. "Despite heavy line noise, failure of my high power six-meter final etc., I did quite well compared to some past years. It was quite a scrounging job to round up contacts. Quite a number of California sections were worked here for the first time during the contest and nearly all were heard." — K7CW. "During the two days I worked almost every state I've worked during the last year on 6. The band was open to the south into California and Nevada from a half hour before the contest until about 7:30 p.m. in the event. QSOs were solid with excellent quality signals. All modes were coming through." — WA7FTG. "Six was open at the start and opened again the next night!" — K7ZIR. "Good conditions on 6 and 2 this year. Apparent lack of good ducts and thunderstorms later dampened 432 Mc. schedules with California. However, 50 Mc. Es, single and double hop were rampant on Saturday with good meter scatter and tropo prevalent on Sunday. Two meter tropo to Los Angeles on 144 Mc. was outstanding with many S-9 s.s.b. two-ways and some c.w. exchanges with stations running 10-15 watts!" — K7RKH/7. "Two meters in Michigan was in poor condition with signal levels below normal for this time of year." — W4SVHG. "Operated portable from a 4200 ft. mountain top in West Virginia. Lots of s.s.b. activity. I'll be back at

Minimum Number of Sections						Minimum Number of Sections						Minimum Number of Sections						Minimum Number of Sections							
20 10 2 2 1						20 10 2 2 1						20 10 2 2 1						20 10 2 2 1							
Band (Mc.)	50	144	220	420	1215	Band (Mc.)	50	144	220	420	1215	Band (Mc.)	50	144	220	420	1215	Band (Mc.)	50	144	220	420	1215		
K1ABR	14	15				K2JNG					6	1	W3HB	1	11				K6KOC/6						6
W1ALE*	7	9	4	3		WB2LJG/2*	14	12					W3HLX	5	3	1	5		K6SLQ/6*	11	6	4	6		
WA1BGB*			1	1	1	W2MAU/2*	6	10	2	2			K3HKK/3*	16	14		1		K6TJL/6*	14	9	3	6	3	
WA1DRO/1*	8	12	4	3		WB2MRK	13	11	6	1	1		K3IPM	25	15	9	7		K6UMV	2	3			2	
WA1GFG	6	13				WB2MYK		13					K3JRO/3*	17	12				K6VYP	12	7	4			
K1HTV		17				WB2MZE	12	14					W3JZY	18	11				W8ZDO	7	3	2	2	3	
W1LUA/1*	15	16	6			W2OW*	18	13	2	5			W3LP*	13	11				K7CWH	21	4		2		
W1MHL/1*	25	20	11	10	3	W2PEZ/2*	22	18	10	8	2		W3MMV		3		7	1	K7RKH/7*	1	1		2		
K1MU3*	7	15				WB2PUI*		19					K3OBU	11					W7TYR	19	2	1	1	1	
W1OOP			5	3	1	WB2QLP	19	12					W3PGA/3*	13	12				W7UDM	9	3	1	1	1	
W1POP	6	14				WB2QZZ	13	14					K3UVR	18	11				K7WTG/7*	17	3			1	
W1QWJ/1*	19	15	9	8		W2SEU	13	11	10				K3WJB	18	16				K7ZIR	20	3	1	1	1	
K1RAR/1*	7	8	6	5	2	WB2SHI	14	13					WA4CGA	28	4		1		K6RCK/7	24					
K1TPK	13	15				WB2SZK	7	9	3				WB4DQW	26	3				WA8BCA*	38	11				
W1UCB	4	3	2			WB2TBO/2*	24	11					K4GWY/4*	29	6				WA8OXC	39					
W1WHL	13	9	4			WB2TXJ		15					K4QIF/4		18				WA8PLZ*	21	3				
K1YLUN/1*	13	15	7	5		W2UFT*	23	19	9	5			WA4SIQ	4	4	2			W8WEN		14				
K1YON	12	7	11	1	1	WA2WEB/2*	36	17	6	7			WA4STJ	25					K8WVS*	22	5				
VE3FCH/W1*	19	11				W2WGL		10					K4SUM	9	14		7		W4UIS/8	24					
K2ACQ			4			WB2WIK		10					WA4VCC/4*	23	3				K9DZK*	33	3				
W2AEE*	14	10				W2WUF			7	7			WA4YKN	22	3				WA9HNJ	31					
W2AXU	26	2				WB2WVA	16	10					WA5DXA	25	1				WA9JFM	28	9				
W2BLV				11		K2YNT/2*		18					K5EZG	20					K9KFR	28	1				
K2BWR*	24	15				W2ZDR/2*	13	9	4	5			K5IPV	36					K9QXY/9*	20	6			1	
K2CEH/2*	29	19	9	9		W3ZGI/2*	32	15					WA5KID	24					W9AJY*	23	1				
W42CJ/K/2*	30	19	3	6		WA8KTZ/2*	8	12					WA5KPU	35	1		1		W9EYE	41	1	1	1	1	
K2DEL*	11	10				KH6GHL/2*	21	13					WA5LTA/5*	22					WA6MRH/6	20					
W2DZA	4	6	3	2		W3AD/3*	18	17	2	3			WA5NOB/5	27	3				W9PTP	28					
WA2EUS	7	9	9			W3ARW/3*	13	18	6	8			W7RUC/5*	31	2				W9ECV/6	32					
W2FAN			2			W3AWA/3*	20	5					WB6UDF/6*	6	5	1	3		VE2HW		11		2		
WA2FGK	27	19	5	2		WA3CBC	14	13					WA6CFA*	5	5	4			VE2RM*	8	7		2		
WB2FKJ/2*	17	15	10	10	1	W3CCX/3*	21	17	11	11	1		W6GDO	22	8	4	6	1	VE3ASO/3*	11	10		1		
W2GKR/2*	12	18	9	7	1	W3CGV	18	7	3	6			WA6GYD	16	5	4	5	1	VE3EZC		11		2		
W2GKZ	8	13				K3ERM/3*	16	10	2				K6HMS		5		4		VE3SAU*	12	18				
W2HF		4	2	2		W3FEY/3	4	15		8			W6PHH		5		3	2	VE3ZZZ	13	6		2		
W2HGR/2*	11	10				WA3GBK		13					K6JC	17	4		2								
W2JKI*	20	16		3		W3GKP				4			K6KLY	18	5	3	4								

* Multioperator Station.

the same spot in September." — *W4UIS/8*. "My first contact and I stayed up the entire time. I set a goal for 75 contacts but only got 62 in 5 sections." — *WV8UWY*. "Poor conditions!!" — *W48PTA*. "Turbulent stormy weather prevailed over this central midwest area during prime operating hours. Just about the most unfavorable operating conditions ever I've ever experienced." — *W8CVQ*. "I'll be better prepared in Sept. with 100 watts on 6 and 2, phone and c.w." — *W4RGRR*. "Let's beat the drums hard for c.w. activity in September." — *W8TBB*. "Poor conditions with two meters the poorest in years." — *K9AJJ*. "Cheers to W1MHL/1, K1ABR and the other fellows who had the patience to copy my c.w." — *W9JBD*. "As with others, lost about 9 hours due to heavy rain, static, severe lightning, thunder and numerous tornado warnings—along with 3 power failures!" — *W190FF*. "Both tropo and meteor scatter were fantastic. Three eight second or better pings in one sixty second transmission were not uncommon. Sporadic E was also very good to the south and the southeast. Real excitement came when six meters opened to Washington, Oregon and Montana with five minutes left in the party." *K9OXY/9*. "I thought it was about time someone from Nebraska entered the contest. Conditions fair with very rough copy due to electrical storms during the entire period." — *W40MRH/8*. "I worked 20 hours to get 22 contacts. It was tough shuazink." — *8CZTQ*. "Finally got a new two-meter final going (pr. 4CX300-A) but only 150 watts output. Lots of fun but the band was flat." — *VE3EZC*.

SCORES

In the following tabulation, scores are listed by ARRL Divisions and Sections. Unless otherwise noted, the top scorer in each section receives a certificate award. Columns indicate the final score, the number of contacts, the section multiplier, and the bands used. A represents 50 Mc.; B, 144 Mc.; C, 220 Mc.; D, 420 Mc.; and E, 1296 Mc. or higher. Multiple-operator stations are shown at the end of each section tabulation. An asterisk denotes a Headquarters staff member, ineligible for an award. A double asterisk denotes a Novice Award winner.

ATLANTIC DIVISION

Delaware
W3CGV 3604-91-34-ABCD
K3NYG 444-37-12-AB
K30BU 341-41-11-B
K3CHN 243-27-9-A

Eastern Pennsylvania
K3IPM 30,267-488-57-ABCD
K3WJB 10,948-322-34-AB
W3FEY/3
 3051-88-27-ABD
W3AAN
 2132-164-13-A
K3VPV/3
 1760-110-16-AB
K3OSZ 915-17-AB
W3HLX 490-26-14-ABCD
W3AHT 432-54-8-B
W3MMV 418-21-11-BDE
W3ZGG 360-40-9-A
K3ROK 90-18-5-A
W3YPT 85-17-5-A
W2MEQ/3 27-9-3-B
W3CCX/3 (12 oprs.)
 43,249-621-61-ABCDE
W3AD/3 (9 oprs.)
 14,040-340-40-ABCD
W3ARW/3 (W3s ARW
 P.V.G., K8R3Q)
 9405-181-45-ABCD
W3AWA/3 (7 oprs.)
 4075-163-25-AB
W3LP (4 oprs.)
 2901-121-24-AB

Maryland-D. C.
WA3UBC 4644-172-27-AB
W3JZY 4437-153-29-AB
K3UVH 2527-133-19-AB
WA3ELA 1824-96-19-AB
K3VRS 1575-75-21-AB
WA3GBK 923-71-13-B
W3HB 768-64-12-AB
WA3EGY 396-44-9-B
W3UQP/3 280-40-7-B
WA3HQD 210-42-5-B
WA3HQE 210-42-5-B
WA3HAQ 138-23-6-AB
WA3FCN 84-14-6-AB
W3GKP 72-9-4-D
WA3QLP/3 39-13-3-B
K3ERAI/3 (5 oprs.)
 4926-170-28-ABC
W3PGA/3 (7 oprs.)
 4175-167-25-AB
WA3EOP/3 (WA3s EOP
 F.Y.Z. HZY)
 2352-147-16-AB

K3TBC/3 (WA3BIV,
 K3TBC)
 1566-87-18-AB

Southern New Jersey
WB2UVB
 2842-203-14-AB
WB2BZK 2546-128-19-ABC
W2AXU 1650-55-30-ABC
WB2SSN 948-79-12-AB
W2BLV 550-25-11-D
WB2JGC 540-35-15-AB
WB2QLG 423-47-9-AB
WB2YEH 282-47-6-A
WB2SPB 234-39-6-AB
WB2TLT 230-46-5-A
WN2ZCG 31-17-3-B
W2HBE 30-10-3-B
WB2TBQ/2 (WB2s JEP,
 PGE) 9240-264-35-AB
WB2LJG/2 (4 oprs.)
 8268-318-26-AB
K2BWR (K2s BWR ZRL)
 5616-144-39-AB

DIVISION LEADERS

Single Operator		Multipoperator
K3IPM	Atlantic	W3CCX/3
WA9JFM	Central	K9DZK
W6GNS	Dakota	.....
WA5DXA	Delta	WA5NOB/5
WA8ONX	Great Lakes	WA8BCA
WA2FGK	Hudson	W2PEZ/2
W9ECP/8	Midwest	K0TLM
K1TPK	New England	W1MHL/1
K7ZIR	Northwestern	K7WTG/7
W6LDJ	Pacific	K6TJL/6
K4SUM	Roanoke	K4GWY/4
W8EYE	Rocky Mt.	W7RUC/5
WA4STJ	Southeastern	W4VYP
K6VYP	Southwestern	K6BPC/6
WA5KPU	West Gulf	W5UGO
VE3ZZZ	Canada	VE3ASO/3

WB2WRP (WB2s WRP
 YCZ) 1620-135-12-AB

WA3HOG/3 (K3s low sfo,
 WA3HOC)
 430-43-10-AB

Western New York

K2ISP 1170-117-10-A
W120EU 634-79-8-AB
WB2QKC 312-78-4-B
W2WGL 290-23-10-B
WB2KYQ 120-30-4-B
K2ACQ 104-13-4-D
W2FAN 20-5-2-D
WA25QD/2 110-10-1-A
WA2WFB/2 (11 oprs.)
 31,878-483-66-ABCD
K2CEH/2 (10 oprs.)
 23,496-315-66-ABCD
WA2GJK/2 (4 oprs.)
 19,720-321-58-ABCD
W2OW (15 oprs.)
 8208-204-38-ABCD
K2ERQ (9 oprs.)
 2919-133-21-AB
W2MAU/2 (5 oprs.)
 1980-88-20-ABCD
WA2JQJ (4 oprs.)
 1584-99-16-A
WA2GJA (WA2GJA, K2s
 LFB POX)
 1170-78-15-AB
WB2VPY (18 oprs.)
 1100-100-11-A
WA2VMB (5 oprs.)
 1032-86-12-AB
WB2NOD/2 (WA2YQP,
 WB2s 1PX 1QE)
 806-86-10-A

Western Pennsylvania

WA3CFK/3
 3120-130-24-AB
W3FGU 1538-96-16-A
W3BWU 1520-95-16-AB
W3DJM 245-35-7-A
WA3CCM 40-10-4-A
K3JRO/3 (K3s 1VK JRO)
 1292-138-24-AB
K3HKK/3 (8 oprs.)
 4123-132-31-ABD

CENTRAL DIVISION

Illinois

K9AAJ 1474-65-22-ABD
*W9TKW*** 600-120-5-B
WA9JYR 444-111-4-B
WA9OQ 201-67-3-B
WA9MSZ 174-58-3-B
W9DJZ 168-28-6-A
WA9XII 168-56-3-B
WA9CUK 156-26-6-A
WA9NY 128-32-4-AB
WA9KQD 22-11-2-B
WA9FIM 21-7-3-A
K9UCR/9 20-10-2-AB
K9MFB (4 oprs.)
 1080-90-12-AB
K9VKF/9 (K9VKF,
 WA9NPS)
 623-89-7-AB
W9AML/9 (4 oprs.)
 215-43-5-AB

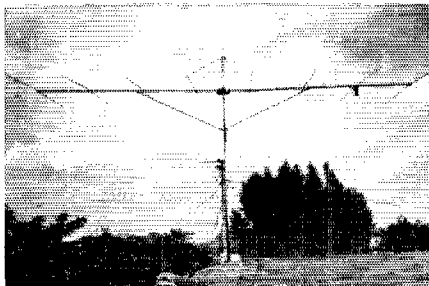
Indiana

K9KFR 5742-198-29-AB
K9QCB 3075-173-21-ABCD
W9JBD 988-76-13-AB
WA9SSK 432-48-9-A
K9DZK (K9DZK, W9JHL,
 WA9RDF)
 12,312-342-36-AB
WA9ONY (WA9s ONY 81A)
 282-47-6-A

Wisconsin

WA9JFM 8880-240-37-AB
WA9NH 5162-102-31-A
WA3BPI 621-68-9-AB
W9KHH 18-9-2-A
WA9POV 13-13-1-A
K9ONY/9 (7 oprs.)
 5319-191-27-ABE
WA9OF/9 (WA9s OFP 10DN)
 1022-73-14-AB
K9EWG/9 (6 oprs.)
 550-55-10-AB

K6RCK/7 led Arizona with 59 contacts in 24 sections all two-meters. His once elaborate California station has now been reduced to one Swan-250 and an 8-element beam at the 20-foot level. He feels contests promote good amateur relations as well as help to improve operating techniques. In fact, he firmly believes all VHFers that are active should participate.





This is what **WA2FGK's** neighbors see: 80 elements on two at 55 feet; 11 elements for 6, 24 element colinear on 432 and 15 elements on 220 on the 80 foot tower. That 432 array is 96 feet above ground and fed with heliax. This fine setup, operated by K2LNS, led all single operator stations in Northern New Jersey and the Hudson Division with a 4-band effort for better than 29-K.

DAKOTA DIVISION

North Dakota
WGNS 528- 33-16-A
K0RDF(K0s CXJ
RDF, WA0IBB)
 672- 42-16-A
South Dakota
K0FKJ 78- 13- 6-AB

DELTA DIVISION

Arkansas
WA5NOB/5 (6 oprs.)
 2460- 82-30-AB
WA5LTA/5 (WA5s LTP
 LTA NNG)
 1188- 54-22-A
Louisiana
WA5DXA
 4316-166-26-AB
WA5KID 3048-127-24-A
Tennessee
WA4CGA
 3498-103-33-ABD
WA4YKN
 2475- 99-25-AB
K4FKO 1755-117-15-AB
WA4GDY 890- 89-10-A
W4GGM 115-23- 5-AB



Here's **WA1GIS** at the 1215 Mc. position of **K1RAR/1**. This "first effort" by the Talcott Mountain VHF Society netted 4060 points in a 5-band QRP-type effort.

WA8RTV 1664-104-16-AB
W8WEN 1400-140-10-B
WA8IDU 1278-143- 9-B
K8OAE 1105- 85-13-AB
WA8SJK 904-113- 8-B
WA8MHR 704- 64-11-AB
W8JRN 682- 62-11-AB
WA8JWY 630- 70- 9-AB
K8WVZ 312- 39- 8-A
WN8UWY** 310- 62- 5-B
W8VND (W8CHT, opr.)
 225- 38- 6-AB
WA8PRZ 22- 11- 2-A
WA8VPI 20- 20- 1-B
W8FAZ 2- 2- 1-R
WA8BCA (5 oprs.)
 22,834-466-49-AB
K8WVS (K8WVS
W8LHY)
 5616-208-27-AB
WA8PLZ (7 oprs.)
 3702-153-24-AB
WA8PNR (WA8s LRE PKB
 PNB) 5325-175-19-AB
WA8WTN (WA8s TYF VOZ
 WTN) 1001- 91-11-AB

WB2PAZ 36- 12- 3-B
WB2PAZ/2 (WB2BHM,
 WB2STR)
 32-16- 2-B

MIDWEST DIVISION

Iowa
W0PFP 2484- 88-28-A
Kansas
W9ECV/0
 3104- 97-32-A
WA0POY 180- 30- 6-A
W0SPF 21- 7- 3-AB
WA0HAZ (WA0s HAZ
 AMU)
 125- 25- 5-AB
Missouri
WA0FTL 36- 9- 4-AB
K0TLM (WA0IKI, K0TLAI)
 2020-101-20-AB
Nebraska

HUDSON DIVISION

Eastern New York
WB2SH 4347-161-27-AB
WB2VQK 648- 72- 9-B
WB2MYK 585- 45-13-B
W2VAZ 532- 38-14-AB
WB2YHE 200- 40- 5-B
W2ZRWU 152- 19- 8-B
W2HF 136- 13- 8-BCD
WB2YHA 100- 20- 5-B
WB2VOZ 24- 8- 3-B
WB2FKJ/2 (22 oprs.)
 35,478-599-54-ABCEDE
W2UFT (6 oprs.)
 30,369-40-53-ABCD
W2JKI (W2JKI, WB2YEM,
 K9C0U
 15,990-406-39-ABD
WA8KTZ/2 (WA2s USG
 ZPD, W1KTTZ)
 2880-142-20-AB
WA2DNR (4 oprs.)
 650- 65-10-A
 N. Y. C.-L. I.

GREAT LAKES DIVISION

Kentucky
K4QPJ 900- 60-15-AB
WA4SIQ 710- 71-10-ABC
Michigan
W8CVQ 368- 45-8-ABD
WA8VHG 266- 38- 7-B
WN8UVG** 252- 84- 3-B
WA8PST/8
 104- 26- 4-B
WA8USQ 92- 46- 2-B
WR8RH 27- 9- 3-B
WA8QAF 12- 12- 1-B
WA8FTA/8 (WA8s EOW
 FTA TSV)
 1190-119-10-AB
Ohio
WA8OXC 10.881-279-39-A

WB2MRK 8288-235-32-ABCEDE
W2SEU 6766-179-34-ABC
WB2WVA
WB2QLP 5382-207-26-AB
WB2MZE 4805-155-31-AB
W2GKZ 4472-172-26-AB
W2GKZ 2058- 98-21-AB
WA2EUS 1500- 47-25-ABD
WB2TJX 1365- 91-15-B
W2WOF 1142- 41-14-CD
WB2WQE 700- 50-14-AB
WR2MEO 612- 68- 9-B
WB2TJE 560- 70- 8-B
WB2ULV 390- 39-10-AB
W2KNG 192- 24- 8-B
WB2YNY 120- 30- 4-F
WB2ZTN
W2AEE (WA2s BNK ZZP,
 WB2BUR)
 5084-211-24-AB
WB2ZNG (WB2s WKL ZNG
 ZNG) 2888-150-19-ABD
WA2ACF (WA2ACF,
 WB2ACF)
 1064-133- 8-A
WB2PTI (WB2PUL,
 WN2ZPX)
 1060-106-10-B

Northern New Jersey
WA2FGK (K2LNS, opr.)
 29,203-537-53-ABCD
WB2QZZ 5508-204-27-AB
WB2WIK
 1210-121-10-B
W2CVW 864- 54-16-AB
W2DZA 720- 38-15-ABCD
WN2ANI** 684- 76- 9-B
WN2ZHL 480- 60- 8-B
WN2VRD 402- 67- 6-B
WB2QZR 387- 42- 9-B
K2JNG 329- 23- 7-DE
WB2TTY 265- 53- 5-AB
W2PEZ/2 (11 oprs.)
 39,780-608-60-ABCEDE
W2GKR/2 (8 oprs.)
 21,504-41-48-ABCEDE
W2ZGL/2 (4 oprs.)
 16,403-349-47-AB
KH6GHL/2 (WA2PBN,
 KH6GHL)
 12,342-363-34-AB
W2ZDR/2 (13 oprs.)
 9488-278-31-ABCD
K2YNT/2 (WA2s KZV
 LNX, WB2GMR)
 5922-329-18-B
K2DEL (13 oprs.)
 3901-281-21-AB
W2HGR/2 (5 oprs.)
 2751-131-21-AB
WB2STR/2 (WB2BHM,

WA0MRH/0
 1160- 58-20-A
W0UJK 663- 39-17-A
K2PCC/0
 104- 13- 8-A
W0NXX 72- 11- 6-BD

NEW ENGLAND DIVISION

Connecticut
K1YON 3648- 93-32-ABCEDE
W1WHL 3198-118-26-ABC
K1HTY 1717-101-17-B
W1HDD/1 85- 17- 5-AB
W1AFES 42- 14- 3-A
W1MOL 8- 7- 1-B
W1LUA/1 (8 oprs.)
 13,357-346-37-ABC
W1ULZ (W1ULZ, K1ZDY)
 6528-192-34-AB
K1RAR/1 (5 oprs.)
 4080-112-29-ABCEDE
K1MUJ (multiple)
 3322-151-22-AB
W1LAW (W1GIS, WA3AUD)
 180- 30- 6-AB

Eastern Massachusetts

W1DOM 1694-121-14-AB
W1HLL 1462- 86-17-AB
W1AANK
 1424- 89-16-AB
WA1ETG 1236-103-12-AB
WA1GEO
 1222- 94-13-AB
K3EXL/1 506- 46-11-AB
W1J8M 462- 33-14-B
W1OOP 207- 23- 9-CDE
W1MXP (K4GGL, opr.)
 180- 27- 7-B
WN1HIG** 184- 23- 8-B
W1CHF/1 180- 30- 6-A
W1GXW 175- 35- 5-A
WN1HON 155- 31- 5-B
W1CTR/1 110- 21- 5BD
W1CTR 60- 24- 3-A
W1A2PC/1 6- 3- 2-B
W1AIFBQ (W1AIFBQ,
 WN1HNQ)
 1638-117-14-AB
WA1EJE (WA1EJE,
 WN1HJE)
 144- 24- 6-B

Maine

W1GKJ 105- 15-7-AB
W1DEO 22- 11- 2-AB
W1ALRO/1 (K1s CHY LFN
 WALDR)
 6264-222-27-ABCD

New Hampshire

W1JJO/1 330- 30-11-AB
W1MHL/1 (10 oprs.)
 57,615-770-69-ABCEDE
VE3FCH/W1 (4 oprs.)
 440-148-30-AB
W1ALE (W1s ALE YQH)
 1771- 63-23-ABCD
WA1BGB (WA1BGB,
 W1QXX) 40- 4- 4-CDE

Rhode Island

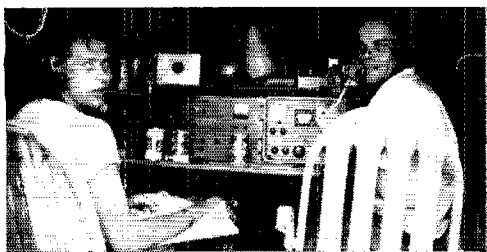
K1TPK 10,136-362-28-AB
WA1GFG 3800-200-19-AB
K1ABR 3422-142-29-AB
W1POP 2780-139-20-AB

Vermont

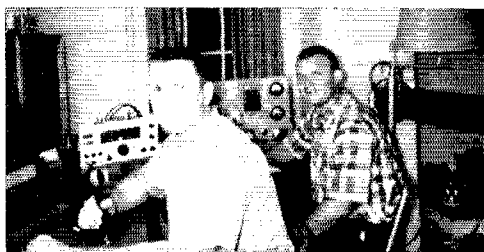
K1GYT 616- 56-11-AB
W1EXZ 48- 8- 6-AB

Western Massachusetts

K1ULZ 912- 76-12-AB
W1UCB 153- 15- 9-ABC
WN1HNN 32- 16- 2-B
K1YLU/1 (14 oprs.)
 18,640-15-40-ABCD
W1QWJ/1 (6 oprs.)
 12,291-210-51-ABCD



After their N. H. effort last September, **W2PEZ/2**, returned to N. N. J. and 1400 foot Bearfoot Mountain. Conditions on 144 Mc. were average, 220 Mc. good and on 432 Mc. it was the mountain-top stations which stood out along with the old reliables. A fine 39,780 point sum for 608 in 60! Here's the two-meter tent with **W2NNL** at the mike and **W2EEW** logging.



Tops in multiops, in the Central Division is **K9DZK/9** of Indiana, operated by **K9DZK** (left), **W9JHL** (right) and **WA9RDF**. Antennas included an 11-element Telrex on a 36 foot boom at 90 foot height and 17 elements on two on a 32 foot boom at 105 feet. It all added up to 342 exchanges with 36 multipliers on two bands. They report that more than half of the six meter contacts were on s.s.b.

NORTHWESTERN DIVISION

Montana
W7GJN 6- 3- 2-AB
W7EGN/7 (W7s EGN EQB) 133- 19- 7-AB
Oregon
K7ZIR 4342-158-26-ABCD
W7TYR 3720-140-24-ABCD
W7UDM 1455- 88-15-ABCD
K7TAK 36- 18- 2-AB
K7AUO/7 (11 oprs.)
K7OGK/7 (WA7s EGY EFP, K7ZCB) 988- 88-11-AB
K7DVK (K7DVK, WA7CHE)
 913- 83-11-A
W7ICS (4 oprs.)
 96- 29- 3-ABD
Washington
WA7FHG 1751-103-17-AB
K7LQI 704-88- 8-A
K7WTG/7 (4 oprs.)
 6400-254-21-ABE
K7IEV/7 (K7s IEV MQF, WA7EHE)
 2244-132-17-AB
K7IKC (7 oprs.)
 846- 91- 9-AB
W2MCO/7 (W2MCO)
K9UCP 93- 31- 3-A

PACIFIC DIVISION

East Bay
K8KLY 4470-132-30-ABCD
W6BXO 133- 19- 7-A
Nevada
K7ICW 2133- 71-27-ABD
Sacramento Valley
W6GDO 10,086-223-41-ABCD
WA6PAB 468- 39-12-A
W6DOR 224- 28- 8-A
W6KDJ 80- 15- 5-ABC
W6YJH 28- 7- 4-AB
WA6FWU 15- 5- 3-A
San Francisco
WA6YYM 350- 70- 5-B
K6PQI 342- 38- 9-A
San Joaquin Valley
K6UJG 602- 43-14-AB
W6WJP/6 (K6DYD, WB6s LEU WJP)
 2025-135-15-AB
W6BWK/6 (5 oprs.)
 1360- 80-17-AB
Santa Clara Valley
WA6GYD 8045-168-31-ABCD
W6VMY/6 1751-103-17-AB
K6JC 1495- 57-23-ABD
WN6WKF 54- 18- 3-B
K6TJL/6 (4 oprs.)
 7490-189-35-ABCD
K6SLQ/6 (7 oprs.)
 7371-249-27-ABCD
W6UW (WB6s FES UOL)
 240- 60- 4-B

ROANOKE DIVISION

North Carolina

W4RPV 1302- 93-14-AB
K8ZEN/4 222- 37- 6-R
WA4ZWE 44- 22- 2-A
WA4VCC/4 (WA4s BNX VCC, K4LYV)
 4030-155-26-AB
W4PAR/4 (4 oprs.)
 1800-100-18-AB
WA4SH/4 (WA4s FCP FUV)
 728- 91- 8-AB
South Carolina
K4GWY/4 (7 oprs.)
 3320-152-35-AB
Virginia
K4SUM 5230-159-30-ABD
K4QIP/4 918- 51- 18-B
K4EJW 144- 24- 6-A
West Virginia
W4IHS/8 3120-130-24-A
K8HYE 806- 62-12-A
K8GNZ/8 658- 47-14-AB
WA8JFA 92- 23- 4-B

ROCKY MOUNTAIN DIVISION

Colorado
W0EYE 9405-202-45-ABCD
WA5LPK/6 828- 69-12-AB
W5TXR/6 374- 34-11-A
W0AJY (W0s AJY CCK)
 3288-137-24-AB
New Mexico
W5HDE/5 531- 59- 9-AB
W7RUC/5 (3 oprs.)
 4686-142-33-AB
WA5DOP (K5FOB, W5UJF, W5LHJ)
 1955- 84-23-ABD
W5ODS/5 (5 oprs.)
 799- 46-17-ABD
Utah
K7RKH/7 (K6JYO, K7s RKH ZOK)
 3468-100-34-ABD
Wyoming
W7EL/7 (7 oprs.)
 900-100- 9-A

SOUTHEASTERN DIVISION

Alabama
WB4DQW 2349- 81-29-AB
K4WHW 310- 62- 5-AB
K4GEC 222- 37- 6-AB
K4BAO 174- 29- 6-AB
W4FVY 112- 28- 4-AB
W4ZNI 96- 32- 3-A
W4YRM 75- 25- 3-AB
K4TUT 38- 19- 2-A
WA4FHY 30- 15- 2-A
W4YXQ 14- 14- 1-A
WA4WGF 4- 1- 1-A
Eastern Florida
WA4STI 3225-129-25-A
W4OJU 572- 52-11-A
K4NTD 120- 15- 6-ABCD
WA4VYP (WA4s VYP WVC)
 768- 64-12-A
Georgia
K4HQI 198- 22- 9-AB
WB4AYN 90- 18- 5-A

SOUTHWESTERN DIVISION

Arizona
K6RCK/7 1416- 50-24-A
K7LDT 1156- 68-17-A
Los Angeles
W6PUZ 1785-101-15-AD
K6UMV 112- 12- 7-ABE
WB6RKG 50- 25- 2-B
WB6FRP 42- 14- 3-A
WA6LMA 34- 17- 2-B
K6BPC/6 (10 oprs.)
 3873-115-21-AB
WB6GDE/6 (8 oprs.)
 3388-185-18-ABCD
Orange
K6VYP 3312-118-23-ABC
WA6OUE 2320-145-16-AB
K6IBY 1870-110-17-AB
WB6PHO 972- 81-12-A
K6HMS 645- 72- 9-BD
WB6OCM 572- 44-13-AB
W6HPH 570- 32-10-BDE
WA6CFA (WA6CFA, WB6RJJ)
 2070-134-14-ABC
San Diego
WA8ZQU 1534-118-13-A
WB6JLC/6 1200-160-12-AB
W3WDX/6 357- 46- 7-ABC
WB6TFC 54- 27- 2-B
WB6WMZ 32- 16- 2-B
Santa Barbara
W6ZDO 2193-106-17-ABCD
WA6RTM 702- 54-13-AB
K8OKC/6 276- 23- 6-D

WEST GULF DIVISION

Northern Texas
K5IPV 4212-117-36-A
K5SXU 1008- 56-18-A

Oklahoma
K5EZG 980- 49-20-A
W5VCJ 180- 30- 6-A
W5LOW 174- 29- 6-AB
WA5OUI 100- 20- 5-A
W5PMX 21- 7- 3-A
W5UGO (W5s HFV UGO, K5PBG)
 2525-101-25-AB
K5VOZ/5 (9 oprs.)
 74- 37- 2-AB
Southern Texas
WA5KPU 7289-197-37-ABD
WA5AUA 975- 65-15-AB
WA5IYX 50- 10- 5-A
K5BDQ 14- 14- 1-B

CANADIAN DIVISION

Quebec
VE2HW 676- 48-13-BD
VE2BH 220- 22-10-A
VE2BMH 38- 19- 2-AB
VE2RM (5 oprs.)
 1581- 89-17-ABD
Ontario
VE3ZZZ 2247-103-21-ABD
VE3EZO 741- 50-13-BD
VE3DSQ 352- 88- 4-B
VE3CIT 150- 29- 5-ABD
VE3GSO 98- 33- 3-B
VE3BHW 6- 3- 2-A
VE3ASO/3 (VE3s ASO FIB FIC)
 4510-202-22-ABD
VE3SAU (12 oprs.)
 3840-128-30-AB
Manitoba
K6GJX/VE4 77- 11- 7-A
VE4RE 66- 11- 6-A
British Columbia
VE7AXM 162- 18- 9-A
VE7EQ 24- 12- 2-A

Check Logs: **W5CRX**, **W5PKL**, **W8PXP**, **W8TCO**



Nope, not Field Day—but the club effort by the Southern California VHF Radio Club **K6BPC/6** atop Los Flores Peak in Los Angeles. It was just six and two this time but a real fun-type contest with good weather and moderate conditions. Watch for this group next year on all bands up to and including 1215 Mc.! Here's **WA6WKF** in action until the last plug was pulled.

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* WINJM

The Phone Hotshots

WE have heard it said that the headquarters staff consists of a bunch of c.w. men who all hate phone. We won't deny the first part, because being called a "c.w. man" implies proficiency in the International Morse Code, which we are all proud (modestly, of course) to admit. But the latter we indignantly deny, and to prove it we are going to discuss, this month, the qualities of the "hotshot" phone man.

Just as the basis ingredient of a hotshot c.w. man is proficiency in the code, that of the top-notch phone operator is the ability to talk. Anyone can do that, you say? Don't you believe it! The world is full of people who have all they can do to make their speech understood, who have insufficient mastery of words to portray anything specific, and whose words tumble from their mouths like the indistinct flow of water in a babbling brook. This is true especially of the younger element. So, a good phone operator first of all is able to *enunciate distinctly* (and this is a good practice phrase in itself).

In traffic handling, the hotshot phone operator realizes that the business at hand is to get the written message, exactly as he has it, on the pad of the receiving operator or, if he is doing the receiving, to get it on his pad exactly as it appears on the pad of the transmitting operator. This is a much trickier business on phone than it is on c.w. He doesn't try to impress anybody with his deep voice, his magnetic personality, or the importance of the message he is handling. He doesn't "read" the message, he *sends* it, by voice, one word at a time, at writing speed, intoning all syllables with almost equal emphasis. He repeats ("I repeat") unusual words, spells phonetically ("I spell") extraordinary words, initials, symbols and uncommon names. He avoids all extraneous remarks (the receiving operator might write them down as part of the message) unless absolutely necessary to the copying of the message—and you'd be surprised how few words out of context are really required. Above all, he eschews such expressions as "common spelling," "Missus, a married lady," "Black, as in the color," "check double-X-Ray." Any doubtful word he *spells*, using phonetics with words unusual enough to require really careful spelling.

The hotshot voice operator, however, *avoids* using phonetics excessively. When using phonetics, he uses a standard phonetic alphabet.

The model phone operator *never* makes any

allusion to any part of a message he is transmitting or receiving, especially the text. This is a common phone liddism and it's a bad one. He simply "sends" the message, or rogers for its receipt, makes no comments.

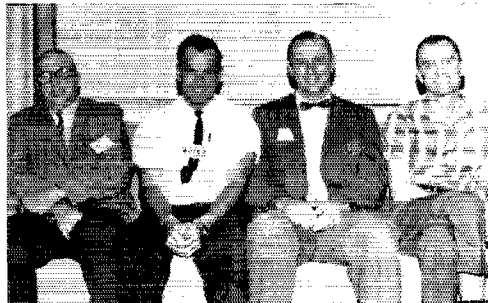
Sending a message by voice at writing speed isn't easy. Unless you are writing it yourself, you tend to go too fast. So, to practice, it is a good idea to actually write the message as you transmit it. If the receiving operator rogers readily, you can try it a little faster—some people are fast writers, some type the messages

The hotshot phone operator doesn't use shorthand. Unless he's a real expert at it, this is subject to errors. He writes or types it longhand, asks for repeats if any doubt. He doesn't waste time. He says "repeat word after blank," and the answer (e.g., "blank check") is brief and snappy.

The perfect phone operator breaks frequently for a check. When using a.m. or f.m., he cuts the carrier after each part of the message (after the preamble, address, text, and signature—if a long text, after every twenty words) to get any fills up to that point. On sideband, of course, he uses VOX and the receiving operator can "break" him if he misses. Two or three words at a time seems optimum for VOX.

It is not necessary for the text of the message to make sense to the handling operators, only to the addressee. All the real pro is interested in is making sure he has it *right*—that is, the way the other operator gives it to him.

The hotshot phone operator doesn't read message texts in a conversational tone, with feeling and emphasis. This is not a broadcast audition, you are trying to convey words and letters. The only way you can emphasize something is to de-emphasize something else, and this invites garbling. The hotshot articulates every



Here are K4SJH (Southeastern Vice Director), W4IKB (SEC West Fla.), W4IYT (SEC East Fla.) and W4RKH (SCM West Fla.) at a meeting to coordinate the Florida emergency nets prior to the hurricane season. This was during the Orlando Hamfest

*Communications Manager.

In Emergency . . .

Monitor your local emergency net frequency.

Make contact with your local EC or RO.

Take immediate steps to follow any pre-arranged plans.

Stay off the air unless or until you are sure you can be of assistance.

In widespread emergencies, monitor WIAW for latest bulletins and news.

word completely and with equal emphasis, whether it be a noun, verb, adjective, adverb, conjunction, or preposition. He wouldn't say, for example, "The NEW CAR is BURgundy in COLor." He would say "THUH NEW CAR IS BUR-GUN-DY IN COL-OR."

On the other hand, when chatting casually on the air, the skilled phone operator uses emphasis and feeling and variation in tone all over the place.

A real hotshot will avoid the long-drawn-out, wearying "aaaaah" sounds so many sideband operators use to keep their VOX relays closed.

Although the expert need require no patience and courtesy from other operators, he is the first to exhibit these qualities toward others. One doesn't acquire proficiency without making mistakes. He recognizes the good qualities of other operators and praises them, quietly admonishes them on their faults, and forgives them if they don't improve. A hotshot operator doesn't usually know he is a hotshot — or if he does, he keeps quiet about it.

Are you a hotshot operator? Probably not. Very few of us are, and not too many of us are likely to be. But if we all work in that direction, the quality of phone operating in the public services is very likely to improve. — *W1NJM*.

National Traffic System

A lot of fun is poked at NTS by non-traffic men anent non-delivery or slow delivery of traffic. Sad to say, some of it is true. Our tests consistently have shown up carelessness and lack of responsibility in the handling of traffic on NTS circuits at all levels. Some of it is simply appalling, and we join those who figuratively wring their hands in despair about it.

But one thing can be said about all such discrepancies — they are in the individual, not in the system. Our study of the problems has indicated quite definitely that no change in the system will keep traffic men from being careless, from failure to get repeats when they are not sure, from assuming meanings or text that turn out not only to be wrong but change the entire content. NTS is a volunteer organization and its participants, though amateur radio operators, are still classified as people and are subject to all the worst human failings. Preaching about them is tiresome, both to the preachers and the preachees. Anyway, it all boils down to the same ultimate admonition: *be careful*. A garbled message is sometimes worse than no message at all. Let the other guy think what he pleases about your operating ability, *get it right*. You're a lot worse lid if you guess (wrong) than if you try the other operator's patience to make sure you're right.

New subject: Local nets. A few months back, someone got on us about our alleged preoccupation with higher-level nets and our lack of attention to Section nets. More

recently, a Local net manager (who shall be nameless, but his call letters are W2EW) mentioned that Local nets have been neglected in the NTS structure and that many Section nets completely ignore them, even when representation is available.

We did some thinking about this. What happens is that an operator in an NTS Section net — let's take the case in point, New York City — gets a message for his city. Let's say he is in Brooklyn and the message is for the Bronx. This is local calling area and he wants to make sure the message is delivered, so he telephones it. But there is a station in the net representing the Bronx V.H.F. Net, a Local NTS net, who registers a squawk that the message should have been passed to him — after all, what are Local nets for?

Well, we sympathize with the message recipient who feels a responsibility to get the message delivered promptly; isn't that what we were just talking about, above? The more relays it has to go through, the better are the chances of error. On the other hand, the Local net rep has a point. Here this group of v.h.f. amateurs go to all the trouble of setting up their network, getting themselves into shape to handle written traffic, sending representatives to the Section net as required by the system, and what happens? The Section net refuses to give them traffic, so what's the point? They might as well fold up.

It seems that Local nets ought to be used, even when traffic received at Section level is within local calling range of the holder — that is, if the Local net can put it closer to its destination, of course. After all, we're supposed to be preparing for emergency operation. In an emergency, it is likely that there will be no telephones; in any case, we have to assume this in our preparations. Delivery of traffic from Brooklyn to the Bronx, or from Queens to Staten Island, or from Long Beach to Burbank, may be impossible without the Local v.h.f. net. And if we don't use 'em, we aren't going to have 'em. Setting them up on the spur of the moment is a poor substitute for advance planning; and advance planning is futile if we don't make use of the facilities set up.

So the official word is, make use of your Local net facilities where they exist. Where they don't exist, encourage their formation and their close tying in with NTS Section nets. — *W1NJM*.



Left to right: W9SNQ (past SEC), K9IVG (SCM) and WA9GKF (SEC), at a recent IRCC meeting in Indianapolis, Ind.



At the Coastal Carolina Emergency Net meeting in Elizabeth City, N. C., W4ANU poses under his call. Others, shown left to right, are W4HSO, W4CXO (Net Manager), W4BNU (SCM), K4UYR, W4YMI (OBS) and W4JPY (Assistant Net Manager).

June reports:

Net	Sessions	Traffic	Rate	Average	Representation (%)
1RN	60	348	.274	5.8	84.8
2RN	59	383	.508	6.4	94.3
3RN	60	379	.353	6.3	95.8
4RN	53	315	.244	5.9	79.5
RN5	60	470	.293	7.8	80.7
RN6	60	975	.610	16.2	99.8
RN7	43	353	.326	8.2	33.5
8RN	59	446	.326	7.3	94.0
9RN	58	383	.327	6.6	89.2
TEN	60	596	.505	9.8	62.2
ECN	23	61	.165	2.7	43.3 ¹
TWN	27	221	.332	8.2	60.0 ¹
EAN	30	1117	.875	37.2	92.8
CAN	30	1079	.691	24.9	99.0
PAN	30	1039	.752	34.6	96.7
Sections ²	2530	12,801		5.1	
TCC Eastern	119 ⁸	652			
TCC Central	90 ⁸	432			
TCC Pacific	117 ⁸	596			
Summary	3242	22,646	EAN	9.2	75.2
Record	2261	23,817	.991	15.9	

¹ Region net session based on one session per day.

² Section and Local nets reporting (81): AENB, D, H, M, O, P, R, T (Ala.); ARSN, OZK (Ark.); NCN, SCN (Cal.); CCN, CEPN, Columbine, EVN (Colo.); CN, CPN (Conn.); FAST, FATT, FMTN, FPTN, GN, SATN, TPTN (Fla.); GSN (Ga.); BEN, QIN (Ind.); Iowa 75; FCATN, KSBN, KPN, QKS (Kans.); KRN, KTN, KYN (Ky.); LAN (La.); PTN (Me.); MLEPN, MDDS, Termitte (Md.-Del.); EMN, EMNN, WAIN (Mass.); M6MTN, QMN (Mich.); MJN, MSPN (Minn.); MNN, PHD (Mo.); NJN, NIPN (N.J.); NYS, NLI, NLS (N.Y.); NCN, NCNN, THEN (N.C.); BN, OSSB (Ohio); EPA, EPEN, PTTN, WPA (Pa.); RISPAN (R.L.); SCN (S.C.); TEX (Texas); BUN (Utah); VTNHN (Vt.-N.H.); VN, VSBN (Va.); WSN (Wash.); WYN (W.Va.); REN, WSBN (Wis.); GBN (Ont.); RPQ, RTQ (Que.); MEPN, MTN (Man.).

³ TCC functions performed, not counted as sessions.

W1EFW reports that June was one of the poorest since he became 1RN manager. Attendance would have been worse if it was not for the students pitching in to take up some of the slack. K3MVO also reports a slip in traffic and attendance. The following received 3RN net certificates: W3s AEQ AIZ AXA EEB JXK KUN LOS MFB NEM NNL TN, K3s JYZ KTH LFD OAE PIE PY8 UXY ZSK FQF RTX YVG, W3s BLE EEQ, W1SHJ issued a 4RN certificate to W4FDN. K6IBZ sez the switch to 40 meters for the early session went off smoothly; over a hundred letters and several QNCs did the trick. K7JHA reports one of the worst months in years for RN7; the attendance on the second session was extremely poor and the bulk of the traffic was that left from the first session.

WA7BYP received a RN7 certificate. W8CHT issued 8RN certificates to W8SQO and W8IMX. W6GG reports that the change in time has adversely affected the traffic on the early session because of conditions. K7NHL is also having a rough time with the earlier meeting time but thinks forty meters might be the answer for the remainder of the daylight time period. K2KIR does not see that the time shift represents any form of progress and running one hour earlier in the summertime will discourage traffic handling. W6VNO enjoys the earlier time schedule in spite of the difficulties that many stations have in making the switch to forty meters. PAN will probably use 7 Mc. next year. W9JUK issued TCC Central certificates to W5KRX, W6LCX and W6TDR. W7DZX sez June was the lowest in six years for traffic.

June TCC reports:

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	119	90.8	1604	652
Central	90	82.3	392	432
Pacific	117	82.7	1192	596
Summary	326	85.4	3688	1681

June TCC roster: Eastern Area (W3EML, Dir.) W1s EFV NJM, K1WJD, W2s GKZ GVH SEI, K2s RYH SSX, WA2s BLV UPC UWA, WB2s MOQ OHK RKK UHZ, W3s EALL NEM, K3MVO, W4s DVT ZM, K4KNP, W8CHT, K8MQJ, WA8s CFJ OUG, Central Area (W9JUK, Dir.) W4OGG, K4s BSS DZM, WA4WWT, W5s GHP KRX, W8FAW, W9s NBY DYQ JUK QLW VAX, K9DHN, WA9s BWY CXP, W6s LCX TDR, K8AEM, WA6s IAW MLE.

Other Net Reports:

Net	Sessions	Check-ins	Traffic
North American	26	779	608
New England Teenage	30	306	175
7290	44	1279	669
Mike Farad	55	354	170
HBN	30	336	473
QTC	21	243	76
75 Interstate	30	821	376
20 Interstate	20	280	2781

Diary of the AREC and RACES

On April 29 and 30, there was a communications emergency in Southern Alberta, centered in Lethbridge because of a snow storm that disrupted telephone and power services in some areas. Thirty six amateurs responded and provided communications for the Phone Company, Power Company and the EMO — 1 B6AFQ EC Southern Alberta.

On May 5, 12 and 19, the AREC of Cuyahoga County, furnished communications for three car rallies in Northeast Ohio. Six meters was used between the mobile units and the base station at the school where the rally data were compiled. The following amateurs were known to have participated: K8s GVK PXR JSE DMC VGF VYK SWJ VJB NIT ZGW MBV, W8TLA, WA8s PIW TTJ UJQ VEJ SIF GFV TTO CGH PQL — WA8PQL, EC Cuyahoga County, Ohio.

On May 27, twelve amateurs provided communications for a Memorial Day parade in Hazel Park, Mich. Sixty-seven messages were sent to overseas servicemen during the four-and-a-half-hour period from a booth that was set up in the park. The following amateurs participated: W8s JXU KSL, K8CCB, WA8s PII MAP UQP USO VML TPV WBY, WN8s WVE WHG — W8CQB, EC Oak County, Mich.

On June 3 at about 0700, two men drowned at Bryan Beach, Texas. The Brazoria Amateur Radio Club used the local 2-meter net for the necessary communications link between the beach and Angleton. Twenty-four pieces of traffic were handled, along with numerous other contacts for supplies and scheduling for the rescue team. The operation was very smooth because the operators rotated several times during the days of June 3, 4 and 5. One of the bodies was located by a volunteer private plane the afternoon of the 4th and the other body was not found until early on the 7th. The club gained admiration and respect from the

persons who conducted the search — *W15VHD, Secretary-Treasurer, Brazoria County Amateur Radio Club, Texas.*

On June 4, *The Channel Derby* boat race from the Bay-shore Boat Club to the Texas City Dike and back, a distance of 100 miles, utilized the communications facilities of 19 amateurs. Five different stations were set up, two of which were aboard boats; the 2-meter f.m. repeater served as a primary link. Back-up equipment for 75 meters was available at each of the stations; however, near-perfect communications were experienced between all stations at all times on 2 meters. Operators were at their positions and all equipment was checked out nearly two hours before the race started. The strict circuit discipline, containing only the required communications, produced lavish praise and gratitude, not only from the race officials but also from persons who monitored the repeater channel. There were absolutely no transmissions on the repeater channel during the four-hour period of the race except by the five assigned stations — *W5VCE, Communications Officer, Houston Civil Defense.*

On June 4 and 5, the Lakehead Amateur Radio Club supplied communications between the Search and Rescue base camp and Lakehead because a 72-year-old man had been lost in the dense brush in the Scoble area of North-western Ontario. The lost person was found alive and taken to the hospital on June 5. VE3AYZ operated mobile from the base camp. Others who helped were VE3s FSE EEW EES ANP EFV — *VE3NG, SCM Ontario.*



This is K2AYQ, the EC of Glens Falls area, during the May 7 White Water Derby canoe race exercise in which twenty amateurs furnished communications. Both 6- and 2-meter equipment was used because of a distance of about seven miles from start to finish lines with a mountain between.

On June 7, YV5CHO called for assistance and W8NIC/portable in San Antonio answered. There had been an airliner crash in Caracas and a medicine for burns was urgently needed; nine persons were seriously burned, including the pilot who was in critical condition. During the early morning hours of June 8, the medicine was located and shipped from San Antonio to Miami but in the early afternoon W8NIC/5 found out that the package had gone to New York City; arrangements were made for immediate shipment to Caracas, arriving in time to treat most of the victims.

On June 24 at 0330Z, VE2ALE received word that a 3-year-old boy was lost in the St. Calixte de Brandon area. He called VE2AUU via the Montreal repeater and advised that communications assistance might be needed. VE2AVP/mobile also called in. At 0400Z the alert was called off because the lad had just been found — *VE2ALE, SEC Quebec.*

On June 24, during the Field Day operation of W6OTX/6, a couple of men came running to the trailer and wanted to know if the hams could contact the highway patrol for

an escort. A boy scout had fallen and suffered a compound fracture of the leg. W6MWW (operator of W6OTX) made an emergency call and a station (unidentified) in Daly City made the arrangements. The receptionist at the hospital was at a loss to know how they were alerted in advance. The scout had been more seriously injured than at first thought and required nearly three hours of surgery, but would be on his feet by the end of the summer — *W6DEF, EC Redwood City Menlo Park, Cal.*

On the 24th and 25th of June the Easton Amateur Radio Society made it possible for officials of the Power Boat Regatta and the general public to be informed about all activities as they occurred. The club used stations on the Committee Boat, in the "pits" and on the Officials' Platform. Communications were the best ever experienced and future plans will involve local amateurs even more extensively — *K8ORP, Secretary-Treasurer.*

On July 4, a couple camping in the high Sierras learned that their son had been injured in Ontario, Cal. WA6ZAA at the Circle B Scout Ranch contacted WB6OEZ in Los Angeles who called the Ontario Police and found that the boy had not been seriously injured but permission of the parents was needed prior to treatment. The family doctor was contacted and the father gave the permission — *WB6IZF.*

On July 4, the Redwood City Civil Defense and Disaster Communications Service used the 2-meter local RACES frequency during Redwood City's annual July 4 parade. K6ANN operated the civil defense station. There was a roving mobile manned by K6DRN and W6VQV, also W6s VGR NYJ NYK UWZ HIX and W6DEF helped assemble the parade. Along the route, WA6GIA WA6YSY, K6MPN and WB6AED helped correct for gaps in the parade. WA6VGR and WB6HIX served double duty by keeping the p.a. announcers informed and advising the judges of any last minute changes. Ten mobiles operated under RACES rules. The Peninsula Celebrations Association was grateful for the assistance by the ARPSC — *W6DEF, EC.*

On July 4, the Wayne and Oakland County AREC groups combined facilities during the Encore Water Festival. AREC members with 2-meter f.m. rigs were stationed at the launch site, judges' stand, finish line and on two official boats during the rowing races. For the hydroplane races, AREC stations were aboard judges' boats, crash boats, at each end of the course, on Sheriff Department boats, in the "pit" area, on the judges' stand and on Mud Island in the center of the course. WA8UTB in the east judges' boat flashed the first report of an accident in the first race. The driver flipped his hydroplane and lost his arm. K9COU started the smoke flare to alert other drivers of the accident. The ambulance was alerted to proceed to the pit area and K8AMA in one of the crash boats helped with the initial rescue. The AREC members were credited with substantially shortening the rescue time and providing continuous progress reports for the anxious officials and spectators. Seventeen amateurs supervised by WA8OXK took part in the festival — *W8TBY.*

The AREC of East San Gabriel Valley, Cal., provided communications for two different July 4 parades, one in Covina and another in West Covina. Two teams of mobiles and a single fixed station were used. The amateurs used 2-meter f.m. equipment and handled all parade communications so that the police communications would be free for emergency use. There were twenty-three amateurs who participated — *W6JXG.*

Forty-one SEC reports were received for the month of May, representing 17,046 AREC members. This is one report less than a year ago and nearly 900 fewer AREC members. The following sections reported: Ala, Alta, Ark, BC, Colo, Conn, Del, EFla, EMass, EPa, Ga, Ind, Ill, Kans, Ky, La, Alar, Mich, Mo, Mont, NC, Neb, Nev, NLI, NNJ, NTex, Ohio, Okla, Org, Que, Sask, SCV, SDak, SDgo, SF, SNJ, STex, Utah, Va, WNY, WPa.

957

Happenings of the Month

Election Notice

Easier I.D. Comments

3rd-Phone Tickets for Blind List of Ham Bands

ELECTION NOTICE

To All Full Members of The American Radio Relay League Residing in the Atlantic, Canadian, Dakota, Delta, Great lakes, Midwest, Pacific and Southeastern Divisions:

An election is about to be held in each of the above-mentioned divisions to choose both a director and a vice-director for the 1968-1969 term. These elections constitute an important part of the machinery of self-government of ARRL. They provide the constitutional opportunity for members to put the direction of their association in the hands of representatives of their own choosing. The election procedures are specified in the By-Laws. A copy of the Articles of Association and By-Laws will be mailed to any member upon request.

Nomination is by petition, which must reach the Headquarters by noon of September 20. Nominating petitions are hereby solicited. Ten or more Full Members of the League residing in any one of the above-named divisions may join in nominating any eligible Full Member residing in that division as a candidate for director therefrom, or as a candidate for vice-director therefrom. No person may simultaneously be a candidate for both offices; if petitions are received naming the same candidate for both offices, his nomination will be deemed for director only and his nomination for vice-director will be void. Inasmuch as all the powers of the director are transferred to the vice-director in the event of the director's resignation or death or inability to perform his duties, it is of as great importance to name a candidate for vice-director as it is for director. The following form for nomination is suggested:

Executive Committee

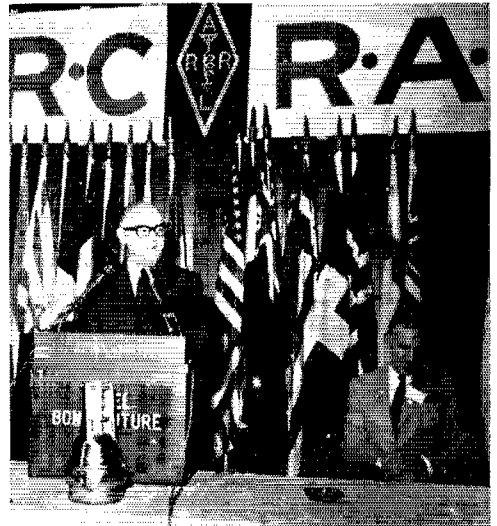
The American Radio Relay League
Newington, Conn. 06111

We, the undersigned Full Members of the ARRL residing in the.....Division, hereby nominateof..... as a candidate for director; and we also nominateof..... as a candidate for vice-director; from this division for the 1968-1969 term.
(Name Call City Zip Code Date)

The signers must be Full Members in good standing. The nominee must be the holder of at least

a General Class amateur license, or a Canadian Advanced Amateur Certificate, must be at least 21 years of age, and must have been licensed and a Full Member of the League for a continuous term of at least four years at the time of his election. No person is eligible who is commercially engaged in the manufacture, sale or rental of radio apparatus capable of being used in radio communications, is commercially or governmentally engaged in frequency allocation planning or implementation, or is commercially engaged in the publication of radio literature intended in whole or in part for consumption by radio amateurs.

All such petitions must be filed at the headquarters office of the League in Newington, Conn., by noon EDST of the 20th day of September, 1967. There is no limit to the number of petitions that may be filed on behalf of a given candidate but no member shall append his signature to more than one petition for the office of director and one petition for the office of vice-director. To be valid, a petition must have the signature of at least ten Full Members in good standing; that is to say, ten or more Full Members must join in executing a single document; a candidate is not nominated by one petition bearing six valid signatures and another bearing four. Petitioners are urged to have an ample number of signatures since nominators are occasionally found not

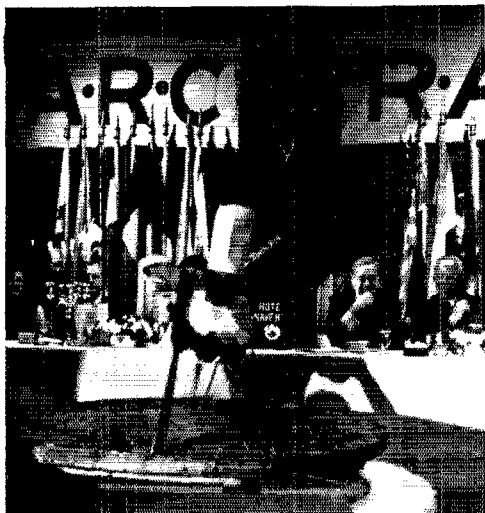


The Honorable Jean Drapeau, Mayor of Montreal, declares the 16th National ARRL Convention to be open. The June 30-July 2 event, first outside the U. S., will go down in League history as one of the very best.

Before the
**FEDERAL COMMUNICATIONS
 COMMISSION**
 Washington, D. C., 20554

In the Matter of
 Revision of the Amateur
 Radio station identifica-
 tion requirements as set
 forth in Section 97.87 of
 the Commission's Rules.
 TO: The Commission

DOCKET NO. 17377



Pie? Oh, my! The chef cuts a huge blueberry pie for the banquet guests.

*COMMENTS OF THE
 AMERICAN RADIO RELAY LEAGUE*

The American Radio Relay League, Inc., an organization having as members more than 80,000 amateur radio operators licensed by the Federal Communications Commission, by its General Counsel, respectfully submits the following comments in response to the Notice of Proposed Rule Making released April 20, 1967 (FCC 67-477).

1. At its meeting on May 6, 1967, the League's Board of Directors, after careful consideration, unanimously voted to support the proposed rules, with minor exceptions, and urge their prompt adoption.

2. The League was initially concerned over the application of the proposed rules to identification of amateur stations using radio-teleprinter communications; however, it now is understood that the interpretation of the proposed rules is such that no additional burden will be placed on identification of such stations as a class.

3. At present, Section 97.87(a)(1)(ii) of the Rules contains a provision for minimum identification if the duration of the communication is less

to be Full Members in good standing. It is not necessary that a petition name candidates both for director and for vice-director but members are urged to interest themselves equally in the two offices.

League members are classified as Full Members and Associate Members. Only those possessing Full Membership may nominate candidates or stand as candidates; members holding Associate Membership are not eligible to either function.

Voting by ballots mailed to each Full Member will take place between October 8 and November 20, except that if on September 20 only one eligible candidate has been nominated, he will be declared elected.

Present directors and vice-directors for these divisions are: *Atlantic*; Gilbert L. Crossley, W3YA and Jesse Bieberman, W3KT. *Canadian*; Noel B. Eaton, VE3CJ and Colin C. Dumbrille, VE2BK. *Dakota*; Charles G. Compton, W0BUO; the vice-directorship is vacant. *Delta*; Philip P. Spencer, W5LDH/W5LXX and Max Arnold, W4WHN. *Great Lakes*; Dana E. Cartwright, W8UPB and Charles C. Miller, W8JSU. *Midwest*; Sumner H. Foster, W0GQ; the vice-directorship is vacant. *Pacific*; Harry M. Engwicht, W6HC and Ronald G. Martin, W6ZF. *Southeastern*; Charles J. Bolvin, W4LVV and Albert L. Hamel, K4SJH.

Full Members are urged to take the initiative and to file nominating petitions immediately.

For the Board of Directors:

July 1, 1967

JOHN HUNTOON
Secretary

ARRL SUPPORTS NEW I.D. RULES

Pursuant to a unanimous decision of the Board, the League has filed comment on Docket 17377, supporting FCC's proposed changes in the identification rules for amateur stations which would in effect legalize "tailending" and simplify identification of portable and mobile stations using phone.

The complete text of the ARRL response appears below; earlier *QST* discussions were on page 83, June *QST* and page 64, August *QST*.

**OVERSEAS AND ABSENTEE
 BALLOTS**

All ARRL members who are licensed by FCC or DOT but are temporarily resident outside the U. S. or Canada are now eligible for Full Membership. These members overseas who arrange to be listed as Full Members in an appropriate division prior to September 20 will be able to vote this year where elections are being held.

Even within the U. S., Full Members temporarily resident outside the ARRL division they consider home may now notify the Secretary prior to September 20, giving the current *QST* address and the reason why another division is considered home (e.g., holding an amateur call appropriate to the division). So if your home division is the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific or Southeastern, but your *QST* goes elsewhere because of a different residence, please let the Secretary know, as soon as possible but no later than September 20, so you'll receive a ballot for your home division.



Behind every successful convention is a committee of dedicated, hard-working hams and wives of hams. Here are just three of the couple dozen which made the Montreal Convention click: Ladies Chairman Mrs. A. G. Daemen; her OM VE2IJ, who was chairman of the Steering Committee; Mrs. George Spencer (the OM is VE2MS), in charge of the Speakers Committee.

than three minutes. No similar provision is included in the proposed rules. The League believes it desirable to retain such minimum requirements. The need which prompted adoption of this rule some years ago still exists — i.e., participation in organized net activities and competitive events. Thus the League especially requests the Commission's consideration of an additional provision in the proposed rules along the following lines:

"Where the exchange is of brief duration (less than two minutes) such as that normally employed in net activities and competitive events, transmission of the call sign of the amateur station and the station with which contact is made need be accomplished only once."

4. As the proposed rules appear to be non-controversial and primarily relieve restrictions in the current rules, the League urges the Commission to make the provisions effective immediately upon adoption.

Respectfully submitted,
The American Radio Relay League, Inc.
By ROBERT M. BOOTH, JR.
Its General Counsel

1100 Vermont Avenue, N. W.
Washington, D. C., 20005
June 30, 1967.

STAFF NOTES

The Ten Year Club (of ARRL employees) met recently to welcome its two newest members, Assistant Treasurer and Chief Accountant Jane Mastronarde, and Advertising Assistant Florence "Beau" Tolhurst.

Miss Mastronarde joined the staff as chief accountant in June 1957, coming to us with two decades of previous financial experience in the Hartford area. She keeps or supervises all the basic financial records and personally handles such jobs as payroll, insurance, life memberships

and building fund records. Jane is the first person present for duty each morning, and is among the most meticulous of a meticulous profession.

Beau Tolhurst's name is well-known to *QST* advertisers and their agencies. She seems to be popular with these people even though one of her jobs consists of nagging them for overdue plates or advertising copy each month! On occasion Beau reaches out beyond the efficient handling of routine. She wrote, for instance, the Camp Albert Butler copy which began, "Novices! Lose Your 'N' and Gain a Tan." Beau and her OM Malcolm have four children.

We regret to report the resignations of D. William Smith, W1DVE/K0CER and Stanley Israel, WA2BAH, from our full-time staff. Bill has reentered broadcast journalism, from whence we called him, but will, at least for now, continue to conduct the regular *QST* column, "The World Above 50 Mc."

Amateurs interested in a career in amateur radio as members of the ARRL staff may write to Personnel, ARRL, 225 Main Street, Newington, Conn. 06111 for an application blank.

3RD CLASS TICKETS FOR THE BLIND

An order from FCC dated June 23 permits blind persons to acquire third-class radiotelephone operator permits upon completion of an oral examination. Such operators may then be employed at certain broadcast stations if the equipment has been adapted for sightless operation. The FCC release notes that some state agencies engaged in rehabilitation services have expressed willingness to pay the expenses necessary for modification.

Amateur rules already allow blind or otherwise handicapped applicants to dictate answers to code and written tests. A sheet of amateur radio reference data for blind aspirants may be obtained from the membership services department of ARRL. Additionally, correspondence courses are distributed free of charge to blind students by the Hadley School for the Blind, 700 Elm Street, Winnetka, Illinois 60093.

Incidentally, blind persons unable to make use



Governor Daniel J. Evans signs a statement proclaiming the last week in June as Amateur Radio Week in Washington State, while W7FLA, SCM K7JHA, K7CTP, Col. H. E. Link of CD, ARRL Director W7PGY and W7BUN look on happily.

of monthly issues of *QST* may pay dues of \$1 per year to become ARRL members without receipt of the journal.

160 Meter Band

In addition, portions of the 1800-2000 kc. band are available for A-1 and A-3, including s.s.b., in each state as shown in the table to follow.

WHAT BANDS AVAILABLE?

As of July 20, the following amateur bands and modes were available to holders of Conditional, General, Advanced and Extra Class FCC amateur licenses:

Frequencies are in megacycles.

- A0 — unmodulated carrier
- A1 — c.w. telegraphy
- A2 — modulated c.w.
- A3 — a.m. radiotelephony¹
- A4 — facsimile
- A5 — television
- F0 — steady, unmodulated pure carrier
- F1 — frequency-shift telegraphy
- F2 — audio frequency-shift telegraphy
- F3 — f.m. radiotelephony
- F4 — F.m. facsimile
- F5 — F.m. television
- n.f.m. — narrow-band frequency or phase-modulated radiotelephony

- 3.500-4.000 A1²
- 3.500-3.800 F1
- 3.800-4.000 A3 and nfm²
- 7.000-7.300 A1
- 7.000-7.200 F1
- 7.200-7.300 A3 and nfm
- 14.000-14.350 A1
- 14.000-14.200 F1
- 14.200-14.350 A3 and nfm
- 21.000-21.450 A1
- 21.000-21.250 F1
- 21.250-21.450 A3 and nfm
- 28.000-29.700 A1
- 28.500-29.700 A3 and nfm
- 29.000-29.700 F1, F3
- 50-54 A1
- 50.1-54 A2, A3, A4, narrow F1, F2, F3
- 51-54 A0
- 52.5-54 F0, F1, F2, F3
- 144-148 A1
- 144-147.9 A0, A2, A3, A4, F0, F1, F2, F3
- 220-225 A0, A1, A2, A3, A4, F0, F1, F2, F3, F4
- 420-450³ A0, A1, A2, A3, A4, A5, F0, F1, F2, F3, F4, F5
- 1215-1300 A0, A1, A2, A3, A4, A5, F0, F1, F2, F3, F4, F5
- 2300-2450, 3300-3500, 5650-5925 F0, F1, F2, F3, F4, F5
- 10,000-10,500 A0, A1, A2, A3, A4, A5, F0, F1, F2, F3, F4, F5
- 21,000-22,000 and all above 40,000 A0, A1, A2, A3, A4, A5, pulse, F0, F1, F2, F3, F4, F5

¹ Single or double sideband, full, reduced or suppressed carrier.

² Except that 3900-4000 kc. is not available at Baker, Canton, Enderbury, Guam, Howland, Jarvis, Palmyra, American Samoa and Wake Islands.

³ Plate input power must not exceed 50 watts in certain parts of Calif., Ariz., Nev., N. Mex., Texas, Miss., Ala. and Fla. Exceptions may be authorized after application to the FCC.

NOTE: The bands 220 through 10,500 Mc. are shared with the government radiopositioning service, the latter having priority.

Area	Maximum d.c. plate input power in watts							
	1800-1825 kc/s		1875-1900 kc/s		1900-1925 kc/s		1975-2000 kc/s	
	Day	Night	Day	Night	Day	Night	Day	Night
Alabama	200	50	No operation	No operation			100	25
Alaska	200	50	200	50	No operation	No operation	No operation	No operation
Arizona	100	25	100	25	100	25	500	100
Arkansas	200	50	No operation	No operation	No operation	No operation	200	50
California	No operation	No operation	No operation	No operation	200	50	500	200
Colorado	200	50	100	25	100	25	500	100
Connecticut	200	50	100	25	No operation	No operation	No operation	No operation
Delaware	200	50	100	25	No operation	No operation	No operation	No operation
District of Columbia	200	50	100	25	No operation	No operation	No operation	No operation
Florida	100	25	No operation	No operation	No operation	No operation	No operation	No operation
Georgia	100	25	No operation	No operation	No operation	No operation	No operation	No operation
Hawaii	No operation	No operation	No operation	No operation	100	25	100	25
Idaho	100	25	200	50	200	50	500	100
Illinois	200	50	100	25	100	25	200	50
Indiana	200	50	100	25	100	25	100	25
Iowa	500	100	100	25	100	25	200	50
Kansas	500	100	100	25	100	25	200	50
Kentucky	200	50	100	25	100	25	100	25
Louisiana	200	50	No operation	No operation	No operation	No operation	100	25
Maine	500	100	100	25	No operation	No operation	No operation	No operation
Maryland	200	50	100	25	No operation	No operation	No operation	No operation
Massachusetts	500	100	100	25	No operation	No operation	No operation	No operation
Michigan	500	100	100	25	100	25	200	50
Minnesota	500	100	100	25	100	25	100	25
Mississippi	500	100	100	25	100	25	200	50
Missouri	200	50	No operation	No operation	No operation	No operation	100	25
Montana	100	25	200	50	200	50	500	100
Nebraska	200	50	200	50	200	50	500	100
Nevada	500	100	100	25	100	25	500	100
Nevada	100	25	200	50	200	50	500	200
New Hampshire	500	100	100	25	No operation	No operation	No operation	No operation
New Jersey	200	50	100	25	No operation	No operation	No operation	No operation
New Mexico	200	50	100	25	100	25	500	100
New York	500	100	100	25	No operation	No operation	No operation	No operation
New York	200	50	100	25	No operation	No operation	No operation	No operation
North Carolina	200	50	No operation	No operation	No operation	No operation	No operation	No operation
North Dakota	500	100	200	50	200	50	500	100
Ohio	200	50	100	25	100	25	100	25
Oklahoma	500	100	No operation	No operation	No operation	No operation	200	50
Oregon	No operation	No operation	No operation	No operation	200	50	500	100
Pennsylvania	200	50	100	25	No operation	No operation	No operation	No operation
Rhode Island	200	50	100	25	No operation	No operation	No operation	No operation
South Carolina	100	25	No operation	No operation	No operation	No operation	No operation	No operation
South Dakota	500	100	100	25	100	25	500	100
Tennessee	200	50	No operation	No operation	No operation	No operation	100	25
Texas	500	100	No operation	No operation	No operation	No operation	200	50
Texas	200	50	100	25	100	25	500	100
Utah	100	25	100	25	100	25	500	100
Vermont	500	100	100	25	No operation	No operation	No operation	No operation
Virginia	200	50	100	25	No operation	No operation	No operation	No operation
Washington	No operation	No operation	No operation	No operation	200	50	500	100
West Virginia	200	50	100	25	No operation	No operation	No operation	No operation
Wisconsin	500	100	100	25	100	25	200	50
Wyoming	200	50	100	25	100	25	500	100
Puerto Rico, Virgin Islands	No operation	No operation	No operation	No operation	100	25	100	25
Swan Island, Serrana	500	100	No operation	No operation	No operation	No operation	100	25
Bank, Roneador Key								
Navassa Island	No operation	No operation	No operation	No operation	No operation	No operation	100	25
Baker, Canton, Enderbury, Guam, Howland, Jarvis, Palmyra, American Samoa and Wake Islands	No operation	No operation	No operation	No operation	500	100	500	100
Wake Island	500	200	500	200	500	200	500	200
Wake Island	500	100	500	100	No operation	No operation	No operation	No operation

MINUTES OF EXECUTIVE COMMITTEE MEETING

No. 317

July 2, 1967

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the Hotel Bonaventure, Montreal, P.Q. at 9:45 A.M. July 2, 1967. Present: President Robert W. Denniston, W0NWX, in the Chair; First Vice President Wayland M. Groves, W5NW; Directors Noel B. Eaton, VE3CJ, Gilbert L. Crossley, W3YA, Carl L. Smith, W0BWJ, and Charles G. Compton, W0BUO; and General Manager John Huntoon, W1LVQ. Also present were General Counsel Robert M. Booth, jr., W3PS, Hudson Division Director Harry J. Dannels, W2TUK, and Central Division Vice Director Edmond Metzger, W9PRN.

On motion of Mr. Compton, affiliation was unanimously GRANTED to the following societies: Albert Lea Amateur Radio Club

Albert Lea, Minnesota

Blue Valley Amateur Radio Club

Seward, Nebraska

Central Arkansas Amateur Radio Club

Little Rock, Arkansas

Eagle Rock Radio Club

Idaho Falls, Idaho

Ford Amateur Radio League

Dearborn, Michigan

On motion of Mr. Smith, unanimously VOTED to grant approval for the holding of a Central Division Convention in Springfield, Illinois, on August 3-4, 1968.

On motion of Mr. Eaton, after discussion, unanimously VOTED that the General Manager is authorized to reimburse up to \$2000 of the costs of the Radio Amateur du Quebec, Inc., in the installation and operation of show station VE2XPO at the Youth Pavilion at Expo 67.

The Committee then examined the first applications for Life Membership in the League. On motion of Mr. Eaton, Charter Life Membership was unanimously GRANTED the following League members:

P. L. Anderson, Jr., W4MWH

Louis G. Arnold, K9ALP

Jonathan B. Balch, W3AES

Richard L. Baldwin, W1IKE

H. E. Banta, W4SGI

Graham G. Berry, Sr., K2SJJ

Dr. Roemer O. Best, W5QKF

Charles J. Bolvin, W4LVV

Robert M. Booth, Jr., W3PS/K1PS



ARRL President W0NWX addresses the convention, with Canadian Division Director VE3CJ at his left.

Charles G. Compton, W0BUO

Gilbert L. Crossley, W3YA

Harry J. Dannels, W2TUK

Paul F. Day, W1PYM

J. F. DeBardeleben, W4TE

Robert W. Denniston, W0NWX

Stuart P. Domber, WB2FSW

Colin Dumbrille, VE2BK

Noel B. Eaton, VE3CJ

LaNeil Eitel, WB6MRW

W. W. Eitel, W6UF

Col. Fred Elser, W6FB/W7OX

Edward F. Erickson, W2CVW

Roberto J. Escallon, WB2FXB

Joseph E. Frank, W1SOV

Richard A. Freedman, K2DEM

E. W. Freeman, K0MOA/W0HUJ

Henry E. Gamache, KH6AIN

John K. Gotwals, W3TNO

John R. Griggs, W6KW

Wayland M. Groves, W5NW

W. J. Halligan, W9AC/W4AK

Fred Hammond, VE3HC

F. C. Huntley, W4EI

John Huntoon, W1LVQ

Harrison J. Klein, WA0FUR

W. D. Lober Melcher, WA3AFI

Edmond Metzger, W9PRN

Henry Morrison, Jr., W0BBW

John E. Pitts, Jr., W6CQK

Rees Powell, VE3DJK

Ed G. Raser, W2ZI

James B. Reid, W5HGL

Charles S. Rockwell, W2ANL

David Sachs, WB2VZM

Robert L. Shea, W1AFM

Ivan Carl Simpson, W6TET

Carl L. Smith, W0BWJ

Kenneth E. Stecker, W8SS

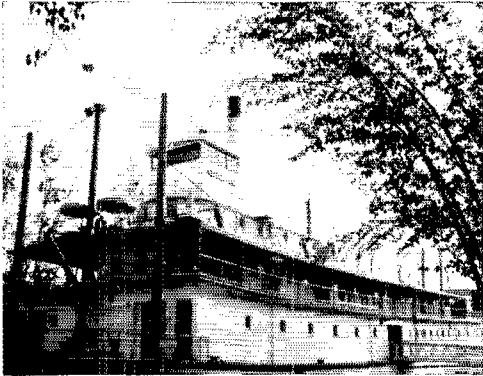
(Continued on page 153)



The New England Division's Ham of the Year award was present to Jim Jacobs, K1GHT by Father Dan Linehan, W1HWK. The award, a memorial to John Mansfield, is an annual feature of the New England Division convention.



Strays



Pictured left is the historic river steamer *Nenana* which used to travel the Yukon River. Now she has been rigged with a tri-band beam and dipoles and has retired to the exposition grounds of the Alaskan Centennial Exposition, Alaska 67. (See *QST* for July 1967, p. 60.) Right, Bill, KL7BAJ is shown in the pilot house posing as river boat captain at the controls of KL7ACS, "The Alaska Centennial Station." Visiting mobiles entering the Fairbanks area may request information on 3866 kc. a.m. and l.s.b., and 145.35 Mc. a.m.



This is the group which is responsible for the *Australis-Oscar* satellite described in July *QST*, page 58. The left-hand photo taken in Australia shows from left (back row) John Monro, VK3ZGY; Paul Dunn, VK3ZPD; Richard Tonkin; Geoff Thomson; (front row) Owen Mace, Peter Hammer, VK3ZPI; and Stephen Howard. Not shown are David Bellair, VK3ZFB, and John Awood, VK3ZAU. Shown in the right-hand photo are Owen Mace, Richard Tonkin and Paul Dunn, VK3ZPD in San Francisco to deliver *Australis-Oscar* to Project Oscar officials. Project Oscar President W6HEK says that the group has done fine work and the package looks as though it will do the job. *Oscar-Australis* will now undergo extensive environmental testing and barring unforeseen difficulties a launch will probably be requested around the end of the year.



Correspondence From Members -

The publishers of *QST* assume no responsibility for statements made herein by correspondents.

CB TO HAM?

[EDITOR'S NOTE: One of the functions of the League is to promote an interest in amateur radio and to help prospects attain amateur licenses. Recently HQ mailed questionnaires to affiliated clubs to determine interest in a program of cooperation between amateur and CB clubs aimed at helping those interested to become amateurs. Below is a sampling of responses.]

☐ I just received your letter inquiring about ways to get some CBers to join amateur radio. Many persons join CB because it is an easy way to get a license and get on the air. There is no examination; you just apply and wait for the license in the mail.

I was a CBER for a year before I became an amateur radio operator. However, when the FCC tightened up the CB rules, I decided I wanted something better and began studying for an amateur license. I finally got my ticket five months later.

I have a lot of friends and neighbors who are hams and who encouraged me to get into amateur radio. — *John G. Walker, WB6QZQ, Woodland, California.*

☐ As a club program our club voted "no." Most of the comments were directed at the FCC. They should clean up their "mess."

We have accepted and welcomed several former CBers to our club. We will work with anyone who has a real desire to become a ham. — *Harland Craft, W49LAF, Falls Radio Club, Inc., Menomonie Falls, Wisconsin.*

☐ We have tried on many attempts to get the CB club members to attend code and theory class with no avail. — *R. E. Hendry, K4CAH, President, Ft. Myers Florida Amateur Radio Club.*

☐ Our Board wished to add its comments that even though we voted to participate in ARRL's program to win CB operators to ham radio, we want to state clearly that we do not endorse Citizens' Band operation when it is illegal and improper. We are sincerely interested in helping those interested in ham radio which we feel will be a minority of the local CB operators. — *Bill Allen, Lafayette Louisiana Amateur Radio Club.*

☐ Our club conducts a very active free licensing program which is open to anyone who wants to become a ham. Our licensing program, in addition to all our other ham activities, receives excellent advance publicity in our local newspapers, a.m. broadcasts, f.m. broadcasts, posted announcements at all local electronic distributors, etc. We welcome anyone who is interested in ham radio to attend our functions and we draw almost 1000 interested visitors each year. Our licensing program draws about 250 CB operators each year and about 40 of them are willing to devote the time and effort needed to upgrade themselves to ham tickets. About one-fifth of our present club members were once CB operators and several hold both ham and CB tickets. We do

not discourage CB people from becoming hams but we have had a lot of experience in dealing with these folks and we know that it is a waste of time to try converting the hard-core CB operator who fully intends to continue his illegal hamming. Our decision is based on first-hand experience, not lack of understanding. — *W. G. Welsh, WGDDB, LERC, Burbank, California.*

☐ We have always tried to cooperate with anyone who was interested in becoming an amateur. Some of our members have met with the local Citizens' Band club and we have extended invitations for them to meet with us. The response, however, was disappointing. The majority of the local Citizens' Band operators enjoy operating but have expressed little or no desire to learn the technical aspects or the code. Their apathy seems to reflect on our whole society as it stands today. — *Vernon Phillips, W7NPV, Sec-Treas, Gallatin Amateur Radio Club, Bozeman, Montana.*

☐ At a regular membership meeting on June 20, 1967, the Warren Amateur Radio Association Inc. gave consideration to your proposals. The following action was taken: A motion was made, seconded and passed that the secretary be instructed to include in this section for general comments that our club is not interested in including Citizens' Band in our organization and want only those who are interested in amateur radio in our club and in ARRL. Another motion was made that if the ARRL CB proposal was passed that the club will take action on dropping ARRL affiliation. This motion was seconded and passed. — *D. K. Lovett, K8BXT, Secretary, Warren Ohio Amateur Radio Association, Inc.*

☐ The Chelmsford Amateur Radio Association has always cooperated and worked with the CBers, as they have with all unlicensed persons who express an interest in amateur radio. The club will continue to do so. — *Robert Cameron, K1TEB, Secy-Treas., Chelmsford, Massachusetts, Amateur Radio Association.*

☐ Our club has always been open to both hams and CBers. The club originally consisted of 90% CBers and 10% hams. Our training programs enabled most of the CBers to get their amateur licenses so that now our percentages are reversed — 90% amateur and 10% CB. — *C. B. Mitchell, President, Lakewood Radio Club, Long Beach, California.*

☐ The Nittany Amateur Radio Club does endorse closer cooperation by conducting biannually code and theory classes through the local adult recreation program.

An additional recommendation for the ARRL would be to promote joint efforts in cleaning up TVI problems with the CB people and amateurs. — *Joel Balogh, The Nittany Amateur Radio Club, Inc., State College, Pennsylvania.*

☐ These answers are the result of the vote taken of members present at our June 27th meeting and we might add it was unanimous. We as a club feel that responsible CBers have good potential as future amateurs. We think the CB survey is a good idea and have no objections to letting them know what amateur radio is all about on both a national and local level. However, the Indian River Amateur Radio Club feels that neither ARRL nationally nor the club locally should actively recruit or force feed them. The choice to pursue amateur radio further must be theirs. — *Dorsey E. Dean, W4RLA, Vice-President, Indian River Amateur Radio Club, Cocoa, Florida.*

FIELD DAY LOST

☐ The emergency preparedness aspect of the ARRL Field Day has pretty much been lost amid the picnic grounds atmosphere of most club participants and the long, drawn out planning of specifics usually associated with the club efforts.

When it frequently takes days to "set-up" at the site in preparation of the actual weekend, when club discussions usually start in January and drag on meeting after meeting, when great reliance is placed on "shopping around" for the loan of equipment, complex antenna systems, and power generators, the field day ceases to be a test of emergency amateur capability.

Instead of setting a definite weekend for field day about a year in advance, how about just a weekend in June, July or August with the actual notification via WIAW and the ARRL OBS system just 24 hours in advance? I believe this would lead to a desired year round planning for emergencies and would provide more of a real, meaningful test of amateur emergency capability. Field Day would become truly representative of the amateur service in times of crisis rather than just another contest to clutter the bands on weekends. — *Bob Rooney, W2QC1/W2AFT, Fulton, New York.*

[EDITOR'S NOTE: The Simulated Emergency Test was created to provide an additional means for testing amateur emergency preparedness. Of course, both Field Day and SET are pre-scheduled events. What are your thoughts on W2QC1's idea?]

AMATEUR F.M.

☐ Southern California has more than a thousand active amateurs currently operating on one of five well established f.m. channels in the two- and six-meter amateur bands. Washington and Oregon have somewhere near that number, and reports are coming in from the East Coast that f.m. is spreading back there like an untended prairie fire.

These f.m. operators are recalcitrant. They stay despite their lack of sanction by such greats as QST and the ARRL. And I believe they deserve recognition. The f.m. operator is honest, but he doesn't reek with the pseudosincerity so prevalent among his a.m. counterparts. He doesn't make a ritual of discussing rig, power, handle, and antenna configurations. Nor does he transmit for more than a few seconds at a time.

The f.m.er won't make QST rich — at least not financially speaking. But he would like to see an official recognition of his chosen mode. And the editor of QST should be able to derive at least some satisfaction from knowing the material they publish reflects the *now* trends of amateur radio.

Look at us. Smile or nod at us. Get mad at us. But please don't boycott us anymore. We like you. — *Ken Sessions, K6MVH, Ontario, California.*

☐ V.h.f. moonbounce is growing at an increasing rate. It will in the future become a major method of communication and I hope that this will come within the next few years. I want to go back for a few minutes to the early s.s.b. days when the idea was catching on. When our League supplied a helping hand in all aspects, things came along in an orderly manner more or less. The latest and best technical advances were published and the idea grew until now many feel it is time to go again. Reliable long distance communication on v.h.f. is done in one of three ways: via Oscar, scatter, or eme. I am willing to lay pretty good money that e.m.e. will be the superior mode within a few years.

What do fellows like me who want to work alone or in very small groups need to help us get into this? We not only need someone to work when we get it all together, but we need right now a reliable signal, working on a fixed and well published schedule. I work six meters and keep the receiver going about 18 hours per day. I couldn't stand the noise if it wasn't that if I set my rx at 50.110 (about), I can hear signals via meteors every few minutes. I have something to look forward to. I also have a 432 and/or 1296 Mc. converter and I could put together a real good front end and build up a fair antenna if I knew I would have a good signal to work with. How about the League putting something together for 432 and/or 1296 Mc. and operating it a few times a month? I would go like the devil to be ready to receive the signal. I think with the League guiding it, a sizeable group would develop that would work to improve things to the point where someone would make a QSO by calling CQ without a 1000 ft. dish.

I feel as an amateur, a member of our League, and a person whose prime interest is v.h.f. that it is our League's responsibility to provide the guiding arm in pointing to the new. — *Larry Kayser, 3C2TQ, Post de la Baleine, Quebec, Canada.*

[EDITOR'S NOTE: The League, indeed, is interested in continuing its leadership into new areas. In fact, the 1967 Board of Directors voted to award the 1968 ARRL Technical Merit Award to amateurs in the field of moonbounce, and funds were appropriated for the establishment of a space communications facility at or near League headquarters.]

HOMEBREWING

☐ I just want to congratulate W3RUE (page 93, July QST) for his most attractive station and his firm belief in home-brewing his equipment.

This is remarkable, as the quantity and variety of presently available kits or factory-built ham gear has almost degraded home-brewing to an occupation for the fellow in the boondocks.

In this regard it is most refreshing to observe how much space the people up in Newington reserve in every issue of QST to equipment that can easily be home-built by an average ham.

While being on the subject I'm somewhat tempted to criticize today's tendency of buying the whole lot that makes up a ham station. Home-brewing the equipment does not only contribute to a better understanding of what's going on inside the "black box" but also adds tremendously to the operating pleasure and the parallel-going satisfaction of getting out with something built from your own ideas. — *P. B. Langenegger, HB9PL, Stafa, Switzerland.*

QST



September 1942.

... The Office of Civilian Defense has delegated to the ARRL the job of lining up amateurs and their gear for the big effort ahead in the War Emergency Radio Service. As many amateurs are away in the armed forces, classes of instruction will be had in technology and the building of apparatus, leading eventually to WERS permits and third-class licenses for civilians.

... K. B. Warner comments on the need for scrap copper, etc., in the war effort. There just has to be lots of copper wire in amateurs' shacks. This writer was able to drag out to the curb a whole small truckload of steel from abandoned and long-forgotten farm machinery from the vacant lot next door.

... Ed Tilton's "On The Ultrahighs" is omitted this month because the copy contained what the censors considered classified material.

... Hams are urged to sell their modern receivers to the Government and use the proceeds to buy War Bonds. Great idea.

... John A. Doremus, W3EDA/1 describes the Massachusetts Civilian Defense organization. Originally started by Col. Boyden, W1SL, it is now a real going concern.

... Don H. Mix, W1TS tells how to build a workable 2½-meter station from salvaged b.c. sets. The best type are the older sets with husky audio sections and goodly power supplies. Even a.c.-d.c. sets can be used, to a degree.

... Interested in the Japanese Morse Telegraph

Code? Donald D. Millikin writes about it. He also gives a good deal of information about the Japanese language. I suppose they think English is tough, too!

... Dr. Raymond Woodward, W1EAO, the well-known frequency measuring specialist, has an article describing a simple, yet effective means for measuring frequencies used in WERS work. It gives four times the required accuracy as set forth in the specs.

... Harold E. Jones, W9JZI tells how to use link neutralization in band-switching rigs. His method gets away from the difficulties encountered when other methods are applied to a neutralized triode.

... An interesting and simple method of calculating the value of a variable capacitor is described by Louis F. Leuck, W9ANZ. In determining the spacing, he uses coins, etc. One of the coins involved in the deal is the silver dollar. What are they?

... George Grammer, W1DF continues his series on "Radio Fundamentals." This time it is vacuum tubes. This is basic stuff and of course still applies, at this date. He has several "assignments" with questions to be answered by the student.

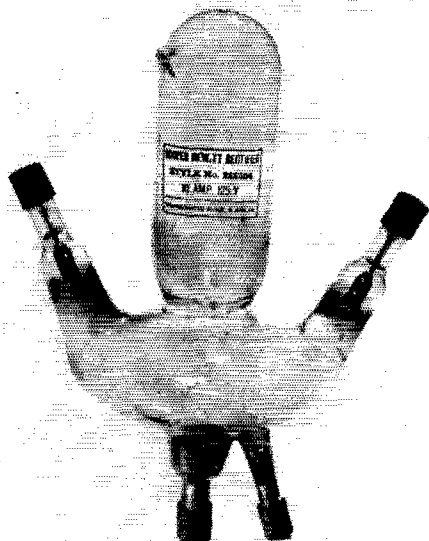
... KBW observes that bicycling teaches you that power is the rate of doing work. — W1ANA

QST



Feedback

In the article on K1KLO's "Connecticut Longhorn," August QST, the coil mentioned as being affected by the road surface should have been L_1 , the shunt feed inductance, not L_2 .



From the Museum of Amateur Radio

Somewhat before high voltage Keneurons became available for high voltage rectification, hams latched on to mercury vapor rectifiers such as the one shown in the photo. This one is rated at 10 amperes at 125 volts. Typically, the boys used them successfully on 2500 volts or more for their high power c.w. transmitters. The tube was so mounted on a swivel that it could be tipped a little so that some of the mercury slipped into the adjacent starting electrode. The tube was then allowed to tip back whereupon the tube was in operating position. This one was used by Ed Handy, W1BDI.

— W1ANA

Hamfest Calendar

Arkansas — The Arkansas Nets Picnic is scheduled for Sunday, September 17 at Burns Park Pavilion No. 1 in North Little Rock from 10:00 A.M. until 4:00 P.M. CDT. Local hams will monitor 3815 kc, and 50.5 Mc. f.m. for talk-in.

California — The Satellite club steak dinner will be held September 16.

Connecticut — The 'Tri-City Radio Club, Inc., 20th annual hamfest will be held on October 7, 1967, at the Crocker House Hotel, State Street, New London, Conn. Tickets are \$5.99 each which includes a steak dinner and registration. Activities include technical talks, swap and shop table, and visits to local military activities. Registration and information available from General Chairman Robert York Chapman, W1QV, 28 South Road, Groton, Conn. 06340.

England — The International Radio Engineering and Communications Exhibition will be held at the Royal Horticultural New Hall, Vincent Square, London, S.W.1. The Exhibition will be open from 10:00 A.M. on Wednesday September 27 to 9:00 P.M. on Saturday, September 30. On Friday evening (Sept. 29) there will be a reception for overseas amateurs. Further information regarding the Exhibition may be obtained from G2BVN of RSGB HQ.

Illinois — The Peoria area ARC will hold its 10th Annual Hamfest Sunday, September 17 at Exposition Gardens which is located on the Northwest edge of Peoria, Illinois. Free swap section, parking, contests and cartoons for the kiddies. Free coffee and doughnuts at 9:00 to 9:30 A.M. CDT. Registration: \$1.50 advance, \$2.00 at the gate. Write Ferrel Lytle, W9DHE, 419 Stonegate Rd., Peoria, Ill. 61614.

Illinois — The W9 DXCC Meeting will be held Sept. 16 at the Holiday Inn of Chicago at O'Hare, 3801 Mannheim Rd., Schiller Park, Ill., starting at 1:00 P.M. CDST.

Iowa — The Jester Park Hamfest, sponsored by the Des Moines Radio Amateur Assn., will be held September 24. Swapfest, rag-chewing, and just good ham fun at this all-day affair. Bring your goodies for sale or trade.

Michigan — The 3rd Annual VHF Hamfest is being held in East Tawas, Michigan on October 6, 7, and 8. For more information write K8IYZ, 20245 Oakfield, Detroit, Mich. 48235.

Michigan — Full day of demonstrations and entertainment at one of the world's largest science museums. National Amateur Historical Radio Conference, September 23, Dearborn, Michigan.

New York — The Overlook Radio Society will sponsor an equipment auction in Kingston, N. Y. on Saturday, September 23 at 1:00 P.M. Equipment may be marked and displayed as early as 10:00 A.M. Registration is 25¢ per person. No commission will be levied on sales. The auction will be held at the Hasbrouk Park Pavilion. For more information write Herb Lacey, WB2LZJ, Rd. 1, Box 26, W. Hurley, New York 12491.

Ohio — The Findlay ARC is holding its annual Hamfest on Sunday, September 10 at the Riverside Park in Findlay. Write Clark Foltz, W8UN, 122 West Hobart Ave., Findlay, Ohio 45840.

Pennsylvania — The 18th Annual Gabfest of the Uniontown ARC will be held September 9 at the club grounds. For more information write Joseph Sofranko, 438 Braddock Ave., Uniontown, Pa. 15401.

Pennsylvania — The Swap and Shop Hamfest of the Skyview Radio Society will be held Sunday, September 24 at the club grounds 5 miles east of New Kensington, Penn. Refreshments will be available. Talk-in on 10, 6, 2, and CB.

South Carolina — The Rock Hill ARC will hold its annual Hamfest on October 1. The Hamfest will be held at Joslin Park with lots of food and entertainment. Playground for the children. Plenty of equipment for sale and trade. Bring your "junk" and do some trading. QST

COMING A.R.R.L. CONVENTIONS

September 2-4, 1967 — Maritime Section, Moncton, New Brunswick

September 8-10, 1967 — Southwest/Pacific Divisions, Los Angeles, Calif.

September 9, 1967 — Kentucky State, Louisville, Kentucky

October 27-29, 1967 — Ontario Province, Ottawa, Ontario

November 5, 1967 — Roanoke Division, Duncan, S. C.

QSL VIA BOX 88 (Is There Any Other Way?)

BY THEODORE M. HANNAH,* K3CUI

EVEN the most casual DXer is familiar with that oft-repeated phrase, "PSE QSL VIA BOX 88, MOSCOW." And anyone who has ever looked in the foreign section of the *Callbook* knows that "P. O. Box N-88, Moscow" is the only address given for Soviet hams¹. Indeed, it is easy to believe that Box 88 is the only doorway through which a foreign QSL can enter the U.S.S.R. But that is not quite true — there are other ways. Let's see how they compare with Box 88 in terms of reliability and speed.

● *QSLing Directly.* This of course requires a knowledge of the Soviet ham's name and complete address, and is therefore relatively uncommon.

* 11106 Bybee St., Silver Spring, Md. 20902

¹ The correct address is actually Box 88, not "N-88." However, mail sent to the latter address undoubtedly reaches the QSL Bureau.

Reliability: Probably high.

Speed: Depends on the kind of mail service used (surface or air), but should generally be faster than the Bureau route.

● *QSLing Via Radio Club.* Here, you send your QSL to the DOSAAF Radio Club in or near the city in which the Russian lives. Most of the larger cities have such clubs, but if you're in doubt you can always send your card via the club in the capital city of the republic. (The ARRL Countries List identifies the republics by their callsign prefixes: a map will show you the capital cities.) Using UISAB as an example, you would address your QSL this way:

Amateur Radio Station UISAB

Radio Club DOSAAF

Tashkent, Uzbek S.S.R.

U.S.S.R.

(Continued on page 186)

YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO



Mae Burke, W3CUL.

Our Fair Ladies

CALL it an expo, a show, or a fair, it's a gala time with something special for everyone who attends. On the grand scale there are World Fairs, with foot-weary miles and miles of exhibits and breath taking displays. Most communities have home, art, sports, automobile, hobby, or boat show each year, and of course, there are the state and county Fairs. There is no way to adequately describe a fair, for it is everything and anything to all of us. It's cotton candy, and intricately stitched quilts. It's hot dogs, and painstakingly canned vegetables and fruits that look like works of art. It's horse racing and displays from nationally known, as well as local

*YL Editor, QST. Please send all news notes to WB6BBO's home address: 1036 East Boston St., Altadena, Calif. 91001.



Gloria, WB2QXY, and OM Les, K6IOV, both active in VHF, RTTY, and 80-meter traffic nets.

manufacturers covering everything from television sets to mattresses. It's the glitter and the tinny music of the midway, with the siren song of the barker's "Come one, Come all." And, to the amateur, as well as the general public, it is the amateur radio station, set up by the local club, or the ARPS group, to acquaint people with the amateur service and offer them the opportunity to send a free message from the fair.

To YLs like WB2PYI, and WA2BUI working in the radio booth at Sag Harbor, Long Island, the messages have the tang of sea air, and echo the "that she blows!", of the annual Old Whalers' Festival in mid June. For Val, WA6KWZ, and WB6DBB, it is the close of the fair season at the



WA2BUI, Paula, and OM Howard, WB2YNK, bending over the message desk at the Old Whalers Festival. Camille, WB2PYI, almost hidden by two winners of the Womens' Whaleboat Race. Walf, W2AJR, in the doorway of the station WB2RWD.

Los Angeles County Fair, and WA6VFM, the official fair station. And, early each year, Helen, K2GSE, along with other YLs and OMs start the ball rolling when they open W1DUG/4 and accept the messages from the hundreds of visitors to the Florida State Fair each February.

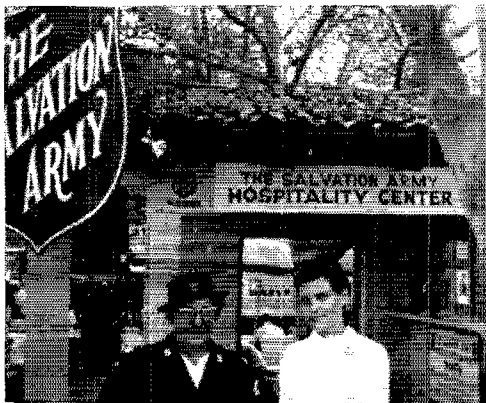
These gals, and their counterparts in state and county fairs all over the country, are busy explaining the purpose of the amateur radio service, and the service that we perform on a voluntary basis at such times as the community may need us to fill a "communications gap." They have fun, but they work hard checking the messages, mak-

ing sure the address is legible, and, they hope, complete. But when Helen, or Val, or Camille, or Paula turn the messages over to the operators, for relay across a state or the country, or, to some husband or son in Vietnam, other YLs pick up the story of active message work.

From Florida, each winter, the great lady of traffic, W3CUL, activates the many schedules that she sets up months before at the request of the Tampa Club. Assisted by other operators, Mae, works 4 to 5 hours a day into all parts of the country, as well as overseas schedules. Bertha, WØLGG, Val, KØZSQ, Harriet, WA3ATQ, Clara, W2RUF, Gloria, WB6QXY, all participate in, and relay much of the traffic in the National



Helen Van Patten, K2GSF, at the counter of the message center at the Florida State Fair.



Val, WA6KWZ, with a Salvation Army worker at the Los Angeles County Fair message booth.

Traffic System, as well as on other nets, and special schedules.

Fair Traffic work is fun. At the booth we meet the most interesting people, who ask some of the most amazing questions, from a guarded "how much will this cost me?", though a third degree on "how did you ever get into this?" to the eager youngster who stands, with stars in his eyes, watching "the hams" and looking longingly at the station layout. So, next time the local club asks for help when they are setting up the radio booth, don't hesitate, just "deck yourself out in your finest array, and hi! ho! come to the fair!" You won't be sorry.

YLRL "Howdy Days"

September 26, 27, 28, 1967

Start: September 26, 1967 at 1700 GMT

End: September 28, 1967 at 1700 GMT

Rules: Scores will be based on contacts made with licensed women operators only. All bands and modes of emission may be used. No cross band operation. Net contacts do not count. Only one contact with each station will be counted.

Scoring: Score two (2) points for each YLRL member worked, and one (1) point for each non-YLRL member worked. No multipliers.

Awards: Top scoring YLRL member will receive her choice of a YLRL pin, charm, or stationary. Non-YLRL member will receive a one year membership in YLRL.

Send copy of the contest log to:

Marte Wessel, KØEPE

P.O. Box 756

Liberal, Kansas, zip 67901

Logs must be received by October 13, 1967.

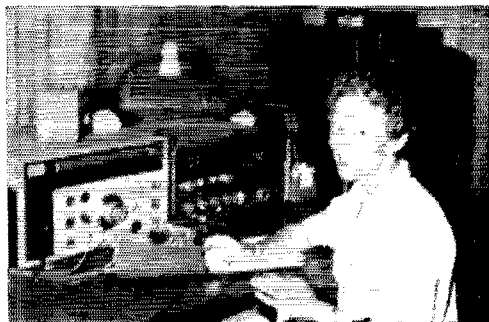
The long, lazy, do-nothing days of summer are over, and the YLRL activities calendar begins with this informal gab-fest with a contest flavor. For the newly licensed women who are just getting started, it is a fine way to meet YL operators and build up the contacts for YLCC. For all of us it is a good way to find out what everyone has been up to all summer in the most relaxed, pour-a-cup-of-coffee-and-gab-a-while contest in amateur radio.

Valerie Eldridge, KØZSQ

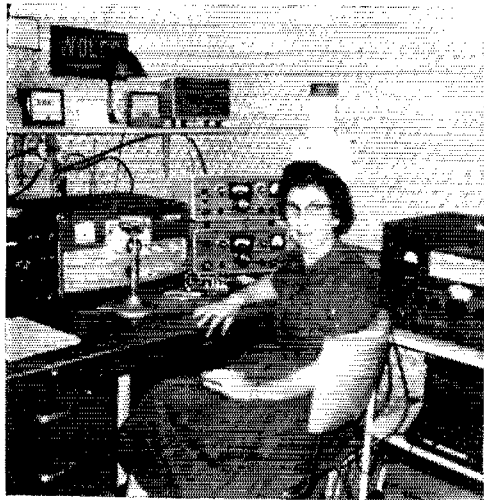
Since her major activities on the air only include a net control spot on the Twelfth Region Net, liaison to Pacific Area Net, six days a week participation in the Colorado Weather Net, early morning schedules for traffic, assisting the OM, Howard, who is Supervisor of the Frequency Measuring Service, Val classifies herself as "just plain lady!"

Val is primarily interested in traffic work, and has received the PICON Award for her untiring work during the Colorado floods of 1965. She also holds the NTS section, region, and area certificates, as well as many BPL, and is a member of the A-1 Operator Club.

Presently, she is enjoying handling USO from the military personnel at the Service Club to their families and friends. She holds a second class radiotelephone license, and is



Val Eldridge, KØZSQ.



Bertha Willits, W0LGG.

studying for the first class commercial ticket.

First licensed in 1960, Val met OM, Howard, K0CDW, on 40 Meter c.w., and they were married in 1961. A member of the Colorado YLs, her other interests include gardening, and rock hounding.

Bertha Willits, W0LGG

Check the BPL list in *QST* any month, and you will find W0LGG first, second, or third on the list, for she rarely is below that top level.

Licensed in 1952, all she worked was c.w. for the first three or four years, and then the traffic bug bit her. First the Iowa c.w. Section Net, then Tenth Region, and Central Area Nets, and activity in the old United Trunk Lines Nets, Bertha added phone to her traffic work, and was for a time manager of the Iowa 75-Meter phone Net.

A liaison station for the Florida State Fair traffic for the past five years, she also operated a station for the GOC and CD at the Marshall County Fair, routing messages all over the world.

Bertha is manager of the Tenth Region Net of the National Traffic System, and holds appointments as route manager and assistant SCM of Iowa. In addition to her 135 BPL cards, her certificate collection includes ARRL Public Service Awards, an award from the Air Force for services rendered during the fair, a certificate from the Marine Corps, in addition to her full collection of NTS certificates.

QST

A.R.R.L. QSL Bureau

The function of the ARRL QSL Bureau system 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 4½ by 9½ 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. Changes are shown in heavy type.

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below.

- W1, K1, WA1, WN1¹ — Providence Radio Ass'n., W1OP, Box 2903, Providence, Rhode Island 02908.
- W2, K2, WA2, WB2, WN2 — North Jersey DX Assn., P.O. Box 505, Ridgewood, New Jersey 07451.
- W3, K3, WA3, WN3 — Jesse Bieberman, W3KT, RD 1, Valley Hill Rd., Malvern, Pennsylvania 19355.
- W4, K4¹ — F.A.R.C. — W4AM, P.O. Box 13, Chattanooga, Tennessee 37401.
- WA4, WB4, WN4¹ — Richard Tesar, WA4WIP, 2866 Browning St., Sarasota, Florida 33577.
- W5, K5, WA5, WN5 — Hurley O. Saxon, K5QVH, P.O. Box 9915, El Paso, Texas 79939.
- W6, K6, WA6, WB6, WN6 — San Diego DX Club, Box 6029, San Diego, California 92106.
- W7, K7, WA7, WN7 — Willamette Valley DX Club, Inc., P.O. Box 555, Portland, Oregon 97207.
- W8, K8, WA8, WN8 — Paul R. Hubbard, WA8CXV, 921 Market St., Zanesville, Ohio 43701.
- W9, K9, WA9, WN9 — Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60126.
- W0, K0, WA0, WN0 — Alva A. Smith, W0DMA, 238 East Main St., Caledonia, Minnesota 55921.
- VE1, 3C1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N.S.
- VE2, 3C2 — John Ravenscroft, VE2NV, 135 Thornecrest Ave., Dorval, Quebec.
- VE3, 3C3 — R. H. Buckley, VE3UW, 20 Almont Road, Downview, Ontario.
- VE4, 3C4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
- VE5, 3C5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Saskatchewan.
- VE6, 3C6 — Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, Alberta.

VE7, 3C7 — H. R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.

VE8, 3C8 — George T. Kondo, VE8 ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.

VO1, 3B1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's, Newfoundland.

VO2, 3B2 — Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, Labrador.

KH6, WH6 — John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, Hawaii 96701.

KL7, WL7 — Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.

SWL — Leroy Waite, 39 Hanum St., Ballston Spa, New York 12020.

¹ These bureaus prefer 5 X 8 inch manila envelopes.

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Fullsize (8 by 10) glossy prints of equipment described in *QST* by staff members (*only*) can be furnished at \$1.50 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 nor ship c.o.d.

Sorry, but no reprints of individual *QST* articles are available, nor are templates available unless *specifically* mentioned in the article.



CONDUCTED BY BILL SMITH,* W1DVE/KØCER

Auroral DX

THE next several months should prove most interesting to the v.h.f./u.h.f. DX man. Indications are that the present solar cycle will peak sometime this winter at an even higher intensity than that which produced 50-Mc. openings between North and South America and record-breaking auroral sessions earlier this year. We'll discuss *F-layer* DX at a later date, but this month here are some clues on auroral DX.

Solar disturbances cause magnetic storms known as *auroras*. In the northern hemisphere the displays are called *aurora borealis*, while in the southern hemisphere the term is *aurora australis*. For the purpose of our discussion, we will consider the *aurora borealis*, or *northern lights*. Auroras occur most often in the more northern latitudes and during the seasonal equinoxes, March and September. The most common time of day is late afternoon and early evening. But like all forms of propagation there are many variances in the rule. Some of the best auroras have occurred on summer afternoons, and their effects have been observed as far south as Florida and Southern California. There are several methods of predicting and finding auroral openings, but none are foolproof, as aurora DXers have found. Do not rely completely upon the propagation predictions broadcast by WWV! Probably the best check is the 80-meter band. If signals are strong and steady, aurora DX is unlikely, but if signals are weak and watery an aurora is probably in progress. Scientists are now studying a theory that the position of planets and their gravitational fields have an effect on the release of solar flares. The flares create particle radiation from the sun. This radiation reaches the earth some 18 to 24 hours after the flare, causing auroral conditions.

Antenna headings are generally north. Eastern stations should point their arrays somewhat west of north, western stations should do the opposite. The auroral curtain is unstable and the northern sky should be probed for optimum reception. The shift of the curtain may be so rapid that an almost constant change in antenna heading may be necessary; at times the curtain will remain almost stationary. Distances of several hundred miles are most usually covered, but contacts over more than 1000 miles are possible. The distance is dependent to a degree upon the skill

and patience of the operator as well as his equipment. 800-mile aurora DX has been worked on 144 Mc. with only 5 watts at one end of the circuit.

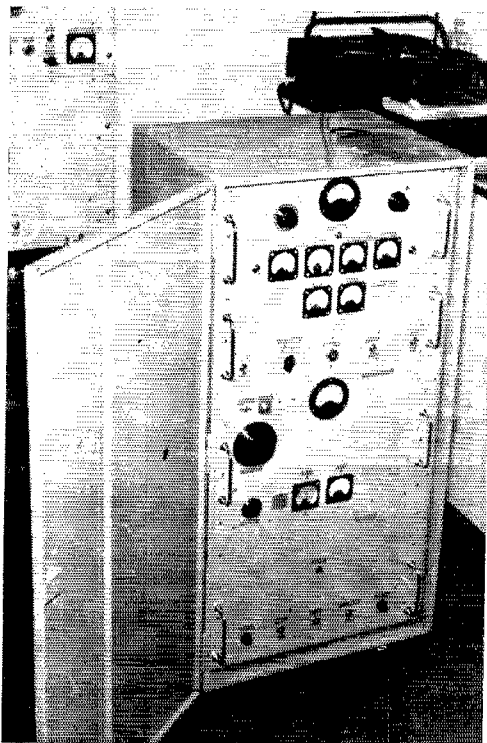
While the expression is well-worn, you won't believe your ears the first time you hear aurora. The signals on 50 Mc. have a "buzzing" sound and the aurora badly demodulates a.m. signals making c.w. and s.s.b. modes the most practical. Again, however, this is not always true and at times signals exhibit characteristics normal to other modes of propagation. Aurora is more common on 50 and 144 Mc. than on the higher frequencies. It was only last year (September 3, 1966) that W9AAG and K9AAJ made the first known aurora contact on 432. Higher frequency signals take on an even more pronounced buzzsaw effect from frequency dispersion, to the extent that no tone or modulation is discernable. At 432 c.w. signals sound like a weak whisper and are so broad that they are difficult to discern from the noise.

Six meter men have found that auroras may lead to *F-layer* propagation. Openings over several thousand miles are sometimes possible immediately before or after pronounced disturbances. Numerous contacts have been made between such distant points as New England and South America under these conditions. It would pay to be particularly observant during the next several months for this type of propagation.



Auroral displays, like this one photographed at the University of Alaska in College, have many forms and colors. Unlike this, the most common are a pale greenish-white and somewhat difficult to distinguish because of the thin, cloud-like appearance.

*Send reports and correspondence to Bill Smith, W1DVE, ARRL, 225 Main St., Newington, Conn. 06111.



ZE1JZA is now operative 50 miles northwest of Salisbury, Rhodesia. This transmitter operates with 100-watts input on 144.016 and 432.048 Mc. as a propagation study beacon. The station is a memorial to Steve Wright, ZE1JZ.

For further reading on the subject of auroral propagation, I suggest *QST*, June 1951, page 14; *QST*, January 1955, page 11; *QST*, February 1967, page 16; *ARRL V.H.F. Manual*, page 19, and past editions of this column, especially March, April, July and August 1967.

DJ4ZC 144 Mc. Transponder Scheduled for U.S. Flight

In the April column we reported that Karl Meinzer, DJ4ZC, was offering the use of a German-built 144-Mc. transponder to anyone in this country who could arrange a balloon flight for the package. The instrument is quite similar to an Oscar. The purpose of the flight would be to give operators here more experience in communicating through and tracking airborne transponders in preparation for future Oscar flights.

Al Chisholm, W5UJF, at Alamogordo, New Mexico became interested in the project and is now in the final stages of arranging a balloon flight from Holloman Air Force Base near Alamogordo. Al says the launch will come on a space-available basis probably sometime during the last two weeks of October, through the cooperation of the Air Force's balloon launch facility of the Air Force-Cambridge Research Laboratories. The launch will be made in the early evening and the flight is expected to last 12 hours. About six hours of the flight time will be spent at the maximum flight altitude of between 100,000 and 130,000 feet. Past exper-

ience indicates the balloon will probably make its ascent straight up and that there will be very little drift. Stations within a 400-mile radius of Alamogordo should be able to communicate through the package. The input passband is centered on 144.1, and the output is centered on 145.9. W5UJF will be able to supply the exact frequencies after testing the package prior to the flight. *Thanks Karl for making the package available, and Al for your sponsoring the flight.*

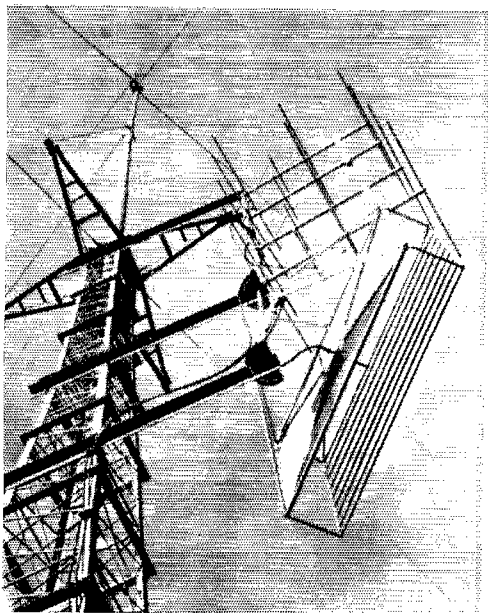
Rhodesian Propagation Station now in Operation

A memorial station to Steve Wright, ZE1JZ, has been put into operation as a propagation beacon on 144 and 432 Mc. The concept of the beacon station, assigned call sign ZE1JZA, was evolved by the Radio Society of Rhodesia after Peter Lowth, ZE7JX (ex VQ2PL of 6-meter fame), donated funds for a memorial to ZE1JZ. The transmitter and antenna were the work of at least a dozen members of the Society. Financial and component donations were made by a number of individuals and companies.

The usefulness of the beacon will undoubtedly be limited to southwestern Africa. The beacon will be in continuous operation for the next three years or until it is no longer needed. Reception reports are requested by the Radio Society of Rhodesia, P.O. Box 2377, Salisbury, Rhodesia.

OVS and Operating News

50-Mc. men are asking themselves if this summer's E's season was up to those of the previous two or three years. Although the band was open throughout the country, the openings do not seem to have been as frequent or with as good signals. Mark Mandelker, W9ECV/B, Lawrence, Kansas disagrees, saying he worked 47 states between May 26 and June 26! He has 45 states on two-way s.s.b. and wants to know if anyone has worked 48 on s.s.b.



This is the array at ZE1JZA. Two 4-element slots are fed in phase and stacked one above the other approximately 1 wavelength apart for 144 Mc. A single-section reflex is used on 432. The array is mounted on the side of a 65-foot tower so that it may be rotated through an arc of 200° and can be locked at 7½° intervals. The array swings from north to south, through west, and is on a 5600-foot mountain peak.

The Canal Zone will be represented on 50 Mc. this fall. KZ5FX says he will be running about 100 watts and a 4-element beam. (*Clem is a contest man and a good operator.*)

VK3QV and VK2ZRH have pointed out an error of mine on page 76 in the May column. The 6 meter band in Australia is 52 to 54 Mc. and 51 to 53 Mc. in New Zealand. David Tanner, VK8AU, writes from the Northern Territory of Australia that the 6 meter band in the Ryukyu Islands is now 52 to 54 Mc. and that KB6TAB is active from there. VK8AU says further that he runs 250 watts s.s.b. p.e.p. and a 4-element Yagi on 52.05 Mc. and that VK8AV, VK8DL, VK8KK, VK8ZBB and VK8ZMR are also active. David says VKs are now permitted 100 watts s.s.b. on s.s.b. but still 150 watts on a.m. and c.w. VK and ZL operators tune 50 Mc. for DX contacts.

T12NA remains quite active in Costa Rica. WA6HXW, near Los Angeles, worked Eric immediately following an early summer aurora.

Larry, 3C2TQ, has worked 1000 stateside stations from his location in northern Quebec. Larry is in one of those locations which allow some interesting propagation observations. He says it is a rare night that he does not see a visual aurora and that a geophysical station near him using auroral photometers observes auroras on more than 70 out of 100 nights. But on only a very few nights does Larry hear signals on 50 Mc. We are sorry to learn that 3C2TQ will soon be leaving northern Canada for another assignment. Thanks for the report, Larry.

K6GJX/VE4 caught several good openings from Fort Churehill on Hudson Bay in northern Manitoba this summer. Chuck's best DX was into northern California on June 29.

K7ICW has received word from KL7FNL that he was being heard near Fairbanks, Alaska at 0450 GMT on June 26. Al says he was working K7TTA in Buckley, Washington at the time and that he heard a c.w. station trying to break in but the c.w. faded before Al could identify it.

144-Mc. activity apparently slowed down during the summer. However, Rich, K2ODJ, will be operating as FP8CA on St. Pierre Island from September 5 to 14. He will be using adequate power and an 80-element array on about 144.018. Rich says c.w. will be used most and that he hopes to make the first FP8/W contact on 144 Mc. He will operate from 0100 to 0300 GMT (9-11 PM EDT) transmitting for 10 minutes past the hour and half-hour and that he will listen during the remaining 20 minute periods. He will also use 3810 kc. l.s.b. for liaison. St. Pierre Island is about 1000 miles northeast of New York City and will probably be a difficult tropo path judging from his past experiences on the island. Rich says he may also try some meteor-scatter schedules.

Moonbouncer K6MYC is continuing his schedules with F8DO. Mike also reports that ZL1TFE in New Zealand has completed a large array of quads patterned after the design of W1CER and W7FS. The big quad apparently works because ZL1TFE heard signals during a K6MYC/VK3ATN schedule. The ZL has a special kilowatt power permit and is ready to schedule. K6HCP and K6MYC have been testing two commercial 28-foot Yagis on the e.m.e. circuit with negative results. The commercial antennas are soon to be compared against two homebuilt ones.

SVLAB was still off the air at the time of this writing due to the political situation in Greece. George says he is hopeful the ban will soon be lifted and that he can go on with his e.m.e. experiments. Another station waiting out political problems is OD5ES in Beirut, Lebanon. Constan Maeridis says he is using the time to build gear for 144 Mc.

In May, I asked if anyone knew of 144-Mc. contacts of more than 1500 miles propagated in the ionosphere. David Rankin, VK3QV, who verifies v.h.f. DX contacts for the Wireless Institute of Australia, reports a contact on December 9, 1965 between VK3ZAA and ZL2HP over a 1631-mile path, and on December 13, 1965 a contact between VK3ZNC and ZL2HP over a 1673-mile path. David says both contacts have been confirmed and that he believes the propagation was E-layer. He says that ionospheric soundings during the period indicated very high E ionization, perhaps the highest ever recorded. David is trying to verify some other contacts over distances approaching 2000 miles! Guessing from another letter from Roger Ford, VK2ZRH, one of those may be an 1800-mile claim between VK5 and ZL2 during the last southern hemisphere summer, December and January.

2-METER STANDINGS

W1JSM...33	8	1390	K5TQP...27	7	1250
W1AZK...32	8	1384	W5SWV...20	5	960
K1HTV...27	7	1326	W5WAX...18	7	1040
K1BHC...25	8	1330	W9MLL...17	6	700
W1AJR...25	7	1130	W5BEP...16	5	1000
W1HDQ...24	7	1040	W5KFM...15	5	1360
W1MEH...24	6	1000	W45MFZ...10	5	1225
W1MMN...22	8	1200	W6GDO...17	4	1325
K1BCK...22	7	1375	W6WSQ...16	6	1390
K1WHT...22	7	1070	W6NLZ...12	5	2540
K1WHS...19	7	1030	W6KAP...12	4	1120
K1UGQ...18	6	1250	K6HMS...11	5	1240
K1JIX...18	6	800	W6DNG...9	5	4250
K1MTJ...16	5	1225	K6HCP...1	2	690
K1OYB...16	5	1225			
W2NLY...37	8	1390	W7JRG...26	6	1320
W2CXV...37	8	1360	K7N1H...23	5	1275
W2ORL...37	8	1320	K7ICW...16	4	1246
W2BLV...36	8	1020	W7LHL...12	4	1170
W2AZL...35	8	1385	K7ZIR...11	4	1130
K2LAG...29	9	1710			
K2HLA...29	8	1300	W8PT...41	9	1260
W2CLL...26	8	1150	W8KAY...39	9	1210
W2AFGK...26	7	1340	W8QOH...38	9	1320
W2AMJ...25	5	960	K8AXU...37	9	1275
W2ATL...24	8	1100	W8SDJ...37	8	1220
W2LWI...24	7	1050	W8YIO...36	9	1250
W82FXB...20	7	1025	W8LOF...34	8	1060
W2UTH...20	7	880	K1CRO/8...32	9	850
W2APMV...18	6	1000	W8SVI...31	8	1100
W2LFLM...17	7	730	W8EHW...31	8	860
K2DNR...18	6	1010	W8BKI...30	8	1240
K2YGO...20	7	650			
W2AJAM...17	6	670	W9WOK...42	9	1170
K2JWT...16	6	550	K9SGD...41	9	1230
W2AUDT...16	5	550	K9UIP...41	9	1150
			W9WDD...40	9	1300
W3RUE...36	8	1100	W9ACG...37	9	1200
W3BYE...32	8	1150	K9AAJ...37	9	1200
W3GKP...32	8	1108	W9BDT...35	8	1140
W3SQA...32	8	1080	W9RNN...33	8	1210
W3KCA...28	8	1110	W9IFA...31	8	1050
W3LNA...21	7	720	W9PBP...29	8	820
K2RTH/3...21	7	1200	W9OJI...27	8	910
K3OBH...20	7	930			
K3CPA...19	6	870	W9BFB...44	10	1350
W3MFT...19	6	600	W9DQY...39	9	1100
			W9NXP...34	10	1200
W4EJO...39	9	1150	W9EMS...33	9	1350
W4NSH...38	9	1350	W9LFE...33	9	1040
W4HJH...38	9	1280	W9EYB...32	8	1360
W4MKJ...37	9	1250	W9ENC...32	7	1250
W4LTU...37	8	1220	K9MQS...29	9	1170
K4LXC...36	8	1423	W9MOX...27	7	1300
W4ZXL...34	8	954	W9LFR...22	8	1100
W4FJ...33	8	1050	K9BMO...20	7	1125
W4MNT...32	8	1225	W9UCO...20	6	1403
K4QIF...32	8	1000	K9JXI...19	7	750
W4CKB...30	8	1300			
W4AWS...26	8	1350	K9HUK...2	2	2540
K4EJO...25	8	1100			
K4MHS...24	8	1000	VE1CO...8	5	800
W4VLA...24	8	900	VE3DIR...8	9	1300
K4SUM...17	6	653	VE3AIB...29	8	1340
			VE3AOG...18	8	1300
W5ROL...41	9	1280	VE3HW...17	7	1350
W5UGO...10	10	1401	VE6HO...1	1	915
W5AJC...33	9	1360			
W5FYZ...33	9	1275	F8DO...1	1	5100
W5JWL...33	7	1150			
K5WXX...30	8	1225	OH1NL...1	1	5250
W5UKQ...29	8	1150			
W5PZ...29	8	1300	VK3ATN...2	2	1017

The figures after each call refer to states, call area and mileage of best DX.

144-Mc. Standings

There are a number of additions and deletions in the 144 Mc. box this month. During the first week of March a postcard was mailed to the 67 stations which had not updated their standings in the past two or more years; replies were received from 26.

Those who did not reply have been dropped, but I will gladly list anyone who so requests if his totals equal or better those of the last man in his respective call district. Are there any other corrections?

K5TQP and WA5MFZ operated a 500-watt beacon on 141.073 beamed east-northeast during June and July from Tijeras, New Mexico. Did anyone hear it by Es? K1HTV at Thompsonville, Connecticut passes along the following for those interested in meteor-scatter. W4WDH is on in Georgia; Kansas is represented by W6s EKZ, F11 and YMG; W5GUG is on in Arkansas; and K118KK is back on from Vermont. Rich says each of these fellows will schedule, and W5ML says he will schedule those needing Louisiana. Does anyone know of any such activity in the states of Maine and Mississippi?

The June 6-7 Comet Rudnicki test was negative from most results. However, the comet possibility prompted F8DO in France to try some meteor-scatter with DL0AB in Germany and OK1VHK in Czechoslovakia. The 6th and 7th were negative but contacts were made with both stations on the 8th. We must note, however, that June 8 is the scheduled date of the Arietids shower. The contacts were made between 0300 and 0600 GMT (2300-0200 EDST). Marius says the shower intensity was good with many bursts. W4AWS in Orlando, Florida ran tests with K1ABR in Rhode Island and W1AZK in New Hampshire during the predicted comet period. Art reports that his daily average of pings from K1ABR is 20, but that on the 6th he heard 50 pings and two bursts. The average with W1AZK is 8 pings, but on the 6th Art copied 17 and a burst, and on the 7th he received 22 pings and one complete set of calls. Was it the comet, or representative of the diurnal peak of sporadic meteors over a favorable north-south path? In New Jersey, W2AZL reported only the usual assortment of pings for a June morning. Carl also says that YV1PP in Maracaibo, Venezuela has a pair of 4-125As and a 24-element Yagi on 144 Mc. The Venezuelan is interested in e.m.e., meteor-scatter and so forth. He may be contacted at 58-10 Avenue 6A, Maracaibo. His name is Leslie Berkley.

230 Mc. is a band that sure has its ups and downs. Long-time 220 booster K1YON in Connecticut lists the following stations active. W1OOP and W1GAN in Mass., W1NOC, K1POP and K1YON in Connecticut, K2GHU, and K2MRU in New Jersey, and W2ITE, W2CRS, W2SEU, K2JDI and WB2UNK in New York. Ted says 2100 EDST is the best time. On the other coast, W6FCF, near Los Angeles says about 40 stations are active in that area using vertical polarization. The work-load at Headquarters has slowed down production on the 220 and up directory but it will be forthcoming.

432 Mc. is the next target of e.m.e. specialist VK3ATN. Ray has under construction a 50-foot dish which will have a surface hopefully useable up to 2300 Mc. The dish is to be polar mounted, fully steerable and Ray hopes to have it in operation by November or December. Construction is thin-wall steel tubing with 12-foot diameter center hub. The completed weight is estimated at 1500 pounds. VE3BPR writes from Ontario that he has 600 watts and 60 elements at 90 feet on the band. Ray lists other Ontario actives as VE3DKW and VE3EYC and VE2LI in Montreal. Smitty, W3GKP, has built a H4A tripler and is running about 10 watts output from Spencerville, Maryland. He has worked three states so far.

At Tyler, W0DRL, Topeka, Kansas has 500 watts and a pair of 11-element Yagis at 75 feet. Al worked six states during his first two weeks on the band. His best DX, 460 miles, was to K9UIF near Hobart, Indiana. Al says WA0PCQ, K0MHZ, W0EKZ and WA0ENM are other 432 stations in Kansas.

1299 Mc. and up activity looks much better this month. Jay, W6GDO, in Rio Linda is working on several projects and reports working K6HCP in San Jose on two-way s.s.b. over a 100-mile path. Several members of the San Bernardino (California) Microwave Society are conducting X-band tests. W6ORS says K6ILJ and W6IFE can work two-way over a 93-mile path using Mt. Baden-Powell as a reflector. Signals run 12 to 18 db. above the noise. W6SDE and K6VYC are also involved in the tests. In the midwest, WA9NXT at Freeport, Illinois is working on a parametric amplifier for 1296. Len has 8 or 10 watts output and will soon begin schedules with WA9HUV at Elmhurst, Illinois, 90 miles away. K2UUR at Parlin, New Jersey runs 50 watts to a corner reflector with a slot-fed dipole. His best DX is a 48-mile contact with W2PEZ at Greenwood Lake, New Jersey. K2JNG of Union City, New Jersey is using a varactor tripler producing about 5 watts into a 32-element collinear. Walt is looking for a solid state preamp for 1296. You might try K2UYH, Walt. In addition to the stations previously mentioned as active on 1296, Walt adds WB2FWN, W2JBZ, K2PPZ and K2UYH.

Late Reports

The 1967 summer sporadic-E season started slowly, but it was closing in a blaze of glory in late July. Multiple-hop work was widespread on 50 Mc. from July 14 through 23, and there was some evidence of Es skip on 144 Mc. on July 17 date.

220- and 420-Mc. STANDINGS

230 Mc.				420 Mc.			
W1BU	14	5	600	W2FUS	9	4	220
W1HDQ	12	5	450	K2TUR	9	3	280
W1AJR	12	4	450	K2AGC	8	5	325
K4JY	11	4	615	W2FQE	8	4	280
K1UGQ	9	3	400	K2HQL	8	4	250
				W7PUA/2	7	4	500
K2CBA	16	7	660	K2YCO	6	5	500
W2AOC	15	5	530	W2YFM	6	3	300
W2SEU	12	5	450	W2DTZ	6	3	200
W2DZA	12	5	410	W2TOV	5	3	140
W2NTY	12	5	300	K2TGA	4	4	383
K2DZM	12	5	400	W3MMV	11	5	410
W2LWI	12	4	400	W3RUE	11	5	470
K2KIB	12	4	300	K3CLK	9	4	290
K2ITQ	11	5	265	W3FNY	8	4	296
K2ISA	11	4	300	K3IUV	9	3	310
K2ITP	10	5	265	W3SZD	5	4	300
K2AKQ	9	3	240	W3UJG	4	2	350
K2JWT	6	3	244				
K2CUR	6	3	210	W4HHK	12	4	550
W2BAH	6	3	200	K4SUM	8	4	363
K2DIG	6	3	140	W4GJO	6	2	1000
K2YCO	5	2	200	W4TLV	6	2	500
W3ARW	17	8	600	W4BYR	6	2	420
W3FEY	11	5	350	W4GQV	6	2	415
W3RUF	10	5	480	W4RFR	6	2	665
K3IUV	10	3	310	W4TLV	4	2	500
W3LCC	10	3	300	K4QIF	4	1	285
W3JYL	8	4	295				
W3NG	7	4	350	W5RCU	16	5	725
W3JZI	4	3	250	W5AJG	7	3	1010
				W5SWY	6	3	325
W4TUG	5	1	315	W5HTZ	5	3	440
K4QHF	4	2	500	W5UKQ	5	2	600
				W5ML	5	1	350
W5AJG	3	2	1050	W6GDO	2	2	493
W6GDO	2	2	100	K7ICW	3	2	165
K7ICW	4	2	250	W7JRG	2	2	420
W7AGQ	2	1	160				
W8PT	11	7	660	W8PT	11	7	715
				W8YTO	11	6	560
W9OVL	6	3	475	W8RVE	9	5	580
W9CSL	6	2	340	W8FX	8	5	470
W9EYE	2	1	175	W8FVE	6	4	450
				K8REG	6	4	275
VE3BPR	3	3	300	W8JLQ	6	3	275
				W8RQL	6	3	270
				WA9HUV	12	6	500
				K9AAJ	11	5	425
				W9AAG	10	4	600
				K9UIT	9	6	520
				W9GAB	9	4	608
				W9ORB	8	4	430
				W9NKT	8	3	310
				W9OJI	6	3	330
				W0EYE	5	2	425
				W0ENC	2	1	400
				W0PHD	2	1	225
				K2CBA	9	7	220
				W2VCG	9	4	280
				WB2EGZ	9	4	280
				VE3BPR	7	4	600
				VE3ATB	5	4	450
				VE3BQN	5	4	447

The figures after each call refer to states, call area and mileage of best DX.

W1MEH, Easton, Conn., heard W5NCE in Garland, Texas, on 144.1 Mc. at 2305 GMT, and K4QIF, Chesapeake Beach, Va., is reported to have worked into Texas the same evening. We are interested in documenting every known instance of 144-Mc. Es, so please let us have your observations on this or any similar event.

Good news for high-band operators in the Northeast: WA2FGK will be on all bands, 50 through 1296 Mc., during the September V.h.f. Party, from Mt. Equinox, Vt. Anyone wanting a high-band check can arrange it with WA2FGK or K2UYH, on 50 or 144. Mt. Equinox is one of the highest points in the southern portion of the Green Mountain State.

QST

SWITCH TO SAFETY!





How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

Continuing with the adventures of SLINKY, our adventurous bed spring (Swedish steel?) we're pleased to report that ham ingenuity still flowers despite widespread lamentation to the contrary. Refreshing amateur unorthodoxy still thrives amid slavish imitators of professional techniques. As you will recall, in April *QST* we discovered our injured hero in a trash heap, grid-dipped him, grounded him, got him loaded and sent him forth to explore the DX world. But somebody beat us to it. W7IJJ records:

Your article prompts me to describe my Slinky antenna which I used until it rusted out on me. It consisted of the spring suspended vertically, stretched out about 25 feet, tied at the bottom to a ground stake, top-loaded with a copper toilet float, and coax-fed through a Heathkit antenna coupler. Good results on 80 and 40!

K3KMO, a frequently published author of very practical bent, is moved to comment:

I've always enjoyed using unusual antennas and surprising my friends by their effectiveness — at times. I still claim the world's DX record with a wet-string antenna, you know, having worked W6WNI from W4UWA/2 with such a radiator (p. 42, November '58 *QST*). If any challenges develop I may come out of retirement to better my own mark.

Well, it's your ball of string, Al. Getting back to Slinky, however, W6PIZ gave his all on an indoors treatment (see photo). Dave is no Johnny-come-lately on the subject:

As a long-time user of Slinky antennas I have tried them in a good many configurations. A favorite is what I call my T-S (Tinkertoy-Slinky) model, designed and installed one recent evening by my three-year-old son and myself for 7-Mc. work. Long-skip reports average about 6 db. down from a good outdoors quarter-wave vertical but I often receive signals inaudible on my other antennas. Should anyone form a Slinky DX Club I'm available as a charter member.

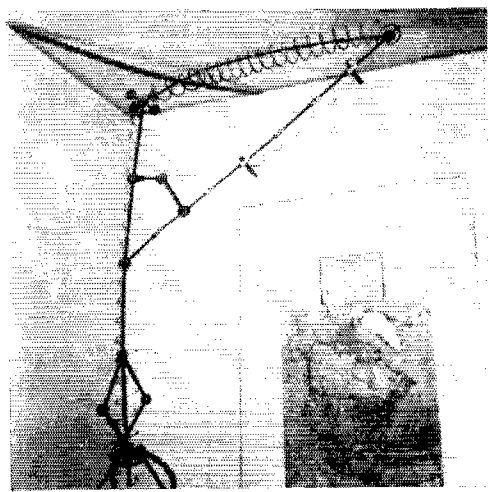
Other correspondents announce favorable results by simply dangling their Slinkys outside shack windows. They agree that the response of mystified neighborhoods is a rewarding study in itself.

What:

Ahh — the summer wanes and our DX bands get down to business. Ready for the ball this fall? We had no room for the key crowd last month, so we hasten to record their 14-Mc. contribution to our documentary. Those figures in parentheses represent kilocycles above the band edge, and the numbers outside parens are GMT whole hours. . . .

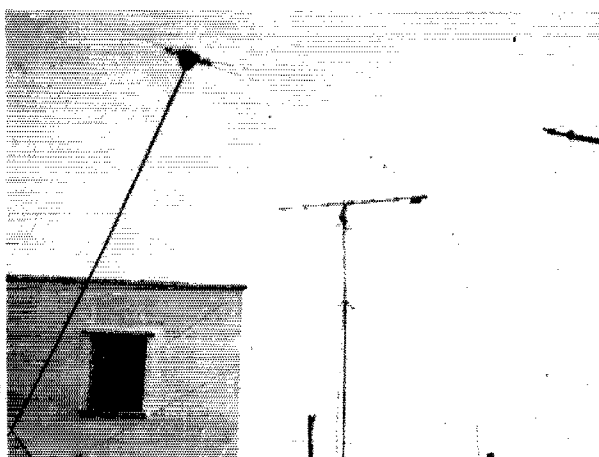
20 c.w. delivers the goodies to Ws 1CNU1 1DYE 2GRD 2JBL 2JDH 3DPR 3HNK 4NXD 6EQB 7OEB 7VCB 8PKU 8YGR 9LNQ. Ks 3MNI 4HPR 4HEX 4MYO 4TWJ 5EIZ 5VTA 7INE 0DEQ 0PJP 0REV. WAs 1FGN 1GXE 2KSD 4CZM 4QLP 4YDR 6JDT 7AUW 7BOA 7BOB 8GGN 8MCC 8SXQ 9MIQ 0LWC 0OXO. WBs 2RJJ 2VYU 6VVS. VE3GLG and IIER. Lots of dots and many a dash from BV2A (25) 12-15. CEs 1DL (45) 23-0, 1DN (40) 23, 3AG (50) 0, 4AD, CMs 2BA 2BL 2WS (20), 3AG (4) 22, CN8FC, GOs 2AP (15) 0, 2CS (35) 6, 2DL (30) 23, 2FC 2JB 3BU 23, 3CA 6AH (60) 23, 6JH (63) 0, 8HB, CEs 1BX 22, 5AA (2) 0-3, 5EO 6, 6FN (40) 4, CRs

* 7862-B West Lawrence Ave., Chicago, Ill., 60656.



W6PIZ's classic Tinkertoy-Slinky installation.

4BC 5CA (80) 20, 6AI 6CH 61A (25) 6, 6EI 6GO (10) 22, 6HI 7BN 5, 7IR 7IZ, CTs 1CB 1JQ 2, 1OI 3AS (17) 22, GXs 1AAC 2CO 3BBD, DMs 2BCA 2BOK 2CDH 3LOG 3VGO 3UE 3UL 4RBO 4WPL, several DKIs, DUIs 1BC FH FM (12) 7-8, OR (48) 20, EAs 6BH (35) 7, 8FE 9EO (5) 3-4, EIs 3AK 4BK 9AR 22, 9J, EP2s BQ GF (80) 11, RV (21) 12, ET3s TC USA (23) 22, F's 2CD/FC 9VN/FC (2, 74) 22, FB8s VW (12) 18, XX (66) 3, YY (37) 6-7, ZZ, FG7s TD TE 18, XF (20) 0, XJ (36) 21, FK8s AT AZ 6, BH BJ, FL8s HM (55) 4, RA 3, FM7s WD WE (46) 0, WO (38) 23-0, FO8s BG 5, BL BQ (5) 11, RT (79) 11, BU (70) 8, BV (60) 4, FR7ZL/t (118), FY7YG (59) 12, GB2Is in the Seilys, GDBAIM (4019-10, GM5AFF (30) 22, HAs 1KSA 1KVM 1KZB 1ZH (30) 7, 3GF 3ALJ 4KYB (28) 5, 5DH 5DJ 5KDQ 6KNB 8KCO 8KUC 8UD 8UF 8UU 0LL (20) 21, HC's 1TH 5CN (40) 0, HIs 1BC OMZ 0, HKs 2DP (20) 14, 3RQ 4ACY 4ALE 5YC (12) 0, 0AI, HL9s KA (53) 23, KB US, HIPs AD (51) 0, BR 19-22, XYZ 5, HVICN (28) 3, HZIAT (35) 23, IT's AGA (30) 0, OMO, dozens of JAs including 4AFA 4DGG (32), 4DIA 4DWC 5AB 6AD 6BBE 6BUL, JHIBIH, JT's 1AD (56) 16, 1AG (27) 15, 1AH 14, 1AJ (13) 22, 2AB (49) 14, JW8NI (60) 23-1, JXs 3P (15) 15, 5AX (67) 22, 5CI (10) 13-14, 6CF (26) 12, 6XF (2) 23, KAs 2EIE 2JP 3-7, 9NF 3-4, KC4UL, KCs 4AN 4CX (6) 22, 6AA 6FAE (85) 16, 6SN (73) 12, KJ6CD, KL7s AIZ EFX FRY MF, KP4s BFF CPP CRT DA, KR6s 6IA 13, 6JZ (50) 23, 6OD 6QW (25) 13, 6SM 6UR 8EA 16, KV4s AA (78) 20, AM IE (57) 22, EY (10) 3-4, CI, KX6s DB 4, BR (15) 12, FB, KZ5s BC B) EM FX GO HR JF JS MF NG TN, LUs 1ZA (20) 0, 2ZI, LX2BQ, LZs 1KKZ (30) 4, KSV (50) 3, SP ZA 20, 2KHAI 2KMLL 2ZZ, MP4s BBW 21, BEU 21, BFK (10) 20-1, OAs AC BR (50) 23, PF (15) 0, QN, OD5s EJ EL (13) LX (18) 4, OH0s AA AG (40) 23, NI (41) 15, OK5s DCD (14) 10, KMB SNL (15) 11, OX3s CJ DL FI LP (5), ZO (9), OYs 4M (9) 23, 5Q (31) 11, 9IAI (35) 22, PE2EVO (24) 13, PIILC/mm (70) 21, PJs 2ME (30) 22, 3CC (70) 14, 3CJ (35) 0, PYs 8PF (80) 4, 9AII, PZIs AP (28) 23, BH (32) 22, B1 CQ (26) 0-5, SL5ZL (71) 5, SM2s BJI COP, SUIs AR (17) 23, IM (50) 22, SVs 1BZ 4-5, 0WLL, TAs 1DS (26) 1, 1KT (13) 22, 2AC (25) 1-2, 2BK (16) 0, 2FM (24) 22, TEs 2WJM 3AB (75) 2, 3AU (12) 0, TE2P (5) 25, TJKQ, TR8AG (37) 22-23, TU2BK (48) 22, UAs 1CK/JTI, 1KED (27) 15 of F.J.L.L., 2AR 2BD (64) 20, 2BZ (30) 19, 2KAQ (49) 5, 9RG (55) 1, 9CM 9CW 9DN (32), 9ES (79), 9FN (4) 4, 9FS (20), 9FU (59), 9FV 9JH (18), 9JO (20) 3, 9JW 9KCE 9KCF 9KIIA (24), 9KOG (3), 9KQA 9KWR 9LQ 9MR (2), 9MZ 9OH 9PP (21), 9PT (37), 9RO (72), 9UN 9US 9WR (20) 4, 9YQ, U5ARTEK (18) 6, UAs 9B 1DV (25), EF EJ (74) 5, EN ER EQ FM IJ (55) 17, JK KBA KFG RIP (45) 12-13, KKT (25) 4, KUV LL MO MT MX (5) 14, NQ NR YD (2) 1, ZB (41) 5, ZI ZL



CN8FV gamely strives for his own DXCC while busily granting Morocco credits to all comers. Walt, well known as WINTH back home, expects to keep CN8FV workable till next June.

ZU, UB5s AV BQ CV ED ES HI IB ID KAB KAI KBR
 KIJ KPF KDS KKI KKM KNF KNI KQV KYV LV
 ALL MN OF RR RS, UC2s AF 5, AL (27) 6, AR AW (60)
 2, CB (30) 20, KAB (5) 0, KBC KCG (80) 1, KMC KMZ
 2, LG (60) 23, WR, UD6s AC 1, AM (6), AY BA (40) 2,
 BV (65) 0, BW (5) 0, KAR KAW (89) 4, KED, UF6s
 AS 3, HG 19, KPA 2, LA (17) 4, UG6s AB 4, CW JJ (39)
 22, UH8s AG BO (23), CE (28) 13, CI (86) 18, DB (5) 23,
 KAA (46) 12, UI8s AG (30) 17, AI (2) 2, AX (50) 17, CD
 DB (65), LG LK (21) 3-6, MF (46), MU (2) 7, UJ8s AC
 (74) 10, AB AJ (10) 3, AV KAA (36) 6, UL7s BG BX
 (68) 12, CG 3, FM (30) 4, FO (33) 3-4, GQ (20) 0, GW
 (54) 1, IQ (30) 17, JT (83) 17, KBB K (37) 7, KBM (52) 12,
 KGI KKB KKL (76) 7, LK (30), PH (9) 3, PJ (52), RL
 (85) 2 3, RQ (9), XG (46), XX YP, UM8s IE (89) 7,
 KAA (33) 6, UN1s BR (70) 6, CF, UO5s AM 19, BM (75)
 0, GW (21) 2, KBB PK 2, UPOL-15 (54) 7, UP2s CA (30)
 20, DX (50) 5-6, KBA KBC (25) 7, KNP (25) 4-5, KPC
 KTU, UO2s AC (20) 11, CC (15) 14, GQ/4 GW IL (50) 4,
 KAE (20) 23, KCC (52) 16, KOR KCT MG, UR2s AR
 7, DE (49) 4, KW KAE KAS (90) 7, KAW 14, UT5s BP
 BY CA HF HP (10) 4, KCD (10) 14-15, KIG (5) 0, KKL
 LE PK (40) 23-0, QE YC, seads of UV3s, UV9s OG (30) 0,
 OP, many UW3-UW6s, UWs IBG IOL 90U (45) 2, 90P
 (43), 9PT (30) 3, 9HH 0IQ (25) 6, 9IX (39), UY5s AJ 23,
 PF II LK MI (35) 3, XN (30) 3, XQ, UZ90A, VEs 8AK
 (30) 2, SRE (57) 2, SZZ 0MM (62) 0, VKs IBA IGD (49)
 11, 2BRJ/VK9 (45) 7, wobs of VK6-7s, 8HA (6) 12, SOX
 9CN 9NW (45) 6, 9RII (75), 9VM (65) 12, 9XI (19) 14,
 VOs I AW IGX 2AF (80) 0, VPs ILP (85) 3, IPV (25) 20,
 IVR 2AP 2GLA 2KR 5, 6AG 6AK (52) 0, 6AP 6PJ (15)
 21, 6YF (22) 22, 7EB (26) 23, 7EF 2, 7NP 7NQ 8J1 (70)
 11, 8F (15) 0, 8UG (9) 22, 9BY (68) 0, 9FO (40) 23-0,
 9GA 9WB 1, VOs 8HJ (35) 13, 8CC (56) 14, 9AR 9B, VRs
 2DK (54) 12-13, 2ER 2FF 3L (22) 12, 4CR (18, 10) 7-12,
 V8s 6EX (32) 15, 6FX 9ASP 9AM (52) 18, 9MB 18,
 VUZs BE (85) 4, DIA (64) 14, GAI 15, GW (60) 1-2, LN
 (52), QB (58) 17, QV (79) 0, VZ (30) 0, a dozen XEs but
 no XEs8, XT2A (30) 23, YAs AN (10) 18, CP (51) 17,
 KO, YJ8BW (35) 8, YNs ICMR (86) 5-6, 3KM 0-1,
 YOs 3RX (35) 22, ICT IQT (85) 15, 8OP 9VI, ample
 YUs including 4VEM 5CXV 5XAM, YSs 1DHE (10) 23,
 15ME 2RC (51) 23, YV8BA (50) 0-1, ZB2s AM (21) 23,
 F (35) 5, ZC4GB (15) 2, ZDs 3G (30) 1-2, 5M (27) 13,
 7DI 22, 8J (14) 22, SRC 21, 9AF (16) 1, one ZK2AU (8)
 17-18, a dozen ZLs, ZPs 5CF (4) 3, 5OG 22, 6AY (23) 22,
 9AG (50) 23, Z8s 3D 3XG 8L and other South Africans,
 3A2NN (45) 0, 4S7s DA (50), EC (45) 17, 4U1TP (20)
 22, 4X4s NX/SU RD VB AM (55) 1, XY (75) 21, 5AITV
 3, 5H3KJ (53) 14, 5N2ABD (12) 6, 5R8s AL AM (26) 3,
 5Z4s ERR KO, 6W8s DD (92) 22, LW (25) 19, 6Y5s BS
 JB (82) 12, MJ (50) 0, RA/P 23, 7O7GB, 7X6QP, 7Z3AB,
 9G1s HI HAI (30) 8, 9H1s AG (18) 7, AM 21, AK (10) 22,
 IN, 9J2s AB (57) 23, CL (7) 11, IE 4, MX (10) 19, 9Ls
 TI PL 19, 9M8s II (49) 14, RS, 9O5s GZ 6, JR (38) 21,
 9V1s MIT MY 16, MX NT NX (60) 0, NZ and 9Y4RA
 (68) 23. Not bad for the summer "hull," eh?

Next month we ought to be well fortified with reports for other bands, space permitting. We'll hear from (15 phone) Ws ICNU 2DY 2GTQ 3HNK 5EHY 8YGR 9LNQ, Ks HPR 5VTA, WAs IGGN 3DSD 4YDR 6JDT

7BOA 7BOB 8MICQ 8PKG, WB6VVS, s.w.l. Kilroy; (15 c.w.) Ws ICNU 2JBL 3HNK 5EHY 7VCB 8YGR, Ks HPR 4MYO 4TWJ 5MHG/6 5VTA 0JPJ, WAs IGGN 3DSD 3GJU 4YDR 6JDT 7AUW 7DUB 7GFT 8MICQ 8OXO, WBS 2RJJ 2UOO 2VYO 2WKR 4EFE 6VVS, WNs IHHO 2ZQE 4FBY 6UVH 8VZS, IIER; (10 c.w.) K4HPR, WAs 7AUW 7BOA 7BOB 9MIQI, WB6VVS KH6BZF, IIER, 5ZASS; (10 phone) Ws ICNU 0YGR 8TGG, WAs IYDR 7BOA 8MICQ; (40 c.w.) Ws 3HNK 7VCB, Ks HPR 4HPR 4MYO 5MHG, WAs 7DUB 8MICQ 9MIQI 0KVC, WBS 2RJJ 6KVA 6VVS and WN3GQ. We should be hearing something from the 80-meter gang, too, and when 20 phone's next turn comes 'round, Ws 3LE 3SEJ 4NXD 8YGR 9LNQ, Ks HPR 5VTA, WA8MICQ and P. Kilroy will be there to lead the "How's" chorus. Hey—stick your head out the shack window. You can smell that autumn DX a-comin'!

Where:

AFRICA — TL8DL, who likes his cards direct, instructs: "For direct reply include self-addressed envelope and two International Reply Coupons. Otherwise QSLs will go via bureaus." 7Q7EC visited 7Q7LC in behalf of the latter's QSL agent, W4NJP, but 'LC still hasn't come through with logs Pasteboards for DXpeditionary work by W9WNV-WA6SBO go to the home QTH of the latter VE3GCO has arranged to do s.w.l. honors "No QSLs will be answered unless the dates and times are Greenwich Mean," declares W4DQS, busy with HK1QQ's TJI TL8 and TT8 "It's a pleasure to help Herman with Florida DX Club and Colombia's LCRA assisting" Jorge Branco, Rua Eng. Carlos Amarante 209, Porto, Portugal, may be able to help confirm TR8AG QSOs which occurred after July 1, 1967, according to work via NEDXA's *DX Bulletin* QSOs with 5X5AU/K6KA can be verified through the K6KA home address.

ASIA — 4X4UQ (K6VQM-K2ASP) indicates you'll be working four new Israeli call areas—Gaza Strip, Golani Heights (near Syria), Jordan River West Bank, and Sinai Peninsula—4X6-7-8-9 (also 4Z) For confirmations of QSOs with EP2GF/I6KA on May 5, 1967; K6KA/YA, May 3; U18KAA/K6KA, April 22; and 9N1MM, April 7-8, write the K6KA home address. "Regarding QSLers of the Month, how about a few nice words about the JA boys?" suggests K6ARE. "I checked my records for an 18-month period and found a return of 97 per cent from Japan. Maybe it would be 100 per cent if I weren't in California." W3LE points out that the *Callbook's* "AC3PT via W4ECI" entry holds only for QSOs by visiting operator W4BPD some years back. "I will most likely take care of QSL chores for North and South American contacts by His Royal Highness although AC3PT may elect to handle his own contacts correspondence." In the *LIDXA DX Bulletin* we see that WA2EFN's efforts to obtain overdue Mongolia QSLs are beginning to bear fruit Since the Middle East fracas WA3EFH's mail keeps bouncing back from the usual HZLAB address VS9MB tells VERON's *DXpress* somebody's been pirating the call on 21 Mc. Due to rig problems, Colin's been sticking to 20 meters.

"Finally received logs for VS9ABL operation from November 9, 1966, to March 17, 1967," announces W4NJF.

OCEANIA — "I'm QSL manager for YJ8BW starting with QSOs of July 7, 1967, and *not* before," notifies W4NJF. "S.a.s.e., or s.a.e. with IRCs are obligatory for direct reply. Others will be answered via bureaus." J. G. Bennett, New Hebrides chief radio engineer, writes that YJ8 is the only proper current N.H. prefix. "All other call signs formerly used, such as the FUS and YJ1 series, are canceled." W8RS contacts of March 13, 1967, may be confirmed through K6KA "Arkansas DX Association, P.O. Box 3323, Little Rock, Ark., 72207, handles QSLs for VK9DJJ, Papua, QSOs on or after July 13, 1967," advises W5HJA "I'll QSL 100 per cent when I get back home to California," vows FO8BW (W6JFM) "QSLs for my QSOs as K8PKY/KB6 and VR3L can be sent to my new Massachusetts address," invites K8PKY/1. "I have all cards received at my Ohio home. They'll be answered as soon as stock arrives from the printers." Several early versions of VK4HG's Willis Isle QSLing portend delay. In any event, he should be back on the mainland in a few months to clear any backlog W4TDUB says the fastest and surest route to Hawaiian QSLs is via 7- and 21-Mc. QSOs with newly licensed WH6s Though VK9HG has received some QSLs he hasn't yet hit the air. A case of mis-identity?

EUROPE — "I've made arrangements with G3NVV to take care of Stateside QSLing for PX1NV," discloses WA9HJM. "S.a.s.e., of course — cards received without self-addressed stamped envelopes will have to be forwarded to John for handling." More Andorra action reported by WA6HAI: "DL5s XE and XH will answer all QSLs for their September PX1 visit as received via S/Sgt (YOFS) David T. Llewellyn, 22nd Signal Regt., BFPO 16, Germany. Lew states they do not expect IRCs or airmail requests." QSOs with SV0WS on June 3, 1967, may be confirmed through K6KA Reminder: QSLs from Italian stations bearing other than the customary "I" numeral usually can be obtained from the II of the same suffix — IS9SCB from IS1SCB, for example SL3ZO may be able to help obtain your holdout U.S.S.R. QSLs. "Every week I'm getting ten or twelve rare ones for W/K friends. Contact me for details." Sven says UZ9UA hails from Kemerovo.

HEREABOUTS — "For my VP2VZ QSOs on April 26-28 of this year, QSLs should go only to my home address," stipulates W1WQC. "I'm occasionally second operator at VP5AB for whom I also handle QSLs." Ham says, contrary to some indications, VP2VZ was inactive in May. Moreover, he has not signed KV4EM since '65 K2YFE can confirm his KL7FOW QSOs but says QSLs for contacts he made at KL7WAH should go to the latter's address. Bob will be busy at medical school beginning this month — patience, please WN4DWN promises 100-per-cent QSLing in behalf of KZ5MF WA9SFB says WB2POH took a turn at PJ3CC, a guest-operated station whose visitors usually can QSL only their own contacts CE8AE specifies Hamshack, Box 916-527, Albrook AFB, Canal Zone, 09825, as QSL route for recent multiplier action, according to the well-pected DX News-Sheet of G. Watts 'A1pl The

following italicized brethren seek QTH data on holdouts mentioned: *K3DCY*, HH7OR, HI8WPC, LX1DF, OA4IGY, VQ2DC, ZE3JV, *K4HPR*, CN2BE '60; *K9DJT*, 9C1TV '65; *K9WEH*, CR10AB '62, KJ6CD; *W41CY7*, HAV/A11 '66; *W45PZF*, ZD8PAIG; *W4N1HHO*, YU2EAB; *SL3ZO*, AP5HQ '64, BV3NO '65, CE8ZZ '64, CR8AD '64, VS5CW '63, XW8BE '65, 3A2LZ '62, 9A1s 1Z and PM of '65. Any 'alp? WAS 1CYT 6KGP and WB2RJJ are willing to undertake QSL chores for deserving overseas DX ops Your "QSLers of the Month," nominated by "How's" correspondents Ws 38EJ 4NJF 4NXd 8AFN, WAS 1CYT 2HIU 5PFI 7DUB 8MCO 9MCI and WB6VVS, are CE8DB, EA9EJ, FO8BJ, G3UQR, HK4PP, JAs 1BPM 1KRU 0B1L K64CX, KL7MF, KP4BN, KZ5AJ, OD5EJ, PY1MCC, TA1SK, UAs 3DR 9US, UI8MU, UR2BV, VKs 2AV4 6RS, XE2s CCI JS, ZD8J, 6W8CQ and 0Y5BS. Any quickies you'd like to commend here? K9KLE's QSL managership for 9Y4DS begins with June '67 QSOs W6GSV's periodic QSL Managers Directory may hasten some new ones for you In the *CARscope*, W8ZCQ highly recommends personal notes with your QSLs to desirable DX stations. "Works wonders!" For direct reply, unless specifically waived, self-addressed stamped envelopes (self-addressed envelopes with sufficient International Reply Coupons when appropriate) should be included in mailings to QSL managers designated herein. This is generally advisable when seeking postal response from *anyone*. And, for goodness sakes, refer to time and date in Greenwich Mean Let's see what individual specifications show up in this month's mail — being mindful that each is necessarily neither "official," complete nor accurate:

- CE3KW, P.O. Box 3388, Santiago, Chile
- CE0AE (see preceding text)
- DI4EF (via WB2RJJ)
- DL5s XE XH (see preceding text)
- EA0AH (via W4DQS)
- EP2KW (via DL2NS)
- F9KJ, Jean-Marie Knibiller, 4 rue de la Wanne, Flaxlanden 68, France
- F6AO/m (via REF)
- FM7WO, P.O. Box 287, Fort-de-France, Martinique
- FO8BW (to W6JFM)
- FP8s CA CS (via K2OJD)
- GB2DSF (via G3WAO)
- GM5AHS, S. Mendelsohn, P.O. Box 574, RAF Edzell, nr Brechin, Angus, Scotland
- I6REE (to I1PEP)
- I0IIC (see "Whence")
- JH1BFF (via JARL)
- JW3NI, E. Selnes, Kap Linnee, Spitzbergen, Norway
- K1FOB/V P9, R. Nielsen, Tudor Hills Labs, FPO, New York, N.Y., 09560
- K8PKY/KB6, D. Dorson, K8PKY/1, Box 215, N. Palmouth, Mass., 02566
- KG6SN, Box 341, Saipan, Marianas ex-KL7FOW (to K2YFE)
- KV4EM (to W1WQC)
- KX6s FN FO (via K2OJ1)
- KZ5MF (via WN4DWN)
- LJ2X (via NRRI)



WN8TND, with a 113/105 worked/confirmed countries total, claims the first Novice DXCC membership of the current sunspot cycle. His Ranger, 75A-4 and homespun 21-Mc. beam were effectively deployed by a battery of sixteen crystals. W1WPO of the ARRL DX Century Club Desk advises that George holds Novice DXCC No. 4 following that of KN0LTB.

LU2AHI (via DL1HH)
 MP4MAX (to G3SYW)
 PJ3CJ, Box 2147, Curacao, N.A.
 PX1NV (W/Ks via WA9HJM)
 PX1VU (to DL1VU)
 PZ1CO, P.O. Box 2222, Paramaribo, Surinam
 SV1CX, 10 Diacon St., Athens 457, Greece
 TJI1s AG AH, M. Prunier, B.P. 20, Bafoussam, Cameroon
 TJ1QQ (via W4DQS)
 TT8AQ (via W4DQS)
 TY5ATD (via 5N2AAX)
 VK4HG (via VK3RJ)
 VK9DJ (see preceding text)
 VK9GZ, Fr. G. Zepczyk, Pouch Mailbag, Rabaul, T.N.G.
 VP2s DAG KA KJ KX VI (via K2OJD)
 VP2VZ (to W1WQC)
 ex-VP8IN, T. Tallis, 21 Eastham Close, Childwall, Liverpool 16, England
 VQ9HJB (via RSEA)
 VR1Q (via G3NHM)
 ex-VR3L, D. Dorson, K8PKY/1, Box 215, N. Falmouth, Mass., 02556
 VS9AHN, W. Cook, HQMEC, BFPO 69, London, England
 WA2DHF/GM5AHS, S. Mendelsohn, P.O. Box 574, NavSec/GruAct, FPO, New York, N.Y., 09518
 WA8RYW/HCI, % HCJB, Casilla 691, Quito, Ecuador
 YJ8BW (via W4NLF; see preceding text)
 YN1GMR, Box 327, Managua, Nicaragua
 YV4QC, Box 510, Valencia, Venezuela
 YV4RZ, Box 18, Maracay, Venezuela
 ZD7DI (via RSGB)
 ZD8J (via W4DQS)
 ZK1CL, P.O. Box 103, Rarotonga, Cook Islands
 ZP3CW (via ZP5OX)
 5A4TZ, P.O. Box 3701, APO, New York, N.Y., 09231
 5N2ABD, Box 2469, Lagos, Nigeria
 6W8DX, Box 347, Dakar, Senegal
 6Y5VV (via VE4JK)



5Z4KN (WA6PKN) keeps this layout warm on 14-Mc. phone or c.w. when not on duty with the Voice of Kenya BC-TV net. Jerry, who anticipates another year in Nairobi, is most active at 1500-2000 GMT.

9A1DFD (to 11DFD)
 9J2HZ, Box 175, Lusaka, Zambia
 9Q5AD, Box 8601, Kinshasa, R.C.
 9Y1OA (via MARTS)
 9Y4LA, Box 216, Tobago, W.I.

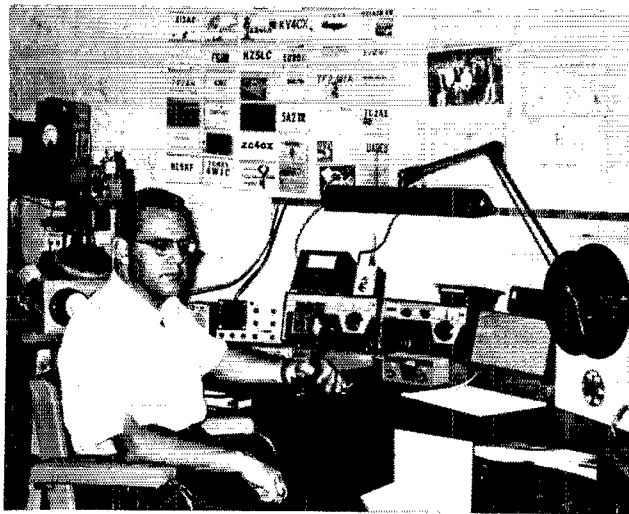
You can thank Ws 1YYM 2GTQ 2JBL 3LE 4NJP 4NXD 7UVR 8YGR 9LNQ, Ks 3CUI 4MYO 5VTA 6KA 9YWY, WAs 6HAI 7DUB 9SFB, WB2QKQ, KH6BZF, P. Kilroy, Columbus Amateur Radio Association *CallAscpe* (W8ZCQ), DARC's *D X-MB* (DL3RK), DX Club of Puerto Rico *D Xer* (KP4RK), *D X News-Sheet* (G. Watts, 62 Belmore Rd., Norwich, Nor. 72.T, England), Florida DX Club *D X Report* (W4BRB), International Short Wave League *Monitor* (A. Miller, 62 Warward Ln., Selly Oak, Birmingham 20, England), Japan DX Radio Club *Bulletin* (JA1DM), Long Island DX Association *D X Bulletin* (WB2EPG), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa, N.Y.), North Eastern DX Association *D X Bulletin* (KH1MP), Northern California DX Club *D Xer* (Box 608, Menlo Park, Calif., 94025), Ontario DX Association *Long Skip* (VE3EWW), Southern California DX Club *Bulletin* (WA6GLD), Utah DX Association *Bulletin* (W7LEB) and VERON's *D Xpress*

(PAGS FX LOU TO VDV WWP) for the preceding suggestions. Any items in your log for our QTH swapshop?

Whence:

OCEANIA — Next month WIA (Australia) invites amateurs throughout the world to frolic in the 1967 *VK/ZL/Oceania D X Contest* to be held (phone) from 1000 GMT the 7th to 1000 the 8th, and (c.w.) the 14th-15th, same times. Exchanging the usual RS- or RST001, RST002, etc., serials, non-Oceanian participants earn a point for each non-VK/ZL Oceanian worked per band, 2 points for each VK/ZL captured, and for final score multiply this total by the number of VK/ZL band-call areas accumulated. (Oceania contestants outside VK/ZL work both sides of the fence at 1 point per non-Oceanian and 2 points per VK/ZL, same multipliers.) Your log should clearly indicate date, GMT, call of station contacted, band, serials sent and received, and each new VK/ZL call area as worked per band (separate sheets for each band). Include a summary sheet showing your call, name, address, equipment description, and designate multi- or monoband entry classification. Then whisk the works off to WIA, Box N1002, GPO, Perth, W.A., Australia, postmarked on or before January 20, 1968, to be eligible for possible certifications of outstanding performance. Propagation conditions should be peaking for this one — good fishin'! W2YTH and spouse now greet friends from the DX end as KX6s FN and FO, says W1YYM of Hq. WB6KVA finds WH6GEQ getting an awful amount of mileage out of his 15-watt AT-1 and dipole on 40 VK9HG is home-brewing a 6AG7-807s c.w. weapon in Lac, as well as a receiver built around the Eddysside dial. FO8BW (W6JFM) will finish up on Tahaa isle around the middle of this month. Patrick uses a Honda kw, gas genny to power his KWM-2 on 10 through 40 meters. Convenient coconut trees make fine masts for his dipoles — what a life! Pacific potpourri via club newshawks: VK4HG has 50 watts and a Vee on Willis isle. YJ8BW likes 14,195-14,205-ke. transceive. The dismantling of KC6BO rarifies the Western Carolines. W4CHA still has his DX eye on Nauru, Cocos-Keeling and Christmas. December may see c.w. and s.s.b. Chathams chatter courtesy ZL4s MO and PIL. ZL1AI of the Kermadecs sticks to 20, so beware the 7- and 21-Mc. species. FW8RC fits between 14,240-ke. sideband and 21,068-ke. c.w., 0630-0900 GMT.

EUROPE — East Germany's 1967 *WADM Contest*, a c.w.-only deal, takes place from 2000 GMT the 7th of October to 2000 the 8th, on 3.5 through 28 Mc. Non-DMs will work DM stations exchanging the usual RST001, RST002, etc., serials. Each DM may be worked once per band at 3 points per QSO, this total to be multiplied by the number of DM band-districts worked, for final score (the last letter of a DM's call indicates his district, A through Q, fifteen possible per band). October 30, 1967, is the deadline date for entries mailed to Contest Bureau, Radio Club of the GDR, P.O. Box 30, 1055 Berlin, GDR. This one could move you toward the DMCA diploma administered through DM2ACB, Box 185, 27 Schwerin, GDR. Don't forget the voice wind-up of DARC's *WLE' D X Contest* on the 9th-10th of this month, details last issue. Italy's International Institute of Communications will fling its *Columbus Contest* from zero GMT, October 7th, to 2400 the 8th — man, that's going to be a busy DX week end! In this one everybody works everybody else outside their own countries, exchanging RST (or RS) and Region numbers (IARU I, II or III). W/K/VE/VOs earn one point per QSO within their International Amateur Radio Union Region, 2 points per contact with each station outside their Region, 5 points for each contact with I S IT 9A M1 and HV stations, and 30 points for working special station IØIIC. Multiply this point total by the number of DXCC countries contacted for final score. File your log extract with IIC, Columbus Contest, Genova, Italy, on or before January 31, 1968, including a statement that all test QSOs were made within rules and regs, and you may qualify for a certification of meritorious performance. WA6HAI learns that DL5s XE and XH have an Andorra endeavor slated for the first few days of this month. Their call isn't handy at this writing but watch (c.w.) 14,050, 21,050, 28,050; (phone) 14,300, 21,300 and 28,300 kc. for PX1 pile-ups. WA9HJM says the PX1NV party of G3s TOT UIF VNH and VNV should be drawing to a close about now. WA2DHF, manning GM5AHS, particularly enjoys 80 c.w. from Angus. "Took me nine years to work 35 countries as a U.S. Two. In ten hours as a GM5 I worked 27! My NCX-3 feeds a trap dipole." Newcomer F9KJ hopes to improve his English with a Swan 350 on 10 through 80. DJ2XP offers details on an "Iron and Steel" certification based on QSOs with Saar-Neunkirchen stations. According to WIBB, the 700-mile daytime path between GM3SVK and G3YVF is frequently bridged on 1.8-Mc. c.w. G3UBW logged the signals of Ws 1B2 2IU and ØVXO on July 2nd, and WIBB popped out of the 1.8-Mc. hash at G3SXW on July 11th, proving again that 160-meter DX potentialities are with us the year 'round. Now Continentalisms via the



TL8DL, formerly 5A4TQ, likes 15- and 20-meter voice work and figures he's the only available TL8 at present. Dave's 3-element rotary is especially prominent around 14,330 kc. at 2000-2200 GMT. TL8DL is with the U. S. foreign service and expects to remain in the C.A.R. well into 1968.

clubs: JW3NI's 14,000-kc. c.w. peeps through around 2300 GMT. . . . Exploration expedition SM2XA/LA/Y is opped by SM7DBF. . . . W2OEH is said to be the voice behind PX1EH and PA9DK. . . . F8AQ/m was worked from Ile D'Oteron in June, and GB2IS was a June-July Seilly sortie by University of Manchester radio buffs.

ASIA — W3LE, after a four-hour eyeball QSO with AC3PT on our shores, comments: "AC3PT's 75S-3, 32S-3 and 30S-1 are not completely operative. His Royal Highness indicates that old friend AC3SQ was up to the palace in Gangtok for several days trying to get the station on the air but things did not turn out too well. He did manage to work several stations, however, including a W9. AC3PT hopes to have a technician from India properly connect up the equipment for single-sideband since he does not cotton to c.w. I can say, though, that there will not be many contacts with the U.S.A. if W/Ks act like greedy vultures." 4X4UQ (W6VQM-K2ASP) leaves Israel after a three-year stint and expects to visit New England this month. . . . VS9ABL may check out of Aden in October, says W4NJF. Brian's summer U.K. leave was marred by a serious auto mishap. . . . Addenda from the East via literature of aforementioned clubs and groups: VU2NR intends to ease our lack of Lacedaives. . . . Operator Colin has another month or two to spread VS9MB Maldives cheer. . . . 9N1MM keeps at it around 14,200 kc. . . . W.B6VXT/mm, aboard hospital ship *Sanctuary*, sprays 14-Mc. phone traffic Statesward from the Vietnam theatre. . . . BV2A keeps Taiwan tempting at 0800-1200 GMT on 20 c.w.'s low edge. . . . How'd you do in last month's All-Asia shebang? In last year's c.w.-only AA results, just released by Japan's JARL, Stateside call area leaders wore Ws 1RVT 2MEL 3MSK 4YWX 5WZQ, WAs 6IVM 7BOA, Ws 8GQU 9IOP, K8VFN, KH6LJ and W8DGP/KL7, with VEs 2YU 3NE 6VO and VO1AW tops for Canada. Continental kingpins: CR6DX, JA1VX, KG6AA, OH2CP, PY280 and W3MSK.

Biggest scores per Japanese call area were registered by JAs 1VX 2DN 3IG 4DGG 5AB 6AKW 7FC 8QA 9BEX and 9AIF. Highs per country: CR6DX, DM2AUO, DU1CL, EP2BQ, F2NZ, FO8BJ, G4CP, GM3KLA, HA5KDQ, HB9MO, HI8XAL, HM8HQ, HP1BR, I1SF, JA1VX, KG6AA, KH6LJ, KR6CO, LA7H, LZ1KBD, OA4PF, OD5LX, OH9NJ, OK3CAG, ON4XG, OZ1LO, PA6GMU, SM2BJI, SP3ALJ, TP3AB, UA5 2KAP 3KFB 9UG, UB5KAS, UC2WP, UD6AM, UF6AW, UG6JJ, UH8BO, UI8KAA, UJ8AH, UL7BF, UP2KBA, UQ2CC, UR2FU, VE3NE, VEs 3AXX 9CJ 9GN, VS6DS, W3MSK, W8DGP/KL7, Y09FM, YU1BCD, YV6BS, 4X4NYM, 6Y5BB, 9M2LO and 9V1LP. Russian entries outnumbered W/Ks by 102 to 61, a slimmer margin than the previous affair's 164-to-40 shellacking. Are we reversing the trend?

AFRICA — "HK1QQ is a pilot with Air Camerouns based A in Douala," affirms W4DQS. "Herman expects to be there for two or three years. He's been intermittently active as HK1QQ/TJ8 and TJ8QQ, lately as TJ1QQ since the TJ8 prefix was eliminated. He has also operated from near-by countries as HK1QQ/TL8 and HK1QQ/TT8. For a short time he used the call TT8QQ but this has been revised to TT8AQ. He also holds the call sign TL8QQ. Herman's BC-348 and ART-13 are due for replacement by a Swan rig, external v.f.o., triband beam and HA-1 keyer, after which he should be very active on (c.w.) 14,005, 21,005, 28,005; (phone) 14,105, 21,205 and 28,205 kc. He also hopes to operate from Spanish Guinea as EA9AH."

. . . . TL8DL is No. 4027 on the 14,330-kc. International YL Net. . . . CN8FV (W1NTH) declares, "The air is full of rude operators but I've found that W/Ks are not the worst of the lot." Walt feels that the language barrier is part of the answer. . . . "EA9AZ, with 150 watts and a dipole, is one of the two Spanish Morocco stations active on sideband," notes K1OZR. "Transmitting near 14,195 kc., Raf tunes 14,210-14,215 for Nevada, South Dakota and Wyoming to complete his WAS." ZS6AM heard W's AW and BB on 160 c.w. in July. . . . UGRA (Republic of Congo) is scheduling a 9Q5 DX test for world-wide consumption December 9th-10th. We'll return to the subject before then. . . . WIBB says VQ8CC hopes to have ten watts on 160 c.w. this season thanks to a 1800-2000-kc. Mauritius allocation.

HEREABOUTS — Ws 8FYR 9EWC 9FKC 9IOP 9MSG 9HTS and other DX notables are programed for the 14th Annual W9-DXCC Dinner at the Chicago-O'Hare Holiday Inn, September 18th. W9TKV's announcement urges you to file reservation with K9VLE before the 11th of this month or suffer the lonely consequences. ARRL's WAICYT finds there are DX Century Club members in 206 countries. . . . W2JBL says that KZ5BC, long a 20-meter c.w. standout, now awaits his One call in Massachusetts, and s.w.l. P. Kilroy hears that ex-8R1P has settled in Concord, N. H. . . . TG5WJ, who also signs WB2GJR, hails from Chicago, according to W2MEL. . . . W7ZC-W5CA likes the version of AE's disappearance presented by Fred Guerner in *The Search for Amelia Earhart*. . . . W3HNK enjoyed Field Daying with ex-5A3TX on 7 Mc. . . . W4NXD wonders when someone will start pushing contests and awards for the more challenging straight-a.m. voice mode. We recall W2TXB and others making their DXCCs via narrow-band f.m. around 1950. Is anyone still deviating DXwise on the lower frequencies? W1WQC figures that VP5AB is due back on from the Cicos after a lengthy vacation. . . . "My best DX from KL7FOW was a South Pole KC4 on 28,600-kc. single-sideband," recounts K2YFE/ø. . . . PY1BAR, according to W3OBD, can supply scoop on a *Cinco Amadores Leite-Lima* diploma premised on QSOs with any five members of this whopping ham family: PY1s AYQ BAR BVL CEJ CHP CPL MIBN, PYs 2DCA and 5RK. . . . WIBB's 160-meter c.w. was copied at PY1NFC in mid-June. Stew and W6VXO were heard by PY2PA in early July. . . . CE9AE's multi-operated Easter agenda includes skeds with the States on 21,378 kc. at 1800 GMT. . . . FM7WO's limited English causes a preference for 14,040-kc. c.w., 2300 GMT or so.

QST

SWITCH
TO SAFETY!





Operating News



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DXCC: ROBERT L. WHITE, W1WPO
Training Aids: GERALD PINARD

Phoney Phonetics. The purpose of phonetic equivalents in voice operation is to make yourself understood. Note we do not say this is the *principal* purpose; it's the *only* purpose. The logical corollary to this is, then, that as long as you make yourself understood, it really makes little difference what phonetic equivalents you use. If this be true, then what's the difference whether we use, say for WINJM, the phonetics Nan Jig Mike, November Juliet Mike, Nepal Japan Mozambique, Nine Jumping Monkeys, or No Joking Matter? Isn't insistence on a standard phonetic list carrying standardization a little too far?

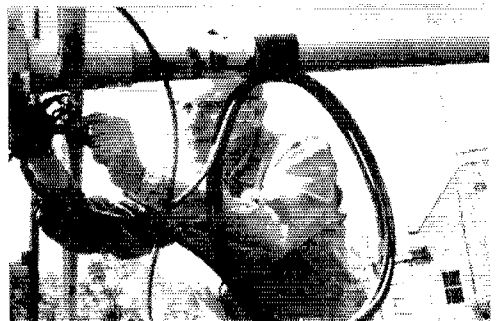
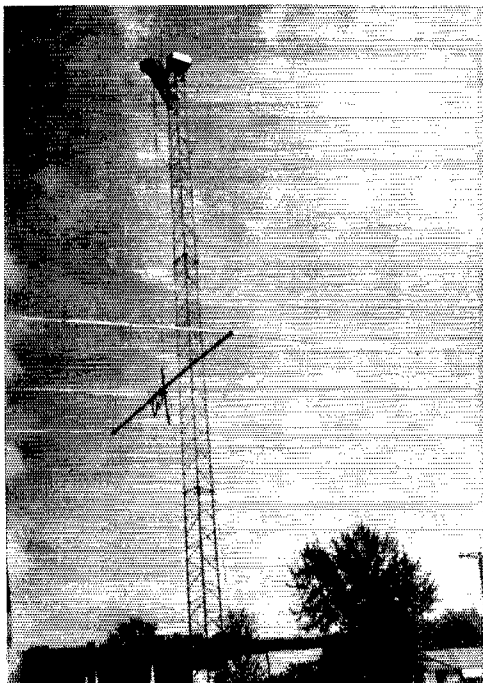
Throughout the years, a great many organizations and communications concerns have endeavored to achieve standardization in the struggle to reduce the spoken to the written word. The result has been promulgation of different standards by the railroads, telephone companies, newspapers, Western Union, the armed services, other government agencies, international groups, airlines — you name it, nearly every entity utilizing voice communication at one time had its own, private phonetic alphabet. We have a folder at headquarters containing

many of them. Just as an example: the phonetic equivalent for the letter A has been, variously, Adam (or Adams), Alfa, Able, Amsterdam, Alice (or Alicia), Ana, Avila, Alabama and Australia — and this is only a partial list, not including, of course, the many facetious phonetics used every day on the amateur bands.

And yet, during all this, attempts were being made to establish a standard phonetic list. ARRL adopted one (the Western Union list) back in the early thirties. During World War II, the Armed Services Combined Communications Board established the JAN (Joint Army-Navy) list, which many of us still use. After the war, ARRL established its own list, and still later the ICAO list was set up for international use. The latter is perhaps the most widely used at present, but you can still hear remnants of many of the old lists being used in the amateur bands.

The debates over which list to use for the standard have been and will be endless. Some say the old JAN list is not only a masterpiece of simplicity and brevity, but is or was known by more people than any, so why not continue using it? Some contend that amateur radio is a service in its own right and deserves its own phonetic list, so why do we have to follow the armed forces and government services into using that ridiculous Romeo-Juliet ICAO list? The proponents of the ICAO list always point out that these words were scientifically selected to have the maximum understandability in any language — besides which, it is getting more and more widely used, so let's get on the bandwagon. But time after time we hear amateur stations

Woe is us! No sooner do we get the rhombic up and working at **W1AW** than troubles develop in the 20-meter beam, requiring lowering it to the ground from atop its 60-foot tower (left) and some expert diagnosing and repairs by Chuck Bender, W1WPR, before hoisting it up again. Sound easy? Don't kid yourself! (Photos by W1DVE)



working DX using place-names for phonetics; they claim Y for Yokohama and Z for Zanzibar are more readily understood by DX stations than Y for Yankee and Z for Zulu.

Could they be right?

Not even worthy of mention are the funny boys who delight in ascribing facetious phonetics to their call letters. Ridiculous poppycock! And yet, we have occasionally caught ourselves grinning, and have to admit that we'll never forget that, for example, W1WPO has called himself the "World's Poorest Operator."

So, you ask, what's the conclusion? Which phonetic list should we amateurs use? Page 13 of the booklet *Operating an Amateur Radio Station* gives you the answer. Both the ARRL list and the ICAO list are included, the former because of pride in our own service, the latter a result of pressure for its adoption. We prefer our own list. Many amateurs prefer the ICAO list, so we include it for information. Many also still use the JAN list, but this is obsolescent.

We still say, however, that the only purpose of a phonetic equivalent is to make yourself understood. If you accomplish this, the first time, then you are using the right list.

DXCC/WAS Service Charges. In accordance with Minute 52 of the ARRL Board Meeting (see page 80, July *QST*), the CD staff has been working on a system of service charges for DXCC and WAS processing. We expect these charges to go into effect on October 1, and details will be outlined in *Operating News* next month. We mention it herewith because for some members the October *QST* details will be after the fact — that is, some members don't receive their *QST*s until after the first of the month of issue.

But what are we talking about? If you're

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for June Traffic:

Call	Orig.	Recd.	Rpt.	Del.	Total
K6BPI	4883	1856	1687	169	8595
W3CUL	221	1380	1437	127	3165
W7BA	5	808	758	46	1617
K8DONK	117	736	715	22	1590
W5ORD	19	537	535	0	1091
W6RBY	37	510	390	105	1042
W1PEX	56	427	343	37	863
K9IVG	16	458	319	5	798
W0LGG	10	391	350	10	761
K7TCY	3	378	341	36	758
K5TEY	12	467	357	2	738
W6GYH	75	320	314	3	712
W6BBO	51	342	309	9	711
W3EML	39	354	268	1	662
W3VR	65	298	273	7	643
W4AFZ	45	303	270	25	643
W6PCC	7	316	252	20	595
W6VNG	17	294	281	6	578
WA2IGQ	32	262	206	56	556
WA1EJ	19	263	225	20	527
WA7DXL	54	239	167	42	502

More-Than-One-Operator Station

Call	Orig.	Recd.	Rpt.	Del.	Total
W1KBN (May)	238	138	16	123	515
BPL for 100 or more originations-plus deliveries					
WA4BMC	341	K3VBA	124	WA4NEV	107
W8IV	170	WA5NYY	118	K81B1	105
WA0CQ	170	K1PNB	115	WB6GGL	104
W6EZ	162	K7CTP	111	K8LRK	104
W6BGF	151	WB4BPL	109	W2OE	102
WA1FVH	145	WA6GHZ	109	WA7BLD	100

More-Than-One-Operator Station

WB2RWD/2 212

BPL medallions (see Aug. 1954, p. 54) have been awarded to the following amateurs since last month's listing: W1DOM, WB2WEL, WA6GW, K4TRT.

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 origination 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.

reading this, you must be a League member, and the charges wouldn't apply to you anyway. That's right, the service continues to be free to League members and most foreign amateurs. Only non-members in the U. S. and Canada will have to pay the service charge. So tell your friends — not to get their cards in before the

OPERATING EVENTS (Dates in GMT)

ARRL-IARU-SCM-Affiliated Club-Operating Events

September	October	November
1-30 B.C. Centennial QSO Party, p. 132, last issue.	6 Qualifying Run, W6OWP	1-2 YLRL Anniversary Party, phone.
2 LO Time (League Officials, only).	7 LO Time (League Officials, only).	2 Qualifying Run, W6OWP
7 Qualifying Run, W6OWP	7-8 VK/ZL Contest, phone, p. 88, this issue.	4 LO Time (League Officials, only).
9 Frequency Measuring Test	W4DM Contest, p. 88, this issue.	5-7 LO Party (League Officials, only).
9-10 V.H.F. QSO Party	Massachusetts QSO Party, p. 110, this issue.	11 Frequency Measuring Test (ARRL Official Observers, only).
WAF DX Contest, phone, p. 86, last issue.	7-8 Columbus Contest, p. 88 this issue.	11-13 SS, phone
9-11 Zero District QSO Party, p. 104, last issue.	14 Qualifying Run, WIAW	12 OK DX Contest
15 Qualifying Run, WIAW	14-15 VK/ZL Contest, c.w., p. 88 this issue.	14 Qualifying Run, WIAW
16-17 Scandinavian Activity Contest, c.w., p. 86, last issue.	14-16 CD Party, phone* RTTY SS, p. 57, this issue.	18-20 SS, c.w.
16-18 Washington State QSO Party, p. 114, this issue.	18-19 YLRL Anniversary Party, c.w.	
Pennsylvania QSO Party, p. 97, this issue.	21-23 CD Party, c.w.*	
18 High-Speed Code Test, p. 93, this issue.	* League Officials and Communications Department Appointees only.	
23-24 VE/W Contest, p. 55, this issue.		
Scandinavian Activity Contest, phone, p. 86, last issue.		
26-28 YLRL Howdy Days, p. 79, this issue.		

deadline, but to pay their ARRL dues so they won't have to fork over for such services. You never know, the Board might impose a fee on other services in the future.

What's Your Section? In the various ARRL contests which require an exchange of "section" we get some real cuties. The CD parties are no problem; every appointee (well, *almost* every appointee) knows what section he is in. In the SS, we get designations such as "Northern Virginia," "California," "West Gulf" and "Southern Nevada." No wonder. Most states are sections themselves, but some are divided into two sections, one into three and one (Calif.) into *nine*. That's right, nine. Sections are operating-administrative subdivisions of the Communications Department's Field Organization. Divisions are jurisdictional subdivisions for ARRL directors who, as a body, determine the overall policies of the League.

Why should California have nine sections? Don't ask us, this all happened before our watch. But it does, and it's mighty confusing to contest operators who aren't appointees and familiar with their section organization. We'll be glad to advise anybody in doubt exactly what section he is in. But for the benefit of you Californians, as well as those working the 6's, here's a breakdown of California sections by counties:

East Bay (EBay): Alameda, Contra Costa, Lake, Napa Solano.

Los Angeles (LA): Los Angeles.

Orange (ORG): Inyo, Orange, Riverside, San Bernardino.

Santa Barbara (SBar): San Luis Obispo, Santa Barbara, Ventura.

Santa Clara Valley (SCV): Monterey, San Benito, San Mateo, Santa Clara, Santa Cruz.

San Diego (SDgo): Imperial, San Diego.

San Francisco (SF): Humboldt, Marin, Mendocino, San Francisco, Sonoma.

San Joaquin Valley (SJV): Amador, Calaveras, Fresno, Kern, Kings, Madera, Mariposa, Merced, Mono, San Joaquin, Stanislaus, Tulare, Tuolumne.

Sacramento Valley (SV): Alpine, Butte, Volusa, Del Norte, El Dorado, Glenn, Lassen, Modoc, Nevada, Placer, Plumas, Sacramento, Shasta, Sierra, Siskiyou, Sutter, Tehama, Trinity, Yolo, Yuba.

Hiatus. We write in midsummer, but you read this near the end of the summer hiatus, when the young are preparing to return to school, the middle-aged are girding for the winter, and the elderly and retired are seeking out their winter havens. For all of us, an active operating season, with higher sunspot activity and shorter and more multiple "skip" is in prospect. We hope you are planning to take the most of it. Get those antennas set up, do your climbing and fixing now instead of waiting until after the first snowstorm. It should be a good season. -- WINJAM.

DXCC NOTES

Announcement is made of the deletion of credits for several DXpedition activities which took place during the past year:

a) KIIMP/KC4, Navassa, because of violation of rules and policies of the U.S. Coast Guard, which prohibit presence on the island without permission.

b) VU2WNV, Laccadive Islands, because the Government of India has stated that the license issued to W9WNV did not authorize Laccadives operation.

c) VQ9AA/C, Chagos, because of inability of the licensee to establish that he was actually present on Chagos.

d) PY0XA, St. Peter and Paul's Rocks, because

FREQUENCY MEASURING TEST SEPTEMBER 9

ARRL invites every amateur to try his hand at frequency measuring when WIAW transmits signals for this purpose starting at 0130 GMT, Sept. 9. **CAUTION:** Note that since the date is given in Greenwich Mean Time the early run falls on the evening previous to the date given by local time. *Example:* In converting, 0130 GMT, Sept. 9 becomes 2130 EDST Sept. 8. The signals will consist of dashes interspersed with station identification. These will follow a general message sent to help listeners to locate the signals before the measurement transmission starts. The approximate frequencies used will be 3534, 7083 and 14,070 kc. About 4½ minutes will be allowed for measuring each frequency, with long dashes for measurement starting about 0136. It is suggested that frequencies be measured *in the order listed*. Transmission will be found within 5 or 10 kc. of the suggested frequencies.

At 0430 GMT, September 9 WIAW will transmit a second series of signals for the Frequency Measuring Test. Approximate frequencies will be 3573, 7116 and 14,152 kc.

Individual reports on results will be sent to all amateurs who take part and submit entries. When the average accuracy reported shows error

of less than 71.43 parts per million, or falls between 71.43 and 357.15 parts per million, participants will become eligible for appointment by SCMs as Class I or Class II OOs respectively.

This ARRL Frequency Measuring Test will be used to aid qualification of ARRL members as Class I and Class II observers. Present observers not demonstrating the requisite average accuracy will be reclassified appropriately until they demonstrate the above-stated minimum required accuracy. Class I and Class II OOs must participate in at least two FMTs each year to hold appointments. SCMs (see listing page 6) invite applications for Class III and IV observer posts, good receiving equipment being the main requirement. All observers must make use of cooperative notices, reporting activity monthly through SCMs, to warrant continued holding of appointment.

Any amateur may submit measurements on one or all frequencies listed above. No entry consisting of a single measurement will be eligible for QST listing of top results. Listing will be based on overall *average* accuracy, as compared with readings made by a professional lab. If you're troubled by GMT, send for Operating Aid 10.

of inability of the licensee to establish that he was actually present on the Rocks.

e) VK2ADY/β, Heard Island, because the Postmaster General of Australia has stated the license did not authorize operation from the island, and the Department of External Affairs of Australia has stated permission to go to the island was denied.

In an attempt to avoid future difficulties such as were involved in the above actions, no credits will be allowed for future DXpeditions until there has been a submission of evidence that the DXpedition was properly conducted in all respects, including licensing authority, actual presence at the claimed location, and so on. Because circumstances vary with each operation, a hard and fast list of required material and information cannot be given without, perhaps, causing undue hardship. DXpeditioners

are urged to maintain full and complete records, including the originals of licenses, authorizations and letters received, copies of all letters and applications sent, a running log showing arrival and departure times at each port and other stopping points, name or number of aircraft or vessels employed, and receipt of transportation and lodging.

DXCC Notes

The last place deleted total shown in the June, 1967, DXCC Honor Roll was 313. Due to deletions that have been made to all DXCC totals since the June issue appeared, the last place deleted total in both the DXCC and DXCC Phone Honor Rolls is now 312. In view of this, the minimum for Honor Roll submissions for September will be 312 (deleted) rather than the 313 shown in the June, 1967, issue.



DX CENTURY CLUB AWARDS



From June 1, through June 30, 1967 DXCC Certificates based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the amateurs listed below.

New Members

W5OBS....254	UA3KYA...116	UA1KIA...108	WA3DFV...104	DJ8SI...101	LA1FH...100
JA1DFQ...201	W2MBU...115	UF9BYV...106	W51JQ...104	OZ1TF...101	SM7DQK...100
LA1KI...182	HA7KPF...112	DL8UP...105	W0UJK...104	UW3EH...101	W1E2M...100
SP6AKK...180	LA2KD...110	G2HAO...105	HA1VE...103	W3PFG...101	WA1CYT...100
W4FWG...153	W11LV...110	HA5AF...105	K8NQP...103	Y05KAU...101	WB28BN...100
WA49NM...147	W92NDI...110	VB5NE...105	P49KOR...103	HL9KB...100	W3WKO...100
W8CAG...132	K8LRK...103	V83PI...105	WA1TTY...103	K4RBZ...100	WA5LMG...100
W9VBU...120	WB2RJJ...107	WB6OLR...105	WA8MVR...103	K4UTI...100	WA8FTO...100
JA2BP...118	WB68EV...107	W8TND...105	OH2LO...102	K1VZI...100	W9HDR...100
KA9MF...116	HB9KP...106	G3FVC...104	WA01BJ...102	KG6IG...100	WA9GYZ...100
	HA7LF...103	K3UXY...104	W9HVP...102		

Radiotelephone

W5ENE...246	OK1ADM...138	W3CES...122	K8GQG...109	HP1E...104	CT1NL...102
W4QBR...245	WA5OAV...133	W3VBU...116	K8LRK...109	K1MKH...103	LA1ZI...102
SM6VR...204	PY2AQ...131	WA6ALF...115	JA2APA...107	K2HPZ...103	WB6URS...102
W5OBS...170	W8GMK...131	W4PC...114	K4SDW...107	K3TVU...103	11ERE...101
W4FWG...152	PY2ASO...129	WB6AKZ...112	ZE1BP...106	WA4GDP...103	K9FVE...100
W6DZZ...139	WA4ZLP...125	DL8PC...110			

Endorsements

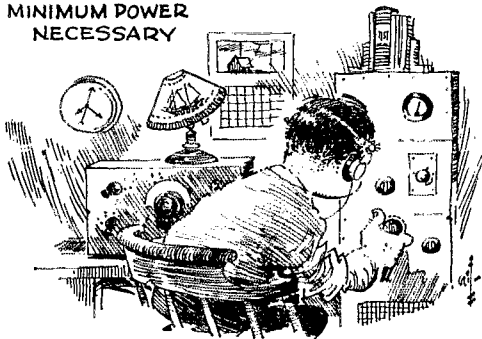
Endorsements issued for confirmations submitted from June 1, through June 30, 1967 are listed below. Endorsement listings through the 30 level are given in increments of 20, above the 30 level they are given in increments of 10. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

340	WA2RAU	W3HTF	SM5AM	W2LWI	K7PJF	160	K9PTW	120
W4TM		W4AXE	VE3IR	W0TDR	LA9CE	F3NB	K0QYD	GM2DPW
	300	W6AAO	VE3WT		OE1KW	Q3ETU	OZ3KE	K2DNL
330	K1IMP	W8LUZ	W2ZY	200	SM4ARQ	HP1PI	SM5AIO	K6HWC
G2BOZ	K7ADL		W4TFL	G3JEG	SM4C1U	K4ELK	UA3KBO	01
G3AAE	K8VUR	260	WB6AKZ	K4THA	VE3PKL	K0YTP	VE5DP	K7QXG
K6EC	OH2BH	CP5KZ	W7PUL	K6BIA	W1FPS	W4JD	W10QP	K0AXU
W3WGH	TG8AD	EP3AM	W8GMK	K9AWK	WA2CLQ	W5DWB	WA1DJG	OK1KTL
	UA2AO	GM3CLX	W9DNK	OK2OP	W4DIF	WB6PYW	WA1ERM	OK2DB
320	W2UFT	SM6VR	W0PAH	VP7NQ	W4DVT	W7MVC	WA2GHW	W21YW
ON4NC	W5RNE	WA2JBY	ZL1AJU	W2MZV	W4KJL	W9BMD	W3AAZ	WA2LOR
W1JNV	W6LDA	W4BHG		WA6CAL	WB4BDO		W3ABP	WA2LRI
WA20JD	W6UQQ	W6PZ	220	WB6HGH	W5NLP		W3UHN	W4BHG
W5MMD	W7BA	WA0KDI	K1OZR	W7AZG	W5NXP		WA3PTX	W4PGK
W9MQK			K3MVP	W9NNK	W7FKK	HA5FE	K1OTA	W8XQ
			OH2BCZ	3C3MZ	W7YBX	K2JJK	W6AEM	WA8TFL
310	280	240	SP6FZ		W7YEX	K4BYN	W61UH	W9JCK
JA1BK	OK1ADM	EA4CR	VE4XJ	180	W9FJX	K6PJT	WA7PIG	WA9SUJ
K2YXY	VE3ACD	G4JZ	W1BGD	HB9T	WA9KQS			
W2GQN	K1WMB	K4WMB	W2QIH	K1SLZ				

Radiotelephone

320	WA8AJI	K1IMP	VE3WT	200	WB2HZG	K4VKW	140	W6NAT
VE8QA		W3BSC	W2CNS	CX3BH	W4TFL	K7YDO	DL6JJ	WB6PYW
W3WGH	280	W4AXE	W3AEV	HP1JC	W5FDX	K0GZN	JAR8DQ	W7YBX
	F2MO	W6EUF	WA5LOB	K4WMB	W5NXP	OE1KW	K8VCB	W8CFG
300	TG8AD	VE3ACD		WA20JD		PY2DYI	OE8KI	9Q5FV
EA7ID	VK2JZ	ZL30Y	220	W4ELB	160	K3RUV	OZ3KE	
K6YRA	W1WQC		K3MVP	WB6HGH	CR4AJ	VE3PKL	VP7NH	120
K8VUR	W6LDA		G4JZ		IS1VAZ	WB2WOU	WB2BEE	K2GPL
UA2AO			GM3CLX	180	K3GKU	W5WJQ	WA2JBV	OZ2KT
W2GQN	260		K8AXG	W61JM	F2FO	W6SUD	W3ABI	W6KHI
W2WVG	EP3AM	PY2GYK	WA0KDI	VE3BSJ				YU2NFJ

ADJUST TO
MINIMUM POWER
NECESSARY



Adjusting to minimum power necessary is just one way to "widen the bands" through efficient occupancy. Make a proper choice of bands below 30 Mc. for distance to be covered. Achieve equipment flexibility to be able to change bands, as well as power, readily. Use the minimum band width, consistent with good engineering practice, and compatible with the mode being employed. Expand your use of v.h.f. for local contacts wherever possible. In operating, listen with care, be brief, use a dummy antenna for tuning up, use VOX or break in, be sure to monitor your signals.

GMT CONVERSION

To convert to local times subtract the following hours:

ADST —3, AST —4, EDST —4, EST —5, CDST —5,
CST —6, MDST —6, MST —7, PDST —7, PST —8
Hawaiian —10, Central Alaska —10.

A convenient GMT conversion card is available, free of charge, from the ARRL communications Department, 225 Main St., Newington, Conn. 06111.

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made Sept. 15 at 0130 GMT. Identical texts will be sent simultaneously by transmitters on c.w. listed frequencies. The next qualifying run from W6OWP only will be transmitted Sept. 7 at 0100 Greenwich Mean Time on 3590 and 7129 kc. **CAUTION!** Note that since the dates are given per Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. *Example:* In converting, 0130 GMT Sept. 15 becomes 2130 EDST Sept. 14.

Any person can apply. Neither ARRL membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m. you may try later for endorsement stickers.

Code practice is sent daily by W1AW at 2330 and 0130 GMT, simultaneously on listed c.w. frequencies. At 0130 GMT Tuesday, Thursday and Saturday, speeds are 15 20 25 30 and 35 w.p.m.; on Monday, Wednesday, Friday and Sundays, speeds are 5 7½ 10 13 20 and 25 w.p.m. For practice purposes, the order of words in each line may be reversed during the 5 through 13 w.p.m. tests. At 2330 GMT daily, speeds are 10 13 and 15 w.p.m. The 0130-0220 GMT runs are omitted four times each year, on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending *in step with W1AW* (but not on the air!) and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and texts to be sent in the 0130-0220 GMT practice on those dates:

- Date Subject of Practice Text July QST.
Sept. 1: *It Seems to Us*, p. 9
Sept. 12: *R.F. Clippers for s.s.b.*,* p. 13
Sept. 18: *The Verti-Vee*, p. 20
Sept. 21: *The W0EPY Squeeze Keyer*,* p. 22
Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition
Sept. 27: *Class C Operation*, p. 72
Sept. 29: *Driving Power*, p. 72

* Speeds will be sent in reverse order, with highest speed first.

Top-Level W1AW/W6OWP Qualifying Run Certifications January-June, 1967

<i>35 w.p.m.</i>			
K1AJ	W3HWL*	W4RZL	W9NSF
W1DWA*	WB4CTD	K4WWY*	W19SEO
K1ESG*	WB4CUA*	W5JAW	K9WRL*
K2AGZ/K3WOO	K4IGJ*	K6EC*	K8JPJ*
W2KCB	W4HYB	K6IBI	W0LXC
WB2MOQ*	W44KJR*	WB6PCQ*	W40MIWJ
WB2RKK*	W4KMA/W3DWM*	W6TN*	W0NWX*
W13BYW*	K4MSK*	WB6UTC*	VE2BVY
Kreso Genari Astoria, L. I. N. Y.		S. J. Mundy, Jr.* Slatersville, R. I.	Michael Zielke* New Britain, Conn.
<i>30 w.p.m.</i>			
W10CYT*	WA3BDK*	K4PCL*	W18TOM*
W1DWA*	W13CTP*	W4RND	K9AQQ/3
WA2BAH/W11FPS*	WA3DSD*	WA4TPB	W19CVB
K2ERE*	W3DUP*	WA4TTE	K9JWF
WA2HBI*	WA3FIP*	WA4YKL*	W19AIYW*
WB2MRA*	K3FAIF*	W5DTR*	W19NPB*
WA20VK*	WN3F8B*	WA5KQN*	WA9NVY*
WA2PFZ	K3KZD*	K5KXW*	W19RFF
WB2QIQ	W3YTY/6*	WA5NPE*	W9RAMI
WB2UFV*	WB4CUA*	W50GS*	K0GSV*
WB2WAD*	K4OUK*	WB6CPD/4*	VE1AKQ
Otto J. Goohs* Pittsburgh, Pa.			Edward F. Vengrouskie* Sheffield, Ala.
* Endorsement Sticker			

WIAW SCHEDULE, SEPTEMBER 1967

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.-1 A.M. EDST, Saturday 7 P.M.-2:30 A.M. EDST and Sunday 3 P.M.-10:30 P.M. EDST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. The station will be closed September 4, Labor Day.

GMT*	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000	CW-OBS ¹	CW-OBS ¹	CW-OBS ¹	CW-OBS ¹	CW-OBS ¹	CW-OBS ¹
0020-0100 ⁴	3,555 ⁶	14.1	1,805	7,08 ⁶	14.1
0100	Phone-OBS ²	Phone-OBS ²	Phone-OBS ²	Phone-OBS ²	Phone-OBS ²	Phone-OBS ²
0105-0130 ⁴	145.6	3,945	145.6	50.7	1.82	21.41
0130	Code Practice Daily^{1A} 15-35 w.p.m. TThSat., 5-25 w.p.m. MWFSun.					
0230-0300 ⁴	3,555	7.08	14.1	7.08	3,555
0300	RTTY-OBS ³	.....	RTTY-OBS ³	RTTY-OBS ³	RTTY-OBS ³	RTTY-OBS ³	RTTY-OBS ³
0310-0330 ⁴	3,625	14,095	3,625	14,095	3,625
0330	Phone-OBS ²	.....	Phone-OBS ²	Phone-OBS ²	Phone-OBS ²	Phone-OBS ²	Phone-OBS ²
0335-0400 ⁴	7,255	3,945	7,255	3,945	7,255
0400	CW-OBS ¹	.....	CW-OBS ¹	CW-OBS ¹	CW-OBS ¹	CW-OBS ¹	CW-OBS ¹
0420-0500 ⁴	3,555 ⁶	7.08	3,945	7,08 ⁶	3,555
1700-1800	21/28 ⁵	21/28 ⁵	21/28 ⁵	21/28 ⁵	21/28 ⁵	.....
1900-2000	14.28	7,255	14.28	7,255	14.28	.....
2000-2100	14.1	14.28	14,095	21/28 ⁵	7.08	.....
2200-2300	21/28 ⁵	21,075 ⁶	21/28 ⁵	7,255	14.28	.....
2330	RTTY-OBS ^{3,7}	.....	.....	.....
2330	Code Practice^{1A} Daily 10, 13 and 15 w.p.m.					

¹ CW, OBS (bulletins, 18 w.p.m.) on 1,805, 3,555, 7,08, 14.1, 21,075, 50.7 and 145.6 Mc.

^{1A} Code practice on 3,555, 7,08, 14.1, 21,075, 50.7, and 145.6 Mc.

² Phone OBS (bulletins) on 1.82, 3,945, 7,255, 14.28, 21.41, 50.7 and 145.6 Mc.

³ RTTY OBS (bulletins) on 3,625, 7,045, 14,095 and 21,095 Mc. 170/850 cycle shift optional in RTTY general operation.

⁴ Starting time approximate. Operating period follows conclusion of bulletin or code practice.

⁵ Operation will be on one of the following frequencies: 21,075, 21.1, 21.41, 28.08 or 28.7 Mc.

⁶ W1AW will listen in the novice segments for Novices on band indicated before looking for other contacts.

⁷ Bulletin sent with 170-cycle shift, repeated with 850-cycle shift.

Maintenance Staff: W1QIS W1WPR WINPG. *All times/days in GMT, general operating frequencies are approximate.

HIGH SPEED CODE TEST

(Sept. 18, 1967)

WIAW's qualifying runs for code proficiency certification go only up to 35 w.p.m., since above that speed the general amateur participation diminishes to the point that it is not worth while running it from the headquarters station. In 1959, the Connecticut Wireless Assn. started sending code practice at speeds between 15 and 65 w.p.m., and for the past seven years has been sending semi-annual "code test" transmissions and awarding certificates at speeds of 40, 45, 50, 55 and 60 w.p.m. To date, about 150 such certificates have been issued.

The next such transmission will take place on Sept. 18, 1967, starting at 0130 GMT. Club station W1E1A will transmit simultaneously on 3637 and 7120 kc., as usual. In addition, four (maybe even five) volunteer stations located throughout the nation will make transmissions on the 80 and 40 meter bands, as follows: W5QMJ on 3665 kc., K6DYX on 3690 kc., W6EQT simultaneously on 3640 and 7115 kc., and W0FA on 3653 kc. All stations transmit identical text (copies of a master tape) in as close synchronization as possible. We have hopes of an additional volunteer station for much-needed coverage of the southern states, now that "old man sunspots" is closing in on us.

W1E1A will transmit full details just prior to its regular code practice starting at 0130 GMT each Monday, starting Aug. 21. Take a listen, on 3637 or 7120, for all the dope. Some of the volunteer stations will probably also be bulletining the information on the frequencies they will be using.

This program, by the way, is not sponsored or implemented by ARRL. All correspondence and labors are conducted by WINJM at his home address.

One more thing: Don't forget that 0130 GMT Monday is Sunday evening by local times in the U.S. and Canada. Don't listen on the wrong day.

Suggested Operating Frequencies

RTTY 3620, 7040, 14,090, 21,090 kc. *Wide-Band F.M.* 52,525 146.94 Mc.

Briefs

Oops, our faces are indeed red! As K4IEX so well puts it "Let's give credit where credit is due. The picture of the young lady on page 63 of July *QST* (Brenda, WN4EPC) is not the xyl of K4IXC but rather that of yours truly K4IEX (John should be so lucky!)"



VE2DCW calls attention to several needed corrections in the 1966 VE/W contest report appearing in July *QST*. Top Canadian scorer should be shown as **VE5US** and the 168-point phone Ontario score belongs to **VE3DPG**. Note the rules for the 1967 contest elsewhere in this issue.

Be on the alert for an hour-long TV special which documents the story of the schooner *America* and its victory over *Britain's finest yachts* during races back in 1851. The special, which will be aired just before the cup races at Newport, R. I. this year, was producing and directed by Gerald Schnitzer, WB6UBM. WB6UBM operated during the filming of the special aboard the new *America*, which is a replica of the original schooner built in detail from 116-year old plans.

The Post Office Department promises faster mail service with the new Zip codes. Use yours when you write League Headquarters. Use ours, too. It's 06111.



Station Activities

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE—Acting SCM: John L. Penrod, K3-NYG—RM: W3EEB. Renewals: WA3FRC as EC Kent County, W3HKS as ORS. This month marks the start of the Delaware Two-Meter Net, Mon. at 7:30 p.m. on 145.260 Mc. WA3HWC will be net control. W3EEB is on v.h.f. WA3DUM passed the 3rd-class commercial test. WA3DUH is a confirmed Tech. WA3DYG has been appointed RO/RACES for New Castle County, 3905 kc, is active with Delaware stations during lunchtime each day. W3DEO is running full power again with the help of a new power transformer. Congratulations to W3CZS and W3EDB on switching to s.s.b. K3KJAJ is active again on MDD. W3KET will judge the home-brew contest and speak on home-brew construction at the Sept. meeting of the Kent County Amateur Radio Club. DEPN reports QNT 31, traffic 4; DSMN, QNI 58, traffic 1. Traffic: (June) W3EEB 136, W3DKX 27, W3HKS 5, WA3DYG 4, K3NYG 3, K3KJAJ 2, WA3DUM 1. (May) W3EEB 180, WA3FRC 4, WA3DUM 2, K3NYG 2.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke Jr., W3ELI—SEC: W3AES. RMs: W3EML, K3YVG, K3MVO, W3MPX. PAM: K3MYS. V.H.F. PAM: W3FGQ. EPA C.W., QNI 328, QTC 250, PTTN, QTC 196, PFN, QNI 440, QTC 361. EPAP&TN, QNI 621, QTC 193. Field Day activities were reported by WA3-GCD, K3VIB, WA3EMO, K3UKO, W3RLT, W3NNL, W3AD, WA3AFI, W3YP, WA3AOE, W3SJI, W3HNP, W3BUR. OO reports were received from K3ADS, K3-NOX, K3HNP. WA3AFI, WA3ERJ's new HW-12 is doing FB. K3YVG now is band director (music, fellas). K3KGN is the proud owner of a new Swan 500. W3AXA is going to the West Coast for a 2-month vacation. W3ADE now is on the swing shift. W3BUR is vacationing in Canada. K3MVO has a new C-4 antenna for some DXing. K3MYS now is EPA PAM. W3EML made the BPL. K3VBA made his first BPL! W3CUL made the BPL plus. WA3CFU has the battery-operated transmitter doing FB. K3HLN/5 was outranked by his TVI complainant at Texas AFB. W3FGQ is the new V.H.F. PAM and EC for Delaware Co. ARPS. W3YPP, IRCARC, is moving to a new location, air conditioned! W3ID still is working on a new antenna. WA3ATQ has a sked with USS *Hope*. W3VR made the BPL. K3VAX passed the Extra Class exam and is back at Drexel. K3WEU has been checking into nets from Maine. K3-MDG set up an amateur radio message center at the opening of the new health center in Norristown June 10. K3PIE is back out of the woodwork. W3RV is QRT indefinitely as his XYL is seriously ill and will take most of his attention. He is selling his equipment. Tom, all of us in EPA sincerely hope things take a turn for the better soon. W3KEK and W3EU are reported on the sick list. Get better quick, fellows. K3FOB now is Dep. RACES Officer for York Co. W3JKX's work sked keeps him inactive at present. Traffic: (June) W3CUL 3165, W3EML 662, W3VR 643, K3MYS 263, K3MVO 200, K3-VBA 174, W3MPX 143, WA3ATQ 139, W3FGQ 131, W3-AIZ 126, KYVG 95, WA3EXW 74, WA3AFI 48, WA3-EMO 48, W3HNP 46, W3KJJ 41, K3MDG 37, W3AIB 36, W3AXA 35, W3ELI 35, K3WAJ 34, W3VAP 32, WA3-GLI 28, W3NNL 26, WA3FEC 21, W3OY 20, W3KQE 18, WA3BSV 17, K3KXJ 13, WA3FWT 12, K3WEU/1 12, WA3CFU 9, W3BUR 8, WA3ERJ 8, W3ID 4, K3PIE 4, K3FOB 3, K3HKW 2, W3KEK 2, W3OML 2, W3ADE 1, W3BFF 1, WA3BJQ 1, WA3CKA 1, WA3EPM 1, W3EU 1, WA3IIZ 1, W3JKX 1, K3NSN 1, K3VAX 1. (May) K3PIE 7. (Apr.) K3PIE 155.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Carl E. Anderson, K3JYZ—SEC: W3LDD.

Net	Freq.	Time	Days	Seas.	QTC	QNI	Mgr.
MDD	3643	2300Z	Daily	30	159	9.6	K3OAE, RM
MDDS	3643	0030Z	Daily	29	18	3.4	W3ZNV, RM
MEPN	3820	2200Z	M-W-F	22	114	23.3	K3NCM, PAM
		1700Z	S-S				
MTMTN	145.206	0100Z	T-W-F-S	19	15	7.6	K3NOQ
MSTN	50.150	2300Z	Daily	11	6	2.9	K3URE
HNON	50.250	0400Z	Daily	30	4	10.0	

New appointees: WA3GDG as EC for Frederick County, K3URE as OVS, K3LFN as OPS. Endorsed appointments: W3BAM as EC for St. Marys County; W3ZNV as EC for Calvert County. New AREC members: W3-GKP and K3GFK. The Eastern ARS provided an outstanding phone net for the 46th Annual Miles River Yacht Club Power Regatta. W3LDD participated in the planning for the D.C. Medical Society simulated emergency along with W3WTW, WA3EKS and K3WSQ. K3-URE will be making a big noise on 2 soon with a TDQ and sixteen-element array. K3TBD reports his XYL has received her call, WA3HEN. WA3BDK attended the ARRL convention and operated in the July CD Party from Maine. W3TN made MDD sound like old times as he pulled the NCS job. W3EOV will be portable K6, 7 and K6H. WA3CFK/3 is QRL rebuilding after moving with big plans. WA3EEQ is extending his stay with the Navy and is back on the traffic circuit. W3MCG and your SCM chatted with G5AFO (W3QCW) via 20 c.w. W3WTW reports 9 new AREC members in Montgomery County. K3CYA and WA3GTX were the only MDC participants in the May PMT. W3MVB has recovered and is back running his radio school with 12 beginners and notes that the last batch of 35 has just finished and all now are licensed. Section Net certificates have been issued to W3ADQ, WA3BDK, WA3BNL, WA3CCN, WA3CGT, W3DKX, WA3DWF, W3EAS, WA3EKP, WA3ERL, WA3GAD, WA3GDB, WA3GDG, WA3JQN, W3LDD, K3LFD, K3LFN, K3LJB, W3NNX, K3ORV, K3TGB, K3VHS, K3YGH/3 and K3ZKD for MEPN operation: to W3TN, WA3CFK, WA3EEQ for outstanding service; to W3LBC, K3LFD, WA3BTA, K3GZK, K3UXY, K3OAE, W3MCG, K3ZIX, WA3CVM, K3TJE, W3GRB, W3PRC, K3QDC, K3QDD, K3FKY, W3ZNV, W3UE, W3QCW, WA3CEK, W3DPR, W3ATQ, K3QFG and K3JYZ for MDD operation; to W3EKO, K3LFD, WA3CEK, K3FKU, WA3CFK, WA3DUM, W3CBG, WA3DWF, WA3CRU, WA3EEO, WA3BDK, W3GEB and WA3CCN for MDDS operation. Traffic: (June) W3-TN 149, WA3ERL 94, WA3CFK/3 85, W3PQT 68, WA3-EKP 60, K3JYZ 47, W3ATQ 33, WA3BDK 32, K3CZK 27, W3ZNV 25, W3CBG 20, W3EVO 20, K3QDD 18, W3-MCG 17, K3TBD 16, W3DPR 13, WA3CBC 12, K3URE 7, WA3EOP 6, K3NCM 2, W3EAS 1, WA3GLP 1, WA3-GVH 1. (May) K3QFG 27, WA3EOP 3.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2Z1—Asst. SCM: Charles B. Travers, W2YPZ. SEC: W2BZJ. RMs: WA2KIP, WA2BLV, PAM & NJPN Net Mgr.: W2Z1. NJN reports QNI 427, total traffic 221. NJPN reports QNI 461, traffic 133. The Englewood Amateur Radio Assn. is sponsoring the 8th Annual N.J. QSO Party Aug. 19/20. K2NBU has moved to Haddonfield from South Plainfield after some 6 years away from S.N.J. He is radio operator aboard the *SS Ohio Sun*. New officers of the SCARA are K2BKG, pres.; WA2-QQA, vice-pres.; K2WGC, secy.; WB2TFD, treas.; WB2ERV, sgt. at arms. WB2ADE is the new EC for Cape May and Atlantic Counties. SNJ had a nice turnout in the April CD Party. W2ZVW tops the list again on c.w. as well as phone. W2Z1 was guest panelist at the 1st Annual Convention of the Medical Amateur Radio Council, Ltd., at Atlantic City June 22. The only FD message received this year was from SCARA station K2BR/2. W2TAM sold all his gear, and is moving to warmer climes in Monaco, southern Europe. W2ZQ participated in the V.H.F. Contest on 6 meters and worked all kinds of DX as there was a band opening. We are losing WB2UZB, who is moving to Phoenixville, Pa. We are glad to welcome back W2HZJ, our SEC, to NJN. WA3ITE worked AIR, WAR and NSS during Armed

Forces Day, all within 37 minutes! W2YPZ is the new EC for Mercer Co. WB2WXA built a 432-Mc. transceiver for the ARRL *Handbook*. WA2ANL is the new EC for Burlington Co. WB2AINM, a new traffic station in Had-donfield, sends in a nice report. WB2MNF wants an OPS appointment. WB2WXA is a new OPS. Traffic: (June) WA2BLV 169, WA2KIP 133, WB2MOQ 128, W2ZL 85, K2SHE 27, W2YPZ 22, WA2ANL 13, WB2NMN 7, W2ORS 5, W2BZJ 3, K2JJC 2, WB2MNF 2, WB2SBD 2, WB2WXA 2, WA2KAP 1. (May) WA2KIP 104.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2RUF. PAM: W2PVI. RMs: W2EZZB and W2FEB. NYS C.W. Net meets on 3670 kc. at 1900, ESS on 3590 kc. at 1800, NYSPTEN on 3925 kc. at 2200 GMT, NYS C.D. on 3510.5 and 3993 kc. (s.s.b.) at 0900 Sun. and 3510 kc. at 1930 Wed., TCPN 2nd Call Area on 3970 kc. at 0045 and 2345 GMT, NYS County Net on 3510 kc. Sun. at 1400 GMT and 2345 GMT on Mon. Appointment: K2ACQ as OVS, Endorsement: WA2GLA as OPS. Congratulations to W2OE on making the BPL. WA2AWK was elected pres. of RAGS. The Squaw Is-land ARC elected WA2RHV, pres.; K2BWK, vice-pres.; WB2BMM, treas.; K2KLP, secy.; members of the executive committee include WB2LZM, K2VBK, K2-RTU and WB2YHD. K2DNN has a cast on his right arm. There is not much in the way of news as this is being written (July 10). I guess every one is recovering from Field Day. Please note that the OES appointment has been replaced by the OVS (Official V.H.F. Station). Those of you who are active and report regularly have already received the new certificate. Erie County Civil Defense will move into its new underground EOC during the middle of August. I have toured the facilities and the Chestnut Ridge site is really something to see. Area clubs are invited to make reservations for fall tours. Erie County RACES and the BARRA will begin instal-lation of equipment and regular drills and training will commence thereafter. Traffic: (June) W2OE 298, W2SEI 276, WA4NDC 159, W2RUF 140, WB2GAL 64, W2HYM 37, W2FEB 39, WB2OYE 25, W2RQF 24, WB2SMD 24, K2OFV 20, W2MTA 16, W2PCG 15, K2RYH 15, K2IMI 11, WB2NNA 11, K2SSX 10, K2BWK 8, W2PVI 6, WA2-AWK 5, W2BLO 5, WA2YNS 5, WA2ANA 4, WA2GLA 2, W2PNW 2, WB2SLA 2. (May) K2RYH 139, WB2RHJ 82, WA2AWK 14.

WESTERN PENNSYLVANIA—SCM, Robert E. Gawryla, W3NEA1—SEC: K3KMO. PAM: K3VPI (v.h.f.) RMs: W3KUN, W3MFB, W3UHN, K3SOH. Traffic nets: WPA, 3585 kc. daily at 7 p.m. local time; KSSN, 3585 kc. Mon. through Fri. at 6:30 p.m. local time (does not operate during June, July, Aug. and Sept. It is with deep regret WPA notes the passing on of K3SBC and K3SBT, both of Erie. The Amateur Trans-mitters Association of WPA has new officers: W3OVM, pres.; W3OJV, vice-pres.; W3WPF, secy.; W3UL, treas.; W3NAW, K3LLL, K3RAD, dir. The Etina RC had FD at North Park as usual. The NITTANY ARC, K3HKK, had the best FD ever with 1275 contacts. Other clubs reporting activity for FD were SUCCO River ARC, Shenango Valley Tonenrg RC, Venango Mike and Key Club and Monessen ARC. W3UHN has DXCC endorse-ment for 140. K3GSI and WA3AUI are now located in Oxnard, Calif. K3ZGJ moved to San Jose, Calif. K3-AKR worked four Seattle, Wash., stations on 6 meters in one morning. K3RBH and W3WLF erected a home-brew 6-meter top-element beam on a 51-ft. boom on a tower 80 feet high at the K3HKK mountaintop site. They drive this monster with a full kw. tow. The Radial reports that WA3CAQ got the TR-4 at the Breeze Shooters Hamfest. *Spark Gap* reports new Generals are WA3HAE and WA3HEC. *Oscillator* reports K3KPT and his XYL have returned from a two-year tour in Iran; K3SMB and W3LKN have cleared the hospital after serious illnesses and are on the mend. WPA RM W3-MFB reports 30 sessions, 169 messages, 318 regular QTI and 9 visitors. Traffic: (June) W3NEM 128, W3MFB 115, W3KUN 81, W3LOS 69, K3PYS 69, WA3BLE 66, K3TEZ 50, WA3AKH 32, W3KPT 28, K3SOH 11, K3EDO 10, WA3BGE 9, WA3AKB 6, W3YA 6, W3LOD 4, K3RZE 4, K3SJM 4. (May) K3HCT 10, WA3BGE 7.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. RM: WA9GUAL. PAMs: W9VWJ, WA9-CCP, and WA9KLB and WA9RLA (v.h.f.s.). Cook County EC: W9HPG. Net reports:

Net	Freq.	Times	Days	T/c.
IEN	3940 kc.	1400Z	Sun.	7
ILN	3760 kc.	0000Z	Daily	113
NCPN	3915 kc.	1200Z	Mon.-Sat.	246
NCPN	3915 kc.	1700Z	Mon.-Sat.	177
Ill. PON	3925 kc.	1700	Mon.-Fri.	No report
Ill. PON	50.25 Mc.	2000	Mon. & Thurs.	"

TENTH PENNSYLVANIA QSO PARTY

Sept. 16-18, 1967

Rules: (1) *Time:* The contest begins at 2300 GMT Saturday Sept. 16 and ends at 0300 GMT Monday, Sept. 18. (2) *Suggested Frequencies:* 3575 3880 7075 7280 14075 14280 21075 21325. Check phone bands on even numbered GMT hours. (3) Each station may be worked once on each band and mode. (4) *General call:* CQ PA and Pennsylvania stations sign de PA. (5) *Ex-change:* Stations send QSO number, RS(T), and ARRL Section or country. Pennsylvania stations send their county. (6) *Awards:* Certificates will be awarded to the first place station in each ARRL Section and country with second and third place certificates where justified. The highest scoring Pennsylvania and non-Pennsylvania station will receive a special prize. NARC members are ineligible for awards. (7) *Scoring:* Pennsylvania stations 3 points per out of State QSO, 1 point per Pennsylvania QSO multiplied by the number of ARRL sections and other coun-tries. Out-of-state stations, 1 point per QSO multiplied by the number of Pennsylvania counties. (8) *Entry:* A copy of the log showing QSO number, station, date, time band, mode and station worked should be submitted to the Nittany Amate-ur Radio Club, P. O. Box 60, State College, Pennsylvania, 16801. Entries must be postmarked no later than October 16, 1967.

Ill. PON	145.5 Mc.	2000	M-W-F	"
TNT Net	145.36 Mc.	2100	Sun-Fri.	250

W9WYB, K9WAMP, K9RAS, W9JUV/K9OSO, K9VYL, K9DQU, W9GEG and W9GFF participated in the League's recent Frequency Measuring Test. The 75-Meter Interstate Single Sideband Net had a traffic total of 376, according to W9NWK, and the 9th RN reported a count of 385 messages passed. K9CRX, WA9RLA, WA9QWZ were elected as officers of the Tri-Town Radio Amateurs Club, Inc. WA9UJT, W9JUY, W9JUF, W9JUA, W9JUV and W9JVC are the graduates of the Kishwaukee Radio Club's theory and code classes. The final scores received indicate a very suc-cessful Field Day. Many of the various clubs have sur-passed all previous scores. Conditions were excellent and the gang made the best of it. K9HEZ has assumed the duties of net manager of the Ill. PON. W9HXW was listed as a Silent Key in July QST. We are sorry for this misinformation. W9HXW was hospitalized for a serious illness and as this goes to press he is on the road to recovery. W9DZG, first president (1929) of the Egyptian Radio Club, dropped in on the club's June meeting for an eyeball QSO with the members. W9DZG was editor of the old *Podunk News*. Many Illinois section amateurs were represented at the Central Division Convention in Milwaukee July 7 and 8. A good time was had by all. The 1968 Central Division Convention will be held in Springfield, Ill., Aug. 3 and 4. More details will be forthcoming. New officers of RAMS are W9GFF, K9DQU, WA9ESO and WA9KHR. K9DQU has a new Model 19 teleprinter. K9RAS was married July 15. WA9RSN suffered flood damage June 10. W9JUA has a new Clegg 22er. W9LNQ placed first in the YL-OM Contest. K9KDN (W9MRQ), WA9HJA and W9FTB joined the ranks of the Silent Keys. This column's sympathy goes to their families and many friends. A new call in the Princeton area is W9JXT. W9SXL was presented a life membership in the Central Illinois Radio Club (Bloomington) for his many years of service. WA9CCP is the only BPL recipient this month. Traffic: (June) W9MHU 262, K9KZB 259, WA9CCP 257, W9EET 216, W9DQO 111, W9NXG 104, W9EVJ 90, WA9RLA 75, W9JXV 74, W9NSPA 72, WA9FFB 60, K9-BTE 54, W9PRN 50, WA9GUM 49, WA9QXT 48, WA9RSN 48, W9CGC 45, WA9QFT 28, W9YCH 23, WA9POZ 22, WA9HSZ 14, WA9RLA 12, K9AUD 10, WA9LDC 10, W9LNQ 10, WA9FH 7, K9HSK 6, W9IDY 6, K9HRC 4, W9JUH 4, W9JUA 3, W9SXL 2, W9MITO 1, K9RAS 1. (May) W9HSD 4.

INDIANA—SCM, Mrs. M. Roberta Kroulik, K9VIG—Asst. SCM: Ernest Nicholas, W9YYX. SEC: WA9GKF.

Net	Freq.	Time	June Tfc.	Mgr.
IFN	3910	1330Z Daily, 2300Z M-F	267	K9IVG
ISN	3910	0000Z Daily, 2130Z M-S	399	K9CRS
QIN	3656	0000Z Daily.	159	W9HRY

K9EYF, mgr. of IPON, reports June traffic as 51. WA9KVP, mgr. of So. Bend ARC net reports June traffic as 6. W9PMT, mgr. of the Hoosier v.h.f. nets reports June traffic as 36. QIN Honor Roll: K9VHY 27, WA9FDQ, K9HYV and WA9MXX 25, W9QLW 23, K9WVJ 22, WA9BWJ 20, WA9LZR and W9UQP 15, WA9CSS is enjoying an HT-32. Listen for XE0FQN on 20 meters—that's W9FQN, EC Elkhart Co., who is spending the summer in Mexico. W9VFF is building a new amplifier. Congrats to K9HSL, who walked down the aisle recently. Much happiness. Bob. Congratulations to WN9TDO, WN9UPQ, WN9NPP and WN9UVI on receiving their Novice Class tickets. Congratulations to WA9YBK on receiving his Tech. Class license and congratulations also to WA9SXE, who received his General Class license. *Amateur radio exists because of the service it renders.* W9QLW reports Indiana was represented 100%. A BPL certificate went to K9IVG. Traffic: (June) K9IVG 816, K9EZX/9 201, W9HRY 200, W9QLW 187, W9JUK 129, K9HYV 107, WA9FDQ 92, K9CRS 50, W9DKR 50, WA9RWY 48, WA9KAG 42, K9VHY 39, WA9JZR 38, K9CBY 34, K9EYF 31, WA9BWT 23, W9RTH 22, W9SNQ 25, W9FWH 23, K9KTB 23, K9RWB 22, W9UB 22, K9CXA 21, WA9NPA 19, WA9BGI 18, WA9BHG 17, W9BUQ 17, WA9GJZ 17, K9HIL 16, W9VYX 16, WA9RNT 15, K9KEM 14, W9EJI 13, W9PMT 12, W9URQ 12, W9CQ 11, WA9AXE 10, W9CMT 10, K9EOH 10, K9QVT 10, WA9FSZ 9, W9HWR 9, K9UEO 9, K9WGN 9, WA9CFV 8, K9EYF 8, W9BZT 7, K9GBR 7, WA9CFW 6, K9IIV 6, W9DOK 5, K9QY 5, W9BDP 4, K9STN 4, W9DZC 3, K9FUJ/9 3, K9FPA 2, WA9ABI 1.

WISCONSIN—SCM, Kenneth A. Ebner, K9GSC—SEC: K9ZPP, RM: WA9MIO, PAMs: W9NRP, WA9QNI and WA9QKP.

Net	Freq.	Time	QNI	QTC	Mgr.
BEN	3985 kc.	1200Z Mon.-Sat.	292	138	W9NRP
BEN	3985 kc.	1700Z Daily	554	128	WA9QKP
WSBN	3985 kc.	2215Z Daily	916	232	WA9QNI
WIN	3662 kc.	0015Z Daily			WA9MIO
SWRN	50.4 Mc.	0200Z Mon.-Sat.			W9JZD

New appointment: WA9QNI as PAM for WSBN. Renewed appointments: W9ONI, W9LQC and W9QQQ as ECs; W9GFL, K9GSC and K9JVP as OOs; W9GOC, W9APB, W9NLJ and W9RTP as ORSs; W9GOC as OPS. W9LRJ is now WA9UMO in Walworth. FMT results: K9GSC 2.7, K9OSC 22.0, K9MIK 22.0 and W9CHD 57.3 p.p.m. error. K9ZMS is operating /VEs for the summer. W9HWQ is operating RTTY. WA9TFG received his General Class license and is on the air with an Eico 720. The W9GOC code classes conducted by K9KGA resulted in 6 new Novices. K9GSC remodeled his shack and now can't find anything. Traffic: (June) WA9QNI 125, WA9NPB 122, W9IFS 121, W9DYG 92, W9NRP 92, WA9NDV 43, W9DXV 42, K9JMP 33, WA9RAK 29, K9CPM 27, K9FHI 27, W9BCH 20, W9HWQ 10, W9OTL 10, K9UTQ 8, W9JFP 4, K9FWF 3. (May) WA9IZK 64.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke, Jr., W0TCK—SEC: WA9IEF, RMs: W0ISI, WA9EPX, PAMs: WA9MAIV, WA9JKT, WA9DWM, MSN meets daily on 3595 kc. at 2330Z. MJN meets Tue.-Sun. at 0000Z. Noon MSPN meets M-Sat. on 3820 kc. at 1705Z. Sun. and holidays at 1400Z. Evening MSPN meets daily on 3820 kc. at 2300Z. MSTN meets Tue.-Sat. on 50.4 Mc. at 0330Z. Sun. at 0100Z. Minn. Wx Net meets daily on 3830 kc. at 2300Z. Congrats to K9ZSE, who will be EC for Redwood Co., and to WA9OBD, appointed as OPS. Appointments renewed: W0HUU as EC for Waseca Co.; K9FLT and WA9EDN as OPSs; W0HEN as OBS. MJN RM WA9EPX has been plagued by antenna and rig problems, but is back in business now. Congrats to WA9LAW, who has received his Extra Class ticket and also an A-1 Operator certificate. WA9PEV has a new all-band vertical up. We welcome WA9OEF to the phone nets. WA9PVF planned to operate as K6YF/M in Canada on his wedding trip into the Montreal area in July. The Rochester ARC, together with Picoent, is planning a drive to obtain hams in every town in S.E. Minn., with a special effort toward the handicapped. There again was much Field Day activity with Murphy's Law also taking an active part. A reminder to appointment holders: Monthly activity reports are expected, and certificates must be endorsed by the SCM each year to remain active. Traffic: (June)

WA9LAW 415, WA9JKT 147, WA9QAK 141, WA9HRA 116, WA9MIV 57, K9ORK 54, W0TCK 44, W0BUC 35, WA9OEF 26, K9FLT 16, W0KNR 10, WA9DFT 15, WA9PEV 12, WA9LVK 11, K9ZRD 10, K9IGZ 9, WA9JPH 4, W0UMX 4, WA9MOH 3, W0SZJ 3. (May) W0HEN 35, WA9PEV 18, WA9ELW 6.

NORTH DAKOTA—SCM, Harold L. Sheets, W0DM—SEC: WA9AYL, OBS: K9SPH. The Fox gang went to Lake Ashstabula for Field Day with both c.w. and s.s.b. gear and reports 1000 QSOs. W0VSL is in the Dickinson Hospital following a heart attack. WA9AYL took off on his annual trek to Ohio and Long Island and will be working mobile. K9OVE and W0PPE are on their way to the Black Hills and Colorado with all-band mobile. WA9GRX and W0YBE are heading for the west coast. W0DM spent two weeks at Ellsworth AFB visiting his son, K9SA, W0TUF, W0HZM and WA9ELO have new rigs. Congrats to W0PPE, who led the section in the Novice Roundup and made the top ten in the nation with a score of over 20,000. WA9OAT was in town again visiting relatives. WA9MSJ reports from the Bismarck Club that its Novice program yielded the following: W0NRSO, W0NRSN, W0NRSQ, W0NRSR, W0NRSX, W0NRST, W0NRSU, W0NRSV and W0NRQY while at UND. K9QYD and WA9OVT are operating mobiles with SB equipment. W0MQA is attending school in Minneapolis and is using a Twoer while there. W0DM finally got a 40-meter antenna up. WA9HUD and WA9ELO still are moving traffic on TEN. WA9ELO reports traffic for May was 39 and for June 87. We still are trying to get some c.w. operators for a local c.w. net to put on and take off traffic from TEN. One from each major city would be a good starter, fellows. Write me. W0DM reports 5.

SOUTH DAKOTA—SCM, Seward P. Holt, K0TXW—SEC: W0SCT, RM: WA9AOY, S.S.B. NET Mgr.: K0RSW. Hope to see you all at the South Dakota Picnic sponsored by the Prairie Dog Amateur Radio Club on beautiful Lewis & Clark Lake Aug. 19 and 20. W0SCT met W0KXQ at the latter's QTH sharing their mutual interests—horses and amateur radio. The Prairie Dog Amateur Radio Club and WA9CPX's AREC group held their respective Field Day activities with other than commercial power with very good success. WA9JUM, of Mobridge, succeeded in making 18 contacts with stations in Japan and 1 in Germany with a quad in one evening. S.S.B. Net: 861 QNI, 20 QTC, 130 informals. So. Dak. C.W. Net: 10 sessions, 25 QNI, % QTC in 222 minutes of operation. Traffic: W0FJZ 80, WA9LLG 55, K0VYV 51, W0SCT 28, WA9BWJ 6, W0DJO 4, W0DVB 1.

DELTA DIVISION

ARKANSAS—SCM, Don W. Whitney, K5GKN—SEC: W5DTR, PAM: WA5GPO, RM: W5NND, NMs: WA5PPD, W5DTR, W5MJO and K5ABE. The "Arkansas Nets" picnic is scheduled for Sun., Sept. 17 at Burns Park Pavilion #1 in North Little Rock from 10 a.m. until 4 p.m. CDT. Local hams will monitor 3815 kc. and 50.5 f.m. for directions. Net reports for June:

Net	Freq.	Time	Day	Sess.	QTC	QNI	Time
RN	3815 kc.	0030Z	Daily	30	70	784	650 min.
AFN	3885 kc.	1100Z	Mon.-Sat.	26	13	600	1515 min.
OZK	2790 kc.	00001Z	Daily	?	?	?	?
APON	3825 kc.	2130Z	Mon.-Fri.	22	98	273	600 min.

Traffic: W5OBD 1091, W5MJO 95, W5DTR 81, W5NND 39, WA5PPD 35, WA5KEF 24, WA5IIS 11

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5BUE, RM: W5CEZ, V.H.F. PAMs: W5UQR, W5DXA, W5CEZ was busy with traffic and at Boy Scout Camp, where he operated W5QEG/5, WA5FNB meets LAN and RN5. The MTA ARC of NOLA begins its annual school for General Class only, the 2nd week of Sept., for 14 weeks. Contact W5CQS for details. W5GHP still is slugging it out on LAN, RN5 and CAN. WA5PWX has a new RA receiver. WA5NYY has the new SB-301 assembled and on the air. He reports that his FD group made 838 contacts. W5BUE says the West-side ARC made 844 FD contacts. W5EA says KNOE doesn't need him any more. WA5DXA reports two new Techs, WA5RSA and WA5RSB both are active on 6 and 2. K5OKR is QRL work. WA5LGO has been at camp for 2 weeks. WA5EID has a new T4X, W5MXQ is trading for a new transceiver. WA5JVL has a new SB-101 and operated with the Loyola ARC W5LJY/5 on FD. W5MKI has received OTC and WAC. Ozona ARC has received its certificate of incorporation. Traffic: W5CEZ 410, W5GHP 284, WA5PWX 192, WA5NYY 154, W5KRX 153, W5MBC 35, W5MXQ 11, W5EA 6, WA5DXA 4, K5OKR 4, WA5LGO 3, WA5EID 2, WA5JVL 2.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: W5JDF. Mississippi amateurs are very glad that W5CUU survived the boat explosion and is doing fine—back on the air with a new RTTY setup and better equipment on 2 meters. W5CAAM reports a big Field Day score from Natchez: W5PFC in Jackson and W5FQ Meridian had scores much larger than formerly. Thanks for the wonderful jobs Net Managers W5JHS and K5SYG on the Gulf Coast Sideband Net. W5WMI and W5AOKI on the Miss. Sideband Net, W5BW and W5WZ on the Miss C.W. Net are doing. Be sure to check in on 3925 kc. at 2330 GMT, on 3888 kc. at 0015 GMT and 3647 kc. at 0045 GMT. W5BW worked AIR, NSS, NPG and WAR on Armed Forces Day. W5AJWP has a 2-meter station with antenna up to check all repeater stations. We are sorry to lose W5OKQ, who will be especially missed for the great number of MARS messages he handled. Glad W5KEY is back on the air.

TENNESSEE—SCM, Harry A. Phillips, K4RCT—RM: K4UWH. PAMs: W4ACGK, W4EWW, W4PFP.

Net	Freq.	Days	Time	QNI	QTC	Mgr.
TSSB	3980	M-Sat.	2330Z	1263	144	W4ACGK
TPN	3980	M-Sat.	1145	903	106	W4PFP
		Sun.	1300			
ETPN	3980	M-F	1040			W4EWW
TN	3635	Daily	0000			K4UWH
			0130			

These nets need your support. New appointment: W4-HGN as OVS. Reports and applications for station appointments should be sent to my new QTH listed in the front of QST. I would like to hear from those interested in an EC job. I sure would like to hear from places like Jackson, Clarksville, Dyersburg and others. Congratulations to the following clubs for 100% ARRL membership. Fountain City Radio Club (Knoxville), Johnson City Radio Assn., Loudon County ARC, Radio Amateur Transmitting Society (Nashville). W4YDZ is doing an FB job with QSL traffic. The MARA, of Memphis, has completed another successful school for those seeking an amateur license. K4PPZ reports that the 2-meter repeater will be in operation in Memphis soon. A nice 12-volt emerg. power generator can be built with an old lawn mower engine and an automobile generator. Traffic: W4WBK 76, W4PQP 71, W4YDZ 44, W4YHO 34, K4MQI 25, W4PFP 22, W4ACGK 11, W4SGI 8, W4TYV 6, W4AZBC 6.

GREAT LAKES DIVISION

KENTUCKY—SCM, Lawrence F. Jeffrey, W4KFO—SEC: W4OYL. Appointments: WB4ACQ as OBS. Endorsements: W4AAGH as PAM, W4ABZS, W4NBZ and W4AUZ as ORSs. K4JOP and W4AWWT as OPSs.

Net	Freq.	Days	GMT	Sees.	QNI	QTC	Mgr.
KRN	3960	M-F	1130	23	349	45	K4KIS
MKPN	3960	Daily	1330	30	320	38	WB4HFM
KTN	3960	Daily	0000	30	838	556	W4AAGH
KYN/KSN	3600	Daily	0000/0300	68	456	406	W4BAZ

Your SCM has been notified that he has been reelected, having been the only nominee. My thanks to all for your support and I will try to justify it. WB4BKG is active in v.h.f. nets and passed the General Class test. WB4AFH is active on 6 with his new equipment and now has 10 states. K4LOA has a new TX-62 transmitter. K4PPW still is active on several v.h.f. nets. W4KKG is back from Florida and getting the gear in shape again. W4CDA and other Danville area boys are building 2-meter linear amplifiers. WB4FOT is looking forward to getting new equipment for net operation this fall. Field Day traffic was received by the SCM from WB4AIN, W4RCC and K4HOE. W4VNH is busy installing v.h.f. equipment in the new car. W4JUL is active in each PMT with high accuracy readings. The Owensboro Club provided communications for the Annual Boy Scout Canoe Race on the Ohio River using 2-meter 1m. and 75-meter s.s.b. Traffic: W4UAZ 643, W4AWWT 301, W4DYF 164, W4AAGH 134, W4BAZ 128, W4AVUE 110, W4KFO 104, W4UWH 91, W4ATTE 63, W4PON 62, W4BAG 56, W4NBZ 47, K4CSH 37, W4IBG 36, W4BAN 28, W4OYT 24, W4KJP 19, W4AVEC 19, W4BCJM 18, W4MWX 16, W4GHO 14, K4LOA 14, W4AWWQ 14, W4BAFH 13, W4BKG 13, W4CDA 13, W4GVU 8, K4PPW 4, WB4FOT 3, W4KKG 3, K4HOE 1.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: K8GOU. RMs: W8ELW, K8QLL, W8EU, K8KMQ. PAMs: W8CQU, K8JED, W8IWF. V.H.F. PAMs: W8CVQ, W8YAN. Appointments: W8DQL, W8ICH, W8KME, W8MQT, W8WVL as ORSs; K8CKD, K8YDA as OPSs; K8QKY as OO; W8NDM as EC. W8FZ as OBS; W8KRH as OVS. W8IV BPLs again on Navy

netops. All nets, especially the PON, W8SB and the QMN, are doing a fine job handling Navy MARS Vietnam relief traffic, with W8OGR taking the bulk of this traffic from W8IV for the PON and QMN. Net reports:

Net	Freq.	Time	Day	QNI	QTC	Sees.	Mgr.
QMN	3663	2315	Dy	407	305	30	W8ELW
W8SB	3935	0000	Dy	878	91	30	W8IWF
HR	3930	2130	M-F	737	63	22	K8JED
MTN	3605	0145	Dy	30	19	30	W8AQAF
Noon (Six)	51.41	1700	M-Sat.	239	00	26	W8AXA
PON-Daytime	3860	1600	M-Sat.	359	218	26	W8OGR
PON-CW	3645	2330	M-Sat.	118	36	25	3C3DPO
MEN	3930	1300	Sun.	222	4	4	K8JED
SW MICH 2	145.26	0000	Tue.	62	00	4	W8CVQ

No reports have been received from the UPN for two months. How come? New officers of the Metropolitan Ragchewers Club are K8PUS, pres.; K8JKU, vice-pres.; W8AQNC, secy.; W8BVP, treas.; K8AVI, K8HND, W8IXU, board. Silent Keys: W8DKK, W8IDLK, W8OFY, K8IRC, just got married. W8RWK got his tower, and his XYL got her new refrigerator. K8IFK has a nice big code practice machine. The Fordson High School Club "graduated" 10 new Novices. Recent tornado victims: W8FM, W8JKS and K8UAZ, K8PIA joins the "heart club." The Hills A.R. Club's new call is W8WVN. WOGXQ/8 waits for his new call while his XYL holds W8WVJ. K8QKY now operates regularly from U. of M., W8UM, W8ROJ has a new 120-ft. tower and 4-1000A amplifier. Traffic: (June) W8OGR 236, W8UM 232, K8KMQ 215, W8IV 170, W8CQB 164, W8WVF 112, W8ICF 81, W8ARKI 81, W8FX 79, W8GQX/8 57, K8ZJU 53, W8ELW 51, W8EU 47, W8AMQ 47, W8VBZ 42, K8JED 38, W8AORC 36, W8RIA 34, W8AMI 34, W8ITC 33, W8OQK 30, W8RTN 26, W8AENW 23, W8HFZ 20, W8NOH 15, K8KRX/8 14, W8KRH 13, W8SWV 10, W8ATSB 10, W8AUD 9, W8MIGQ 9, W8UFS 9, W8TRP 8, W8SS 7, K8VDA 6, W8DSE 4, W8JDF 4, K8IRC 1, W8PZT 1, W8WVL 1. (May) W8HKT 13, W8IBB 9.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE, SEC: W8OUU. RM: W8AFCF. PAMs: W8VZ and K8URK.

Net	QNI	QTC	Sees.	Acc.
OSSN	128	728	56	13.7%
BN	485	307	60	
OSN	120	43		

The North East Ohio v.h.f. group held a picnic-hamfest where W8DRX got a Gonset 6-meter transceiver, W8ACGY a Gonset 2-meter transceiver, K8AYK a 6-meter Telrex beam, K8EVP an HQ-110 receiver and W8FTX a Spalding tower-beam and rotor. The Apricot Net, founded by K8ONA I believe, was introduced for the first time, during Field Day. K8BXT reports W8NVA graduated from high school; W8HSP and W8ICR were in the hospital; W8BKR is back on the air with a TR-3 after a long absence; W8ARCP is on s.s.b. with a new Galaxy 5; K8CRF has a tri-band beam after losing his quad in a storm; K8ORG has a complete Swan mobile and W8TTQ was discharged from the service, moved to Warren, has a new SB-101 and works 2-meter mobile. K8RXD and W8LVY are stationed at Pensacola with the Navy. K8RXD has a new Swan 350. W8SDBI has a 75A-4 and moved to North Canton. Toledo's Ham Shack Gossip tells us that W8KUI and K8UVE joined the Silent Keys. K8EEU has a new baby boy. W8HGA and W8ARLT received their General Class licenses. W8PCP returned home from the hospital and K8PMI is home after a tour in Viet Nam. W8AQ has a new Galaxy 5. Smoke Signals, of Indian Hills ARC, informs us the club's 1967 officers are W8QXQ, pres.; W8PBM, vice-pres.; and W8SZF, secy.-treas. ARE 1, Amateur Radio Editor's Assn., founded by W8BAH, celebrates a birthday and is starting its 7th year. W8MEI was in the hospital after falling off a ladder while painting. Springfield ARC's Q-Five informs us that W8RIGD put up a quad and several inverted Vs. Columbus ARA's Carascope says that W8GDC spoke on "Public Safety Communications." Lancaster & Fairfield County ARC's The Rag Chewer reports W8IHK spoke on air navigation telling how they operate the beams and beacons that enable an aircraft to land in poor weather. We learn from Greater Cincinnati ARA's The Mike & Key that W8HGH, now K4TMN, joined the Silent Keys. June appointments were W8IMI, W8ALM and W8AOCG as ORSs. K8LRK made the BPL in June. W8OOCG received his Extra Class license and has a two-element tri-band quad. Received Mt. Vernon ARC's K8EEN Newsletter, Westpark Radios' The Radios Log, Parma RC's P.R.C. Bulletin and Southeast ARC's Ham-Pax with no news I could use. If you want the Ohio column to be short keep it up and don't send any news. Can't figure why editors in our larger cities don't phone the radio stores and ask them for the call letters of those who had bought new receivers, transmitters and beams.

W8SQW is in the hospital with a broken hip. How about you guys and gals writing to me and give me this news. My wife won't care. Hi. Traffic: (June) W48CXJ 262, K8LGA 223, W48PMN 172, W48PQL 164, W8NAL 151, W48OCG 134, W48AUA 119, W48LTI 114, W8DAE 113, K8LRK 104, W48NTA 104, W8TV 102, W8QCU 99, W48LAM 86, W8CWT 63, K8ONA 70, K8CBK 67, W48-TYP 66, W48DWL 65, W48SED 58, W48MHO 54, K8-GVX 53, W8IMI 49, K8BYR 47, W8QZK 47, W8GOE 42, W48FSX 37, W8WEG 37, W48KPN 32, W48SHP 32, W8OF 28, W8OOU 28, W48QFK 20, W8WGD 18, W8GRT 17, K8LGB 17, W8ERD 16, W8DVAI 14, W48LPI 14, K8BXT 11, W48LOW 11, K8QYR 10, W8HII 8, W48-RLW 7, W8VND 5, W8YGR 5. (May) W8CHT 88, W48-LVT 17.

HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SEC: W2KGC. RM: W42VYS. PAM: W2JGJ. Section nets: NYS on 3670 kc. nightly at 2400 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590 kc. nightly at 2300 GMT. Appointments: W2EAF as ORS and OPS; W2WBWA as OVS. Endorsement: W2DXL as ORS. Field Day plans were the order of the day at the Albany Club. The Schenectady Club held "family nite" in June and W2AZH was the winner of the Broughton Award for meritorious service. FD plans also dominated the club meeting in New Rochelle. Election of officers was the feature of the Westchester County Club in Hartsdale. Your SCM received FD messages from the Albany, New Rochelle, Peekskill and Schenectady groups. Advance reports indicate all ENY club groups did well on Field Day. The Westchester County RACES Net, K2AVP reports 2750 messages handled between August '66 and June '67. Congrats to this live-wire group. W2EAF was top check-in station on NYSPTEN for May and third in traffic handled. Attending Navy radio school in Bainbridge, Md., is WB2-DXL. Among those doing well on 432 Mc. are K2CBA, K2JKI, W2PYM, W2BFKJ and W2AWEB. Operating 2 meters from the V.A. Hospital in Albany is W2APFZ using a Communicator I and a halo. W2HF reports activity on 220 and 432 Mc. Herb runs 30 watts on 432 Mc. a pair of ten-element stacked Yagis. W2UEQ has a new Heath 75-meter transceiver and Drake 7C receiver. Congrats. W2BRBG is building gear for 432 Mc. among those heard on 1296 Mc. are K2JNG, W42VTR, K2UYH and K2UUR. Traffic: W2BUHZ 232, K2AVP 230, K2-SSX/2 160, W2TBN 107, W42VYS 105, W2EAF 85, W2HZY 55, W2URP 39, W2FOA 38, W2UC 32, W42-WGS 25, K2S2N 20, W42ZPD 6, W2ANV 5, WB2UEQ 2.

NEW YORK CITY AND LONG ISLAND

Blaine S. Johnson, K2IDB—Asst. SCM, Fred J. Brunjes, K2DGI. SEC: K2OVN. PAM: W2EW

NLI	3630 kc.	1915 Nightly	W42UWA—RM
NLIVHF	148.5 Mc.	1900 Nightly	WB2ROF—PAM
NLPN	3932 kc.	1600 Daily	WB2SLH—PAM
NLS(Slo)	3715 kc.	1845 Nightly	WB2UQP—RM

Some of the first ARRL Charter Life Members in the section are W2AXL, W2F5W, W2TUK and W2VZM. W2RWD, the official station of the East Suffolk Radio Club, put in a full week-end schedule of message-handling at the Wbaler's Festival this past June. F88CY and Y5GD had a very pleasant visit with our own W2GKZ. WB2QIL took a trip to the ARRL National Convention this summer before entering C.W. Post College this fall. That impudent evil known as "final exams" torpedoed the WB2UQP traffic total this month! W2BOT, W2TUK, K2IDB, K2OVN and W2RNB attended a meeting of the Long Island Civil Air Patrol at Mitchell Field, where W2TUK presented a plaque commemorating the C.A.P.'s participation in the W2RNB SET last fall. The W2RBA traffic total went on the skids this month because of a tussle with a little paper put out by the Board of Regents! W2BJG, who we remember when he first fired up on 10 meters a few years back, was home from college this summer. You know, some rascal went and absconded with W6ECQ/ ex-K2ORA's mobile-type antenna! WB2JW reports that the Nassau AREC bunny huns have been successful this summer even though K2DGI, the big winner, missed the last one! After four strenuous years of retirement, W2BCB enjoyed a summer's worth of vacation. It was the sad duty of W2PF to record the passing of a couple of old friends and former members of the Radio Club of Brooklyn, W2ARW and W3TI (ex-W2TI). The latter was a former president of the Radio Club of Brooklyn. W2DBQ reports the radio blackouts "is rasin' glob with his telephone relayin'." It also was reported that the Long Island Hamfest, sponsored by the Federation of LIRC, was again a success for the 3rd year in a row. Although it looked doubtful in the A.M. because of inclement weather, the spirit and fortitude of

this dedicated group really showed through as they "took to the air" and "drug 'em in" as the sun began to peep through the misty haze. W2UJN has been experimenting with several types of antennas, WB2RWD/2 made the RPL. WB2MZE was awarded a Section Net certificate by the NYCLIPN. Congenial old K2OVN, venerable SEC and beloved prey of Rockaway ARC, was seen tripping lightly through the ARRL National Convention. Likewise for the Big D of the Hudson Division, W2TUK, and the chic XYL, W2BAWX was re-elected president of the IEEE at CCNY. We note with sorrow the passing of the mother of W2BK5. Also, may it be noted that W2PVE joined the hallowed list of Silent Keys, WN2UZU, with his Dad (W2TUK) as pilot, came in first at the May LIAIRC Fox Hunt. This is a rather unusual hunt in that your ability to locate the "fox" is dependent upon extracting sufficient clues from the other participants in order to decode the location of the "fox." Operating ability under trying conditions, rather than equipment or technology, is stressed. Most challenging indeed when you consider that F88DD held some of the clues on the last one. Traffic: (June) W42UWA 487, WB2RWD/2 215, W2GKZ 139, WB2QIL 96, WB2UQP 72, W42JJS 71, W2RBA 69, W2-EC 66, WB2SLH 50, WB2LYK 46, W2BAEK 42, W2DJW 33, W2EUSH 30, W2BCB 17, W2BGP 15, K2IDB 13, W2PF 10, W2DBQ 9, W2EW 8, W2BRQF 8, W2UJN 4, W2GP 3, W42JZX 2, W2MZE 2. (May) WB2QIL 71.

NORTHERN NEW JERSEY—SCM, Louis J. Amoros, W2LQP—Asst. SCM: Edward F. Erickson, W2-CVW. SEC: K2ZFL. ARPSC section net schedules:

NJN	3695 kc.	Daily	7:00 P.M.	W2BVE	RM
NJ Phone	3900 kc.	Ex. Sun.	6:00 P.M.	W2PEV	PAM
NJ Phone	3900 kc.	Sun.	9:00 A.M.	W2ZL	PAM
NJ PON	3900 kc.	Sun.	6:00 P.M.	W42TEK	PAM
NJ 6	51,150 kc.	M W Sat.	11:00 P.M.	K2VNL	PAM
EC TN	146,700 kc.	Ex. Fri.	10:00 P.M.	WB2IYO	PAM

All times shown local in effect. New appointees: WB2-IYO as PAM for the Emergency Coordinators Traffic Net. WB2WFO as EC for Madison and vicinity. W42-IGQ and W42TBS as OPS. K2AGZ as OBS. K2UYH as OVS. Endorsements: K2OEI and W42NJB as ECs. The EC-TN is now on 6 nights a week. The purpose of this net is to give the Emergency Coordinators and the AECs in the section an opportunity to handle traffic, train and have a common meeting ground to discuss their problems. Prospective AREC members can listen or join in. All are welcome to join. Field Day once again proved itself to be a popular League activity in our section with a record number of messages received by your SCM from the following stations: K2EB, K2CW, K2GQ, K2ODP, K2ZSS, W2LI, W2MM, W2WW, W2GLQ, W2-OYH, W42UH, WB2FIT, WB2KTO, WB2SSZ, WB2-QMP, W2RNV, W2BWK, W2BBA and W2YRD. W2NKD has been reappointed c.d. director at Seaford Plains. W2KOG was the first to man radio equipment during the East Coast power blackout. We received reports from K2KQD, K2VNL, W2QNL and W42ASM on the blackout. Amateur radio did its usual good job in the state. As usual, problems developed. W42ASM measured 165 volts when the power did return. Remember that one; it could save your gear. K2ZFI is relaxing after his recent illness. W2CVW reports operating in both the V.H.F. QSO Party and FD. W2ZSH passed the General Class exam. W2WVW helped WB2UFV put up his new 80-meter dipole. W2RKK is working new DX but takes time out to work the local Novices. W2-RIG added a 20A to his shack. The summer job is slowing down WB2RJJ's DX totals. W2AHR returned to Mattawan after four years in Maine. W2PEV lost his 75-meter antenna by lightning. How about some more reports, fellows? We like to hear from you. Traffic: (June) W42IGQ 556, W2PFUW 253, W2RKK 205, W42-TBS 128, W2IYO 121, W2UQP 47, W42TEK 68, W2-KSG 62, K2OEI 59, W2WVW 55, W2IWB 50, K2EPP 49, W2BVE 47, W2BCS 36, W2WVW 34, W42ASM 29, W2ZSH 23, W2QMP 18, W2DRV 17, W2CVW 15, W2WFO 15, W2CGI 13, W42KZF 12, W2PEV 12, W2PXX 10, W2S2H 10, W2NZU 8, K2MFX 7, W42-CGF 4, W2TFM 4, W2UFV 3, W42UZH 3, K2ZFI 3, W2KNN 2, W2QNL 2, W2JDH 1, W2RJJ 1. (May) W2OHK 93, K2VNL 63, W2WFO 31, W2CVW 24, W2-ABL 2. (Apr.) K2ZFI 6.

MIDWEST DIVISION

IOWA—SCM, Owen G. Hill, W6BZ—Asst. SCM: Bertha V. Willis, W6LGG. SEC: K2BRE. PAM: W6NGS. RMs: W6TU, W6SCA. A simulated emergency drill was held by the Marshalltown/Marshall Co. c.d. group on June 29, with RACES members W6LGG, W6EFL, W6HNP and K6GVG participating in the exercise. Field Day messages were received from the following: W6VMM, JUL, QJX, HFX, CVJ, MG, III,

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vapor-cooled high-linearity tetrode powers unique new 2000 watt PEP linear amplifier

The unique new linear amplifier shown here is powered by an EIMAC 4CV1500B tetrode. The ultimate in amateur equipment, this fine linear was designed by Jack Quinn, W6MJG, and uses the advanced concept of vapor-phase cooling for ultra-quiet operation. The amplifier runs cooler than most forced-air-cooled amplifiers, and because there is no extraneous noise from air blowers, your shack is quiet—ideal for receiving weak DX signals! On CW, the amplifier has an average input of 1 kW, with only 400 watts of plate dissipation at 60% efficiency.

High SSB performance of the amplifier is credited to the 4CV1500B's outstanding intermodulation distortion characteristics...better than -40 db third-order products at all drive power levels from zero to 2 kW PEP. The 4CV1500B—and its air-cooled brother, the 4CX1500B—are products of a four-year development study which included optimization of internal tube geometry by computer techniques. Because the tube has very low grid interception (typically less than 1.5 mA grid current) it is possible to drive the grid positive without adverse effects upon the distortion level of the driver. Both tubes are recommended for Class AB₂ linear amplifier service. For further information on advanced EIMAC power tubes, write Amateur Services Department or contact your nearest EIMAC distributor.

4CV1500B				
TYPICAL OPERATION (Frequencies below 30 MHz)				
DC Plate Voltage.....	2500	2750	2900	V
DC Screen Voltage.....	225	225	225	V
DC Grid Voltage.....	-34	-34	-34	V
Zero-Signal DC Plate Current..	300	300	300	mA
Single-Tone DC Plate Current..	720	710	755	mA
Two-Tone DC Plate Current...	530	555	542	mA
Driving Power.....	1.5	1.5	1.5	W
Useful Output Power.....	900	1100	1100	W
Intermodulation Distortion				
Products				
3rd Order.....	-38	-40	-43	db
5th Order.....	-47	-48	-47	db

We have a new brochure entitled "Linear Amplifier and Single Sideband Service." Write for your copy.

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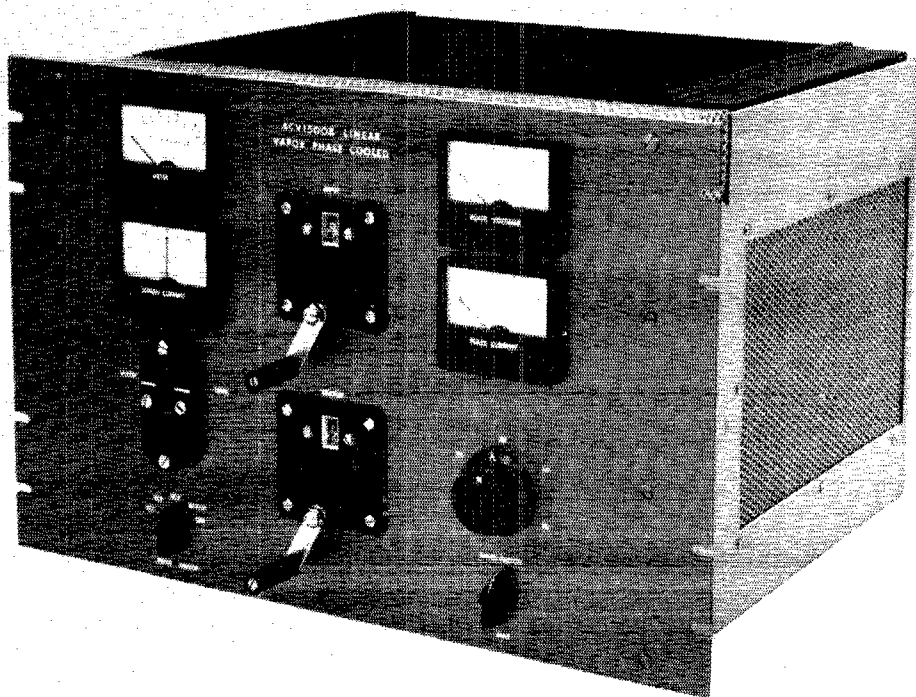


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EIMAC TYPE	CLASS OF OPERATION SERVICE	TYPICAL OPERATION — SINGLE TUBE								FILAMENT VOLTS AMPERES
		D. C. PLATE VOLTAGE	D. C. PLATE CURRENT (AMPERES)	D. C. SCREEN VOLTAGE	D. C. GRID VOLTAGE	APPROX. MAX. DRIVE POWER (WATTS)	APPROX. D. C. SCREEN CURRENT (AMPERES)	APPROX. D. C. GRID CURRENT (AMPERES)	APPROX. MAX. POWER OUTPUT (WATTS)	
3-400Z	B	3000	.100	—	0	32	—	.12	655	5.0
	SSB		.333 ⁽³⁾							14.5
3-1000Z	B	3000	.240	—	0	65	—	.30	1360	7.5
	SSB		.670 ⁽³⁾							21.3
4CX250B ⁽¹⁾	AB1/SSB	2000	.1/.25 ⁽³⁾	350	-55 ⁽⁵⁾	0	0/.005 ⁽³⁾	0	300	6.0 2.5
	C/CW	2000	.25	250	-90	2.9	.019	.026	390	
	C/AM	1500	.20	250	-100	1.7	.02	.014	235	
4CX300A	AB1/SSB	2500 ⁽⁴⁾	.1/.25 ⁽³⁾	350	-55 ⁽⁵⁾	0	0/.004	0	400	6.0 2.5
	C/CW	2500 ⁽⁴⁾	.25	250	-90	2.8	.016	.025	500	
	C/AM	1500	.20	250	-100	1.7	.02	.014	235	
4CX1000A	AB1/SSB	3000	.25/.90 ⁽³⁾	325	-60 ⁽⁵⁾	0	.002/.035	0	1680	6.0 10.5
4-65A	AB1/SSB	3000	.015/.065 ⁽³⁾	360	-85 ⁽⁵⁾	0	0/.006	0	130	6.0 3.5
	C/CW	3000	.112	250	-105	1.6	.022	.009	270	
	C/AM	2500	.102	250	-150	3.1	.026	.013	210	
4-125A	AB1/SSB	3000	.03/.105 ⁽³⁾	510	-95 ⁽⁵⁾	0	0/.006	0	200	5.0 6.5
	B/SSB ⁽⁴⁾	3000	.02/.115 ⁽³⁾	0	0	16	0/.03	0/.055	240	
	C/CW	3000	.167	350	-150	2.5	.03	.009	375	
	C/AM	2500	.152	350	-210	3.3	.03	.009	300	
4-250A	AB1/SSB	3000	.055/.21	600	-110 ⁽⁵⁾	0	0/.012	0	400	5.0 14.5
	C/CW	3000	.345	500	-180	2.6	.06	.01	800	
	C/AM	3000	.225	400	-310	3.2	.03	.009	510	
4-400A	AB1/SSB	3000	.09/.30 ⁽³⁾	810	-140 ⁽⁵⁾	0	0/.018	0	500	5.0 14.5
	B/SSB ^{(2) (4)}	3000	.07/.30 ⁽³⁾	0	0	40	0/.055	0/.10	520	
	C/CW	3000	.35	500	-220	6.1	.046	.019	800	
	C/AM	3000	.275	500	-220	3.5	.026	.012	630	
4-1000A	AB1/SSB	4000	.17/.48 ⁽³⁾	1000	-130 ⁽⁵⁾	0	0/.04	0	1130	7.5 21.0
	B/SSB ⁽⁴⁾	4000	.12/.67 ⁽³⁾	0	0	105	0/.08	0/.15	1870	
	C/CW	4000	.70	500	-150	12	.137	.039	2100	
	C/AM	4000	.60	500	-200	11	.132	.033	1910	
3CX100A5	C/CW ⁽⁷⁾	800	.08	—	-20	6	—	.03	27	6.3
2C39A	C/AM ⁽⁷⁾	600	.065	—	-16	5	—	.035	16	1.0

(1) Ratings also apply to 4X250B.

(2) Ratings apply to 4-250A within plate dissipation limitation.

(3) Zero signal and maximum signal dc current.

(4) Grid and screen grounded, cathode driven.

(5) Adjust to give stated zero-signal plate current.

(6) For operation below 250 Mc only.

(7) At 500 Mc.

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WAOLKM, NNR, KOJVN. The new president of the SCARA (Sioux City) is KOJZX, WOPAN, back in the U.S. after several years in KH6-Land, is now active in Minneapolis. WOLCX lost out on the BPL while catching some fish in Canada. The Lee Co. Emerg. & Wx Net held a picnic June 25 for its members and others. The Iowa 160-Meter net held its Annual Picnic at Webster City June 18 with good attendance. WOMMZ was the winner of the hidden transmitter hunt. WAQTA, v.h.f., report several good openings on 6 meters. WO-EIT, v.h.f., also reports working several call areas. The Amateur Weather Observers Net, Ia., operates at 7 p.m. CDT Mon. through Fri. and 9 a.m. CDT Sun. on 3885 kc. Mgr. is WOGPL, asst. WAQGUU. The Ia. 75-Meter Net reports QNI 1157, QTC 147 in 26 sessions. The Ia. 160 Emergency Net reports QNI 515, QTC 6 in 30 sessions. Traffic: (June) WOLCG 761, WOLCX 293, WOCZ 4, WAODYV 21, WOPAN 21, WOPFJ 14, WAOMIT 12, KOTDO 12, KOBRE 11, WAQJEG 10, WAQIYH 8, WONGS 5, WAQAIW 4, WOGQ 4, WAQJOA 4, WAQ-DUB 2. (May) WAQIYH 25.

KANSAS—SCM, Robert M. Summers, KOBXF—SEC: KOEMB, PAM; KOJMF, RM; WAOMLE, V.H.F. PAMS: WAOCW, WOHAI, WAOKS, WAOSH, WOFY, of KC is a Silent Key. The Salina Hamfest was a real success. WAODZI reports June was a successful month v.h.f.-wise with ranges up to 2200 miles, QRS, the c.w. traffic net, is on 3610 kc. at 1900 CDDT and 2100 CDDT daily and needs outlets to the Wichita and S.W. Kansas areas. KOYRQ moved to KC from Lawrence, WONI, hq. of Kansas National Guard at Tonoka, operated from Camp Guernsey, Wyo., July 1-13. WOCRN is operating in Guam. WOPAG, of Acara, is putting out quite a bit of effort to Novices and c.w. WAOCW reported 3 emergency sessions were held on V.H.F. during June. WOFIL reports 10 states now confirmed on 2 meters. Royden A. Konopkas is the new asst. state civil defense director, replacing Warren G. Paramore, who retired Mar. 31. The civil defense director for Kansas is Gen. Joe Nickell. FD reports were received from Jo. Co. Club WOFRH; Wichita Amateur Radio Club WOSBE; Flint Hills ARC WOLU; JARS WOLB; Leav. Radio Club WOVZG. WOHs is using a tri-band two-element 20-meter quad 70 feet high. V.H.F. ARC nets: North Central PI Net 2-meter, QNI 35; Zone 7 2-meter, QNI 32; Zone 15 6-meter QNI 23; NKC 2-meter net, QNI 19. ARC nets low frequency: Zone 7, QNI 9; Zone 11, QNI 75, QTC 14; Zone 9, QNI 26, QTC 5; Zone 15, QNI 23, QTC 5.

	Days	Freq.	CDDT	QTC	QNI
QKS	Daily	3610 kc.	1900 & 2100	83	220
EC Net	Sun.	3920	1300	3	28
KWN	Daily	3920	1800	47	678
Kans PON	Mon.-Sat.	7220	1230		
	Sun.	3865	0830	7	135
KPN	M-W-F	3920	0645	54	278
	S		0800		
KsBN	M-Sat.	3920	1830	254	778

Traffic: (June) WAOMLE 266, KOJMF 209, WAOLLC 131, KOBXF 104, WAQJH 67, KOEMB 50, WAOKDQ 50, WAQJOG 46, WOHNH 42, KOHGI 38, KOFED 38, WAQVX 33, KOYVH 17, WAOCW 12, KOGII 11, WAOKDZ 3, WOFH 7, WAOHMZ 5, WAODZI 4, WOLXA 4, KOLPE 2. (May) WAOHMZ 4.

MISSOURI—SCM, Alfred E. Schwaneke, WOTPK—SEC: WOBUL, KOYIP renewed appointment as OPS. I am sorry to report that WAQPS, pres. of the K.C. VHF Club, has joined the Silent Keys. FD messages were received by the SCM or by the SEC (WOBUL) from the following portable stations: WAQAPC, KO-ANU (NW St. L. ARC), KOAXV (Kirkwood HS ARC), WAOZL (Central Mo. ARC), WGBRN (Three Rivers ARC), WOCBL (NE Mo. ARC), KODOK, WAQPAD (K.C. VHF Club), WOEBE (Sw. Mo. ARC), WAQFLI (Clay Co. EC), WOGWX (Lew Summit RC), WAQ-HQR (Boy Scout Camp), KOTOG, WAQJBX (Western Electric ARC, K.C.), WAQJEL (Macon, Mo. ARC), WAOKUH (PHD ARC), WOFUR (Band hoppers ARC), WÖRR (HARC K.C.), WAOFLL was portable in Colo. WAOKUH worked 14 states on 6 meters on FD. Antennas put up by the Tri-State ARC a week ahead of FD were lost to vandals. WAQEMS, WAQ-QLO, WAQQA, WAQPFU and WOHYI helped WAQ-HQR on FD operations at Scout Camp. KOORB reports the K.C. RACES Net was alerted three times for severe weather operation. The RACES group also visited the Rotary Camp for Handicapped Children and held a demonstration mobile exercise. KOYBD received an A-1 Operator certificate. WAQBF built an EICO 753 transceiver. KOJWN has a new kw. s.s.b. on the lower bands. WOECA and KZEZ visited with WOBUL. OO reports were received from KOJPI, KOORB and KOYIP. Net reports for June:

Net	Freq.	Time	Days	Sess.	QNI	QTC	Mgr.
MEN	3885	2230Z	M-W-F	13	148	18	WOBUL
MON	3585	2400Z	Daily	30	181	178	WÖTDR
MNN	7063	1900Z	M-Sat.	25	85	42	WÖUD
MTTN	3940	2200Z	M-F	20	190	117	WAQELM
SBN	3585	0300Z	Daily	18	46	9	KÖAEM
MoPON	3810	2100Z	M-F	19	123	73	WÖHVJ
QMO	3580	2100Z	Sun.	3	11	10	WAQFKD
PHD	59.4	2430Z	Mon.	4	53	9	WAQKUH

Traffic: KOONK 1590, KOYBD 234, KOAEM 208, WÖTDR 157, WAQHRQ 120, WÖUD 100, WAQEMS 95, WAQJOA 75, WAQLYE 44, WÖEBE 41, WAOPYJ 41, WÖHVJ 30, WÖBUL 29, WAQFMD 28, WAQJH 27, WAQQLQ 27, WAQITU 26, KOORB 20, WÖGQR 16, WAQFKD 12, WAQKUH 10, WAQLOQ 9, WÖGBJ 8, WAQBF 7, KOYGR 7, WAQFL 2, KOYIP 2.

NEBRASKA—SCM, Frank Allen, WÖGGP—SEC: KOOAL, Net reports for the month of June, 1967: West Nebraska Phone Net, WÖNIK, QNI 704, QTC 38, Nebr. Morning Phone Net, WAQJUF, QNI 1023, QTC 80, Nebr. Storm Net, WAQGD, 1st session, QNI 962, QTC 95; 2nd session, QNI 686, QTC 91, Nebr. C.W. Net, WAQ-GHZ, 1st session QNI 90, QTC 143; 2nd session, QNI 120, Nebr. AREC C.W. Net, WAQEEI, QNI 12, Nebr. Emergency Phone Net, WAQGHZ, QNI 1380, QTC 48. Welcome to Nebraska to KÖAKK, now becoming active again in the Centennial State. The Midwest Division Convention was well attended in North Platte, despite a conflict with Field Day. Also, Field Day activity in the state was exceptional this year. A new OPS appointee is WAQHOH. Traffic: WAQGHZ 293, WAQHWR 94, KOYXY 86, WOLOD 53, KOYTW 48, WAQHOH 42, WAQZM 35, WÖBFV 32, WAQLOY 30, KÖKJP 27, WAQOBK 24, WAQGVJ 24, WÖHTA 20, WAQPCR 20, WAQIBB 14, WÖGGP 12, WAQNXF 12, WAQXND 11, KOJFN 11, WÖWKP 9, KÖDVG 8, WÖNIK 6, WÖYFR 6, WAQDXY 5, WAQEEI 5, WÖLJO 5, KÖODF 5, WÖHOP 4, WAQIBL 4, WAQTKK 4, WAQJAV 4, KÖOAL 4, WAQJUF 3, WÖPQP 3, WÖVEA 3, WAQNYM 1.

NEW ENGLAND DIVISION

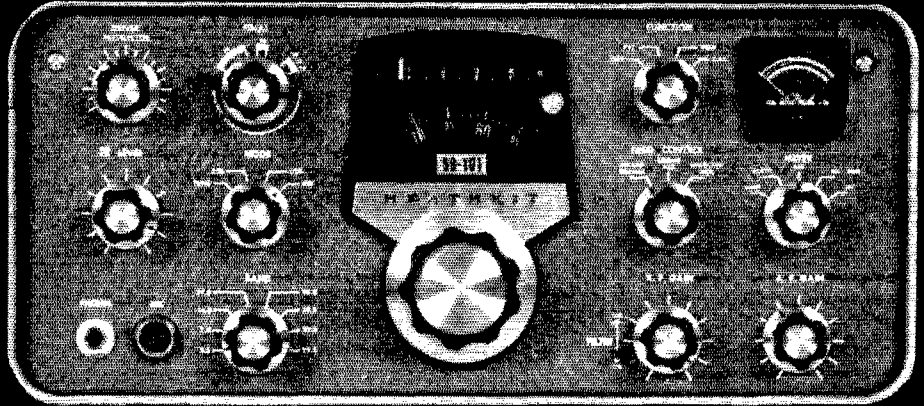
CONNECTICUT—SCM, John McNassor, WIGVT—SEC: WIPRT, RM; WIZFM, PAM; WIYBH. Net reports for June:

Net	Freq.	Days	Time	Sess.	QNI	QTC
CN	3640	Daily	1845	30	377	336
CPN	3880	M-S	1800	30	465	210

High QNI: CN—KITKS, WAHSHN and KIEIR, CPN—WIGVT 29, KIEIC and WAIFVH 27, WIYBH 24, WAIEEJ 22, WILUH 18, KILFW/1 and WIYU 16, KIDGK 15. SEC WIPRT is devoting considerable time and effort to promoting statewide emergency communications. This is perhaps the least appreciated phase of amateur radio but can do more than anything else to help us serve in the public interest—a basic requirement for the continuance of amateur radio. Please support your local EC and contact WIPRT if you are willing to assist him with the fine job he is doing. PAM WIYBH continues to keep CPN running smoothly and has prepared a new net roster (send SASE if interested). New officers of the Tri City ARC are KIRJH, pres.; KISR, vice-pres.; KIVBA, treas.; WIAIP, secy. So far 30 Connecticut County Awards have been presented. Want yours? Contact WIHQ! Please note: The Slo Speed C.W. Net now is on 3740 kc. at 6 p.m. KICSB has returned to active Air Force duty and is now in Viet Nam. WAIFGN made WAS, WAICYT's DXCC is 128/105, WAIFJU's DXCC is 128/101, all on 15-meter c.w. with 75 watts! All clubs are requested to report their Connecticut Council delegate to WIHQ. Congratulations: to WNI-HZU and WNIHZV as new Novice YLs; WNIHLP as the only Novice reporting traffic; WAIGO on passing the General Class exam; WAIFGN on taking first place for Connecticut in the Vermont QSO Party; WAIFVH on making the BPL in June! Please consider the advantages of obtaining ARRL Life Membership—an opportunity recently made available. Don't overlook it! Traffic: (June) WIEFW 274, WAIFVH 219, WAHSHN 153, WAIFNJ 116, KIEIR 111, KIEY 106, WIAW 104, WAICYV 103, KIEIC 102, WIKAM 97, WIEEN 73, WIGVT 68, WAQVU/1 65, KILMS 61, WAHEW 59, WIGJM 51, KISXF 33, KITKS 33, WIBKC 32, WAIFGN 25, WAIFZE 21, WNIHLP 21, KISY 20, WIYBH 20, WAIDUV 19, WAIDEM 18, WIZL 14, WIBKI 13, WIYU 13, WIBNB 10, KICYG 9, WICTI 7, WIKUO 7, WIOV 4, WICUH 3, WAICYT 2, WAIGOI 1. (May) WIQJM 84, WAIDUV 15, WICTI 9.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., WIALP—WIAOG, secy. SEC, received reports from Wis RPE, LVK, K1s PNB, DZG. Heard on 75: WIOD, WA1AXK. KIDJM has moved back here again. The 8 Meter Crossband Net had 21 sessions, 189 QNTs.

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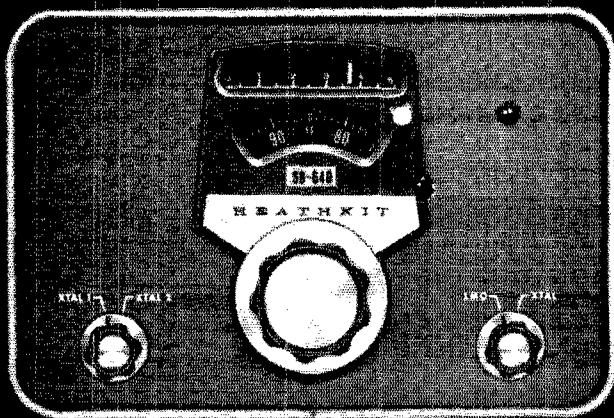
We Invite You To Compare. Send for a complete SB-101 spec. sheet. Contains all specifications and complete schematic diagram. Then make your comparison with any other rig on the market.

Kit SB-101, Transceiver, 23 lbs. \$370.00
Assembled SBW-101, Transceiver, 23 lbs. \$540.00
Kit SB-600, SB-Series Speaker, 6 lbs. \$18.95
Assembled SBW-600, SB-Series Speaker, 6 lbs. \$24.95
SBA-301-2, Optional 400 Hz CW Filter, 1 lb. \$20.95
SBA-100-1, Universal Mobile Mounting Bracket, 6 lbs. \$14.95
Kit HP-13, DC Mobile Power Supply, 7 lbs. \$64.95
Kit HP-23, Fixed-Station Power Supply, 19 lbs. \$49.95

PARTIAL SB-101 SPECIFICATIONS — RECEIVER SECTION: Sensitivity: Less than 1 microvolt for 15 db signal-plus-noise to noise ratio for SSB operation. **SSB selectivity:** 2:1 kHz minimum at 6 db down, 5 kHz maximum at 60 db down — 2:1 nominal shape factor — 6:60 db. **CW Selectivity:** (With optional CW filter SBA-301-2 installed) 400 Hz minimum at 6 db down, 2.0 kHz maximum at 60 db down. **Spurious response:** Image and IF rejection better than 50 db. Internal spurious signals below equivalent antenna input of 1 microvolt. **TRANSMITTER SECTION:** **DC power input:** **SSB:** 180 watts P.E.P. continuous voice. **CW:** 170 watts — 50% duty cycle. **RF power output:** 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 ohm nonreactive load). **Output impedance:** 50 ohms to 75 ohms with less than 2:1 SWR. **Oscillator feedthrough or mixer products:** 55 db below rated output. **Harmonic radiation:** 45 db below rated output. **Transmit-receive operation:** **SSB:** Push-to-talk or VOX. **CW:** Provided by operating VOX from a keyed tone, using grid-block keying. **CW side-tone:** Internally switched to speaker in CW mode. Approx. 1000 Hz tone. **Carrier sup-**

pression: 50 db down from single-tone output. **Unwanted sideband suppression:** 55 db down from single-tone output at 1000 Hz reference. **Third order distortion:** 30 db down from two-tone output. **Noise level:** At least 40 db below single-tone carrier. **RF compression (TALC):** 10 db or greater of .1 ma final grid current. **GENERAL:** **Frequency coverage:** 3.5 to 4.0; 7.0 to 7.5; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (megahertz). **Frequency stability:** Less than 100 Hz per hour after 20 minutes warm-up from normal ambient conditions. Less than 100 Hz for $\pm 10\%$ line voltage variations. **Modes of operation:** Selectable upper or lower sideband (suppressed carrier) and CW. **Dial accuracy — "resetability":** Within 200 Hz on all bands. **Electrical dial accuracy:** Within 400 Hz after calibration at nearest 100 kHz point. **Dial mechanism backlash:** Less than 50 Hz. **Calibration:** 100 kHz crystal. **Power requirements:** 700 to 800 volts at 250 ma; 300 volts at 150 ma; —110 volts at 10 ma; 12 volts at 4.75 amps. **Cabinet dimensions:** 14 $\frac{1}{8}$ " W x 6 $\frac{3}{8}$ " H x 13 $\frac{3}{8}$ " D.

The New SB-640 External LMO SB-101 Transceiver



- Provides external control of the SB-101 transmitting or transceiving frequency
- Provides LMO (Linear Master Oscillator) frequency control or either of two crystal controlled frequencies for a total of five frequency control options
- Features the same calibration and smooth dial mechanism as the SB-101 built-in LMO

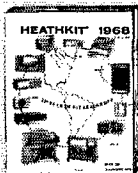
Heathkit SB-640 LMO \$99.00

The SB-640 Is Like Adding A Second Receiver For DX Operation . . . Provides (1) normal SB-101 transceiver operation, either external LMO (2) or crystal (3) control of transceiver frequency, or either external LMO (4) or crystal (5) control of the transmit frequency with independent receiver tuning through the SB-101 LMO. A red panel light indicates when the SB-640 is actually controlling the frequency. One panel switch selects LMO or crystal control; a second switch selects either of two crystal frequencies. Here's the convenience and all-around versatility you need for a top DX rig. Features SB-Series styling. Here is a unique combination of performance and versatility, the uncompromised value of choosing Heathkit, plus the "pride of authorship" in going on the air with a

fine piece of communications equipment you have assembled yourself. **Note:** The SB-640 operates *only* with SB-101 transceivers.

Kit SB-640, 9 lbs. \$99.00

SB-640 SPECIFICATIONS — **Frequency output, LMO:** 5 to 5.5 MHz. **Frequency output, crystal:** 4.975 to 5.525 MHz. **Frequency stability:** Less than 100 Hz per hour after 20 minutes warmup from normal ambient conditions. Less than 100 Hz for $\pm 10\%$ line voltage variations. **Visual dial accuracy:** Within 200 Hz on all bands. **Electrical dial accuracy:** Within 400 Hz after calibration at nearest 100 kHz point. **Dial mechanism backlash:** Less than 50 Hz. **Front panel controls:** Main (LMO) Tuning dial; LMO/XTAL switch; Crystal Selector switch — XTAL 1/XTAL 2. **Panel light:** ON when transmitting or transceiving frequency is controlled by External LMO. **Rear apron facilities:** Connector to SB-101. Frequency Adjust trimmers XTAL 1 and XTAL 2. **Power requirements (from SB-101 Transceiver):** 150 VDC at 5 ma. 12.6 VAC at 450 ma. **Dimensions:** 6 $\frac{1}{2}$ " H. (plus feet) x 10" W. x 11 $\frac{3}{4}$ " D. (including knobs).



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The 8637 is a 'small tube', (only 3 1/8" seated height), perfectly suited for today's low-profile designs. Its cost is lower than ICAS and CCS rated tube types of the same power.

For data, applications reports and engineering assistance, write: Amperex Electronic Corporation, Tube Division, Hicksville, L. I., N. Y. 11802.

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ONE 8637—PUSH-QUALITY**

Internally Neutralized Throughout Entire Freq. Range

50 MHz	PLATE	OUTPUT	DRIVE
CCS	375v.	25w.	0.67w.
ICAS	450v.	34w.	0.82w.
PTTS	600v.	84w.	0.86w.

175 MHz

CCS	300v.	18w.	1.4w.
ICAS	350v.	26w.	1.6w.
PTTS	560v.	63w.	2.2w.

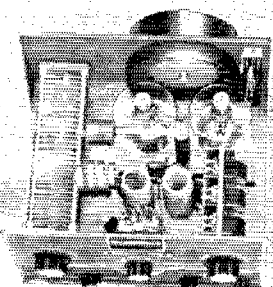
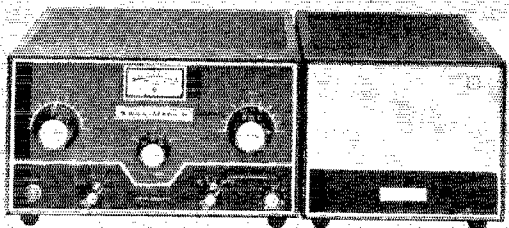


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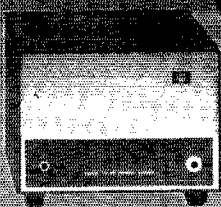
MATCHING AC SUPPLY

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DC-MODULE Converts AC supply to 12' volts DC for portable or emergency operation.

MODEL 14X...\$65

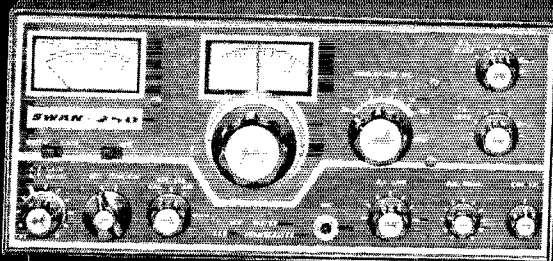


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500 watt power rating
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MODEL 45.....\$65

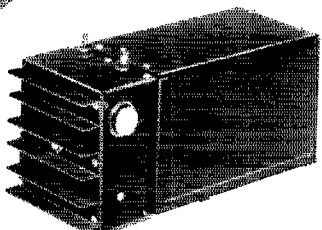
REMOTE CONTROL
MODEL 55.....\$95



SWAN 250 SSB-CW-AM TRANSCEIVER FOR 6 METERS. 240 WATTS PEP

Engineered to provide the same excellent voice quality, power, and performance that have become the trademark of all Swan transceivers. With the Swan 250, there is practically no limit to the operating pleasure you can find in the 6 meter VHF band.

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12 VOLT DC SUPPLY

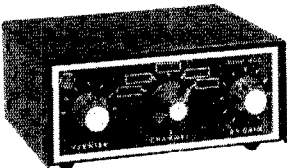
For mobile or portable operation. Negative ground standard, Positive ground available on special order.

MODEL 14-117.....\$130

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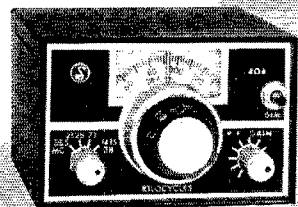
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MODEL 405X, less crystals . . . \$45



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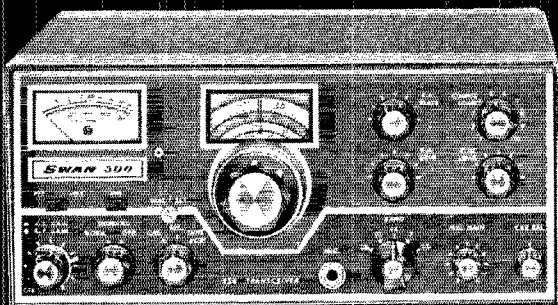
Miniature size for use with Model 500 or 350. Covers phone bands only. Makes it possible to trunk mount the transceiver.

MODEL 406B \$75

REMOTE CONTROL KIT

For trunk mounting of transceiver.

MODEL RC2 \$25



MODEL 500 SSB-CW-AM TRANSCEIVER 5 BANDS 480 WATTS

Deluxe model offers many extra features including selectable upper and lower sideband, 100 kc crystal calibrator, automatic noise limiter, and factory installed accessory socket for addition of Model 410 external VFO. **\$495**



FULL COVERAGE EXTERNAL VFO

for Model 500 and 350 transceivers. 8 ranges, 500 kc each, 5 kc calibration.

MODEL 410 \$95

DUAL VFO ADAPTOR

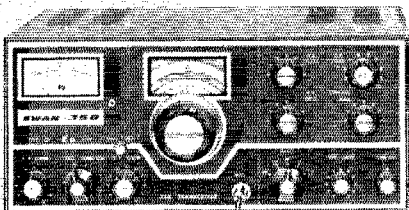
Provides for the addition of second VFO for separate control of transmit and receive frequencies. May be plugged into either 350 or 500 transceiver.

MODEL 22 \$25

EXTERNAL VFO for MODEL 250

Same as Model 410 in size and appearance. 50 to 54 mc coverage includes switching relay for VFO selection. (Model 22 adaptor not required.)

MODEL 210 \$120



SWAN 350 SSB-CW-AM TRANSCEIVER

Standard model 5 band transceiver. **\$420**

PLUG-IN VOX UNIT

for use with Models 250, 350 or 500.

MODEL VX-1 \$35

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11 traffic. New officers of the Quannapowitt RA are K1-LJT, pres.; K1ZQL, vice-pres.; K1PBC, secy.; K1NKP, treas.; W1s, ONC, DFS, K1s, NKA, UOQ, VKW, CCW, dir. Bill Loefer showed slides of his trip to FP8-Land, W1ONW and K1MAX are Silent Keys. W1AIAT is the call of Boy Scout Troop 18, Beverly, on 80 and 40 c.w. W1OFY is trustee. New officers of the Yankee RC are K1VZX, pres.; K1ASY, vice-pres.; W1ADTI, secy.; K1SMP, treas.; K1YOM, W1NHOF, W1AHVX, dir. New officers of the Chelmsford RC are W1AQO, pres.; W1AECN, vice-pres.; K1TEE, secy.-treas. W1WAJ and W1AYG took part in the May FAIT. K1SYF is working in Norwood. EM2MN had 22 sessions, 110 QNTs, 90 traffic. W1HHW is the call of WB2WTN in Scituate. W1ZMJ is back in Reading. W1HBB is back to work again. K1-SWU is in the Navy. W1FSN has been quite ill. I received many Field Day messages. W1PFW has moved to Duxbury. K7HBD/1 is in Braintree. W1HTM now is General Class. New appointments: W1HIL as OVS, W1AQY as OBS, W1DWY has been endorsed as EC and W1BYP as OO, W1s AOG, DFS and HIL visited W1AW. W1HVS is W1BJT's call in Sandwich. W1AEQU has an NCX-5 with a v.f.o. W1AIFD is working DX on 15. W1FN made a trip to N.Y.C. W1PEX and K1-PNB made the HPL. W1KBN made the HPL in May. W1ADD is a busy man, between being pres. of the North Shore RA and trying to get e.d. going in Lynn. With over 210 hams in Lynn, how about giving him a hand? K1WXC, at W1AF, worked some good DX on 6 during a sporadic E. The Capeway RC met at K1DYU's for its Annual Dog & Bean Supper. W1FSH-FSI have a 900-watt portable generator. W1AIDFL worked VOIDW on 6. Mass. Chapter NAHC sponsors a Worked All Mass, Cities & Towns Award. Write to W1AIDFL for information. The NAHC Net meets Sun. at 10 a.m. on 50.4 Mc. K1ZCU went to the National Convention. W1HIL is getting out well on 2 and 6 and reports a local net on 144.8 Mc. Sun. at 9:30 a.m. with W1s KJ, EAE, AUY, VN and K1AYZ. W1s GRP and GPs are new check-ins in our Novice Net. The Central N.E. Net had 27 sessions. QNTs 1016, 12 traffic. The net meets on 3842 Mon. through Sat. from 0630 to 0745 local time. W1EMG is going to Montreal. W1FIS is NCS on EMNN Fri., EMN Sat., IRN rep. from EMN on Sun. W1DAL has an SB-301 receiver and the call W1HHW for his summer QTH at E. Otis. W1AKN is on OOTC nets. W1-GXC is NCS of EMN on Sun., EMNN on Mon. W1-ETC has a Dow-Key relay. W1ADPX finally worked VPDD on 6. W1ZQQ has a Swan 500. Our sympathy to W1AMO on the death of his mother. W1BW retired and moved to Duxbury. W1WYF is working on the Cape and has an SB-34 on the air. W1ZXG has gone to Calif. to see his son. W1KP is up in Nova Scotia in his mobile land cruiser. W1AHP had a nervous breakdown a few years ago but gets on 80 c.w. some. W1OJM is on the Cape for the summer. W1GCH has a Clegg 22er for 2. K1ESG is in Army MARS. Traffic: (June) W1PEX 803, K1PNB 173, W1OPK 110, W1OJM 99, W1UIR 74, W1-EBY 69, W1EMG 64, W1AQY 54, W1AFKQ 50, W1-DOM 41, W1CTR 40, W1AFSI 40, K1CLM 37, W1AOG 25, W1DEC 20, W1GCH 16, K1ESG 12, W1AIED 10, W1ADPX 10, W1DAL 6, K1GKA 4, K1OKE 4, K1ZGH 4, W1AKN 2. (May) W1KBN 515, W1AFKQ 67, W1-GXC 47, W1JDP 9, W1DAL 4.

MAINE—SCM, Herbert A. Davis, K1DYG—RM: W1BJG. Traffic nets: Sea Gull Net meets Mon. through Sat. on 3940 kc. at 1700 to 1800; Pine Tree Net meets daily on 3596 kc. c.w. at 1900. K1WQI has resigned as PAM because of the work load. We sure will miss him as he did a very fine job for all. W1GKJ is sending Bulletins on RTTY on 2 and 6 meters and a.m. on 2 meters. He is using a Drake R-4A and T-4X and a Clegg Zeus on 2 and 6 meters. K1GAX is using a new Collins S/Line and doing real well. The word from W1-BJG is 100% participation on PTN and IRN in the c.w. world by the small dedicated group as always. K1SKP has been heard on 2 meters about every night lately and he is working the Maine stations FB. That was a nice piece of work K1GZL did in handling 1000 pieces of traffic for the crew in Antarctica. Traffic: K1WQI 73, W1AFCM 51, W1GU 30, K1OAZ 6.

NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1-SWX/K1DSA—SEC: K1QES, PAM: K1APQ, RM: Open. Appointments: K1QES as your new SEC and W1AEUJ as ORS. Don has renewed operation of the New Hampshire Emergency Phone Net Sat. nights. Let's all check in and help our new SEC. New hams: W1NHSC, W1HSP, W1AHTA, W1AHHV, W1AHTV, W1NHWI, W1NHWD, W1NHWC, W1NHWF, W1NH-HWG, W1NHWH, W1NHWP, W1AHEX, W1AHTX, W1AHHY, W1AHHY and W1HYC. The GSPN report from K1APQ shows 764 check-ins and 93 traffic. W1HXG is the new call for W1PZA while in Danbury. K3FMP has moved to New Hampshire. K1POV is back on the air with a fine signal. W1DYE operated from W1TX/1 during Field

MASSACHUSETTS QSO PARTY

October 7-8

All amateurs are invited to participate in the third Massachusetts QSO Party, sponsored by the M.I.T. Radio Society, W1MX.

Rules: (1) Party will begin at 2300 GMT on October 7, 1967, and will end at 0200 GMT on October 9. There are no time restrictions. (2) A station may be contacted only once per band. Each phone and c.w. segment shall be considered a separate band. Crossband contacts are not allowed. (3) The general call will be "CQ MASS"; and Massachusetts stations will identify themselves by signing "DE MASS, DE W1MX." (4) Each exchange shall consist of: a QSO number, RS(T), and county (for Massachusetts stations), state, province, or DX country. (5) Logs should show: date and time of contact in GMT, station worked, signal report sent and received, QSO numbers sent and received, county, state or province, frequency and type of emission.

Scoring: (6) Count one point for each report received and one point for each report sent and confirmed, for a total of two points for each completed exchange. Massachusetts stations multiply the number of QSO points by the number of different states and Canadian provinces worked to determine TOTAL score. Outside stations multiply the number of QSO points by the number of different Massachusetts counties worked (maximum of 14) to determine TOTAL score. (7) DX stations may be worked for QSO points but countries do not count as multipliers in the scoring.

Awards: (8) Certificates will be awarded to the highest scoring single-operator station in each state, province, and Massachusetts county. (Minimum score of 200 points required.) Additional awards will be issued, if, in the opinion of the Contest Committee, the number of entries from an area warrants them. (9) All logs must be postmarked by October 25, 1967, and mailed to: M.I.T. Radio Society, W1MX, Box 558, 3 Ames Street, Cambridge, Mass. 02139. Include an s.a.s.e. to receive contest results. A valid entry must include a signed statement that the operator observed all regulations of his country. Decisions of the Contest Committee are final. Logs cannot be returned.

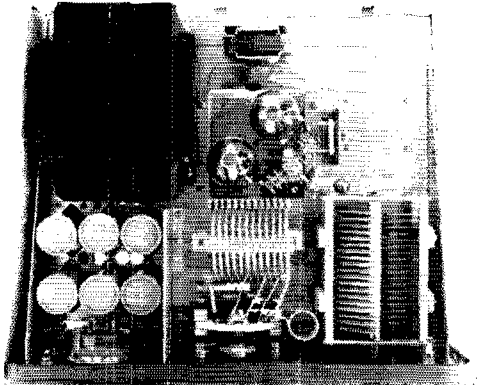
Suggested Frequencies: C.w. 3560 7060 14060 21,060, 28,060, S.s.b.: 3960 7220 14290 21,410. Novices: 3735 7175 21,110. All stations are urged to try s.s.b. at 0130 1300 1600 2130 and 2400 GMT.

Day. W1JB did well in the recent Frequency Measuring Test. K1KQJ is going on 2 meters. K1SLR is putting up a tower. K1DWK reports 180 check-ins and 11 traffic for the Merrimack Valley AREC Net. W1DYE received his 160 DXCC endorsement. W1PFA went to Expo 67. K1UZG reports 114 check-ins and 67 traffic. How about a volunteer for Route Manager? The GSPN held its picnic at Elkins and a good time was had by all. K1NDA operates from Goffstown when visiting N.H. K1YAM has gone on sideband. Traffic: W1AEUJ 45, W1MHX 35, K1BGI 30, K1POV 15, W1ALE 13, W1BYS 6, W1DYE 4, W1NHGL 3, K1SLR 2, K1PCY 1.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: K1LIL, RM: W1BTV, PAM: W1TXL, V.H.F. PAM: K1TPK, R1SPN report: 30 sessions, 373 QNT, 83 traffic. The Newport County Radio Club, W1SYE, reported that its Field Day was a huge success with 20 licensed amateurs and 14 helpers taking part. At a recent meeting of the club W1AUL was elected pres.; W1-BLC, vice-pres.; Foster Chase rec. secy.; and W1AIFL, corr. secy. The W1AQ Club of Rumford elected to membership W1UCQ, W1NICP, W1NHXN and Tony Sousa, who has just taken the Novice exam. During Field Day W1AQ/1 was located at the North Central State Airport and during the late evening on Sat. contacted W1YNT/1 aero mobile who was over East Hampton, Conn. During the QSO W1YNT was invited to Rhode Island for coffee and hamburgers. He accepted the invitation and landed at the airport for an eyeball QSO with the members of the club. Field Day messages were received by the SCM from W1AQ/1, K1NQG/1, W1OP/1 and W1YSE/1. W1-EEJ handled over 100 messages from WB2PWD/2 during a recent Festival at Sag Harbor on Long Island. Traffic: W1EEJ 527, W1TXL 137, K1VYC 42, W1BTY 34, K1TPK 22.

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- "Instant power"—no warm up needed!
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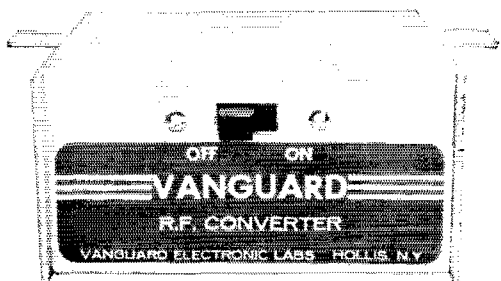
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VERMONT—SCM, E. Reginald Murray, K1MPN—

Net	Freq.	Time	Days	QNI	QTC	NCS
Gr. Mt.	3855	2130Z	M-S			W1VAC
Vt. Fone	3855	1300Z	Sun.		No reports	W1UCL
VTNH	3685	2230Z	M-F	114	67	K1UZG
VTCD	3990½	1400Z	Sun.		27	W1AD
VTSB	3909	2130Z	M-S	731	57	W1CBW
		1230Z	Sun.			

Hap Preston gave a good demonstration of 2-meter f.m. repeater operation at the Montreal Convention. Vermont had at least 4 clubs operating on FD this year. Please forward traffic reports by the 6th of the month. The VTSB Net will miss VE2BWU, who has gone to VE7-Land. Hope everybody had a good time at International Field Day in Burlington. Traffic: K1BQB 236, K1UZG 41, K1MPN 17, W1AIGUV 10, W1KJG 1.

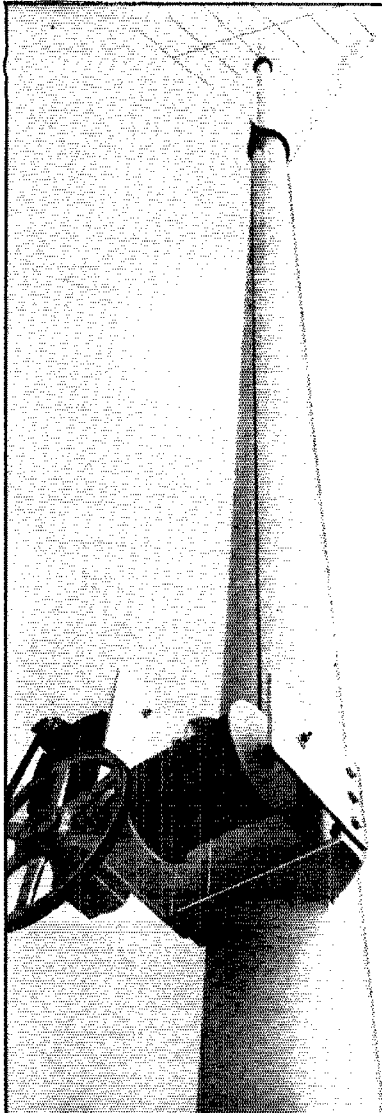
WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—C.W. RM: W1DWA. The West. Mass C.W. Traffic Net handled 51 messages during June with the following stations most active: W1DWW, K1AEC, K1WZY and K1JJV. W1ZPB is making improvements on his rig for the coming fall season. The Hampden County Radio Association operated on Field Day from Middlefield with a total of twenty three operators. The Valley Amateur Radio Club racked up a score of 8312 points during Field Day. The club's Annual Banquet was held at the Cavalier Restaurant in Chicopee. K1NEZ is publicity chairman for the club and is doing a fine job. Hats off to W1DWW for the fine job he is doing on WMN. Because of moving to a new QTH, some reports may have been delayed. If I've left anybody out, I am sincerely sorry. Now, for the first time in some 33 years I hold no elective office in the League. We needed new and younger blood, and at this time I extend most sincere congratulations to our new Section Communications Manager—Norm Forest. W1STR, of 38 Valley Road, Springfield, Mass. Please send reports to him from now on. I have enjoyed my work with all of you, but I do hope that you report more regularly to your new SCM. Best of luck to all. Traffic: W1DWW 31, W1DWA 31, W1EOB 13.

NORTHWESTERN DIVISION

IDAHO—SCM, Donald A. Crisp, W7ZNN—The FARM Net convenes at 0100 GMT, Mon. through Fri. on 3935 kc. All ECs are asked to report activities to the SCM. The office of SEC is open; contact your SCM if interested. K7IPJ passed away. K7SNZ was killed in auto accident. W7QVK is recovering from an airplane accident. W7FGB is recovering after treatment in the hospital. W7HLR is active with a SBE-33 from Pullman. New hams in the Lewiston area are W7HPW, W7HOX and W7AFJS. The Eagle Rock Club is sponsoring an Explorers Electronics Post, and has plans for a club station at its new quarters. W7BDD is moving to a new QTH, and is trying to revive the old Gem State C.W. Net. W7CJE is alternate net control for NSL. K7ZQG is operating mobile and portable from Utah and Idaho. W7IUC built a new keyer and Select-o-Jet and full break-in. The Spokane Dial Twisters club is sponsoring an area meeting Sat., Oct. 7, at 7:30 p.m. at the Carnation Co. dining room. Speakers are SCMs W7ZNN and K7JHA. FARM Net report: 19 sessions, 513 check-ins, 48 traffic handled. Traffic: W7BDD 198, W7ETO 44, K7OQZ 22, W7ZNN 21, K7OAB 11, W7GGV 5.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—Asst. SCM/SEC: Harry Roylance, W7RZY. Montana hams were saddened by the death of W7UWY. His leadership in the state RACES will be missed. Field Day stations active in the state were W7ED/7 Bozeman; W7ATY/M, K7CPT Missoula; W7FO/7 Butte; K7TZZ/7 Butte; K7EFA/7 Billings; W7TYN/7 Anaconda. The Great Falls AREC group provided communications for the Fish Derby on the Missouri. W7NWC, K7JXL, K7EGJ and W7VHP were some of the gang helping out. The call K7NDV, of Butte, was left out of the list of hams helping with the U.S. Army Special Forces activity. The Annual PON Picnic was held with everyone in attendance having a great time. Congratulations to K7PWY and his staff on a job well done. K7DCH has been ill and has just returned from the hospital at Seattle. K7LZF will move to Moscow, Idaho, soon. W7AQZ and W7ADMA are now on 2 meters in the Missoula area. W7HIX, W7HLP, W7HPJ are new calls in the Anaconda club. W7NPV, W7LKB and W7FIS had fine scores in the ARRL FMT. W7ROE is moving to Butte. Traffic: K7EGJ 8, W7FL 5.

OREGON—SCM, Dale T. Justice, K7WWR—RM: W7ZFH, PAM: K7RQZ. Section net reports: W7AHW, AREC Net mgr., reports sessions 30, total attendance



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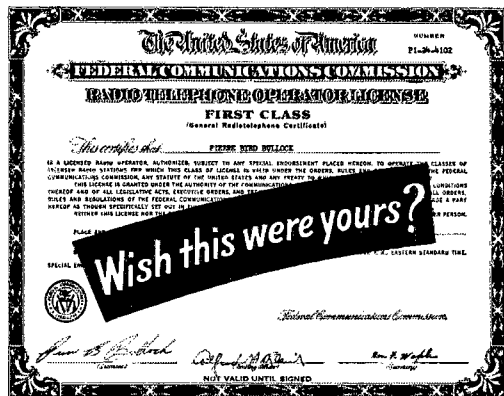
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577, maximum number of counties 16, QSTs 3, contacts 58, W7ZFH, OSN mgr., reports sessions 22, total attendance 76, traffic 49. Field Day reports: WA7BYP/7 reports two operators, both AREC members, operating from Larch Mountain. K7CBP/7, Klamath Basin Amateur Assn. reports 20 operators, of which 10 are AREC members, operating from Algoma Ridge. WA7DOX/7 reports 3 operators, 2 AREC members, operating from Warren. W7OTV/7, the Tualatin Valley ARC, had 9 operators on Skyline Road near Portland. K7OUS/7, the Clarkamas Club, had 20 operators. W7PXL/7, the Valley Radio club of Eugene, had 10 operators. W7SSA/7 the Salem Club, was at Joyville with 15 operators. W7TMI/7, on High Heaven lookout, had 3 operators. K7YQM/7 was at Serpentine Point with 14 operators, 12 of them AREC members. We regret to report that K7MJQ, who was very active in local nets, has joined the Silent Keys. K7RQZ reports that the Central Oregon ARC is conducting its first licensing class in several years. K7WWR is on RTTY now with a Model 15 printer and a Main-line TT/L terminal unit, and is sticking to 80 and 40 meters. WA7DOX is designing a multiple vertical phased array for 15 and 20 meters. Traffic: (June) K7RQZ 269, K7LFG 186, WA7BYP 81, K7WWR 68, W7ZFH 51, W7GUH 43, WA7DPK 21, WA7DOX 14, WA7CIP 11, WA7EES 11, W7MLJ 10, WA7CPI 8, WA7GLP 4, WA7-DWK 2, WA7GFS 1. (May) K7WWR 21, WA7CPI 14, WA7GFS 9.

—WASHINGTON—SCM, William R. Watson, K7JEA
—RM: K7CTP. PAM: W7BUN.

WSN	Daily	3535 kc.	0200Z	QNI 280	QTC 375	Sess. 30
WARTS	Daily	3970 kc.	0100Z	QNI 1056	QTC 117	Sess. 26
NTN	Daily	3970 kc.	1830Z	QNI 841	QTC 497	Sess. 30
NSN	Ex. Sun.	3700 kc.	0300Z	QNI 395	QTC 136	Sess. 30

Washington Radio Amateurs were honored by Governor Daniel J. Evans in a Proclamation designating June 19-25 as Amateur Radio Week in the State of Washington. At the signing were NW Director W7PGY, Wash. SCM K7JEA, RM K7CTP, PAM W7BUN, Asst. Dir. W7LFA. The meeting was arranged by Col. H. E. Link, Ret., State Director of Civil Defense. A tour through

WASHINGTON STATE QSO PARTY

Sept. 16-18, 1967

The Second Annual Washington State QSO Party sponsored by the Boeing Employee's Amateur Radio Society, K7NWS, will start at 2300 GMT September 16 and end at 0500 GMT September 18, 1967 and all amateurs are invited to participate.

All bands may be used, c.w. and phone (phone classified as both a.m. and s.s.b.). Stations may be worked once each band and each mode. Washington stations score one point for each contact (including contacts with other Washington stations). All others score two points for each contact with a Washington station. Washington stations multiply total QSO points by number of different states, Canadian Provinces and countries worked. All others multiply total QSO points by the total of different Washington counties worked. Washington stations send QSO number, RS(T) and county. All others send QSO number, RS(T) and state province or country. General call "CQ WASH" Washington c.w. stations should identify themselves by signing de (call) WASH K. Phone say "Washington calling". Certificates will be awarded to the highest scoring station in each state, province, country and Washington county. Worked Five Bears certificates are also available to anyone working five club members before, during or after the QSO Party. Working club station, K7NWS, will provide gold seal endorsement sticker for either certificate. Suggested frequencies: c.w. 3560 7060 14060 21060 28100, a.m. 3990 7260 14230 21310 28600, s.s.b. 3960 7220 14290 21290 28700, Novices 3735 7175 21110. Logs must show dates, times in GMT, stations worked, exchanges sent and received, bands and modes used, and scores claimed. Each entry must include a signed statement that the decisions of the contest committee will be accepted as final. No logs can be returned. Log sheets and scores must be postmarked no later than October 7, 1967 and sent to: Boeing Employee's Amateur Radio Society in care of Contest Chairman Willis Propst, K7RSB, 18415 38th Avenue, South Seattle, Washington 98188.

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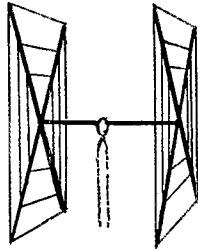
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— these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete 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!



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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: Steel wire, tempered and plated, .064" diameter.

X Frameworks: Two 12' x 1" OD aluminum 'hi-strength' alloy tubing, with telescoping 7/8" 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.

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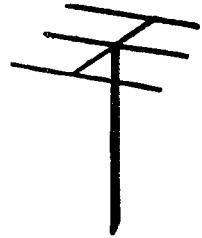
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2 E1 20	\$16	4 E1 10	\$18
3 E1 20	22*	7 E1 10	32*
4 E1 20	32*	4 E1 6	15
2 E1 15	12	8 E1 6	28*
3 E1 15	16	12 E1 2	25*
4 E1 15	25*		
5 E1 15	28*		*20' boom

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, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWI, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, 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
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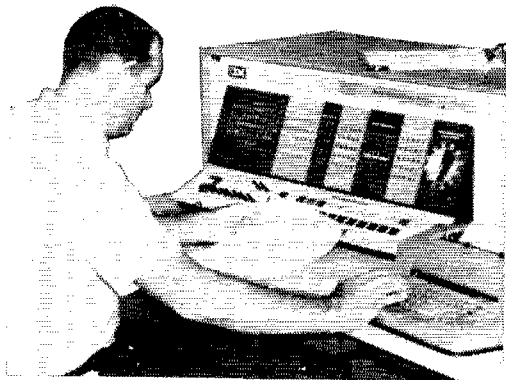
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the state cal. center followed with a round table discussion of the RACES program under the ARPSC. An important point was brought out that the State of Washington provides Workman's Compensation coverage to persons called out in emergency, which includes RACES members. PAM W7BUN reports registration of the following nets: Washington PON, Tue. 0130Z 3960 kc.; CRN, 0300Z 3960 kc.; NW S.S.B., 0230Z 3945 kc.; NW Eyebank, 0500Z 3960 kc. K7JHA reports the NV Tech. Net will resume Sept. 10 at 2300Z on 3970 kc. New appointments: W7AXT as OO; W7IEU as OBS and ORS; W7BUN and W7WCW as OBSs. Field Day reports showed good activity by the Cascade Radio Club W7EK/7, Lower Columbia Amateur Radio Assn. W7NCW/7, Walla Walla Valley Radio Amateur Club W7DP/7, Woodland Amateur Radio Club WA7FQE/7, Amateur Radio Assn. of Bremerton W7VE/7, Radio Club of Tacoma W7DK/7, Mt. Baker Amateur Radio Club K7SKW/7, Yakima Amateur Radio Club W7AQ/7, Omak and Okanogan K7OOM/7, Western Washington DX Club W7CO/7, Lake Washington Amateur Radio Club W7BB/7, Mt. Walker W7RGL/7, West Seattle Amateur Radio Club W7AW/7, Boeing Employees' Amateur Radio Society. W7AXT reports session with Field Day Antenna ending up with a longwire. W7DZX is busy with the cherry crop. W7ZIW took off for a vacation. W7AJV is rebuilding the shack. The WARTS Net is underway with nominations for new officers for 1987-88. The Spokane Dial Twisters is planning an ARRL organization meeting Oct. 7 under new chief, K7RZE. We regret to report W7BBK, Ritzville, and W7MGT, Kelso, as Silent Keys. Reported under the weather have been W7BTB and K7CTP. Recent Washington legislation upped the amateur license plate fees to \$50. At this time those who now have plates will not be affected. New applicants are required to pay the new fee. In the meantime, efforts are being made to restore the original \$5 fee for radio amateurs at the next legislative session which, we are informed, will be prior to the issuance of new plates. Traffic: W7BA 1617, K7TCY 758, WA7-DXI 502, W7DZX 394, W7ZIW 388, W7PI 313, K7CTP 271, W7HMA 248, W7JEY 148, K7JHA 96, W7BTB 95, W7MCW 69, W7APS 54, W7IEU 49, WA7EDQ 45, W7-AXT 39, K7MCA 30, W7UU 30, K7SUX 9, W7AMC 8, W7AJV 2.

PACIFIC DIVISION

EAST BAY—SCM, Richard Wilson, K6LRN—As it is near 100 degrees here this report is going to be short. Congrats to WB6PCQ on her first RPL since moving to the East Bay section. We hope it is the first of many. Her OM, WB6PCR, probably will have a rig in operation from the store before long. Let's hope he stays too busy to operate. WA6UFW is sending the Pacific Division bulletins and the ARRL Official Bulletins. W6UZX and WB6PCQ have been issued ORS certificates. WB6QNE is studying for the 2nd-class commercial and amateur extra exams. WB6FHH made 633 points in PD operating Class B, and W6CBF operated with the SARO, W6AEX/6, with about 21 others. W6OJW earned a WAC/SSB certificate. Traffic: WB6PCQ 595, W6UZX 131, W6IDY 112, K6LRN 63, WB6QNE 11, WB6FHH 1.

HAWAII—SCM, Lee R. Wical, KH6BZF—SEC: K6EWZ/KH6, PAM: Vacant. V.H.F. PAM: KH6EEM, RM: KH6GGR.

Net	Freq. (Mc.)	Time (GMT)	Days
League Appointees	7.290	0700Z	Wed.
Friendly Net	7.290	2030Z	M-F
Pacific Interisland	14.330	0830Z	All

Don't look bewildered if the chief clerk and manager, Nate, of the Rubber Stamp House, knows what your ham talk is all about. Nate is ex-KH6AXZ. Get your Hawaii QSO Party logs in soon. The due date is coming up for all logs. Also get those QSLs. Hope to see many of you at the Southwestern Pacific Division ARRL Convention Sept. 8, 9, 10 at the Ambassador Hotel in Los Angeles. YJIDL, Dave, is on from Santo, New Hebrides. It's been a long time since we've heard a YJ station. In the Hobbies-Within-a-Hobby Dept. Bob Berg, K5-FLK, R. 2, Box 324G, Fort Worth, Tex. 76135, writes he's looking for a Hawaii car license plate and would appreciate a ham plate from some Hawaiian amateur. He'll pay the postage to add a KH 6 plate to his collection. What say, fellas? Kokuu? Mahalo for all your contributions. Keep those cards and letters coming in. See page 6 this issue for my address for your column news.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU, W7KQI still is on the sick list. WA7-CFS is a Silent Key. W7JLN, the most active amateur in Lincoln County, now will have some competition from a couple of Novices. WA7BYQ is active again on 40 and 6 meters. The Southern Nevada f.m. group now

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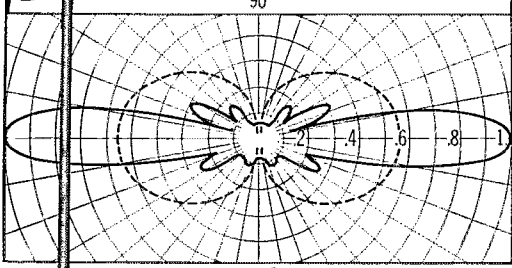
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ELEMENT HOUSING LENGTH.....20 Feet
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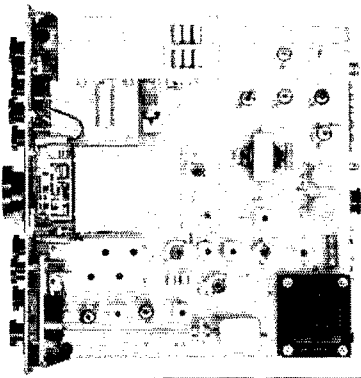
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numbers more than fifty with W7AAF, WA7EXG, K7OHX and K7IKN as the newest members. K7RKH, K6JYO and K7ZOK had a Field Day on v.h.f./u.h.f. from Castle Cliffs, near St. George, Utah, with 96 contacts in 32 sections being made on 6, 2 and 432. W7BIF and W7PBV babysat while their XYLs spent two weeks in KH6-Land. WA7DIA, W7PRM and K7RBM all were heard on Field Day. K7LBQ and family are spending the summer in Colorado. W7PBV attended the ARRL Oregon State Convention visiting in San Francisco en route home. W7TVF is building a new four-element quad and will schedule anyone stateside or DX needing Nevada. K7NYU is active on 2 meters. Traffic: K7OHN 25, WA7BEU 2, W7PBV 2.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—SEC: WB6BWB, RM: W6LNZ, ECs: WB6-MXD Del Norte County, K6RHW Nevada County, W6SMU Sacramento County, WB6RSY Shasta County, WA6TQJ Yolo County. Your SCM received Field Day messages from WB6VTG/6, WA6DDO/6, W6AK/6, WB6-GEO/6 and W6GDD/mobile. Thanks to all who originated messages to me or our SEC. I had the pleasure of operating with K6IS/6 at Finnon's Reservoir. New officers of the North Hills Radio Club are WB6KZN, pres.; WA6TZR, vice-pres. and secy.; WB6RIM, treas. WB6MPP and W6ZJW participated in the May FMT. WA6FWU reports a record snowfall of 47 feet at Soda Springs last winter. The summer months limit the section activities as one can see. Traffic: W6LNZ 95, WB6RSY 73, WA6TQJ 13, WB6MAE 10, K6YZU 5.

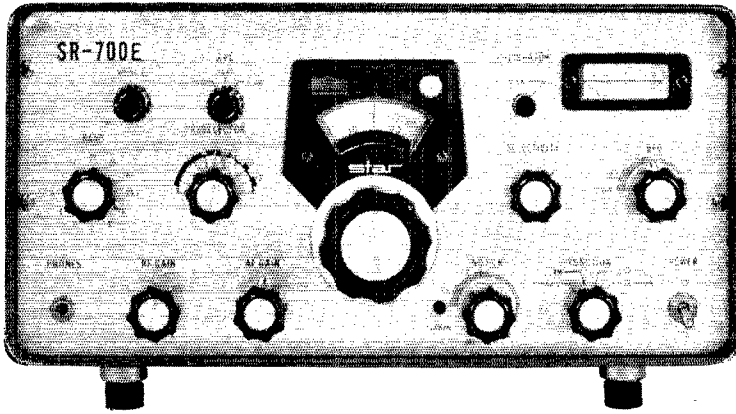
SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD —Field Day '67 saw every county within the section out in the hills with their emergency operations with good operations in San Francisco, Marin, Sonoma, Mendocino and Humboldt Counties. WA6BYZ again is active on the NCN and turning in a fine traffic total. WB6GVI now has an October date for the Navy. W6-ARQ is now at a new QTH in Petaluma and reports numerous 6-meter openings. WA6QXV reports that a new TV station in Ukiah had not helped him at all. WB6UJO put up a new tower and beam and should be getting his DXCC by this time. A tower case in Marin appears to have ended OK. The San Rafael City Council overruled the planning commission denial and authorized a permit. In Belvedere a proposal to tax transmitters and restrict towers was forgotten when most of the local amateurs showed up at the city council meeting. Col. Steinbeck, of 6th Army MARS, gave an illustrated talk on the MARS operations to Viet Nam at the July Marin Radio Club meeting. WB6PVY found the rabbit in the 6-meter hunt at the Fresno Hamfest. Stations worked by the SCM for the FD message included W6JTP and K6GWE in Marin County, K6NCG and W6PW in San Francisco and W6LFJ in Sonoma County. Activity in the San Francisco Section Net has picked up with check-ins being made regularly from every county in the section. K6CWS is back on the air in Corte Madera from a new QTH. W6SXR has been promoted from his former position as warden at San Quentin to a new position in Sacramento. W6CYO is working on his second hundred DXCC countries. W6GQA and W6SPB continue to turn in exceptional reports in the Frequency Measuring Tests. In the February test W6SPB had an average error of 0.1 parts per million and W6GQA matched it in the May test. Outlets for the Northern Calif. Net, which meets daily at 7 p.m. local time on 3635 kc., are needed in Marin and Mendocino Counties while additional outlets would be welcomed in Sonoma and Humboldt Counties. The San Francisco Section Net meets Mon. and Fri. at 8:30 p.m. local time on 3900 kc. W6PTS is back to work after a long seige of illness. Traffic: W6WLV 251, WA6-BYZ 163, WA6AUD 31, WB6OGF 16, W6BWW 12, K6-TZN 12, W6CYO 6, WA6QXV 5, WB6GVI 4, K6TWJ 2, W6ARQ 1.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—SEC: WA6BUH, ECs: W6ARE, WB6TFU, WA6TZN. The Fresno Amateur Radio Club held FD near Shaver Lake with 40 operators. The Delta Amateur Radio Club held FD at Arnold, Calif. The Turlock Amateur Radio Club held FD at Groveland, Calif. K4AVO/6 had 10 operators and held FD at Castle AFB in Merced. WB6QGI and WA6ZLP are monitoring 146.00 Mc. in the Stockton area, which is the Guard Channel. WA6PUF is looking for check-ins on 15 meters. WA6FBL, W6DKI, WB6GCD, WB6TNC and WB6UWI are conducting code and theory classes in the Stockton area. WB6LQL has joined the Air Force. The Tulare County Amateur Radio Club held FD at Hatchet Peak. W6JUK is chasing 6-meter DX. W6ONK has a Galaxy Mark II. WA6FFJ has moved to Texas. WB6NCG is active with repeater work. Summer activity seems to be low around these parts, but it takes only a few minutes to fill out a post card telling me of your activities which I can use. Traffic: WB6HYA 159, WA6SCE 6.

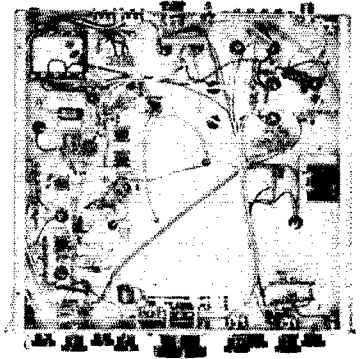


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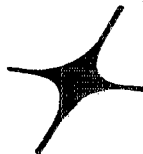
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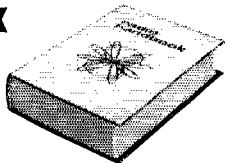


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SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM: Ed. Turner, W6NVO, SEC: W6VZE, RM: W6QMO. Your SEC is busy making plans for the fall operating and organizational season. Please contact Charlie if your club or group would like a visit on emergency operations and activities. W6RSY made the BPL. W6YBV is very QRL with building projects but finds time for lots of traffic work. W6BPT, former SCM and PAN manager, is back on the air after several years. Pinky works 75-meter phone and would like to hear from some of the old gang. W6DEF reports traffic down because of vacation. Hal was busy with EC work and Field Day. He reports that the gang at W6OTX/6 handled a real emergency when a Boy Scout was injured in an accident at a nearby camp. Communications were furnished by the FD gang on 2 meters and went into the regular Field Day operations. Nine clubs or groups have reported Field Day operation thus far, with several high scores reported. K6DYX reports that the RATT'S Net has changed from 3025 to 3020 kc., 0300Z Mon. through Fri. Smitty handles Bulletins on the same mode three nights per week. W6PLS reports that DX conditions have become poor. Gene hopes that his CEC/FEC QSO Party score may be tops worldwide. W6ASH is busy sending Oscar bulletins, at 0200Z Fri. on 14,030 and 0500Z Fri. on 7015 kc. Listen for these important bulletins if you can. W6AUC reports operation on several nets and also regular skeds with KL7-FSD/M on the Alaska Hiway. W6OII enjoyed a vacation to Hawaii in May and was active in the CD Party upon return. Congrats to WB6IZF for his fine article in QST in June. Ed reports that the Boy Scout group did well in Field Day. W6YHM is keeping a regular schedule with U.S. Geological Survey geologists in the field. Calls are WB6WAR, K6AUL and K6YIW. Don works for USGS. W6MMG reports that the San Carlos C.D. Amateur Radio Club is now active the 1st and 3rd Thurs. under the call K6DKX. W6WX is a new Assistant Director. Congratulations. Dave reports that the new president of the Northern California DX Club is W6CUF and vice-pres. is K6DXM, both from SCV. Remember the W6ZRJ code practice schedule: Tue., Wed. and Thurs. at 7:30 p.m. local time on 3590 kc. speeds at 10, 15 and 20 w.p.m., sending ARRL Pacific Division and special bulletins. Please send me comments on this schedule. Traffic: W6RSY 1042, W6YBV 308, W6DEF 74, K6DYX 73, W6PLS 36, W6ASH 28, W6AUC 26, W6OII 23, W6VZE 20, WB6IZF 10, W6YHM 8, W6ZRJ 3.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4BNU—Asst. SCM: James O. Pullman, WA4FJM, SEC: WA4LWE, RM: K4CWX, PAM: W4AJT, V.H.F. PAM: W4HJZ. WN4EQW is operating a homebrew transmitter running six watts input. K4TTN says the Buncombe County ARC code class now has six of its members licensed as Novices, with more to come. The Brightleaf ARC of Greenville, N.C. is a newly-formed club in that area with over 20 members already. The club is putting out a nice club bulletin called *Ham Chatter*, edited by W4QMW, the secy.-treas. Other officers of the club are K4SKI, pres.; W3MCE/4, vice-pres.; and WA4HPY, chairman of the board. K4EO has received confirmation on his 500 counties and 48 states. WA4KWC reports WN4GKE, WN4GKF and WN4GKG are now Novices in the Asheville area. W4NAP reports that check-ins in the Rockingham County AREC Net are dropping off during vacation months.

Net	Freq.	Time	Days	QTC	Mgr.
NCN(E)	3573 kc.	2230Z	Daily	148	W4IRE
THEN	3865 kc.	0030Z	Daily	104	WA4GMC
NCN(L)	3573 kc.	0200Z	Daily	85	WA4CFN
NCNN	3710 kc.	2100Z	M/W/F/S	24	WB4BGL

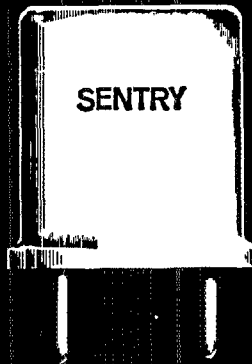
Traffic: (June) WB4BGL 172, W4RWL 143, WA4CFN 97, W4LWZ 95, WA4VNV 39, WA4ZLK 39, W4BNU 34, K4CWX 31, K4EO 29, WA4FJM 16, WA4VTV 15, K4-ZKQ 10, W4UWS 9, W4AJT 3, WN4EQW 6, K4TTN 6, WA4KWC 3, WN4FGU 1, W4NAP 1. (May) WN4FMS 3, WB4CVM 1. (Apr.) WA4VNV 35.

SOUTH CAROLINA—SCM, Clark M. Hubbard, K4LJN— SEC: WA4BCJ. Asst. SEC: W4WQM, PAM: WA4EFP, RM: K4LND.

SCN C. W. Net	3795 kc. Daily	2300Z/0200Z Tfe.	59
SC88BN	3915 kc. Daily	2300Z Tfe.	142

The operating hours of the nets are for the Daylight Saving Time period only. K4VVE will receive an ORS appointment. WB4DXX continues to lead all stations in activity, and in his work on the 4RN and EAN. W4NTO still leads in frequency measuring accuracy.

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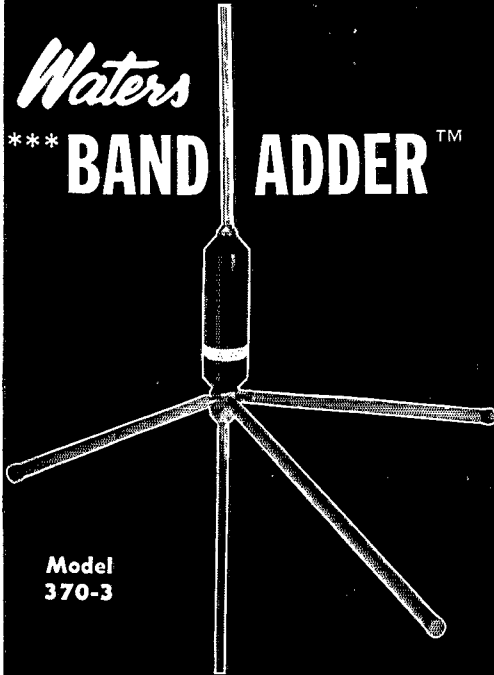
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W4FFH will become active again in OOing. The Greenville V.H.F. Society is working on a v.h.f. convention for the first of Nov. Watch for announcements. The club has acquired a mountaintop for 6- and 2-meter operations. Traffic was received from the Anderson Radio Club, Palmetto Radio Club, Mike & Key Club, Orangeburg Radio Club and the North Augusta Belvedere Radio Club on Field Day operations. Traffic: WB4DXX 284, WB4BZA 111, WA4UDC 71, K4VVE 58, WA4APD 55, K4OCU 55, W4WQM 45, K4LNJ 44, W4JA 32, WA4-ICF 25, W4FVV 14, W4NTO 14.

VIRGINIA—SCM, H. J. Hopkins, W4SEJ—SEC: K4LMB. PAM: W4OKN. RM: WA4EUL. New officers of the Northern Virginia Radio Club are K4AHS, pres.; WA4GHU, vice-pres.; and K6HPR/4, secy. The Patrick Henry Amateur Radio Club is new in the Martinsville-Henry County area; W4BUW has been active in sparking the club and has been appointed EC for Henry County. K4MLC has agreed to act as VSN manager, replacing K4LJK, who is leaving the section. WA2UF1/4 has been busy observing and reporting commercials in the amateur bands. K4GR and WB6DCL/4 recently received VSBN certificates. W4YZC has moved to Charlottesville. Activity for June seemed to be the lowest in recent years. Your SCM received more than a dozen reports of no activity. Some Field Day groups reported lack of participants with the lowest activity in years. Section members are reminded that now is the time of year to begin planning for a new season of activities. Soon standard time again will prevail throughout the nation and our nets will be back to normal, we hope. Remember also that the Annual SET will occur in Jan. 1968 instead of Oct. 1967. See last month's column for net summer operating schedules. Traffic: (June) W4DVT 158, W4RHA 140, WA4EUL 134, WA2UF1/4 78, W4ZAI 70, K4KNP 63, K4FSS 44, W4SZT 41, WB4DRB 36, W4-MUJ 36, W4OKN 34, W4BZE 26, WB6DCL/4 26, WA4SZT 25, K4LMB 18, WA4PBG 17, W4TE 15, WA4HHX 11, WA4WFO 9, WA4URN 5, W4MK 4, K4MLC 4, WA4QOC 4, W4SEJ 4, W4WBC 4, K4GR 3, W4KFC 2, K4VCY 1. (May) W4BWF 102, WB4FDT 15.

WEST VIRGINIA—SCM, Donald B. Morris, W8JMI—SEC: W8SSA. RMs: W8HZ, K8TPF. PAMs: K8-CHW, W8IYD.

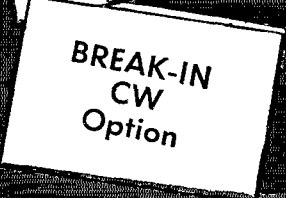
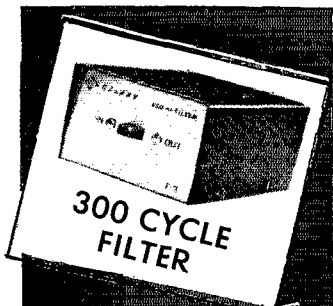
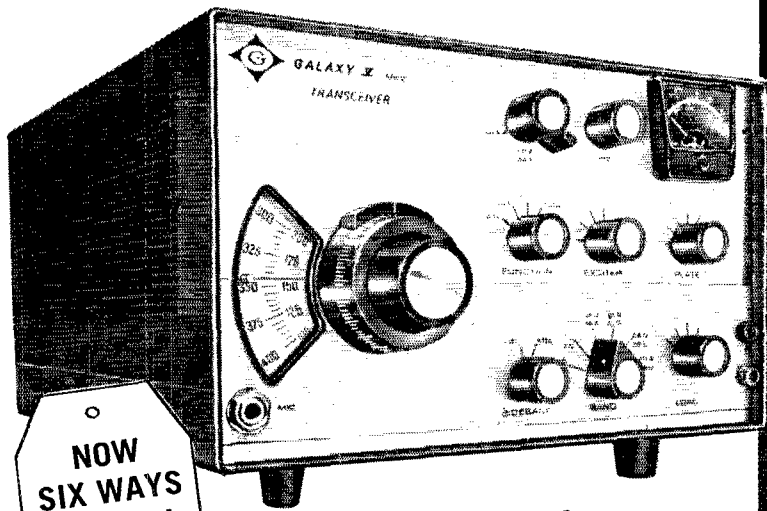
Net	Time	Freq.	Days	QTC	Net Mgr.
WVN	0000 GMT	3570	Daily	67	W8HZ
WVN	2330 GMT	3890	Mon.-Fri.	63	W8RQB

Congratulations to K8BIT on being West Virginia's Most Outstanding Amateur for 1967. His certificate now hangs beside that of his wife (K8MIQB), who won in 1963. The Kanawha Radio Club won the handsome trophy for being "tops" in ARRL FD competition among state clubs. It is with regret I report the passing of K8AGT of Moundsville. W8IRN and W8NTV went on a trailer trip to the West Coast with 20- and 75-mobile gear aboard. W8QND, W8NDY and W8LD assisted in the code and theory classes that passed 7 Upshur County men as Novices. Re-elected net managers at the net meetings during the state convention: WVN C.W., W8-HZA; WVN Phone, W8RQB. West Va. loses a fine young man with W8PXE moving to Florida. There was good publicity for amateur radio with the writing of W8IYD, state convention chairman, in a Wheeling paper. The Opquon Radio Club of Martinsburg provided communications at the airport for the Powder Puff Derby. Traffic: W8POS 142, W8CKX 70, W8SQO 65, W8RQB 31, K8BIT 22, W8HZ 20, K8MIQB 10, K8IYU 10, K8CHW 9, W8JM 9, W8FKB/8 5, W8NDY 5, W8IYD 4, W8KQX 3, K8WWW 3, W8GUL 2, K8-ZDY 2, W8ANS 1, W8MIX 1, W8LAL 1, K8OQL 1, W8PWI 1, W8RJO 1.

ROCKY MOUNTAIN DIVISION

NEW MEXICO—SCM, Bill Farley, W5FLG—SEC: W5ALL. PAM: W5MIX. The Southwestern Phone Net needs net controls badly. If you can meet the net at 1130 MDT and would like to help, please do so. W5PNY soon will move to Los Alamos where he and his wife will be teaching school. Good luck to both of you. Alamogordo has two new calls in town. W5QCF, Bob, no longer has a zero call and WA5SJB, Rachel, is new to the airways. Welcome to both. Like to work c.w.? Why not meet WA5BMN, Gary, on 7179 and ragchew. He is stationed with the Air Force at Lubbock and would like to hear from his old buddies in New Mexico. Well Field Day has passed and among those reporting were the Los Alamos group, the Albuquerque group, the Las Cruces group, several bunches from Alamogordo and one group from High Rolls. W5HDR has several good contacts on 2 meters. W5PTQ and K5HPJ were the only ones reporting in on mobile only. Everyone seemed to

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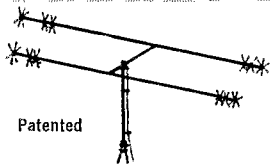
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have a lot of fun. Traffic: WA5RBU 85, W5UBW 55, WA5MLY 11, W5PNY 6, W5BWV 2.

UTAH—SCM, Gerald F. Warner, W7VSS—SEC: W7-WKF. RAI: W7OCX. Section nets:

BUN	Daily	7272 kc.	1830Z
UARN	Sat.-Sun.	3987.5 kc.	1400Z
URN	Mon.-Fri.	146.2-146.8 Mc.	0030Z

The UARN is being reorganized with W7ZC as the new net mgr. V.h.f. DXer W7RQT has moved to a new Salt Lake City QTH. 8 meters really came to life during June, with K7HEN reporting QSOs with 22 states. Field Day reports were received from five different clubs and groups in the state. Most reported good band conditions and excellent results. W7OCX reports more business than usual on BUN despite summertime QRM and QRN. WA7BAQ is now on 40 meters with an HW-22. A new licensee in the Kearns area is WN7HUA. Traffic: K7-RAJ 359, W7LQE 96, W7OCX 93, WA7BME 29, K7SLX 5, WA7ADK 4.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: W7YWE. RAI: WA7CLF. PAMs: W7TZK, K7SLM. OBSs: W7TZK, K7SLM. Nets: Pony Express, Sun. at 0830 on 3920; YO, daily at 1830 on 3610; Jackalope, Mon. through Sat. at 1215 on 7255. New appointment: K7-KSA as ORS. As of this writing K7OWT is on his way to Germany. The Casper Club is the proud winner of the Field Day trophy. However, it wasn't won without combating Murphy's Law. WA7DLK has a new transceiver and has been keeping the 20-meter airwaves hot. Vacation time is about over, so start thinking about becoming active in some of the nets again. If conditions dictate, the Jackalope may have to move back to 3920 for the winter. The YO is handling more traffic than ever. Traffic: W7TZK 61, W7YWW 61, W7YJI 24, WA7-DNZ 21, K7AHO 16, W7NKR 8, K7POX 7, K7SLM 7, W7CQP 4, W7EUX 2, K7OWT 2.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Edward L. Stone, K4WHW—SEC: WA4FL. RAI: WA4EXA. PAM: WA4EEC. New appointees are K4UPL as OO, WA4AZC as OBS V.H.F., WB4-DIN as OPS. EC K4EJM informs us that a new Swan 350 is now in operation at Anniston c.d. headquarters. OVS W4YRM is doing some fine work with FETs on 144 Mc. W4KPD, K4TKB and K4TRC have joined the 2-meter f.m. group in N. Alabama. W4WGI has a new array up 60 feet and is working the f.m. mobiles 40-45 miles out in any direction from Huntsville. K4VPP has a new HW-22 and K4PXR has a new NYL. A new 60-ft. tower has been added to the W4ZNI QTH; atop is a tri-bander and new beam for 6. WA4EEC now has a new SB-200 in her new "shack." The new frequency of AENO is 50.540. WA4CCV is manager. Would like to have more reports from the section operators. If you have not been reporting, how about letting us hear from you. Let us know what's going on at your QTH. Traffic: (June) WA4FYU 183, WA4TXC 158, W4FVY 123, WB4DIN 62, K4BSK 53, WA4EXA 52, WB4DCR 50, K4WHW 47, K4AOZ 46, WA4EEC 38, WA4GGD 34, WB4EKK 32, K4GNS 29, W4FPI 22, WA4YU 21, K4-HJX 18, WB4CYU 15, W44YV 14, WB4EKJ 11, WB4-RAS 10, K4KJD 9, K4HJM 5, WA4ZDW 5, W4DGH 4, K4WOP 4, W4YRM 4, WA4WLD 2, WB4FYP 1. (May) K4HJX 53, K4RC'E 4, WA4FNY 2.

CANAL ZONE—SCM, Mrs. Lillian C. Smith, KZ5TT

Asst. SCM, Russel Oberholtzer, KZ5OB. SEC: KZ5MV. RAI: KZ5FX. This will be my last Station Activities report as SCM and I want to thank all the KZ5 gang, and most particularly my Asst. SCM, SEC and RAI, for the fine cooperation I have received. KZ5-OB, who has so ably performed as Asst. SCM, will take over as Acting SCM until an election is held. The OM (KZ5LT) and I will QSY permanently back to Texas and will be on the bands (Ben WA5NVE; Lil WA5NUR) from the Houston area. It has been a great fifteen years here and we'll sincerely miss all our friends on the Isthmus, KZ5PA (Crossroads Amateur Radio Club), KZ5AA (USARSO MARS) and KZ5CZ (Canal Zone Amateur Radio Assn.) all turned in fine Field Day reports. New KZ5s for June: KZ5SB (General), KZ5RON and KZ5-THN (Novice). Traffic: KZ5SF 102, KZ5FN 84, KZ5OA 27, KZ5OB 12.

EASTERN FLORIDA—SCM, Jesse H. Morris, W4-MYB—SEC: W4IYT. Asst. SEC: W4FP. RAI C.W.: W4ILE. RAI RTTY: W4RWM. PAM S.S.B.: W4OGX. PAM 40M: W4SDR. PAM 75M: W4TUB. V.H.F. PAM: WA4BMC. With Field Day past the summer season of relative inactivity is here. Judging from the number of messages I received there weren't many Eastern Florida

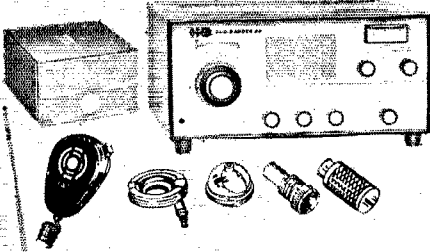
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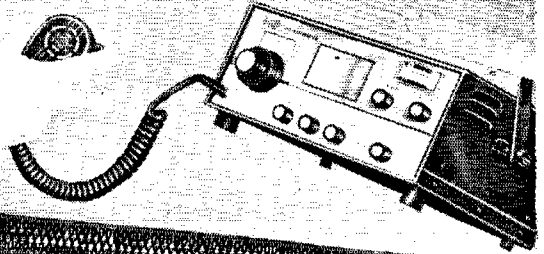
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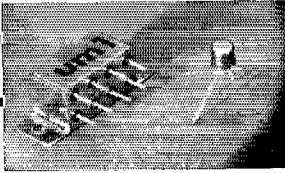
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amateurs in the annual affair but checking the logs of the station at which I participated showed a large number from this section. Maybe Andy got all the Field Day messages. The Novice Hurricane Net (NHN) is now in session on 7185 kc. at 1930Z Sat. WA4YAK is net manager and his efforts are towards making the Novice into an efficient traffic-handler. All stations are invited to check in. K4MTP will undergo surgery for cataracts soon. We wish him well. A nice letter from WN4FLW says that after he read WINJM's comments about being a hot-shot c.w. operator he went out and got himself a mill! Traffic: (June) WA4BMC 453, WA4NEV 383, WB4-ATW 347, WA4RQR 301, WA4FGH 173, W4FPC 166, W4FP 139, WB4DSP 131, WA4NBT 131, WB4BPL 114, W4YPX 112, W4SDR 104, WA4HDIH 98, K4COO 88, WA4YII 88, K4QCC 76, WA4SCK 75, W4MVB 70, WA4-BGW 64, WA4OHO 56, K4DAX 54, W4AKB 53, W4OGX 52, WA4TWD 48, WA4CIQ 47, W4SMK 46, W44MRK 38, K4HEX 30, W4NGR 25, K4HLB 24, W4TRS 22, WA4-WOW 22, WA4PWF 21, W4BKC 17, WA4DEL 17, K4-ENW 16, W4PRK 16, K4LPS 15, WA4WYL 15, W4TJM 14, W4VPQ 14, W4VDC 13, WA4VZD 12, W4GDK 11, K4D8N 9, W4GOX 9, WA4JYB 8, W4SCY 7, W4DFZ 4, K4EBE 3, K4SHH 3. (May) K4BNE 29, WA4IHH 26, W4IYT 14, WA4NBT 14, W4CBE 9.

GEORGIA—SCM, Howard L. Schonher, W4RZL—Asst. SCM: James W. Parker, Sr., W4KGP, SEC: W4-DDY, RM: W4CZN, PAM: K4PKK, K4HQI indicates 50-Mc. activity was poor for June but there were almost daily marginal openings. He indicates plenty of c.w. activity on the band. WB4YN hit a good 50-Mc. opening for 5 hours and worked some good ones. He is building for s.s.b. with 4-65s. Who is interested in a c.w. net on 6? K4UYD is back on the air. W4BGK and WA4LLI have added a TX-62 to their equipment. WB4-BCL now is General Class and WB4EMQ is mobile with a Clegg Thor, K4OSE and his NYL have a new YL harmonic. WA4VVF was QRT vacation and family emergency. W4HYW is active as usual and worked in the New York QSO Party. W4LRR built a nuvister pre-amplifier for 2 and is building a portable 2-meter linear for mountain-top expeditions. Both GSN and GTN activity are improving during the summer season. Check-ins are improving. W4FDN led the check-in on GSN with K4YEC taking over the No. 2 spot. W4FQX is operating mostly mobile and portable these days. The Columbus ARC operated Field Day with three stations and 1027 contacts. K4AJF got on 20 and 15 for the first time in five years. Traffic: W4FOE 448, W4CZN 149, WA4RAV 72, K4VHC 57, W4PIM 37, W4DDY 32, W4-FQX 26, W4RZL 21, K4BAI 20, WA4JES 18, WA4LLI 11, W4HYW 8, W4YE 5, K4AJF 4.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKB—SEC: W4IKB, PAM: WA4ZGI, RM: W4BYE, Pensacola: W4NOG is the new EC for Escambia County. W7BNR/4 was appointed OPS. He and WB4DHz helped the Panama City group on Field Day. W4AXP is looking for a new receiver. The USS Lexington code and theory classes have resulted in a number of new hams for the area. The ship is equipped with an all-band s.s.b./c.w. ham station. The CG cutter *Schago* also has its own station. Fort Walton: W5BJG/4 is back at Eglin and renewed ORS. DJ6RD/4 was a recent visitor in town. DeFuniak Springs: K4KHV moved here from Crestview. K4VWE joined the 2-meter f.m. gang. WA4-PXR's shack was struck by lightning. Panama City: The PCARC, operating as W3MPK/4, made over 1000 QSOs in FD. The section will meet WA4TJ/FJF, who were transferred to Washington, D.C. WA4ZGI moved to Red Bay, in Walton County. WA4JIM will take over as EC for Bay County. Chipley: The WFPN Picnic was held at Falling Waters State Park with a good turnout. Madison: WA4GHE, W4RCO and W4WMA formed a county AREC Net which meets the 1st and 3rd Sun., 1930 EDT, on 3957 kc. Cross City: W5AYS/4 was appointed EC for Dixie County. He has a new Swan 500, with an SBE-34 mobile rig. Traffic: (June) K4VYF 250, W4BYE 116, WA4JIM 57, W7BNR/4 52, WA4EOQ 29, W4IKB 11, WA4GHE 2. (May) WA4JIM 96.

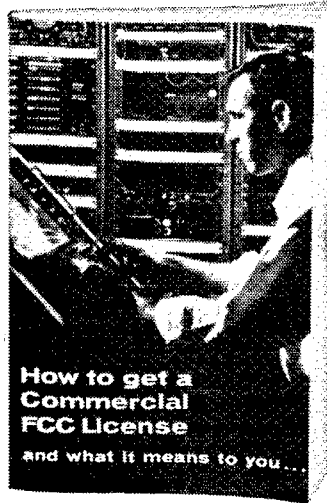
SOUTHWESTERN DIVISION

ARIZONA—SCM, Floyd C. Colyar, W7FKK—PAM: W7CAF, RM: K7NHL, K7MTZ has been appointed OBS. K7YAM is taking flying lessons. Congratulations to new licensees WN7PSA, WN7FNB, WN7FLK, WN7EVS, WN7GAF and WN7EQS. OBS WA7GOG is televising Official Bulletins, ham news and test signals 24 hours a day on 444.1 Mc. W7DQS operated Field Day on 40-meter c.w. from historic Vulture Gold Mine near Wickenburg. W7ZUW/7 is building a converter for 6 and 2 meters. W7QHC is active on all bands using a Heath SB-100. K7IIV won a ski boat, motor and trailer at the Airesearch Spring Dance. Congratulations to W7-CAL on earning the DX Century Club Award. All

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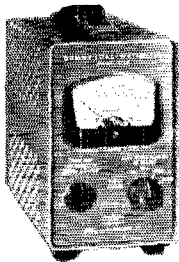
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LOS ANGELES—SCM, Donald R. Etheredge, K6-UUV—RMs: W6BHG, W6QAE, W6BBO, PAMs: K6-MDD, W6MLZ, W6ORS. Traffic-handling congratulations go especially to BPLers for the month of June: W6GYH, W6BBO and W6GGL. W6BRVQ is looking for a new transmitter for his new QTH. W6VNI attended a convention in W7-Land early in June. W6GGL is operational now on RTTY for traffic-handling. W6-SCK reports, "TVI in ham receiver from color TV set." However, he points out there is no TVI in the color TV set from his rig. K6LJ and W6GHLB report they used "battery multiplier" in the past Field Day exercises. W6GHB was solar powered. The City of Los Angeles now has active RACES participants. For full information on joining contact W6TXJ. K5ANS/6 now runs Official Bulletins on RTTY but expects to be moving to Louisiana permanently soon. W6AM reports Field Day was operated from the car the whole 24 hours worth. W6OUD now is the holder of the WAC 2-way s.s.b. award. Congratulations, Dave. W6BTY's operating schedule was cut down because of an increased work schedule. K6HV reports a nice visit at the QTH of SM5KP and VE2XPO during vacation. K6BPC now has the capability of RTTY on 2 through 80 meters and has been designated as AREC headquarters station for L.A. New officers of the LERC Amateur Radio Club include WA6VTM, presy.; WA6RQ, vice-pres.; W6-PSR, secy.; W6MZI, treas. K6QPH reported a bumble bee sting for Field Day. Club stations requesting the Field Day points bonus for a message to the SCM included WB6VHU, W6LS, W6KA, K6AGE, W6PMO, W6HS, K6HAM, W6SD, W6GZC, Crescent Bay and Aerojet. K6BY and K6LK are active with 100 watts in on 1222 Mc. daily at 0239Z. Traffic: W6GYH 712, W6-BBO 711, W6QXY 346, W6QAE 285, W6GGL 238, WA6KZI 197, K6CDW 159, W6OEO 131, W6FD 123, W6MLF 106, W6SCK 74, WA6WKF 47, K6IOV 45, W6BHG 43, W6GKG 43, W6GPH 33, K6LJ 30, K6-ASK 28, K6BPC 28, W6HUJ 24, W6OILD 22, W6TXJ 22, W6AM 16, K5ANS/6 16, W6QMF 16, W6SLG 10, W6AEL 9, W6DQX 9, K6QPH 9, W6PCP 9, K6UAV 9, W6OUD 8, W6TN 8, W6USY 8, W6ORS 6, W6YRA 6, W6PUZ 2, W6SRE 2, W6RCV 1.

ORANGE—SCM, Roy R. Maxson, W6DEY—K6IBI returned to the air recently after 15 years QRT. Orange section hams had the biggest FD, from all reports. SEC: W6WRJ and the SCM visited as many FD stations as possible during operations. W6TYZ handled the ORS sked for W6TIF during graduation. RAI WA6ROF is in a new QTH and now has one room strictly as a ham shack. ORS W6AKR moved to the Newport Beach area. W6VQE is a new trahe-handler. OO W6-BAM was visited by WA6CDQ, a former next-door neighbor and the first novice to take the exam from him; also by K7OIN, ex-W6ISN, formerly of Santa Ana. The RATS is on summer schedule; next club meeting, Sept. 12, W6FB. QSOs DUFIF every Sat. a.m. at 7:30 local time on 14.225 USB. W6SIE is a new AREC member. Interested u.h.f. hams should by all means attend meetings of the San Bernardino Microwave Society at 7:30 p.m. the 1st Thurs. of each month at the Corona City Hall, or contact K6HLJ, corr. secy. Traffic: W6BRJX 216, W6BTIF 192, WA6ROF 150, K6IBI 107, W6AKR 102, K6IME 94, W6VQE 39, W6WRJ 20.

SAN DIEGO—SCM, Don Stansifer, W6LRU/WA6-VUI—An Active East County club is the Amateur Radio Club of El Cajon, which meets the 2nd Thurs. of each month at 7:30 p.m., Wells Park, El Cajon. If interested contact W6TAL. Sorry to report as a Silent Key, WA6-HWX, well known to many area amateurs. Director W6KG was a June visitor at the San Diego DX Club meeting. Received a Field Day message from the SOBARS relayed from Brown Field to Ore., back to San Diego, to Bishop, then mailed. Traffic-man W6EOT hopes to climb Mt. Whitney in the fall. W6GMM and family visited SCM W6LRU/WA6VUI in July. My term as SCM expires in Oct. 1967. My last column for QST will appear as the Dec. 1967 San Diego section news. To those who have helped me, worked with me and been my assistants and appointees during the past 14 years as SCM, a heavy thanks. Please support your new SCM and give him every assist you can. My decision not to run again is because of my teaching load both days and nights, keeping me from attending club meetings that fall on week nights. Traffic: K6PPI 8595, W6VNIQ 578, W6BGF 478, W6EOT 247, W6MMPD 9, W6TAI 4.

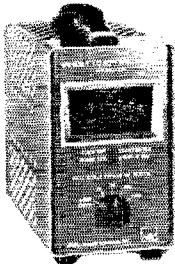


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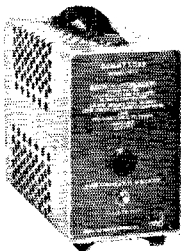


Waters
Mod. 374

DUMMY LOAD/ WATTMETER

2 to 30 MHz • Non-inductive, oil cooled load • 52 ohms load impedance • VSWR less than 1.3:1 DC to 230 MHz • Power Range: 50 w. continuous, 1500 w. intermittent • Warning light signals when max. inner case temp. is reached at 1500 w. input • Wattmeter Range: 4 calibrated scales... 0-15 w.; 0-50 w.; 0-300 w.; 0-1500 w.; \pm 5% of full scale.

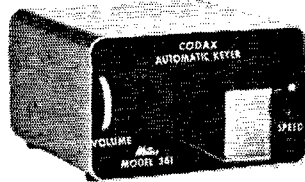
Net \$135.00



Waters
Mod. 384
DUMMY
LOAD

DC to 230 MHz • Non-inductive, oil cooled load • 52 ohms nominal impedance • Power Range: 50 w. continuous, 1500 w. intermittent • Over-temp. indicating lamp signals when max. operating temp. has been reached

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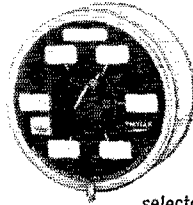


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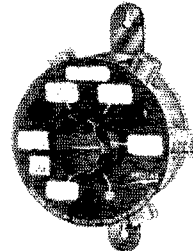
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ANTENNA
SWITCH

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SANTA BARBARA—SCM, Cecil D. Hinson, WA6OKN—SEC: K6GV, WB6SLT, of Santa Barbara (who is age 18), is the Calif. NCS of the North American Teenagers Net (NATAN). More teenagers are needed. Those interested should check in on 7005 at 5 p.m. every Thurs. Your SCM was with the Simi Valley ARC on Oak Mountain (7510 feet) for Field Day. While everyone had a grand time, the score will reflect numerous equipment failures. The rigs on 144.432 and 1296 all failed, plus the 40-meter c.w. position. W6BJM and spouse are on an extended work/play trip to KH6-Land, K6CYR has returned from a month on an ice flow called Fletchers Island, which is now floating near Russia. W6DPV has a new old DX-100 and WAS. WACC, WAC on the wall. W6DPV sent the only traffic report. Field Day messages were received from the Esfero and Santa Clara HS Amateur Radio Clubs. Appointments: K6GV as SEC. Traffic: W6DPV 24.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG —Asst. SCM: E. C. Pool, W5NFO. SEC: W5PYL, PAM: W5BOO, RM: W5LR. Another Field Day is history, and what history can be written about all the different insects and various kinds of stinging and itch-causing weeds that have never been heard of before that causes Field Day to be such a challenge to the ham. Thanks to the weather man there was not too much bad weather to mar the pleasure of good Field Day operation. All of the groups heard from report a very successful operation. I was disappointed in the number of Field Day messages, only eight were received. That is the easiest 25 points a group can make and it takes only a few minutes time. Now that the bonus for a FD message has jumped I wonder how many noticed the announcement on page 64 of June QST. Looks like about 600 points could be earned without much effort. The Tarrant Co. 6-Meter Emergency Net has 19 active members and all are working toward the completion of their newly-acquired van. Now they are in need of a 1500-watt 110-volt generator. Do you have one that is not being used? If so, why not donate it to the group so that some use may be made of it? The Arlington ARC has started making plans for its Annual Christmas Party, Dec. 9 has been picked as the tentative date. W5JSM is director of civil defense at Hereford. Traffic: K4UBR/5 93, W5LR 35, W5JSM 20, W5PBN 16, W5MSG 2.

OKLAHOMA—SCM, Daniel B. Prafer, K5CAY—Asst. SCM: Sam Whitley, W5WAX. SEC: K5ZCJ, RM: W5QMJ, PAM-75: W5PML. The turnout for the Aeronautical Center rote and theory class has been excellent with over thirty students attending. K5OCX is recovering from a crushed foot. W5GVH received extensive damage from lightning. Field Day was rough for Oklahomans because of rain storms over the state. W5EHC reports he worked W9CC for his DX contact of the year. The Lawton-Fort Sill Club's new officers are WB4-AGX, pres.; W4LPM, vice-pres.; W5QJB, secy.; W4SNPN, treas.; W5HIM, act. mgr.; W49FRE, pub. mgr. W5PEC is station trustee. WB4AOX also is the proud father of a new daughter, Tabatha Ann. K5BYF was active during the V.H.F. QSO Party on Mount Scott. WA5OTU has his station on the air working through the Tulsa repeater on 2 meters and holding skeds with KH6-Land on 20 meters. WA5NYX is the proud owner of a Galaxie V. K5ZEP has his new 2-meter amplifier on now running around 800 watts. W5PWZ is recovering in Tulsa Hospital. The Oklahoma Central V.H.F. Club received its club license with the call WA5-SOD. Charlie Farris is trustee. Traffic: K5TEY 738, WA5-IMO 148, W5TZX 39, W5PML 24, WA5KZA 12.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5-AIR—SEC: K5QQG, PAM: W5KLV, RM: W5EZY. Enjoyed seeing quite a number of ECs and other appointees at the Texas State RACES Conference June 11 held in Texas Dept. of Public Safety Training Bldg., Austin. WA5QKE still is plagued with rig trouble but managed to handle some traffic and add a couple of countries to his list. Speaking of DX: The South Texas QSL Bureau desperately needs you SASE. K5QVH and his helper, W5NGW, advise they sure hate to see so many "scrumpitious" DX QSL cards destroyed for lack of SASEs. Mail your SASE to K5QVH, Hurley Saxon, Box 9915, El Paso, Texas. New officers of STEN are K5FRO, NCS; K5-UMH, Alt. NCS; K5EJR, Pro. PAM W5KLV has been meeting and getting acquainted with all the S. Texas emergency and traffic nets. K5WYN provided communications to the State Hospital in Galveston. EC W5TFW reports the usual QNTs but no traffic. He notes that WA5PVF has a new SB-100 on the air. RM W5EYZ reports a summer traffic slump on TEX. More stations



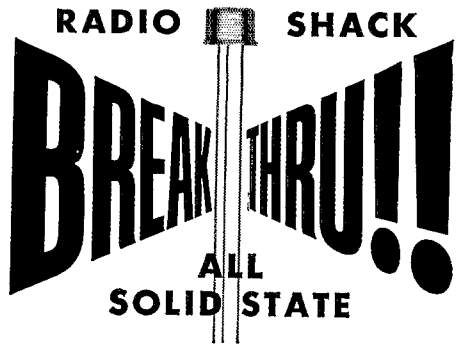
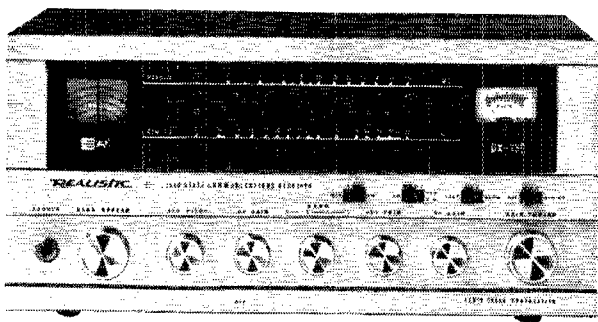
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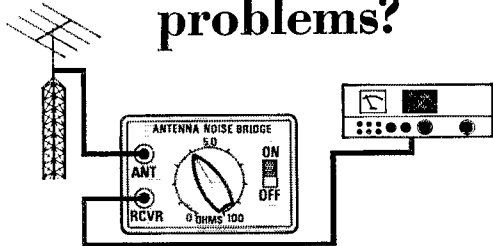


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are needed on the TEX Traffic Net, 3770 kc. at 1900 and 2200 CDST daily. Here is the net to move your traffic. It maintains liaison with RN5 and NTS. RM W5EZY is busy traveling between San Antonio and Washington, D.C. Keep in mind that the RN5 early session at 1930 CDST will meet on 7095 kc. for the duration of Daylight Saving time. The late session is as usual on 3645 kc. at 2130 CDST. EC K5HZR reports 1968 National ARRL Convention plans are moving ahead. W5LLS will be convention chairman, K5PKX chairman of committees, W5EJT registration committee chairman. W5VPQ attended the National Convention in Montreal and presented ARRL Pres. Robert Dennison with a scroll appointing him International Ambassador for 1968 "HemisFair." W5HFU is the new Editor of the *W5ES Bulletin*. Traffic: K5HZR 125, W5AC 107, W5KLV 61, W5JQKE 56, K2EJU/5 50, W5HGE 47, W5MBC 40, W5EZY 29, K5HMF 17, W5AIR 13, W5HWY 8, W5AQN 4, W5GZX 2, K5WYN 2.

CANADIAN DIVISION

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FK, PAM/APS: VE6ADS, ECs: VE6SA, VE6SS, VE6XC, VE6AFQ, VE6PL, ORS: VE6BR, VE6ATH, VE6ATG, OPS: VE6HM, VE6SS, VE6ADS, OOs: VE6HM, VE6TY, OPS: VE6HM, VE6ATF, VE6EJ had a very nice visit from G3FYG and his XYL of Meopham, Kent, England. K6IPF visited VE6FK, some groups reported very good results on Field Day and some not so good. Thanks to all those who quired on the nets and sent cards while I was in hospital. VE6AFQ is busy these days putting a new s.a.b. rig together with hopes of not too many bugs. Another new call heard on c.w. is VE6AUJ with a good signal. Also some new voices are heard. Nice going, fellows, and welcome to the crowd. Let us know what your fall activities are so that we can let the rest know what to expect for this winter. As you know you have no elected SCM at present, and I am only acting pro tem until some name is sent in. Traffic: VE6HM 69, VE6ATH 66, VE6XC 36, VE6FK 13, VE6ATG 9, VE6SS 7, VE6FS 6, VE6AOO 5, VE6WN 3, VE6YW 3, VE6AFQ 2, VE6GN 2.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—Richmond ARC officers are VE7AAN, pres.; VE7BTV, vice-pres.; VE7BKK, secy. The club meets every Tue. night. VE7AAN and VE7BKK have built the HBR-13C Oct. '65 QST and now plan to convert to solid state. Nanaimo ARC's new officers are VE7GR, pres.; VE7BDR, secy.-treas. VE7AR will be back in Vancouver UBC this fall. VE7ARO is wearing an arm cast; not from c.w. but he fell on it. W6IQP, VE7PF and VE7FB were awarded the British Columbia Centennial Medal by the City of Vancouver and Burnaby for their assistance in communication on the Pony Ride to Expo. At long last VE7DH has retired his for a Fontaine and has better 2-meter signals from it. VE7BUV and XYL had girl No. 2. VE7KS now has his Class "A" ticket. VE7MQ is a member of a flight crew on a DC-8. VE7PW lost his son through "C." Coupe fall *Zero Beat*, the VSWC paper, will be looked for after summer vacation. Ben Pooley now is VE1AHX. The Vancouver Island Picnic was a big success with seventy amateurs and their families really enjoying themselves. The committee put on a real active event and even the weather cooperated. Well, this is a first for B.C., no Form 1 reports.

MANITOBA—SCM, John Thomas Stacey, VE4JT—Field Day activity saw the Winnipeg DX Club, VE4-AAA/4; Winnipeg Amateur Radio Association, VE4BB/4; Flin Flon ARC, VE4DF/4; and Brandon ARC, VE4-QD/4, in action with many AREC members taking a five part. VE4LG is on 2 meters f.m. and is building s.a.b. gear for 75. VE4RW has his Advanced Class license now and enjoying 75-meter phone QSOs. VE4EI has a solid state receiver underway. VE4HT takes over as chairman for UMARS and promises real activity from VE4-UM in the fall. The C.W. Net is in need of some additional Winnipeg operators and solicits your support. This column completes two years of reporting as your SCM. It has been a frustrating period of time as most of the section amateurs fail to submit an activity report. A hamgram, letter or postcard will bring a supply of station activity report cards for your use. The SCM's appointment has expired and after due notice in QST no nominations were filed. Let's pick up our socks and get some life into the Manitoba section. MTN reports sessions 30, QNT 124, QTC 110. Phone Net reports sessions 26, QNT 240, QTC 9. Traffic: (June) VE4LG 74, VE4RW 66, VE4NE 55, VE4JT 54, VE4NW 16, VE4SC 16, VE4QJ 6, VE4XN 6, VE4EI 5, VE4JA 4, VE4GN 3, (May) VE4GN 4.

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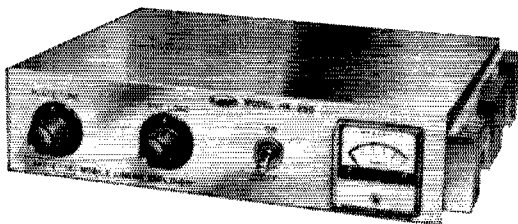
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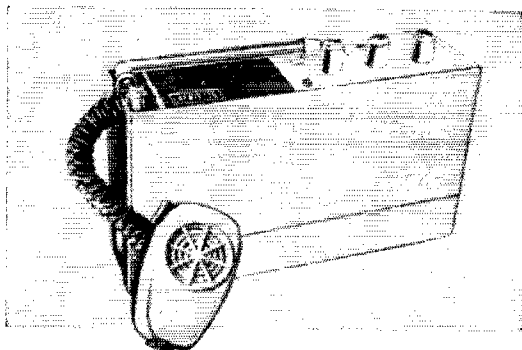


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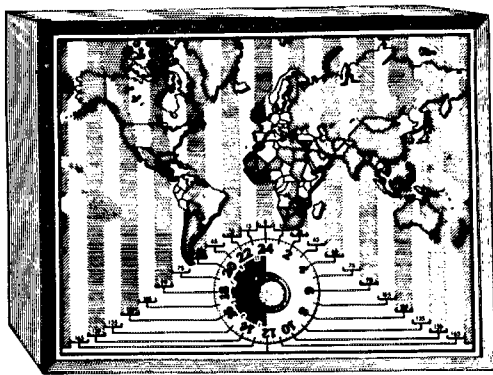
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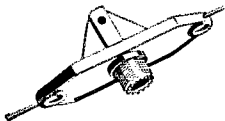
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QT-118

MARITIME—SCM, J. Harley Grimmer, VE1MX—Asst. SCM: R. P. Thorne, VO1EI. SEC: VE1HJ. It is with deep regret that we report the passing of VE1OY and our sympathies are extended to his family. The HARC provided communications for the Halifax Natal Day Parade and together with the CBC Club handled traffic for the Marblehead Ocean Race. VO1AW was top Canadian in the RSGB 7-Mc. C.W. Contest and received a certificate for his operation in the OZ Contest. VE1MX had top score for this section in the New Jersey QSO Party. Congratulations to VO1HQ for top score in the W/VE Contest for this section. VO1IM recently received his Advanced amateur ticket. VO1AQ has a new SB-401A. VO1BH has a new KW1M-2 and VO1FN has a new N-200 and homebrew 3-band ground plane. Poor band conditions and summer vacations have been playing havoc with net attendance lately but improved conditions this fall will hopefully remedy this situation. VE1OM reports hearing VP9 and KP4 stations on 6 meters so keep a close watch to the south, gang. See you all at the convention on Labor Day week end. Traffic: (June) VE1AMR 15, VE1MX 4. (Apr.) VO1FX 24, VO1FN 8, VO1AW 5, VO1AI 2.

ONTARIO—SCM, Richard W. Roberts, VE3NG—VE2TT was welcomed to his native Ontario by host VE3HW after 23 years in VE2-Land. A mid-day get-together and a splash in the swim pool of VE3KQ was indeed a fine welcome. The Ontario ARRL Division Convention, to be held in Ottawa the last week end in October, is shaping up in right good form. There will be sessions for all of you. A note to P.O. Box 204, Ottawa, will get you all the information. VE3VF vacationed in Maine. Your SCM, as usual, was in his W1 QTH at Kennebunkport, Maine. The Chicken Junction Picnic was a gasser. VE2BK, Canadian Division Vice-Director, has advised me that Air Canada has passed along to him its appreciation of the assistance of three hams in the Ottawa area on the crash of a DC-8 May 20. The following are to be congratulated: VE3GFL, VE3FTJ, VE3DAIU. Gentlemen, I nominate you for the ARRL Public Service Award. VE3YN has moved to Sharbot Lake and is on 75-meter s.s.b. most evenings. VE3VD works all kinds of c.w. DX with an indoor antenna. VE3CUA sends a very comprehensive report on 2 meters. VE3BBQ soon will be on with an HW-12. VE3DU attended the National Convention in Montreal. VE3EZI and VE3FZC attended the welcome to VE2ATT at the QTH of VE3KQ in Don Mills. VE3RX was read from the Bancroft area with much gusto. VE3AW likewise in the Eastern Georgian Bay Area. VE3HW is en route Maritime Mobile to Expo, mit all der gear, etc. Traffic: (June) VE3DPO 91, VE3NG 81, VE3DRG 72, VE3BLZ 51, VE3DVE 36, VE3BUR 35, VE3ATI 31, VE3GCE 30, VE3EBH 26, VE3DU 23, VE3BBQ 19, VE3FGV 17, VE3GI 16, VE3EZY 12, VE3ETM 9, VE3HZ 6, VE3VD 3. (May) VE3UD 4, VE3BUR 2, VE3EZY 2.

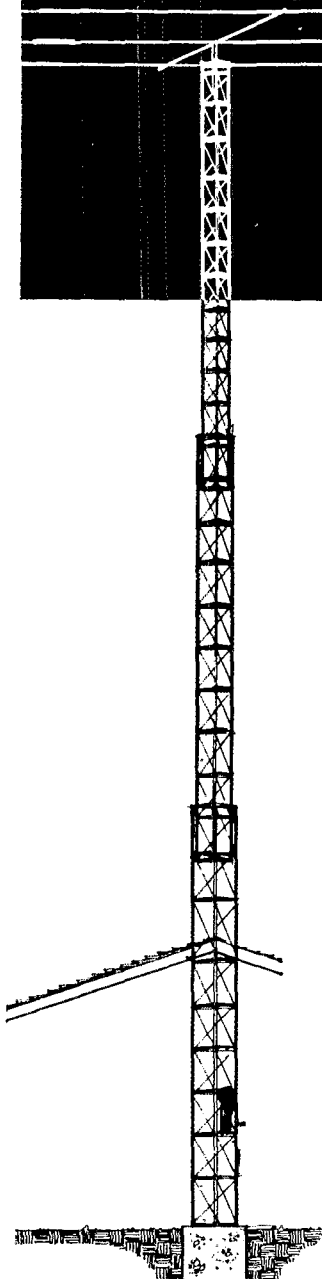
QUEBEC—SCM, J. W. Ivey, VE2OJ—SEC: VE2ALE, RM: VE2DR. PAMs: VE2AGQ, VE2BWL. The main thought on our minds has been the National Convention. Much thanks to VE2MS and VE2IJ for getting together a fine team and to VE2PX for his very lively work. VE2ANY has relinquished EC duties to VE2ASJ. VE2BWU, who is leaving our section, has his EC duties taken by VE2WM. VE2EC has asked to be relieved of EC duties and VE2AJD is to assume that appointment. An addition to the amateur radio roster is VE2AKC, another protegee of MARC code classes. It was nice to hear, as portable VE2, mainly because of the convention, that the first GI, LA, EL and several others were the first to operate portable VE under our new reciprocal agreement with all countries wishing to participate. The MARC group, under the capable wings of VE2AGQ, had a very successful Field Day setup. We received Field Day messages from the following groups: VE2BAW/2, VE2ALH/2, VE2ARC/2, VE2SD/2, VE2BUW/2, VE2CSH/2, VE2WE/2, VE2AZR/3. After many years as an excellent net manager for OQN, VE2CYR has had to give in to other duties. Thanks very much, Den. As his successor, VE3EBH will deserve all your support. Traffic: VE2BWL 74, VE2DR 70, VE2OJ 56, VE2BRD 36, VE2CK 34, VE2EC 30, VE2RVY 21, VE2AGQ 18, VE2ALE 17, VE2WM 12, VE2DCW 7, VE2AJD 6.

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(Continued from page 77)

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Reliability: Uncertain, but in no case higher than that of the Bureau.

Speed: Again uncertain; depends on how foreign mail is handled when it reaches the Soviet Union. In some cases may be considerably faster than the Bureau.

Russian Callbooks

Perhaps the most frustrating thing about QSLing Russian hams is that there is no really usable callbook available. The list compiled by SL3ZO contains about 750 calls, mostly in the DX regions of the U.S.S.R. But, like all such publications, it contains no street addresses, only the amateur's name and his city or town.

The only official callbook I know of was published — in Russian — in 1962. It is complete in the sense that it lists all 10,500 stations licensed at that time, but it too gives no street addresses. A typical entry is "UA9DN, V. I. Semenov, Sverdlovsk." I have a copy of the book and will be happy to furnish "addresses" from it to anyone interested. (A s.a.s.e. will be appreciated.)

Some Hints

While there is no magic formula for speeding up the return of Russian QSLs, there are two techniques that may help. First, mint Russian stamps² and IRCs³ will probably expedite the return of a sought-after card. Second, if you QSL via the Bureau, you will make its work easier if you sort your cards the way the Russians do — by prefix number and then by letter, i.e., UA1, UN1, UA2, UC2, UP2, UQ2, UR2, UA3, etc.

The Russians encourage the exchanging of QSLs with foreign hams, so much so that a recent issue of Russia's *Radio* magazine contained an article with a title borrowed directly from the ARRL: "A QSL Is the Final Courtesy of a QSO." Though it may sometimes seem that, in the case of Soviet hams, that final courtesy is a long time in coming, most Russian QSLs do arrive eventually. Here, your watchword is patience.

QST

² A good source of mint Russian stamps is the DX Stamp Service operated by W2SAW.

³ IRCs are not redeemable in the Soviet Union. However, Russian hams can use the IRCs when sending out their own direct cards to countries that can redeem them.



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BETTER READABILITY**

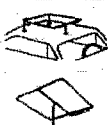
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200	12¢	1000	51¢
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**1. AMP 600 PRV
TOP HAT 6 for \$1**

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400	11¢	1400	69¢	4000	2.50
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250		4.50	5.50	6.89

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15	90¢	1.35	1.59	1.79
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160	5.75	7.50	9.25	10.95
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- 3-45 AMP POWER RECTIFIERS, stud, silicon ... \$1

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400	12¢		

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6.4	20 39 47 91 110
8.0	22 51 120
9.1	27 56 130
10	32 62 150
12	37 68 160
13	33 75 180
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100	7¢	800	29¢
200	9¢	1000	45¢
400	13¢	1200	59¢

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RECTIFIERS**

PRV	7 AMP	16 AMP	25 AMP
50	48	70	80
100	70	1.05	1.20
200	1.05	1.30	1.70
300	1.60	1.90	2.20
400	2.10	2.30	2.70
500	2.80	3.00	3.30
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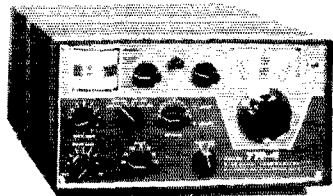
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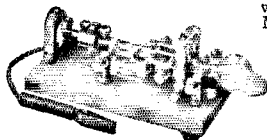
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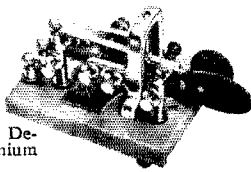
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It is with deep regret that we record the passing of these amateurs:

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W1BVI, Ludlow P. Mahan, Newport, R. I.
K1EGC, Jesse Bagley, Newport, N. H.
W1EHI, Felix Striebe, Trumbull, Conn.
W1YMY, George Hilton, Seymour, Conn.
W2ARW, Morris Brody, Laurelton, N. Y.
WA2DQV, Thomas Hull, South Glens Falls, N. Y.
WA2GOO, George Witting, Toms River, N. J.
K2GY, Joseph E. Joy, Collingswood, N. J.
W2HBU, Stanley Forsythe, Gouverneur, N. Y.
W2IBM, Walter S. Cole, Wayne, N. J.
WB2PVE, Isabel Hempel, Staten Island, N. Y.
W2WWJ, Frederick Miller, Valley Cottage, N. Y.
W3FYP, William Kriz, Kensington, Md.
W3UXW/W2CRE, Raymond G. Beyer, Drexel Hill, Pa.
K4JRK, Joseph Mullen, Williamsburg, Va.
W4MUI, Philip Denon, Miami Beach, Fla.
W4PDW, H. P. Weatherwax, Alexandria, Va.
W5HXX, Clyde Steward, Watonga, Okla.
W5OKE, George Bean, Fort Worth, Texas
W5PWS, Thomas E. Wetsel, Commerce, Texas
K5YTB, Ray Taylor, Oklahoma City, Okla.
WA6HMX, Stanley Walderman, Los Angeles, Calif.
W6JX, William L. Butler, Los Angeles, Calif.
K6KWG, William Horn, Cambria, Calif.
WA6MHW, Irving Aridon, Yuba City, Calif.
W7BBK, C. Wesley Eckhardt, Ritzville, Wash.
K7BAM, Ralph Baker, Klamath Falls, Ore.
WA7CFS, Phil Dunn, Fallon, Nev.
W7EOY, D. Palmer Young, Corvallis, Ore.
W7GJ, Art Bertuleit, Portland, Ore.
ex-W7KVP, Virginia Metzger, Las Vegas, Nev.
W7LHG, John W. Googins, Klamath Falls, Ore.
W7MGT, John Edwin Holmes, Kelo, Wash.
W7OGI, Eugene Wiedmaier, Portland, Ore.
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K7SNZ, Luther Dunn, Springville, Utah
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W9CC, Russell Jenkins, South Bend, Ind.
ex-W9EVF, Wilfred H. Harz, Elgin, Ill.
K9LZF, Earl Fortier, Elkhart, Ind.
W9LRR, Vincent Polich, Chicago, Ill.
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W9UQU, John Massoth, Elkhart, Ind.
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Technical Correspondence

(Continued from page 45)

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Technical Editor, *QST*:

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(Continued on page 140)

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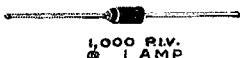
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values have been determined by any one of a number of published methods.¹

After completing the wiring of the input circuit, temporarily place a small carbon resistor, equal in value to the final tube's input impedance, from the cathode to ground. Connect an impedance bridge set at 52 ohms (if that is the exciter's output load impedance) to the input coax connector of the amplifier via a short length of coax cable. With a grid-dip oscillator coupled to the bridge, adjust the slug-tuned input coil, or tap on the coil, for a null reading at the operating mid-frequency of each band. Remove the temporary resistor from the cathode.

With the unwired variable plate tuning and loading capacitors positioned in the chassis, measure the capacitance of each at different dial settings and plot the results.² Then after completion of all wiring except the coil taps, proceed as follows: Set the loading capacitor to its proper value as judged from the plot of capacitance values *vs.* dial settings. Disconnect the pi network coil from the L network and short the antenna side of the L network coil to ground. Calculate the resonant frequency of the L

network according to the formula, $f = \frac{1}{2\pi \sqrt{LC}}$

where *L* refers to the L network coil and *C* to the loading capacitor. This frequency is *not* the band operating frequency. Using the grid-dip oscillator, carefully grid dip for the calculated frequency by adjusting the coil taps on the *L* network coil for each band.

Next, rejoin the pi coil to the L network and set the input capacitor to the proper value as read from the previously-plotted graph. Temporarily place a small carbon resistor, equal in value to the tube's required load impedance at the working plate voltage, from the plate to ground. At this point, the amplifier has been completely wired except for the coil taps, and the tube is in its socket. With the impedance bridge set at 52 ohms (assuming that is the antenna load impedance), feed a g.d.o. signal at the mid-frequency of the band into the bridge, which is connected to the antenna coax connector by means of a short length of coax cable.

Adjust the taps on the pi network coil for each band until the bridge is nulled. The input and output capacitors may be rocked slightly in order to obtain a good null. Some minor adjustments of the taps on the L network coil may also be necessary. Solder the tap connections and remove the temporary plate resistor.

This completes the task, and assures that the plate load impedance is correctly matching the antenna load impedance under resonant conditions via the pi-L network. When the amplifier is checked out on a dummy load with normal power there should be little change in the settings of the plate tuning and loading capacitors. When connected to the antenna, there may be a greater change in the output capacitor setting due to line effects; however, the r.f. output is maximized. This will be readily appreciated on the 10- and 15-meter bands.—
Louis Berman, W6TAQ, 1020 Laguna Ave., Burlingame, Calif. 94010

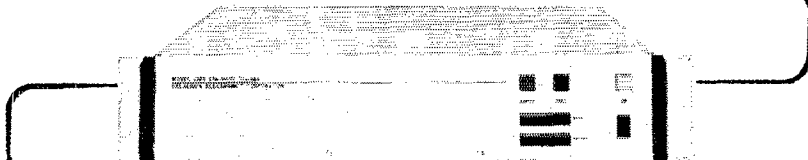
¹ Grammer, "Simplified Design of Impedance-Matching Networks," *QST*, March, April, May 1957.

Rinaudo, "The Pi-L Plate Circuit in Kilowatt Amplifiers," *QST*, July, 1962.

² *The Radio Amateur's Handbook*, 44th edition, p. 240.

³ If a capacitance bridge is not available, the grid-dip meter, together with a standard inductance, can be used as described in the chapter on measurements in the *Handbook*.— *Editor*.

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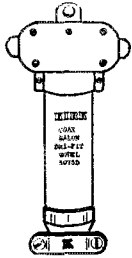
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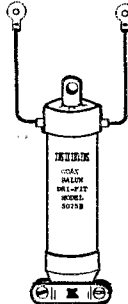


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Forced-Air Cooling of Transmitting Tubes

(Continued from page 25)

mainder are filled with properly-thinned paint sensitive to several different critical temperatures.

Measurements made with temperature-sensitive paint yield basic information sometimes obtainable in no other way, and are the "ounce of prevention" that is worth a "pound of cure."

Conclusion

Tube-surface temperatures are the ultimate criterion by which cooling adequacy may be judged. As tube life is closely related to surface temperatures, reliable temperature or cooling information is very important to the equipment-design engineer and the radio amateur. The proper choice of air blower is important, especially in cases where a high order of back pressure exists in the air system. Use of a manometer to determine back pressure, as well as the use of temperature-sensitive paint, allow the circuit designer to construct a satisfactory forced-air cooling system at the lowest possible cost.

Thanks and appreciation to Bill McAulay, W6KM, Ray Rinaudo, W6KEV, and Bob Sutherland, W6UOV for their suggestions and help in preparing this article. **QST**

The Swiss Quad at ZS6PP

(Continued from page 36)

taps adjusted for minimum s.w.r., keeping the taps at equal distances from the cross-over point. The author found that there was no change in the s.w.r. when the antenna was elevated to full height.

Those with tilt-over towers should have no difficulty in mounting the antenna. Those with fixed towers will probably have to feed the mast up through the tower, fasten on the top horizontal members, raise the mast, and then attach the bottom set of horizontal members.

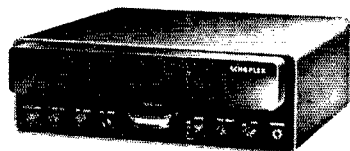
Results

No attempts were made to establish the gain of the antenna in respect to a dipole. On receiving, signals can be heard that just aren't there on a dipole. With the bottom of the antenna 35 ft. above ground, and an input of 150 watts, performance on transmitting has been excellent to all points on the globe. Judging from S-meter readings, the front-to-back ratio appears to be better than 20 db. **QST**

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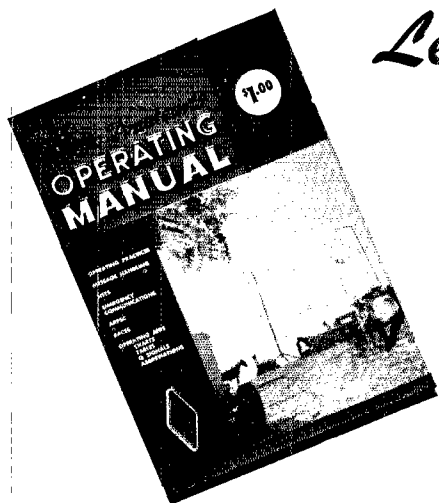
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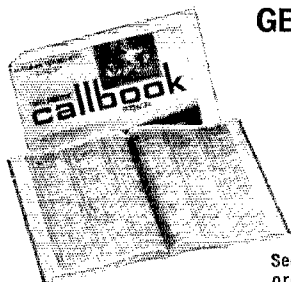
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Happenings of the Month

(Continued from page 72)

Kenneth E. Stecker, W8SS
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 Arthur S. Walker, VE3RO
 Don C. Wallace, W6AM
 Lacy Phil Wicker, W4ACY
 Curtis R. Williams, W5DTR
 Francis K. Williams, WA2UFI
 Donald C. Wilson, WB2RLS
 Richard S. Wujciak, K2OJD

The Committee was officially in recess from 10:45 A.M. until 6:15 P.M. participating in events of the National Convention.

After an examination of a draft report of actions of the ARRL Awards Committee, and after extensive discussion, it was the sense of the meeting that the actions to delete DXCC credits for Chagos (VQ9AA/C), Heard Island (VK2ADY/Ø) and St. Peter and Paul's Rocks (PYØXA), should be implemented immediately.

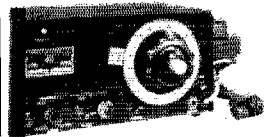
There being no further business, the Committee adjourned, at 6:40 P.M.

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Choosing Batteries

(Continued from page 44)

The maximum permissible charging rate is higher than for nickel-cadmium batteries. Normal charging time for the CRL-1200 pack is 7 hours for a 90-percent charge and 12 hours for a full charge. The pack may be used in any position, and under a wide range of temperatures.

Another battery worth looking into for portable work is the type used for motorcycles and other applications where durable and compact secondary batteries are required. Some of the smaller imported motorcycles now have 6 or 12-volt batteries that weigh as little as 1.5 pounds for the 6-volt model and 5 pounds for the 12-volt. The smallest 6-volt type has a 2-ampere-hour capacity. A 12-volt 5.5-a.h. model weighs 5 pounds. With outlets for Japanese motorcycles every few blocks in most cities these days, it should not be hard to find something to fit your needs in this department.

All this is just the beginning of the battery story. We have purposely stayed with types and sizes that are readily obtainable, and which have definite advantages, depending on the service you expect and the price you want to pay. The details are worth looking into. Though a long-time user of batteries for portable work, the writer learned quite a bit in the process of compiling information for this article. We wish to express our thanks to the Union Carbide Corporation (Eveready), the Burgess Battery Company, the Electronics Division of Globe-Union (Centralab), the Mallory Battery Company, The Electric Storage Battery Company, Wisco Division, and IRC, Inc., for their generous assistance.





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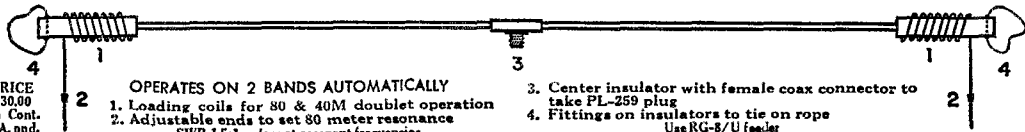
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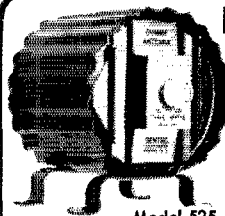
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See Page 159



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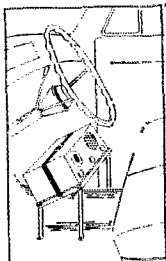
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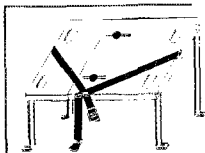
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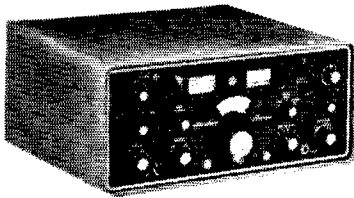


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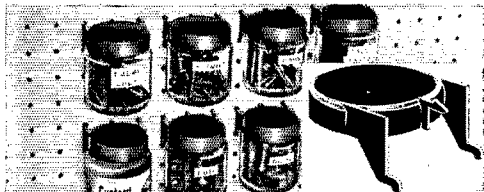
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Handy Dandys are sturdy, plastic caps that snap into 1/8" pegboard and hold quarter twist baby food jars. Ideal for storing all kinds of small parts and things. Keep your workshop neat. 10 for \$1; 36 for \$3; 72 for \$5; 500 for \$32.50. Handy Dandys only. No jars. Shipping paid anywhere USA. Send payment with order—no C.O.D.

WICKLIFFE INDUSTRIES, INC. P.O. Box 244, Dept. QT-9
Wickliffe, Ohio 44092

Clicks and Chirps

(Continued from page 19)

Fig. 2C, can be constructed to shape the make and break for eliminating clicks. Such a unit is shown in the photograph: it is easy to build and requires no modification of the transmitter.

In the filter, values of approximately 1 henry for L_1 and 0.5 to 1.0 μf . for C_4 would be suitable for most rigs. Increasing the inductance of L_1 will reduce the clicks on "make" and increasing the capacitance of C_4 will reduce clicks on "break." The current rating of L_1 should be approximately the same as the plate current rating of the amplifier in the transmitter. L_1 in the model in the photograph is a power-supply choke from a TV set. These TV chokes run about 1 henry and have adequate current-carrying capacity.

The unit shown is housed in a $2\frac{1}{4} \times 2\frac{1}{4} \times 4$ -inch Minibox. A key jack is mounted at one end and a cord and plug at the other. The key is plugged into J_1 and P_1 goes into the key jack on the rig.

It is recommended that the reader also study the chapter on keying in *The Radio Amateur's Handbook*. There is no reason for putting up with clicks and chirps. Aside from having pride in your own signal, no one wants to get into trouble with the FCC!

QST

A Low Noise Converter

(Continued from page 16)

An aluminum cover panel (Vector PL4566) serves as a bottom plate. Four rubber feet were attached to the bottom cover in this model. This box cost approximately \$2.40, minus the circuit board. There is no reason why a standard chassis or Minibox could not be used as a base. The circuit board could then be mounted over a cut-out area just slightly smaller than the etched-circuit board's outer dimensions.

Because J_2 is mounted near the corner of the circuit board, it interferes with the corner bracket of the Vector box when the end rail is attached. The author merely omitted that particular corner bracket and no problems resulted. The box closed tightly and maintained its rigidity as though all four brackets were used.

The photos show that large 0.005- μf . disk capacitors were used. The smaller 0.005- μf . 50-volt disk capacitors and that are available from most supply houses would result in a neater-appearing layout. Either type is satisfactory, however.

Because this converter is stable, has good overall gain, and has a good noise figure, it should appeal to the v.h.f. operator who has discerning tastes as far as two-meter receiving gear is concerned. Even the author was pleasantly surprised at the outcome of this project. Others should have equal success with this circuit.

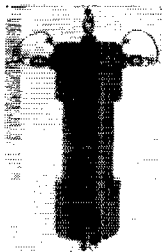
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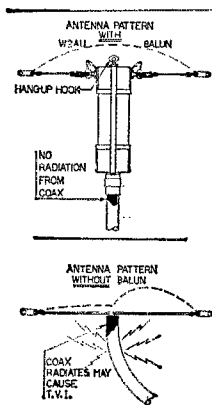


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QUICK QUIZ

Q. When may third-party messages be handled between amateur stations of different countries?

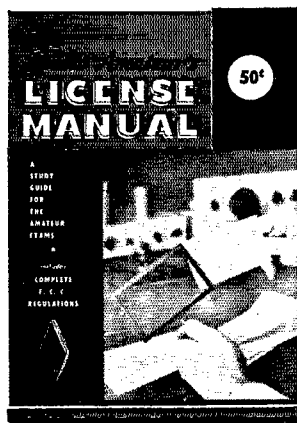
Q. When does a state of emergency affecting amateur communications become effective and when is it terminated?

Q. On what amateur bands is portable operation permitted without prior notification to the inspector of the district in which such operation is contemplated?

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THE AMERICAN RADIO RELAY LEAGUE

Newington, Connecticut 06111

(Continued from page 54)

Glen Sez:

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Glen-W2CXX

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other, I raised the hot end of this antenna to the edge of the adjoining window using parcel post twine, and tied the string firmly to the closest bed leg. Mechanically, this arrangement meets our usual requirements very well. I do caution against rearranging furniture, though, without first taking whatever precautions are needed to prevent breaking this string—the radiating qualities seem to be impaired with half the antenna lying on the lawn.

This completed 40/15 meter antenna curves in a graceful catenary along the outside walls of the apartment, laying against metallic rain gutters and other apparent discontinuities. An s.w.r. measurement, however, shows a value of 2.0, more or less, depending on the meteorological conditions. I really must cut or splice the antenna length to a lower s.w.r. — I plan to get around to this one of these days.

The 20-meter antenna was the final addition to this cliff-dweller's sky-wire farm. This was a separate length of hook-up wire, soldered to the same coax inner conductor as before. This was hung outside the window through the same screen, starting with a 17-foot length of wire and pruning it, 3 inches at a time, till the s.w.r. on 20 meters fell below 1.5. This s.w.r. also varies slightly with the wind and the rain, but not too badly.


At the beginning of this article, I spoke of possible lease restrictions on exterior antennas. In my case, the outside walls of the apartment house are made of cream-colored bricks. Careful color matching of the white insulation of the hook-up wire results in both antennas being unnoticeable against the brick walls, thus minimizing any distasteful eyesore for the surrounding neighbors.

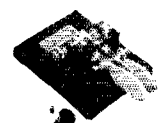
Materials used during this installation included about 50 feet of hook-up wire of appropriate color, about 50 feet of string (most of which may be used for more conventional purposes after completing the installation), and a C-clamp. Total cash investment was about a buck, if you buy new hook-up wire. This cost can be further reduced, if shorter bits and pieces of hook-up wire are available, spliced, and taped. No matching networks are necessary, and, in my case, TV reception in adjoining apartments is unaffected.

Thus far, after some 30 hours of on-the-air time, I've worked about a dozen European countries, and 20 states as far as the West Coast without too much difficulty. DXCC may not be achieved with this lash-up, and we do admit finding it hard competing with phone stations with beams on 20 meters. But I am on the air with some degree of satisfaction.

I hope this article encourages other hams who have no room to put up more conventional or sophisticated antennas. Remember, any reasonable hunk of wire will radiate a signal, given half a chance!

QST

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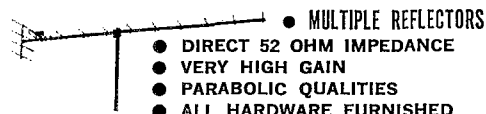
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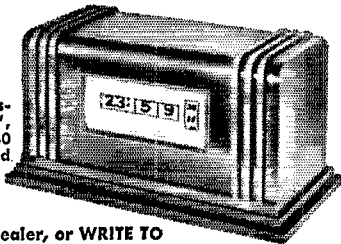
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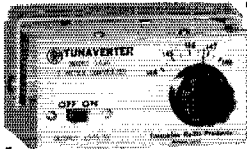
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(See complete listing in Aug. '67 QST ad, page 130)
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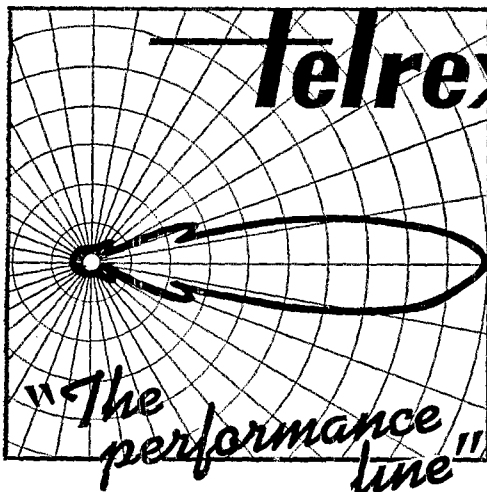
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(Please see the other side of this page for an application for membership in ARRL and 12 issues of QST)

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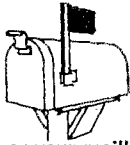
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(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for, except there is no charge for phone, which is essential you furnish. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate. Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plain on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking-copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

INVITATION: New York Radio Club cordially invites New York City area hams and SWLs to its regular monthly meetings, Second Monday of each month at George Washington Hotel, 23rd St. and Lexington Ave., at 8 P.M. All are welcome. W2ATP, New York Radio Club.

PEORIA Hamfest September 17, Peoria, Illinois. For details see September issue QST Hamfest Calendar. Advance registration: \$1.50. Write: Ferrel Lytle, W9DHE, 419 Stonegate Road, Peoria, Ill. 61614.

"SAROC" Sahara Amateur Radio Operators Convention 4-7 January, third annual convention, hosted by the Southern Nevada Amateur Radio Club. Designed for exhibitors and participants at Hotel Sahara, Las Vegas, Nevada. MARS seminar, Army Airforce and Navy representatives. Ladies' luncheon with crazy hat contest, hat should convey amateur radio theme. Plus fabulous entertainment only "Las Vegas" can present. Registration includes three cocktail parties, Hotel Sahara Show, hunt breakfast, technical sessions, admission to leading manufacturers and sales exhibits. Advance registration closes one January. OSP OSL with zip and telephone number for details to Southern Nevada Amateur Radio Club, Box 73, Boulder City, Nevada 89005.

OLD Old Timers Club now over 160 members with verified 2-way contacts before 1926. Life membership \$15.00, Bi-monthly "Spark Gap Timers" \$2.50 annually. Roster free to members. Write Secretary, W5VA, Box 840, Corpus Christi, Texas 78403.

FAIRBANKS, Alaska Centennial Exposition, KL7ACS Official Station. Visitors call on 3866 or 145350. Informal get-togethers, Kings Kup, Noble Street, noon Saturdays. Commemorative QSLs issued.

FULL Day of demonstrations and entertainment at one of the world's largest science museums, National Amateur Historical Radio Conference, Sept. 23, Dearborn, Michigan. Write W2OY, 69 Boulevard Parkway, Rochester, N.Y. 14612.

MOTOROLA used FM communication equipment bought and sold. W5BCO, Ralph Hicks, 813B No. Federal Hiway, Fort Lauderdale, Florida.

WANT Callbooks, catalogs, magazines, pre-1920 for historical library. W4AA, Wayne Nelson, Concord, N.C. 28025.

SELL: Eimac 4X250B tubes. Guaranteed and cond. \$6.50 each. \$10.00 paid repair in U.S.A. Send check or m.o. Everett Stidham, Jr., W5LQ, 722 So. 30th, Muskogee, Okla.

TUBES, Diodes and Transistors wanted, Astral Electronics Corp., 150 Miller St., Elizabeth, N.J. 07207.

SELL swap and buy ancient radio set and parts magazines. Laverly, 118 N. Wycomb, Landsdowne, Penna.

TUBES Wanted. All types higher prices paid. Write or phone Coco Communications, 120 West 18th St., N.Y. 11, N.Y. Tel: 242-7359.

DUMMYS Loads, 1 KW, all-band, \$7.95; wired, \$12.95. Ham Kits, P.O. Box 175, Cranford, N.J.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 118 S. Clinton, Chicago 6, Ill.

MANUALS for surplus electronics. List 10¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

WANTED: Collins Parts, BC-610, GRC-2, Autodyne, Bethpage, L.I., N.Y. 11714

QSLs?? Largest variety samples, 25¢. Deluxe, 35¢ (deductible). Sakkers, W8DED, Box 218, Holland, Michigan 49423.

HUNDRED QSLs, \$1.25 postpaid. Samples, dime. Holland, R3, Box 649, Duluth, Minn. 55803.

QSLs, Fast. Catalog. Samples, 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio 44935.

QSLs "Brownie" W3CJL, 3111 Lehigh, Allentown, Penna. Samples 10¢. Catalog 25¢.

C. FRITZ—QSLs that you're proud to send, bring greater returns! Samples 25¢ deductible. Box 1684, Scottsdale, Arizona 85252 (formerly Joliet, Illinois).

QSLs-SMS, Samples 10¢. Malgo Press, Box 373, M.O., Toledo, Ohio 43601.

DELUXE QSLs Petty, W2HAZ, P.O. Box 5237, Trenton, N.J. 08638. Samples, 10¢.

QSLs. See our new "Eye-Binder" cards. Extra high visibility. Samples, 5¢. Dick, W8VXK, 1944 N.M. 18, Gladwin, Mich. 10¢ Brings free samples. Harry R. Sims, 3227 Missouri Ave., St. Louis, Mo. 63118.

CREATIVE QSL Cards, 25¢ for catalog, samples, 50¢ coupon. Personal attention. Imaginative new designs. Wilkins Printing, Box 787-1, Atascadero, California 94322.

RUBBER Stamps \$1.15 includes tax and postage. Clints' Radio W2UDU, 32 Cumberland Ave., Verona, N.J. 07044.

QSLs, finest, YLRL's, OMS samples 10¢. W2DJH Press, Warrensburg, N.Y. 12885.

QSLs, SWLS, XYL-OMS (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing, eye-catching, comic, sedate, fabulous, DX-attracting, prototypical snazzy, unparagoned cards (Wow!) Rogers KOAAB, 961 Arcade St., St. Paul, Minn. 55106.

3-D QSL cards, recognized leader among raised designs. Compliments aplenty! Prized collector's item. Samples 25¢ (refundable). 3-D QSL Co., Monson, Mass. 01057.

QSL, SWLS, WPE, Samples 10¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix 17, Ariz. 85017.

QSLs, 300 for \$4.35. Samples 10¢. W9SKR, George Vesely Rte. #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLs 3-color glossy 100, \$4.50. Rutgers Vari-Typing Service. Free samples. Thomas St. Riegel Ridge, Milford, N.J.

QSLs-100 3-color glossy \$3.00; silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

RUBBER Stamps, 3-line address \$1.50. J. P. Maguire Company, 448 Proctor Avenue, Revere, Massachusetts 02151.

QSLs stamp and call brings samples, Eddie Scott, W3CSX, Fairplay, Md.

ORIGINAL EX-IN double holders display 20 cards each in plastic. 3 for \$1.00 or 10 for \$3.00 prepaid and guaranteed. Free sample to dealers or clubs. Tepabco, John K4MNT, Box 198T, Gallatin, Tenn. 37066.

QSLs: Quality with service. Samples free. R. A. Larson Print, Box 45, Fairport, N.Y. 14450.

PERSONAL, Different low cost colorful QSLs. Samples, 10¢. Carl, WA6ZHD, 5437 Charlton Way, Hollywood, Calif. 90028. QSLs, Free samples, attractive designs. Fast return. W7IIZ Press, Box 2387, Eugene, Ore. 97402.

QSLs, Kromkote glossy 2 & 3 colors, attractive, distinctive, different. Choice of colors 100-\$3.00 up. Samples 15¢. Agen, for Call-D-Cals, K2VOR Press, 31 Argyle Terrace, Irvington, New Jersey 07111.

PICTURE QSL Cards for your shack, etc. Made from your photograph. 1000 \$14.50. Also unusual non-picture designs. Samples 20¢. Raum's, 4154 Fifth St., Philadelphia, Penna. 19140.

QSLs, Fast service. Free samples, Boiles, W5OWC, Box 9363, Austin, Texas.

QSL, SWL, cards that are different. Quality Card stock. Samples 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio.

FINE Embossed QSL's Samples, Ace Printing, 6801 Clark Ave., Cleveland, Ohio 44102.

QSLs Glossy coated, 100, \$2.00, 3 and 4 colors. Samples, dime. Bob Garra, Lehighton, Penna. 18235.

QSLs, Free Samples. Fast. Joe, W82YIV, 518 Glenmore Ave., Neptune, New Jersey 07753.

QSLs, Second to none. Your personal combination from largest selection, glossy reds, blacks, calypso, Pinecraft, velum and crystallon. All ink colors. Many card styles. Fast service. Samples, 25¢. Includes your call in beautiful 4 1/2 inch letters. Ray, K7HJR, Box 1176, Twin Falls, Idaho 83301.

COLORFUL QSLs Samples 10¢ or SASE. WA8NYB Print, 645 Reynard Ave., Cincinnati, Ohio 45231.

CANADIANS: Best used gear list in Canada. Free Etco, c/o Mary, VE2ANN, Box 744, Montreal 3.

CANADIANS: Collins 32V-2, spare final and others: \$200.00. NC-183D, \$185.00. Hammarlund 100 Kc., \$7.50. B&W, low-pass filter, \$10.00. All mint condx. New 4D32 tube, \$17.50. A. B. Morgan, VE30I, 62 Oak Dundas, Ont. P., Canada.

WANTED: Military and commercial laboratory test equipment. Electroncraft, Box 13, Binghamton, N.Y. 13902.

SAVE On all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts, 617-598-2530 for the gear u want at the prices u want to pay.

TELETYPE: Buy 28¢, sell parts. W4NYF, Schmidt, 405 NW-30th Terr., Ft. Lauderdale, Fla.

MICHIGAN Ham! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan 48104, Tel. NOrmandy 8-8262.

FOR Sale: Heathkit Comanche-Cheyenne mobile twins. Complete mobile and fixed supplies, mike, cables, bracket, etc. Make an offer, package deal only, sry, K. Lamson, 4702 Fifth Ave., Pittsburgh, Penna. 15213.

We buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y.
RTTY Gear for sale. List issued monthly, 88 or 44 myh toroids, five for \$1.50 postpaid, Elliott Buchanan, W6VVC, 1067 Mandana Blvd., Oakland, Calif. 94610.

CASH Paid for your unused Tubes, and good Ham and Commercial Equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, NYC 10012. Call 212-WALKER 5-700.

WANTED: Tubes, all types, write or phone Bill Salerno, W2ONV, 243 Harrison Avenue, Garfield, N.J., Tel: GARfield Area code (201)-773-3320.

ESTATE Liquidation offers, Big list. Parad Engineering Service, 284 Rte. 10, Dover, N.J. 07801.

WANTED: Model 28 Teletype equipment, R-388, R-390A. Cash or trade for new amateur equipment. Alltronics-Howard Co., Box 19, Boston, Mass. 02101.

TOROIDs, 88 mh uncased, \$/2.50. Postpaid, Humphrey, WA6FKN, Box 34, Dixon, Calif.

SELL: CO, QST, Handbooks, old radio magazines, any quantity. Buy Old radio gear and publications. Erv Rasmussen, 164 Lowell, Redwood City, Calif.

NOVICE Crystals, all bands, \$1.30 each. Free list, Nat Stinnette, Umatilla, Fla. 32784.

FREE Catalog. Loads of electronic Bargains, R. W. Electronics, Inc., 2244 South Michigan Ave., Chicago, Illinois 60616.

ILLUSTRATED Certificate Guide; Radio Amateur's Vocabulary German/English, \$1.00 each. Zangerl, OE9CZI Dornbirn 1, Nachbauerstrasse 28, Austria.

TOOOBES: 6146B, \$4.00; 6CW4, \$1.40; 811A, \$4.25; 4D32, \$15.90. All new, boxed, guaranteed. Free catalog. Vanbar Distr., Box 444Z, Stirling, N.J. 07980.

WANT: Good homebuilt RTTY only transmitter, ready to go, 400 watts or more. No junk! Thompson, 5 Palmer, Gorham, N.H. 03102.

SHOP Around, get the best deal you can and then try Gell 21 years of service to amateurs in South Texas and now ready to serve Hams anywhere, Bob Douglas, W5GEL, Douglas Electronics, 1118 S. Staples, Corpus Christi, Texas 78404.

WANTED: Heathkit "Chippewa" KL-1 linear and companion KS-1 power supply. Gene Beckwith, K2SFP, Powers Road, East Pembroke, New York 14056.

WANTED: Tubes and all aircraft and ground radios, Units like 17L, 51X, 618T or S, R388, R390, GRC, Any 51 series Collins unit. Test equipment, everything. URM, ARM, GRM, etc. Best offer paid, 22 years of fair dealing. Ted Dames Co., 308 Hickory St., Arlington, New Jersey 07032.

INTERESTING Sample copy free Write: "The Ham Trader," Sycamore, Illinois 60178.

SELL: Hallifacers SX-62A with Q-Multiplier, excellent condition. With 15" speaker in portable cabinet, \$300.00. M. Pellegrino, 65 Maspeth Ave., Brooklyn, N.Y. 11211. Tel: ST 2-5630.

WANTED: For personal collection: QST, Mar 1916; Learning the Radioteletype Code, 4th Ed.; How to Become a Radio Amateur, Edition 12; The Radio Amateur's License Manual, Edition 10, 11, 12. List of Stations (1914); Map of Member Stations (1914), W1CUT, 18 Mohawk Dr., Unionville, Conn. 06085.

HAM'S Spanish-English manual, Gabriel, K4BZY, 1329 N.E. 4th Ave., Fort Lauderdale, Florida 33304.

TR-4, \$480.00; AC-4, \$83.00; DC-3, \$123.00; R4-A, \$330.00; T4X, \$330.00; MS-4, \$175.00; RV-4, \$83.00; L-4, \$580.00. Factory-sealed boxes, fully warranted. Mel Palmer, K4LGR, Box 10021, Greensboro, N.C. 27404.

BEST Offer paid for any piece of aircraft or ground radios, tubes or test equipment. In a hurry? Cash-in-advance arranged. Turn those unused tubes into money! Air Ground Electronics, 64 Grand Place, Kearny, N.J.

BILL Ogg at Evansville Amateur Radio Supply, 1629 S. Kentucky, Evansville, Indiana 47713, says check these Summer Bonus Savings! Bonus #1: a free, matching AC-Supply with the purchase of a Swan-350 or Galaxy MK II at \$420.00 each or Swan 500 at \$4.95. Bonus #2: a free, matching, AC supply plus a MS-4 speaker and Turner #454X with the purchase of a Drake TR-4 at \$399.00. Code #454X at \$799. We prepay most shipping charges. Send us a stamped envelope for a deal you've been looking for.

SELL: RME DB-20 Preselector, \$15.00; Century tube-checker, floor model, \$50.00; Eico 625 tube-checker, \$15.00; 24-hour clock, \$6.00. W2UGM, 66 Columbus Ave., Closter, New Jersey 07624. Tel: (201)-768-1884.

FOR Sale, KWS1 and 75A4. Late serial and modified. Excellent condition. Manuals and cables included. Dr. C. L. Samuelson, 539 So. Main St., Findlay, Ohio 45840

FOR Sale: SB-101 and SB-200. Wanted, kits to wire, Heath preferred, 12% of cost, some in stock. Professionally wired, Lan Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna. 17112. 1916 QSTs needed for personal collection. Price secondary. Ted Dames, W2KUW, 308 Hickory Street, Arlington, New Jersey 07032.

RTTY Channel Filters, octal mounted, 2125/2975, \$5.95 pair. FSK units for 32-S-3, variable shift, easy installation, \$14.95, 88 mh. toroids uncased, 5 for \$2.50. Herman Zachry, WA6JG1, 3322 Selby Ave., Los Angeles, Calif. 90034.

DX-60 xmt, \$45.00; Hallifacers HT-40 xmt, \$40.00; SX-100 rev. \$130.00; Dow-DKC-TRP switch, \$12.00; R-46B speaker, \$8.00; CDR AR-22 rotor, cables, control, \$22.00; 40 ft. telescoping antenna mast, \$12.50. All on air, FB condx, clean, Will ship freight collect. W6BTA, Bill Brooks, 11818 Julius, Downey, Calif. 90241. Tel: 862-0850.

EXPANDING national sales organization needs new amateur products and accessories. You make it and we'll sell it, our trade name or yours. Mann Enterprises, P.O. Box 292, Deerfield, Illinois 60015

WANTED: Military, Commercial, Surplus, Airborne, Ground, transmitters, receivers, test-sets, accessories. Specialty Collins. We pay cash and freight. Ritco Electronics, Box 15650, Annandale, Va. Tel: 703-560-5480 collect.

WRL's used gear saved...
Galaxy V, \$269.95; Galaxy III, \$179.95; SK-100, \$299.95; Thor V and AC, \$219.95; Eico 753, \$149.95; NCX-3, \$179.95; King 500A, \$169.95; Champ 300, \$149.95; SB-400, \$199.95; SB-300, \$229.95; HQ-170A VHF, \$299.95; B, \$199.95; 5113, \$449.00; 6N2 Thunderbolt amplifier, \$449.95. Hundreds more, free list. WRL, Box 919, Council Bluffs, Iowa 51501.

FOR Sale: Goins SSB, HQ-110. Exclnt condx, \$100; AF-67 with homebrew AC supply, and Turner 80 xtal Mlc. \$65.00; Tecraft 2M xtal conv., \$7.00; Heath TS-2 generator, \$10.00; B&W 424 LP filter, \$3.00; Eimac 304THS (Good for hi-pwr. linear), \$10.00 each; Viking 75 tape deck and RP61 preamp., \$25.00; D. Corsair, W9JLD, RD 2, Box 55, Windfall, Ind. 46076.

COLLINS Owners: Now is the time to get that long awaited conversion. If you want the very best in receiving capabilities this upcoming season, a VZC front end conversion is your answer. 75A4's, \$69.95; 75-S series, \$34.95 complete, in stock; converted 75A4's for immediate shipment. Dealers in fine used Collins gear. Write for details. VZC Sales, 5 Pinetree Rd., Ramsey, N.J. 07446. Tel: (201)-327-9494.

NATIONAL Historical Radio Conference for Old Timers, amateur historians and collectors will be held at Ford Science Museum, Sept. 23. See Hamfest Column for details.

TRELEX Tribander 10-15-20 antenna w/Ham-M rotator, \$225.00; New 1500W, 8 HP gasoline 110V portable generator, \$125.00; Dow-Key relay, \$10.00; New PV50 Amec preamp., \$10.00; New hcr Western Electric, \$16B, \$20.00. Guaranteed used 4X150, \$5.00; new carbonite set, \$5.00. WA2FMC, Tel: 516-AN5-6137.

AMATEUR Equipment repairing specialist: Transmitters-Receiver-Kits wired-Alignment-Calibration-Custom building-Product detectors added. John Roache, W1SOG, Broadcast Chief Engineer 20 years. J-J Electronics, Windham Road, Canterbury, Conn.

FOR Sale: SB-101 and SB-200. Wanted, kits to wire, Heath preferred, 12% of cost, some in stock. Professionally wired, Lan Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna. 17112.

SELL: Apache, \$125.00, Mohawk, \$150.00 or your best offer. Excellent condition. Manuals included, K4DA, 605 Kingfish Key, North Palm Beach, Florida 33404.

JOHNSON Facemaker SSB xmt., \$135.00; National NC-270 rev. \$110.00; hcr for \$240.00. Good condition. Fred, WA4URA, RFD 4, Clarksville, Tenn. 37040.

COLLINS KWM-2, No. 12066 with noise-blanker, \$850.00; 312B-4 console, \$190.00; AC supply, \$75.00; DC supply, \$175.00, mobile mount \$50.00; 75S-1 receiver \$295.00; Electro-Voice mike, \$64.35; 40-20 Hy-Gain beam, \$75.00; Model 19 teletype, \$65.00; Heath SB-200 amplifier \$200.00; IT-77 capacitor tester, \$13.00, \$190.00 takes all. Bob Winter, 5392 Antoinette Dr., Flint, Michigan 48507. Tel: 313-694-6777.

CHRISTIAN Ham Fellowship non-profit organization for Christian Ham Fellowship and gospel tract efforts among hams now being organized. Free details on request. Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, Michigan 49423.

RTTY Fans. Read the RTTY Journal, exclusively on amateur radioteletype. Articles on how to build, operate, DX, VHF, class, ads, etc. Sample copy \$0.4, \$3.00 per year. RTTY Journal, Box 837, Royal Oak, Michigan 48068.

SELL Swan 350 latest model and 117XC AC supply, in mint condx, in original packing, with Electro-Voice cardioid microphone, \$595.00. W2KIT, 151 Rock Creek Lane, Scarsdale, N.Y. 10583. Phone 914-723-5493.

SELL: Waterman Pocketscope, original box, like new, \$95.00. Pilot \$72.50 preamplifier, plus Dynakit Mark IV 40-watt PA set, \$230.00. Hewlett-Packard 200C audio oscillator, 20-20,000 cps, by perfect, \$95.00; Zeiss Ikon Contessamite E 35mm, Tessar 1.8, flash and case, \$65 (trade?). R. Guttentag, 828 Midwood St., Brooklyn, N.Y. 11302.

QSTs, 1935 through 1960. All intact and in sud condx; 1935-1946 bound. One 1931 bound. Write Mrs. A. B. Martin, 300 Carteret St., Camden, N.J. 08103.

FOR Sale: HX-10 Marauder, \$250.00; SX-101A, \$185.00. Both have had but little use. In exclnt condx. Don Erickson, 601 SW 26th St., Austin, Minn. 55912.

1924 Freed-Eisemann neodymium. Best offer. W6VN, 7631 Truxton, Los Angeles, Calif. 90045.

NEW TR-44 rotator, never used, plus hardware, indicator and seven (7) conductor line, \$55.00, plus shipping. WA7CSK, 2943 N.E. 78 Street, Seattle, Washington 98155.

WANTED: Drake TR-4/AC-4 NS-4, WA2AKZ, 9935 Sunset Ave., Seaford, N.Y. 11783. State price and condition. Tel: (516)-545-3275.

ADVENTURER with modulator and mike, KT-320 with speaker. Both in exclnt condx. Make offer. WA2VWG, 6029 56 Drive, Maspeth, L.I., N.Y. 11378.

MINT Condition: HQ-180V clock, speaker, \$240.00 cash. Check J. M. Adams, 307 Eastlake #8, Seattle, Washington 98107.

MOHAWK w/spkr, \$175.00; DX-60, \$60.00; VFO, \$35.00; SWR, \$10.00. All Health Jack Schlosser, W5OFI, 413 Ridge Crest Dr., Richardson, Texas 75080.

HEATH Marauder and Heath Warrior, in mint condx. About 75 hours operating time. No first reasonable offer refused. Mike Waltash, 7009 Brecksville Road, Independence, Ohio 44131. Tel: 216-524-2834.

KW AM Phone 4-400As, final 810 mods, Class B Ranger Fxclter, superpro receiver, plus spare parts, \$190.00. W6SAN, 9222 Trask Ave., Playa del Rey, Calif. 90291. Phone 8233890.

HALLICOR FETTERS HT-37, \$175.00; SX-101A, \$175.00; SK-99, \$75.00; Skyridar Defiant, \$25.00; RCA voltohmmeter VTVM, \$15.00; Simpson 260 VOM, \$15.00; Johns'n P.R. switch, \$15.00. All are in exclnt condx. W0KON/7, Box 473, Sumner, Wash. 98390.

MUST Sell: HQ-110 receiver, plus S-100 matching speaker, \$110.00; Ranger 1 transmitter, with DK-60 coaxial relay, \$80.00. Sets in excellent, A-1 shape. Will sell all for \$150.00 or willing to bargain. WA2RT1, Richard Harris, 11 Curley Street, Long Beach, N.Y. 11561. Tel: 516-GE2-2539.

COLLINS 6251, complete with cables and manual, excellent condition: \$650.00. Dennis Dressler, K9LAD, Rt. 7, Topeka, Kansas 66604.

TELETYPE 14TDs; w/sync motor 65w or 75w. New: \$37.00, used: \$29.00. K. Kester, W8SDZ, 1418. Genesee, Royal Oak, Michigan 48073

HEATHKIT HX-20 SSB/CW transmitter-exciter, 90 watts, 80-10 meters, matching HP-20 ac power supply, D-104 mike-rig in mint condx, worked DXCC barefoot. Built by holder of First Class radiotelephone license given transceiver in Europe. Package, \$140.00. Extras with local deal, WA2RTI, 27 Lt Andrew Hook, 83-10 118 St., Kew Gardens, N.Y. 11415. Tel: 8493532.

BW-5100/515B SSB/AM/CW transmitter, 80-10. VOX, low pass, manual, \$200.00. NC-125, \$65.00. Heath Conelrad, \$7.00. W8NDM, 5728 Parkside, Monroe, Michigan 48161.

WANTED: B power supply, National type 3580, for old National SW-4 receiver. David Morris, W3CWY, Old Babcock Blvd., RD #4, Gibsonia, Penna. 15044.

HAMMARLUND HQ-180C—General coverage HF receiver. Exceptionally fine condition. Clock crystal calibrator, amateur bandspread, manual: \$265.00. Ira Kalish, 2537 Dock Road, Bellmore, N.Y. 11710. Tel: 516-CAI-6486.

HALLICRAFTERS SX-101A w/speak Johnson Valiant, Hy-Gain TH-4, cables, SWR bridge, many accessories, professionally maintained. R. Yarmus, 5900 Arlington Ave., Riverdale, N.Y. 10471. Tel: 212-884-6336.

SELL SBE-34 #161342, 3 hours' use, like-new, for best offer over \$300.00 or consider swap for good telescope. Ken Cornell, W2MBM, 332 W. Dudley Ave., Westfield, N.J. 07090.

SELL: OST complete, 1943 to 1966 (7 binders) inclusive, CO complete 1947 to 1966 inclusive. Four binders. Excellent condition. Some spare OSTs. No splitting. Unable to ship, sorry. Wilfrid Rogers, VESANB, 18 Colborne St., Strathroy, Ont. P., Canada.

SELL: Ranger I, clean with instr. manual: \$95.00. WB2SBA, Adr. John Whelan, 63 West Main St., Kings Park, N.Y. 11754. Tel: 269-9818.

DRAKE 2B, speaker, Q-multiplier, calibrator, all in excellent condition. \$200.00. WA2APT. Tel: (201)-747-3763.

WANTED: Mobile SSB transceiver, also Barker & Williamson grounded grid amplifier cathode tuner IPA-MU, K3BHB, 903 Western Ave., Jeannette, Penna. 15644.

SELL: 75A-2, \$175.00. Steve Paulson, 716 28th St., Bismarck, N.D. 58501.

SELL: DX-40 and VFO, \$40.00. WN2YWK, 114 Meadow Lane, Riverhead, N.Y. 11901.

SX-42, in new condition, \$200.00. A. Petit, 102 Sonstrom Road, Bristol, Conn. 06010.

FOR SALE: Cessna 170 airplane. Will take in Collins S/Line or KWM-2 in trade, K0TGR, Paul DuBois, R #5, Newton, Kansas.

SWAP: 120 base mother-of-pearl Wurlitzer accordion for HQ-180AX or HQ-170A-VHF. John Waskotwitz, W2KPF, 541 Marcy Ave., Bklyn. N.Y. 11206.

SELL: SBE-33 transceiver, \$150.00. Mrs. Adrene D. Christian, 8436 North 7th Ave., Birmingham, Alabama 35206.

FOR Quick sale, complete Collins S/Line twelve hundred dollars Canadian F.O.B. home QTH, VESAYX, Toronto, 30L-1, 32S-3, 75S3B and power supply. Tel: 363-5031 nine to four.

GOING TO expensive college (Rose Poly). Need money. Don't want to sell but have to! Please make offer for excellent condition HQ-180C with speaker and manual to: Roger J. Martindell, W9AMZL, 3228 S. High School Rd., Indianapolis, Ind. 46241.

COLLINS Mechanical filters 1-4, 6.0 kc type F500-B (500 cps 15db), Best offer, SB-200 linear, mint, \$200.00, and 6 converters for Heath SB line, \$15.00 each, SB-34 xcv, mic mount, \$290.00. Trade? Inquiries answered, KSUUN, 1715 Kendallia, San Antonio, Texas 78224, 512-924-2870.

TOROIDS, 88 mhy., center-tapped, 5/81-50 postpaid, Valiant, \$130.00. Johnson Matchbox (250-23) as new, \$65.00. Simpson 260 VOM, new, \$35.00. Heathkit HD-11 Q multiplier \$7, Heathkit VF-1 VFO, \$12.00; HQ-140XC, \$100.00. RTTY paper, 12 rolls/\$5.50. Stamp for list, Van, W2DLT, 3022 Passaic, Stirling, N.J. 07980.

SELL: 5113—\$250.00; Heath 6M/SSB HX-30, \$85.00; Model 15 w/table, new condx, \$90.00; Model 14 typing reper, Model 14 TD, meter KW w/4CX250 B (new) for OST, Dec. 61. Make offer. Sry no shipping. Many tubes, parts, send for list. D. L. Orr, W4URI, 320-D 73rd St., Newport News, Virginia 23607. Tel: (703)-245-6089.

SELL: SX-100 receiver w/R46B speaker, in excellent condition, \$140.00. Jim Luitweiler, RD 2, Doylestown, Penna. 18901.

SELL: Receivers SX-111, BC312-N w/power supply, LA400C 1KW linear; Johnson Matchbox 275 w/SWR; Johnson TR switch; Telrex 1KM881K balun, mint condx. Package only: \$350.00. K4E0F.

FOR Sale: Drake 2-B, 2BQ, like new. DX-60A, factory checked and HG-10, Perfect for Novices. Dave, WA8PIP, 2767 York Road, Columbus, Ohio 43221.

HAM Discount House, Latest amateur equipment, Factory sealed cartons. Send self-addressed stamped envelope for lowest quotation on your needs, H D H Sales Co., 170 Lockwood Ave., Stamford, Conn. 06902.

INCENTIVE Licensing? You need Posi-Check, Amateur Extra and General Class FCC type exams, complete in detail and style, even to IBM type answer sheets. A very good aid to learning and a Must in preparation for FCC Amateur exams. General Post-Check consists of 297 questions and explained answers for only \$2.98. Extra Class, 115 questions and diagrams with explained answers, \$2.00, 139 questions of the 297 in the General Post-Check apply directly to Extra Class also. Get both for only \$4.50 postpaid. Posi-Check P.O. Box 3564, Urbandale Station, Des Moines, Iowa 50322.

QUITTING: For sale, Drake TR-3, \$350.00; AC supply, \$60.00; DC supply, \$85.00; Heathkit SB-200, \$180.00. 1KW low-pass filters, Johnson & Drake, \$10 each; Shure 400C mike, \$12.00; Vibroplex keyer, \$13.00; B&W coax switch, \$6.00; Hornet TB500 beam with commercial balun, \$25.00; Jensen 6G10B speaker, in maple folded horn cabinet was \$400 new, \$125.00. Elco MX-99 multiplex adapter, \$20.00; Seco 250 amplifier, \$20.00. WAGCP 15929 Dalmatian, La Mirada, Calif. 90638. Tel: 714-521-3379.

NCX-5, Mark II National transceiver. Bought one myself and received one at same time from NYXL for birthday April 1, 1967. Will sell one in original unopened carton for \$360.00. Also NCX-A power supply, \$80.00 and XCU-27 calibrator \$20.00. W3NEC, Dick Ache, 707 Barclay Lane, Broomall, Penna. Tel: 215-353-0226.

HW-32A, in mint condition: \$85.00 or swap for receiver or VHF gear. K8HJI, 1510 Houseman, Grand Rapids, Mich. 49505.

MINT Knight T-60, \$35.00; V-44 VFO, \$15.00; OF-1 Q-multiplier, \$5.00, old Vibroplex bug works, \$3.00. All post-paid in U.S. all with manuals. John Sellers, WA9EEF, 8217 Cecil Court, Indianapolis, Ind. 46219.

SELL: 32V-2, RME 6900, \$250.00. W5QDF, 1108 N. 29th, Mattson, Ill. 61938.

WE Would like to increase our silicon diode volume, so we are lowering the prices giving the same full guarantee and shipping everything postpaid. 1.5 amp torches or 100 mv diodes, 50 PIV, 10¢, 200 PIV, 12¢, 400 PIV, 14¢, 600 PIV, 25¢; 800 PIV, 30¢; 1000 PIV, 40¢, 6 amp studs, 50 PIV, 15¢; 200 PIV, 25¢, 400 PIV, 40¢, 600 PIV, 70¢, 800 PIV, 110¢; 1000 PIV, \$1.50; 50 PIV, 150 amps, \$2.50. In lots of 10, may be mixed. East Coast Electronics, 123 St. Boniface Rd., Buffalo, N.Y. 14225.

WANTED: 275 watt Johnson Matchbox, with manual, Steve Couris, WA8PO, Rt. #2, Milton, W. Va. 25541.

SELL: Telrex preuned beams, complete, 3-element 10-meter Model 1030S, \$25.00; 2 element 20 meter model 520, \$30.00. Box for \$50. Cash and carry. Have purchased Tribander, W3KB.

DRAKE TR-3, AC-3 power supply, \$400.00. W1DXJ, Fred Bickell, 19 Granite Dr., Norwalk, Conn. 06850. Tel: 203-847-8255.

APACHE #107.00; HA-350 receiver, \$83.00. Sixer, \$35.00. Robert Mauro, WB2UHY, 150-30 18 Ave., New York City, N.Y. 11357.

KWS-1, \$700.00. 75A4, \$450.00. WA1FXR.

SELL: National NCX-5 transceiver with NCX-A AC power supply and speaker. Factory installed solid state balanced modulator just completed, like new, \$500.00 complete with manual, Harold Mabes, W2CKY, 445 Delmar Place, Syracuse, New York 13208. Tel: (315)-455-6034.

SX-110, R48A speaker, \$90.00. Vic Woonish, 143 Longford, Elyria, Ohio 44035.

ELECTRONIC Kit wiring. Quality workmanship/Service. K0HWE, Hammond, 2309 Mt. Vernon Rd., S.E., Cedar Rapids, Iowa 52403.

SELL: National NCL-2000 linear amplifier, moderate use. Purchased new. Good condition. Price \$300.00. Transportation charge collect. Specify how ship, M.O. or certified check only. John E. Cain, Jr., 1101 Belle-Meade Blvd., Nashville, Tennessee 37205.

SQUEEZE Keyer (W0EPV circuit, July QST) is world's best. Complete kit (less paddle) includes my printed circuit board, pre-punched cabinet and instructions: \$69.50 (plus postage). Brown double-lever paddle, \$16.95 (plus postage). Satisfaction guaranteed. Jimmy Moss, W5GRJ, Box 442, Natchitoches, La. 71457.

T-4X with AC-3, \$370; SB-300 all filters, \$225.00; HA-1 Keyer, \$45.00; SB-33 Jr., \$50.00. You ship, WA9KXG, 418 N. Main, Columbia, Ill. 62236.

THREADED Brass, some stainless hardware. Rebuilding beam. Write Watt on Fasteners. See July, August ads. Bronze lock washers. Special long machine screws. Lists available. Watt, W8BLR, 29716 Briarbank, Southfield, Mich. 48075.

CRYSTALS Airmailed: SSB, NETS, MARS, Novice etc. Custom finished etch stabilized FT-243 .01% any kilocycle or fraction, 3500 to 8600 \$1.90. (five or more this range \$1.75 each). (Nets ten or more same frequency \$1.40). 1700 to 3499 and 8601 to 20,000 \$2.75 with overtones supplied above 10,000 to 13,500 fundamentals \$2.95. Add 50¢ each for 005%. Add 75¢ each for HC-6/u metal miniatures above 2000. Crystals—crystal groups for construction. See ARRL publications—OST, Handbook, SSB and Mobile Manuals and other. Inquire. Write for order-bulletin and listings. Crystals since 1933. Airmail 10¢/crystal, surface 5¢. C-W Crystals, Marshfield, Missouri 65766.

HEATHKIT HR-10, excellent condition, \$50.00. Pat Dolan, WB2ZEL. Tel: 516-692-5299.

HAVE Too much equipment. Drake T4X, R4A, AC-4, M'S-4, \$675.00. Polycorn #1, \$125.00. Collins 30L-1, \$300.00; 32S-1 with 516E, \$400.00; 75S-3, \$350.00. W2BBV, 49 Frum Ave., Yonkers, N.Y. 10704.

COLLINS 75S3B, new, \$550.00; 32S-3, new, \$650.00; 30L-1, \$400.00; 32S-3 power supply, \$50.00. Full allowance for transceiver trade-in on entire package. All equipment high serial, in exelnt condx. K8SRV, 1690 Ardmore Ave., Detroit, Michigan 48235. Phone 342-1731.

WANTED: Collins F45Y31 or equivalent. Robertson, 522A S. Hanley, Clayton, Missouri 63105.

SUMMER Specials: BC-457, BC-458, \$6.00 each; RCA mechanical filters, center frequency 455 Kc, bandwidth 10.5 or 32 Kc, \$.25 each; 5A94 (same as 5BPI 3" shorter) New, \$1.95; plug-in computer cards (about 100 components, transistors, diodes, etc. 2 for \$1.00, cards only, no components 5 for \$1.00; NE-2 neonds \$1.00 dozen, RCA stereo recorders and erase heads \$3.00 pair; Transformer; isolation plus 63 20 Ma. \$1.50; sermo transformer 1350 V. 5 Ma., \$2.50; Variacs used 1 Kw, \$10.00, 20 amps \$25.00; RCA AR-88 fair condx, \$50.00; Measurements 80R certified, \$425.00. Send for free catalog now in preparation. Rex, 759 Tenth Ave., New York, N.Y. 10019.

B&W Model 151B single sideband generator, with instruction manual. Prepaid USA first certified check, \$75.00. Lemuel Banks, W4DDC, 2001 Austin Road, Southwest, Atlanta, Ga. 30331

JOHNSON Viking II, \$50.00; 250-20 low pass filter, \$5.00. WRL 755 VFO, \$10. Dave Christel, 219 Shady Lane, La Crosse, Wis. 54601.

"ORIGINAL Carton" HQ-170. Best offer over \$200.00. F.o.b. Ameco 3-meter Nuvistor converter. Never used, \$25.00. W1-BPM, #4, Box 247B, Scarborough, Maine 04074.

WANTED: Instructorgraph with tapes. State condition, type, price in first correspondence. Duke, WA5RJO, 1305 Finger St., Borger, Texas 79707.

R-100, S-meter, calibrator, \$60.00; DX-40, \$35.00, K5MEP, 800 Wellesley, N.E. Albuquerque, N.M. 87106.

COMPLETE Station. BW-6100 xmt. BWLPA1 final, SX-115 rcvr, all like-new condx. Also fabulous power supply, Heath Monitor 'scope. BWTR switch No. 381; BW 50 ohm Match-Master, Astatic 10D mike, and many extras. K3EEP, 2649 Colmar Ave., Cornwells Hts., Penna. 19020. Tel: 215-639-4659.

WRITE, Phone, or visit us for the best deal on new or reconditioned Collins, Drake, Swan, National, Galaxy, Gonsel, Hallcrafters, Hammarlund, Hy-Gain, Johnson, Millen, Mosley, SBE, Henry linear, and most other equipment. We try to give you the best service, best price, best payment terms, best trade-in. Write for price lists. Your inquiries invited. Henry Radio, Butler, Missouri 64730.

FOR Sale: Eico 753 rcvr, with SS VFO/PS, \$150.00; SX-99, \$70.00; Knight T-60, \$30.00. WA7BQS, 114 So. Ninth, Bozeman, Montana 59715.

TRANSCEIVER, Drake TR-4, receiver R-4-A, AC-4 matching speaker and p/s used only a very short time, mint condition, I still have the warranty cards. Best offer, never used. B&W 850-A, Eimac SK-500 socket, vacuum variable VCS 300 at 10,000. WA2KQZ. Call after 6 PM: Tel: 769-8185.

30L-1, like new, three months old, \$375.00. SR-500, with AC supply and speaker, new, with warranty card: \$375. Jerry Swank, 675 Wilshire, Washington Courthouse, Ohio 43160. Phone: (614)-335-479.

FOR Sale: Mint condx, 20A and QT-1, \$115.00; 458 VFO with 10 meters, \$40.00. Both factory-wired: SX-146, \$200. K3-BDU, 30 Tearose Lane, Levittown, Penna. 19053. Tel: 215-943-5465.

FOR Sale: Drake R-4/w sp, HT-44 ps, ex esset finals, B-W T-R switch, cables, Hy-Gain vert., TA-33, best offer over \$510.00. Contact M. Landau, WB2REO, Tel: (516)-PY1-4960.

APACHE and SX-100. Both excellent appearance and operation. \$225.00 for both, or \$125.00 each, separately. K2GKU. Tel: (212)-BA9-2738.

HY-GAIN Tower, 18 HT. Come and get it. \$70.00. Schofield, W4ZHL, Gilbert St., Sebastian, Florida 32958.

TELETYPE Mod. 15, \$69.00; 14-TD, \$34.00, xcint condx. Q6EWM, 21526 Monrovia St., Cupertino, Cal. 95014.

QUAD Builders: High density Fiberglass pole vaulting poles. 1 1/2" diameter, 12 through 16 ft. Limited supply. \$8.80 per pole, plus shipping. Money order or cashier's check only. James E. Lindsay, Jr., W0HTH, RFD 2, Castle Rock, Colorado 80104.

GALAXY III, AC supply, speaker console, \$225.00, original owner, in mint condition. WA8RFP, Terry Minsel, 916 Wilhelm St., Defiance, Ohio 43512.

FOR Sale: Drake 2B and 2B0 multiplier. Mint condition. \$95.00. Pick-up deal only. See WB2CTO, 210 Roosevelt Ave., Oakhurst, N.J. 07755. Tel: (201)-531-0246.

COLLINS KWM-2 with 516F2 pwr supply, 312B5, VFO unit, w clean and mint condx, \$970.00. Will accept receiver as part trade. Foy Coble, WA4LXX, 251 Collier Ave., Nashville, Tenn. 37211. Henry 2KD2 linear, Heavy duty rugged model. Like new \$550.00, or trade. Accepted HT-45 or other linear or gear and cash, etc.

HO-110, 6-160 meters, \$115.00. Want Drake 2B, SX-117 for general coverage. Prefer pick-up deal. Bill Zehner, W3TRC, 401 Goodley Rd., Wilmington, Del. 19803.

"LIL Lulu" six meter combo. Features: WWV, crystal filter, squeelch, ANL, S-meter, product detector, 117/12V supply, VFO control, CW monitor, mobile mount, \$185.00. R. Adler, K3CXZ, RD Box 90/-2, State College, Penna. 16801.

SR-160 PS-150-120AC, \$300.00; HW-22, HP-23-AC, \$135.00. WA3AJT, Wilf, Akron, Penna. 17501.

WANTED: I am looking for three or more channel radio-control for model airplane. Please send model number, price, and condition to Robert Johnson, K9KFR, 5230 Forest Ave., Fort Wayne, Ind. 46805.

COLLINS PTO, 70E-24 for 75A4, new, \$39.00; 70E-7A for 75A-1, new, \$29.00; 70E-18 for R392, used, \$20.00; 70E-23 for KWS-1, used, \$20.00. Richard E. Mann, 430 Wilmot Rd., Deerfield, Ill. 60015.

ALL New, guaranteed absolutely perfect: Henry 2KD-2 deluxe linear, \$660.00; Drake AC-4 supply, \$65.00; Collins F45521 filter, \$40.00; Heath 14D-10 keyer, \$37.00. W4ETU, 1315-108th Avenue, North, Seminole, Florida 33540. Phone (813)-595-3447 evenings.

SELL: Astatic D-104 with PTT stand, \$18.00; Telrex beams, excellent; 10 mtr. 3-el. \$35.00; 20 mtr. Supermint, 2-el. \$30.00; motor/generator PE-103, \$10.00. Advance antenna relay, \$3.00; Simpson Ham-meter, \$4.00. F.o.b. Jackson, N.H. Make Beal, W1PNR.

FOR Sale: Galaxy V and home-brew AC power supply. In gud condx. College. B. Taylor, 1714 Langhorne Rd., Lynchburg, Va. 23503.

FOR Sale: I year old Collins S/Line; 32S-3 and 516 F2 power supply, 7553-B with W-2 VZV modifications, 112 B-4 station control, Henry 2K amplifier. Excellent condition, \$1900. Would rather sell all in 1 sale, but will give prices on separate items for SASE. Paul Neveu, Jr., W1CKA, P.O. Box 653, Bristol, Conn. 06010. Tel: (203)-582-4885 after 5 pm.

FOR Sale: National HRO-700 receiver and LF-10 preselector; NCX-5 MK, 2 transceiver with NCX-A AC power supply/speaker and XCUI-27 crystal calibrator; NCL-2000 linear amplifier; National 2000 transceiver with AC-200 AC power supply. All for only \$2395. These are manufacturers representative's samples and are in excellent condition. Jack West, W9NHF, 6747 N. Octavia Ave., Chicago, Ill. 60631.

SAMCO, Tail-Lite plaque. Have name, initials call, etc. or any 7-letters; mount on tail-light for "Message Bright Day 'N Nite!" Pressure sensitive plaque, 4 1/2" set. State year, make of car! N.Y.S. residents include 1¢ tax. Samco, Box 203, Wyanntskill, N.Y. 12198.

FOR Sale: SX-101 rcvr with R-46B speaker, \$130.00 and HT-32 transmitter, \$220.00 or both for \$325.00. Excellent condition. W8IEX, 612 Sedgfield Drive, Bloomfield, Mich. Phone (313)-335-3177.

BUFFALO Area, unusually fine losided summer home appraised 1964 at \$13,500, used year 'round for contests, DX, 5 rooms, bath, fireplace, furnace, hardwood floors. Storage buildings 10 x 20, 10 x 14, 2 acres. Shade, fruit trees, 1400 elevation. Features 113 ft. Big Bertha rotating mast, largest Telrex arrays, 10, 15, 20, 40 meters. Installed 2 1/2 years. Cost \$9200. Also 65 ft. tower. Nearest permanent residence 1/2 mile. \$14,900. K2GXI.

COMPLETE DX Station, Valiant FW, 200 watts AM, 275 c.w., Hallcrafters SX-71, TA-33 beam, 30 ft. tower, rotor, D-104 mike. All accessories, all perfect, \$380.00. Les Zwiebel, 3911 Anthony St., Wantagh, N.Y. 11793. Tel: (516)-CA-1-7766.

HY-GAIN 18 HT Hy-Tower, 10 thru 80 meters, vertical, with Spaulding XBO base, Six months in use: \$75.00 f.o.b. E66GMP, 9700 Blantyre Drive, Beverly Hills, Calif. 90201. Tel: (212)-CR3-0664.

NC-200, 3 Mo. old. Latest factory mods. by factory. Mint condx with NCX-A, \$275.00 firm. Eico 717 keyer, with 1/2 paddle, \$60.00. WA3FBP, Dallal, 703-3rd Ave., Lester, Penna. 19113. Tel: (215)-521-9358.

SELL: Johnson Matchbox, 250-23-3, w/directional coupler and indicator; new, never used, in original carton. Best offer, D. H. Payne, W9HXD, 6910 S. 111th Street, Franklin, Wisconsin 53132.

KNIGHT T-150A, w/5 Novice crystals, \$75.00; R-100A with S-meter, X-10 calibrator, \$75.00; Hallcrafters S-16 (works!). \$10.00. Shipped collect. Robert Stueckert, WA9SYD, 3118 North Summit, Milwaukee, Wisconsin 53211.

MUST Sell: B&W 5100/518B, \$200.00; Globe King 500B, \$150.00. Melsner Signal Shifter, \$20.00. Manuals, Regency ATC-1, \$20. P.O. Box 583, Zimmerman, Emporia, Virginia 23847.

WANT: SB-400, State conditions. Sell: SX-110, \$90.00, and HT-40, \$50.00, in A-1 condx. Sell one or both, WA3FUV, Don Weyel, RD #1, Coneaunt Lake, Penna. 16316.

SELL: BC-348Q, modernized, in gud condx, \$75.00. Homebrew 811A linear (80-10) and power supply, \$150.00. Write for full details. W1AKC.

SB-34 with mobile rack and mic, in original carton, \$325.00. Dr. M. L. Lee, 5219 Nichol Ave., Ansherson, Indiana 46011.

DX-100 modified for SSB adaptor, \$65.00; DX-20 with 3 Novice xtals, \$25.00. Stephen Bonk, 131 Oak Street, Nanticoke, Penna. 18634.

DX-60 with ext. plate mod, \$75.00, NC-188, \$60.00, Bruce Elliston, 705 Newberry Road, Nashville, Tenn. 37205.

5-BAND receiver. Portable, with direction find. Following coverage: 30-50 mc, 150-175 mc, 190-400 kc, 550-1600 kc, 1.6-4.5 mc. Free 18-page Instruction Book, packed with interesting information. Nova-Tech, Dept. 242, Redondo Beach, Calif. 90278.

VALIANT Good condition, \$150.00. W1LVO.

SWAN Mark T, 2000 watt PEP Linear with 2 gud final tubes installed plus gud spare will be shipped express collect insured in original carton banded upon receipt. First postal money-order or certified check for \$350.00. All in excint condx. W3JO 12429 Mellling Lane, Bowie, Md. 20715.

SELL: QST November 1920 to December 1959; CO Nov. 1945 to October 1955. Not complete runs. SASE for full list. W6BFK, N. H. Finley, 9415 Mesa Terrace, La Mesa, Calif. 92041.

WANT: Hallcrafters Skyriders. Diversity model DDL circa 1939, also wireless and radio sets, items prior to 1925. Russell Hanselman, 914 Columbia, Oak Park, Illinois 60302.

TRADE Complete Collins station, factory reconditioned 1967: 75S-1, 32S-1, 312B4, 516F2, 30L-1 for late model pick-up truck with camper. Bob Petveys, 6728 Newman, Arvada, Colorado 80002.

FOR Sale: Excellent condition. SB-400, \$280.00, Drake 2B with calibrator, \$165.00. Both with manuals. W4DUW, 3703 McKewen Dr., Huntsville, Ala. 35810.

WANTED: 2 Meter xmt only. Plate mod, around 50 to 100 watts. H. Michaels, WA2WXH, 365 E. 37th St., Paterson, N.J. 07504.

SELL: SB-34, almost new, \$310.00, 813s linear, \$50. Hornet Triband beam, \$35.00. WA5OJG, 2002 Evangeline, Bastrop, Louisiana 71220.

SELL: Hallcrafters HT-44, with PS-150, and HT-45 Loudspeaker amplifier with PS-45; all like-new condx. K1EUS, tel: (203)-582-0236.

WANTED: National NC-240-C or NC-240-D receiver, preferably rack mounting, but table model OK. State condition and price. W4SE, Box 602, Birmingham, Alabama 35201.

SELL-SWAP: Heath HO-10 'scope, excint condx, \$50.00. Need: Late model Autronix or HA-100 keyer, large prop-pitch motor, Navigator, Carl Smith, W4NBV, 7843 Ramskate Dr., Knoxville, Tenn. 37919.

SELL: SB-200, \$185.00, 75A4, 3 filters, matching speaker, \$425.00; HT-44 and AC/PS 150/120, \$240.00; new PS 150/120, \$60.00; BC-221 and LM-14 free, meter, \$40.00 each. Original parts for SB-200. Send for list, HA-1 and keyer, \$65.00. All are in mint condx f.o.b. Earl Crews, W4DBH, 2522 Shafer Street, Norfolk, Va. 23513. Tel: (703)-853-4903.

"CHARGE IT" at Edwards Electronics. Discount prices with time payments. New equipment, full warranty. Drake TR-4, \$511.00; R-4A, \$349.50; T-4X, \$349.50; Galaxy V Mk II, \$465.00; SW-350, \$365.00; SW-500, \$430.00; SB-34, \$360.00. Payments as low as \$10 monthly. We take trades. Reconditioned specials: NCX-3, \$199.00; SW-40, \$189.00; SB-34, \$379.00; SW-350, \$299.00; Galaxy V, \$299.00; HT-37, \$199.00; HT-32, \$199.00; 2-B, \$199.00; 755-1, \$275.00; 75A-4, \$425.00; Viking 500, \$199.00; NC-303 with 6 & 2 converters, \$239.00. Send for big list. Complete selection of Drake, Galaxy, Swan, SBE, Hy-Gain, New-Tronics. New Ham-M rotator, \$99.95. Edwards Electronics, 1320-19th St., Lubbock, Texas 79401. Tel: (806)-762-8759.

FOR Sale: SB-301, 401, 200, 600, 610, 14AVQ, mike, key, etc. Jack Hills, K8IZM, 2221 Wascana, Lakewood, Oh' 44107.

"HOSS-Trader Ed Moory" offers limited supply of equipment opened and displayed at various Hamfests, with warranty. SB-34, \$339.00; NCX-3, \$439.00; New NCL-2000 factory sealed carton. Regular price \$685.00. Cash price, \$469.00; Swan \$10, \$409.00; TR-4, \$489.00; Swan 350, \$329.00; L-4 linear, \$539.00; R-4A, \$339.95; T4X, \$345.00. Special: New KVM-2 transceiver, \$1149.00; new 32S-3, \$794.00; new 75S-3B, \$557.00. So, sorry, Santa Claus must make a profit. Package deal: New Mosley Classic-33 Beam and demo Ham-M rotator, \$209.00. "Special", Rohm 50 ft. 10klover tower, prepaid, \$189.50. Demo Ham-M rotator, \$89.95. Reconditioned gear. Trade, \$429.00; Swan \$10, \$359.00. R-4A, \$298.00; 2-B, \$189.00; HT-37, \$195.00. Ed Moory Wholesale Rad'o Co., Box 506, DeWitt, Arkansas 72042. Tel: a.c. (501)-946-2820.

HEATHKIT HR-10 Novice receiver with crystal calibrator and speaker, \$60.00. Ronald Panetta, WB2WGH, 865 Buckley Drive, Westbury, N.Y. 11590, Tel: ED 3-2456.

COLLEGE Expenses: T-150A transmitter, HE-30 receiver, relay, HD-11 Q-multiplier, JT-30 microphone, \$160.00. Jerry, WA0LYO, 811 10th St., Spearfish, S. Dak. 57783.

SB100, \$350.00; HP23 power supply \$35.00; HP13 mobile supply, \$45.00; Tri-Ex 60 foot crank-up tower with all accessories \$170.00; Ham-M rotator with control box, \$70.00; Fico 322 Signal Generator, \$35.00; Heath grid-dip meter, \$30.00; Fico 425 oscilloscope, \$70.00. All excellent condition, Bob Christie, WA2SIZ, 215-28 Spencer Avenue, Queens Village, L.I., N.Y. 11427.

SELL: SX-122 rcvr in A-1 condx. best offer over \$160.00. Convert HW-32 to 3-band operation, \$25.00. Kaminsky, 2501 Lippincott, Flint, Michigan 48507.

SELL: Good shape Novice rig. Hallicrafters \$40B, electric handspread, noise-limiter, BFO pitch, \$45.00; Heath DX-20 50 w, all-band xmt, \$20.00. Both for \$55.00. Want: Manual, schematic for RME-69. A. Weiss, K8EEG, Rte. 4, Carroll Rd., Athens, Ohio 45701.

FOR Sale: T-150A, excellent condition, good Novice rig, \$65.00 or your best offer. Tom, WB4FOT, 1923 Oxford Cir., Apt. 5, Lexington, Ky. 40504.

SELL: HA-14 Compact Linear with AC power supply \$125.00. First class condx. Vantron 300A Linear, all-band, \$35.00. K1TVY, 52 Rotch St., New Bedford, Mass. 02740.

WANTED: Clegg Zeus and Interceptor "B" with Allbander converter. Must be perfect inside and out. Cash on the barrel-head. Philip Litchfield, Apple Meadow, Katonah, New York 10846.

HEATH HW-32 with xtal calibrator. Never mobile. \$80.00. E. Eggert, W1EGM, 42 Ridgewood Rd., Rockville, Conn. 06066.

SELL: Mohawk, \$100; Leece-Neville 12V 100A, \$70. Vibronlex \$5.00; Elec 720, \$40.00. WA6KGP, Box 1261, Chula Vista, Calif. 92012.

WANTED: Hallicrafters SX-32 "Skyrider 32". Best price and condition first offer please, Howard Hoaland, 639 North Sierra Bonita Ave., Los Angeles, Calif. 90036.

WANTED: Heath DX-40. Condition, price? Also, manual for LR-3 frequency meter, W1CNY.

DRAKE 2B, 2AC, 2B0, WVVV crystal and manual. Realigned, tested, cleaned, in premium condition, \$195.00. P. Gleda, 41-15 50 Ave., Apt. 3P, L.I.C., N.Y. 11104. Tel: (212)-ST6-9372. 6 Meter Ameco CB-6W converter for sale, 7-11 I.F., \$15.00. WA6AIZ, 3105 Mt. Vernon, Bakersfield, Calif. 93306.

WANTED: Hyeon crystal filters 2800 and 220 cycles wide as per QST article page 13 January 1957. Walter Lindgren, W2AJR, Box 1148, Easthampton, N.Y. 11937.

2M Gonset Communicator II, \$100.00; Matchbox 1 Kw Johnson, \$85.00; National 270 receiver, \$130.00; Q-multiplier, \$7.00; Hallicrafters SR-46, \$125.00; Seneca \$125.00; Fico 753/751, mint condx, \$190.00. SASE for list of others. W2FNT, 18 Hillcrest Ter., Linden, N.J. 07036.

TEKTRONIX 104A square wave gen, and calibrator, \$75.00; Hewlett-Packard 500A freq. meter, 0-50 KC, \$75.00; telegraph apparatus bus, \$5.00. W6EHZ, 14945 Dickens St., Sherman Oaks, Calif. 91403.

WANTED: 3 Band SSB transceiver with 12-volt power supply. Will consider units not in proper working order. Give full particulars as to electronic and physical condition. Also asking price in first offer. All replies answered, K1UQB, N. Wilbraham, Mass. 01067.

SACRIFICE For quick sale: Swan 240 used 4 hours, original carton, \$150.00. WA4WAO, 1815 Forney Drive N.W., Huntsville, Alabama 35805.

MUST SELL: Heath Cheyenne, still in unbuilt kit form! \$90.00; Vibroxlex Lightning Bug, \$12; AC power supply for Cheyenne, \$30; Cantenna dummy load, \$7.00; Fico 730 modulator with cover, \$50; HG-1 VFO, \$25; homebrew kit, \$35.00; K.V., low pass filter, \$7; dipole antenna with 100 ft. RG-11U polytoam coax, \$8.00; (1)-1B grid dip meter, \$15.00. Other items, Howard Mark, 1460 Beach Ave., Bronx, N.Y. 10460. Tel: SY-2-2651. If no ansr, call GR-1-2015.

LX-100, \$80.00, Elmac A-54 transmitter, needs supply and several tubes; Gonset Mobile Tri-Band converter; and surplus dynamotor DM-35-D, \$25.00 takes all three. WB2RBT, Nethercrest Lane, Orchard Park, New York 14127.



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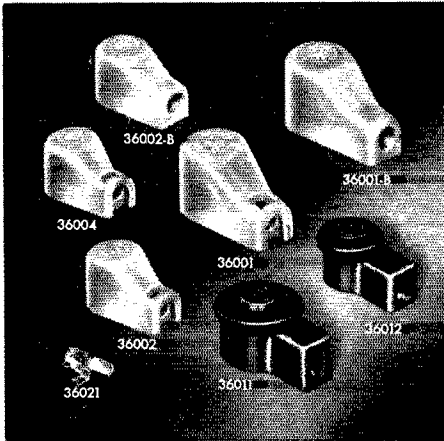


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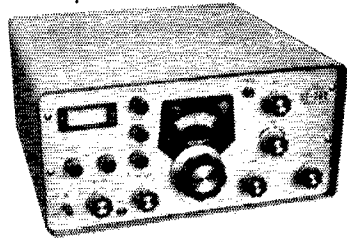
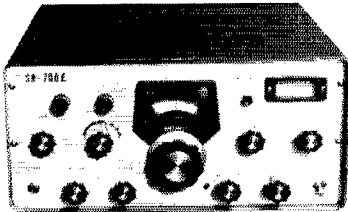
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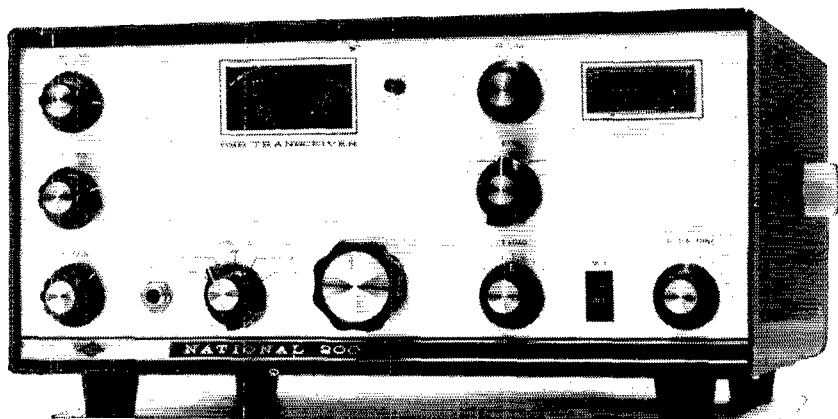
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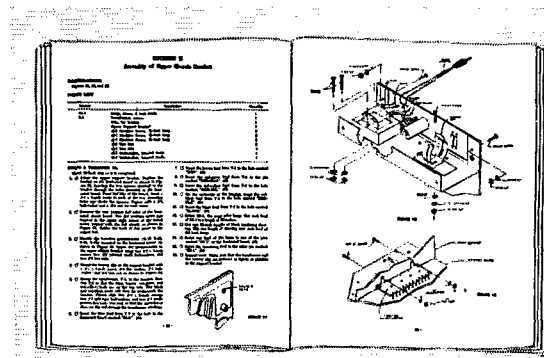
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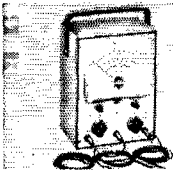
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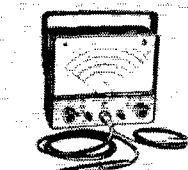


Each sub-assembly is described in a separate section with illustrations applicable to that sub-assembly available at a glance. No cross referencing necessary.

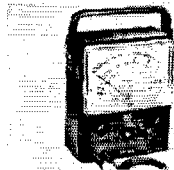
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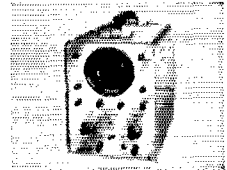
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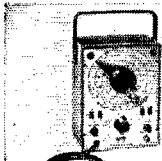
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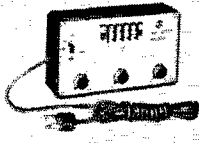
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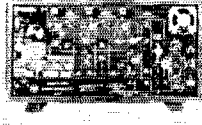
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