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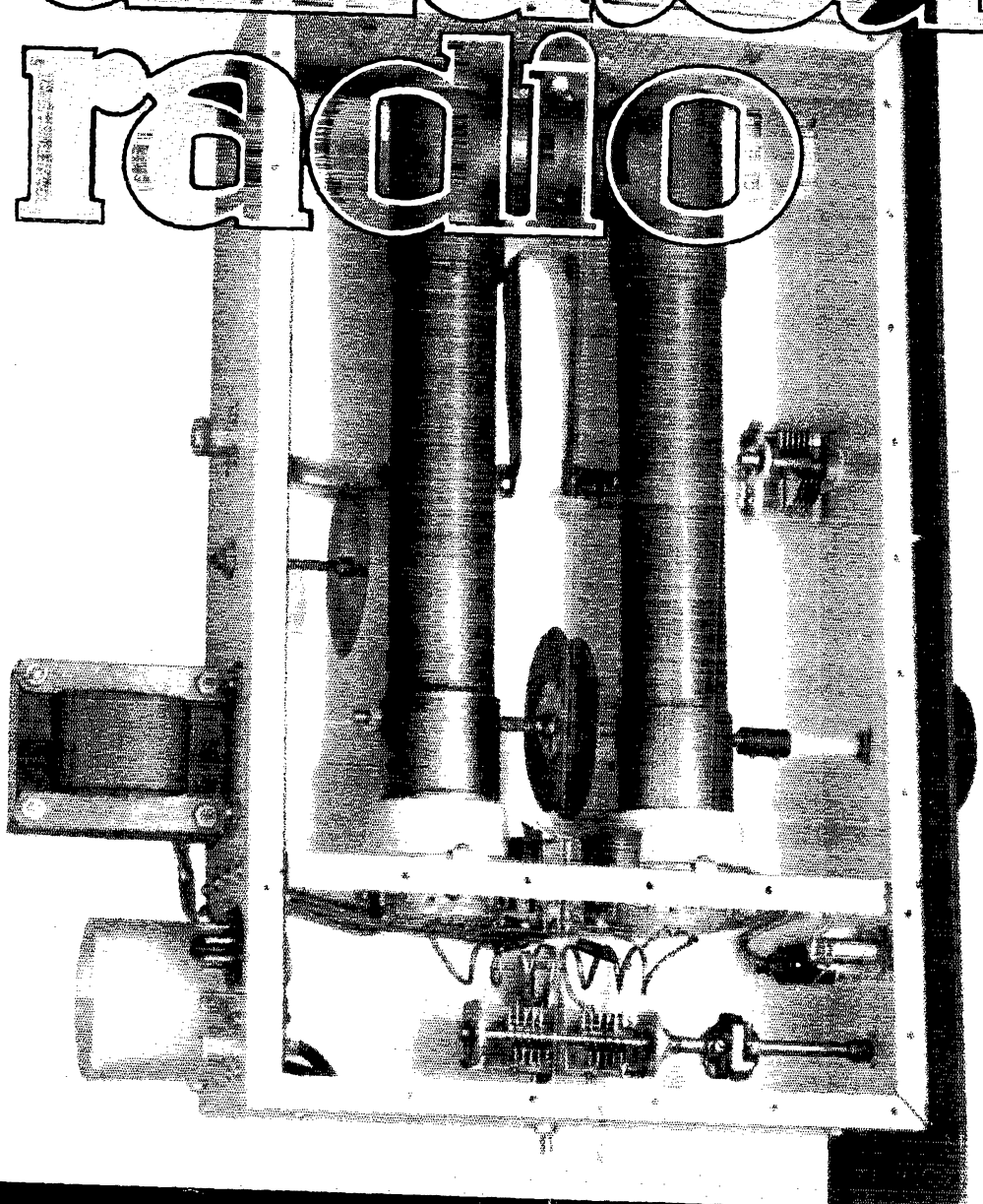
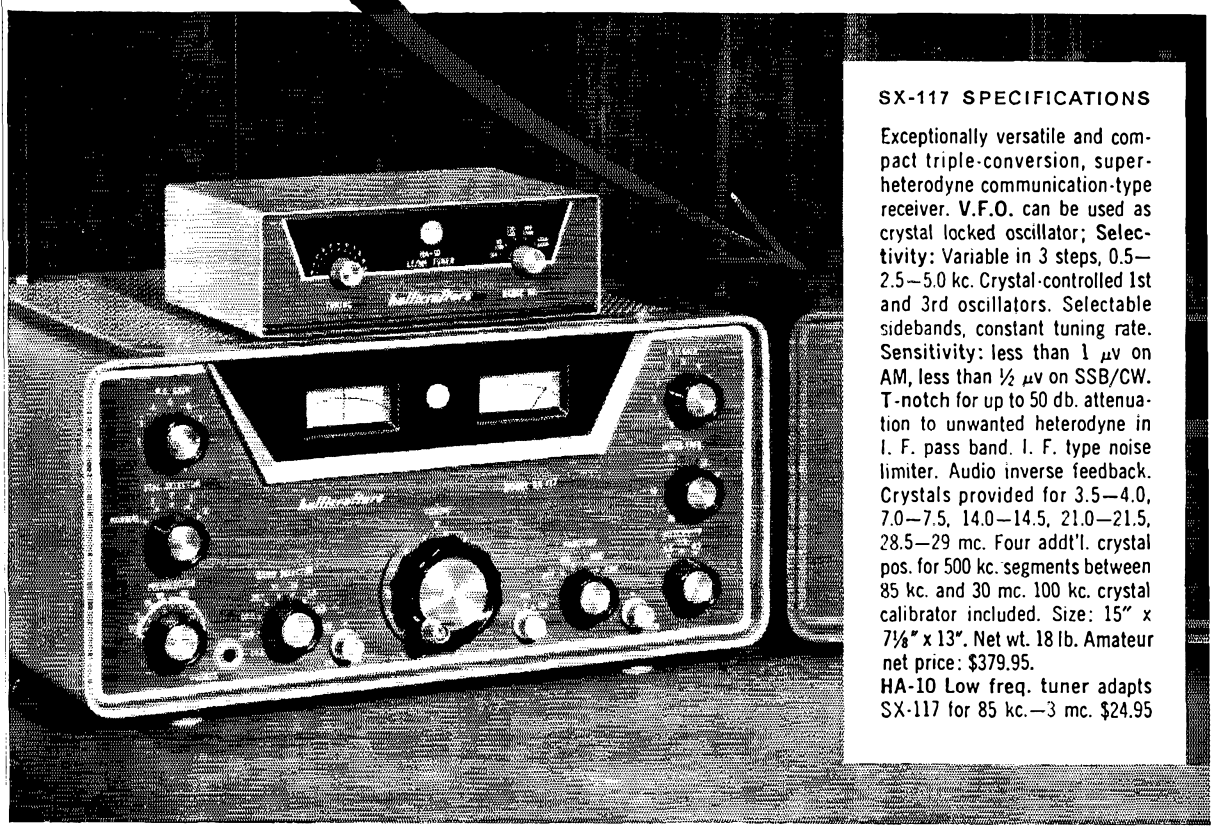


PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

In case you figured we had plans for a transmitter that would transceive with the **SX-117** .



SX-117 SPECIFICATIONS

Exceptionally versatile and compact triple-conversion, superheterodyne communication-type receiver. **V.F.O.** can be used as crystal locked oscillator; **Selectivity:** Variable in 3 steps, 0.5—2.5—5.0 kc. Crystal-controlled 1st and 3rd oscillators. Selectable sidebands, constant tuning rate. **Sensitivity:** less than 1 μv on AM, less than ½ μv on SSB/CW. **T-notch** for up to 50 db. attenuation to unwanted heterodyne in I. F. pass band. I. F. type noise limiter. Audio inverse feedback. Crystals provided for 3.5—4.0, 7.0—7.5, 14.0—14.5, 21.0—21.5, 28.5—29 mc. Four addt'l. crystal pos. for 500 kc. segments between 85 kc. and 30 mc. 100 kc. crystal calibrator included. Size: 15" x 7⅛" x 13". Net wt. 18 lb. Amateur net price: $379.95.

HA-10 Low freq. tuner adapts SX-117 for 85 kc.—3 mc. $24.95

No other receiver in its class has proven so versatile and reliable as the SX-117. Part of the story is its frequency coverage capability . . . variable selectivity . . . crystal-controlled H.F. oscillators and other high-performance features. Now comes the sequel — Hallicrafters' new SSB/AM/CW HT-44 transmitter. On its own, the HT-44 gives you 200 watts DC input, SSB and CW . . . break-in CW

The unit that stacks up best alongside the **SX-117** *is*

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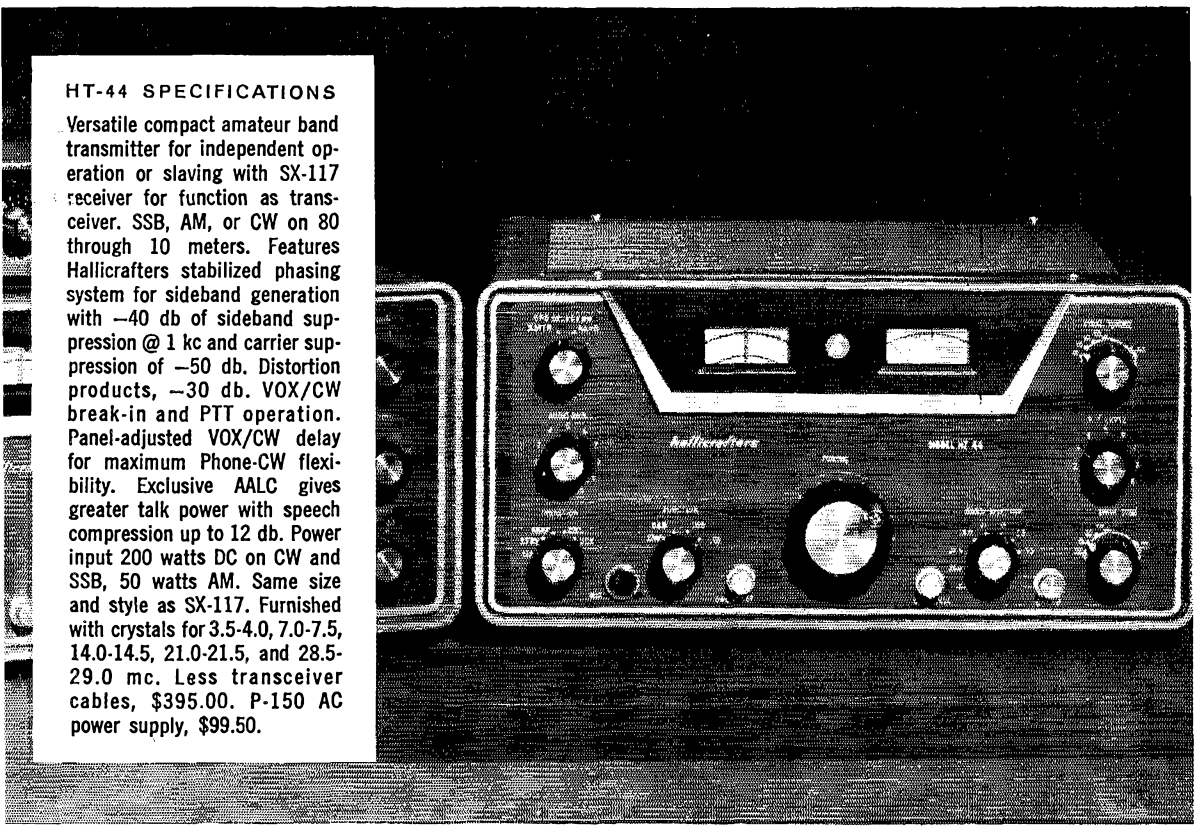

HT-44 SPECIFICATIONS

Versatile compact amateur band transmitter for independent operation or slaving with SX-117 receiver for function as transceiver. SSB, AM, or CW on 80 through 10 meters. Features Hallicrafters stabilized phasing system for sideband generation with —40 db of sideband suppression @ 1 kc and carrier suppression of —50 db. Distortion products, —30 db. VOX/CW break-in and PTT operation. Panel-adjusted VOX/CW delay for maximum Phone-CW flexibility. Exclusive AALC gives greater talk power with speech compression up to 12 db. Power input 200 watts DC on CW and SSB, 50 watts AM. Same size and style as SX-117. Furnished with crystals for 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, and 28.5-29.0 mc. Less transceiver cables, $395.00. P-150 AC power supply, $99.50.

operation . . . Hallicrafters' exclusive stabilized phasing system and Amplified Automatic Level Control (AALC) . . . VOX/PTT and a dozen other solid value features. Interconnected, this great new Hallicrafters pair gives you independent or transceive operation at the flip of a switch—and a whole new world of flexibility. Your distributor will give you a convincing demonstration today.

the NEW **HT-44** *Transmitter by*

hallicrafters

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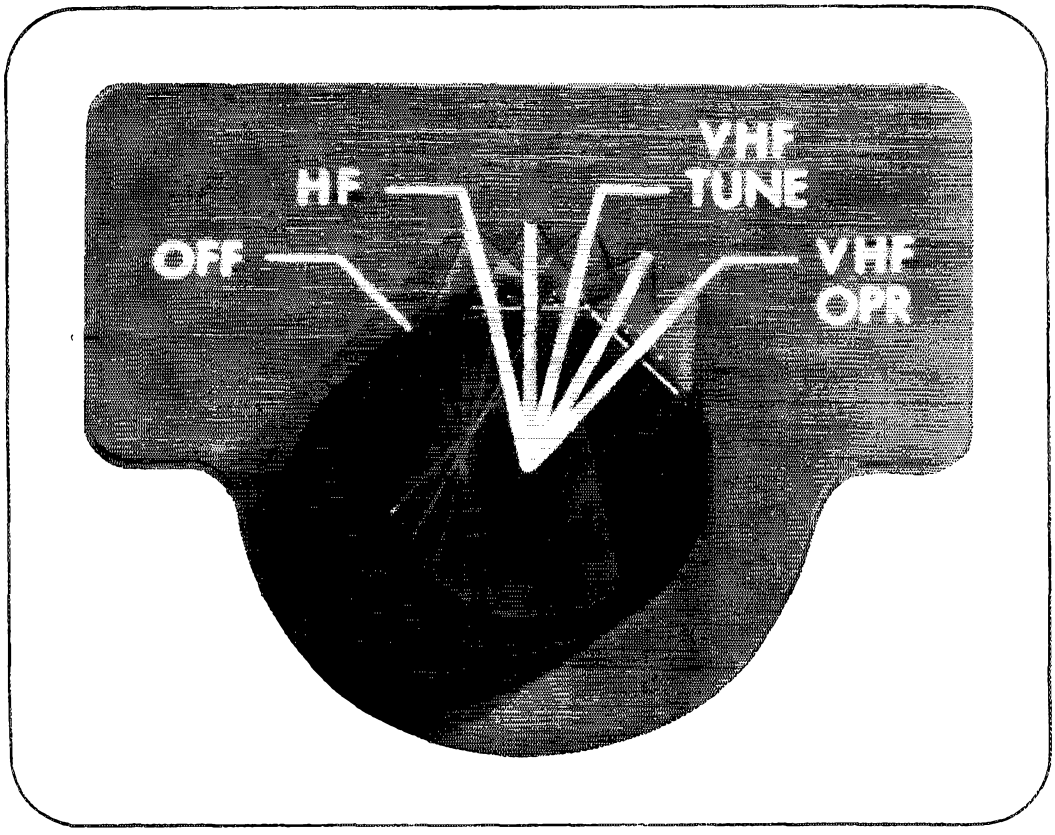

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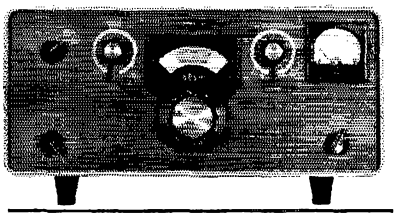
Flick the switch and you're on VHF. With Collins 62S-1 VHF Converter you can transmit and receive on 6 and 2 or HF without changing cables. Think how great it will be to escape the crowds on the lower bands. The 62S-1 gives you eight full megs of bandwidth. You'll be able to work people you've never been able to reach in the past. You'll be able to get more local QSO's. You'll have the cleanest VHF signal on the air. And you'll have both bands from one self-contained unit. When used with the KWM-2, you don't need an additional power supply. You can use the 62S-1 to cover 49.6 to 54.2 and 143.6 to 148.8 mc (crystals for amateur bands provided). Incidentally, Collins 62S-1 will convert most equipment operating in the 14.0 to 14.2 mc range. Visit your Collins distributor and ask him to demonstrate the 62S-1 VHF Converter. Then ask him about Collins S/Line trade-in value. You'll be pleasantly surprised to find out how little it costs to operate the finest.



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QST

FEBRUARY 1964

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—CONTENTS—

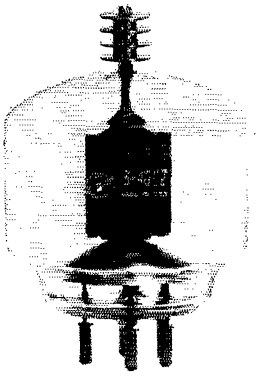
Eimac zero bias triodes offer economy, simplicity, low distortion

by William I. Orr, W6SAI

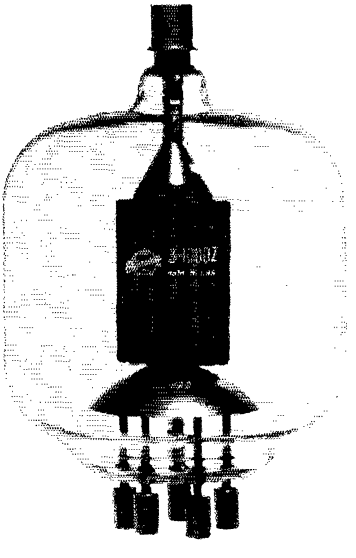
The Eimac 3-400Z and 3-1000Z are zero bias triodes especially suited for single sideband operation in the amateur service. Costly and bulky screen and bias supplies are not required. The tubes are small and rugged and are designed to fit into modern, compact transmitter design. Best of all, they provide improved linearity and a reduction of bothersome intermodulation products when operated in an approved circuit.

The 3-400Z is rated to 1000 watts p.e.p. input and the 3-1000Z is rated to 2000 watts p.e.p. input. These ratings are established at moderate plate potentials and result in third- and higher-order product distortion figures better than -35 db below maximum output. These ratings are for continuous, key down service!

For a zero bias package including complete details and application information write me today c/o Amateur Service Dept., Eitel-McCullough, Inc., San Carlos, California.

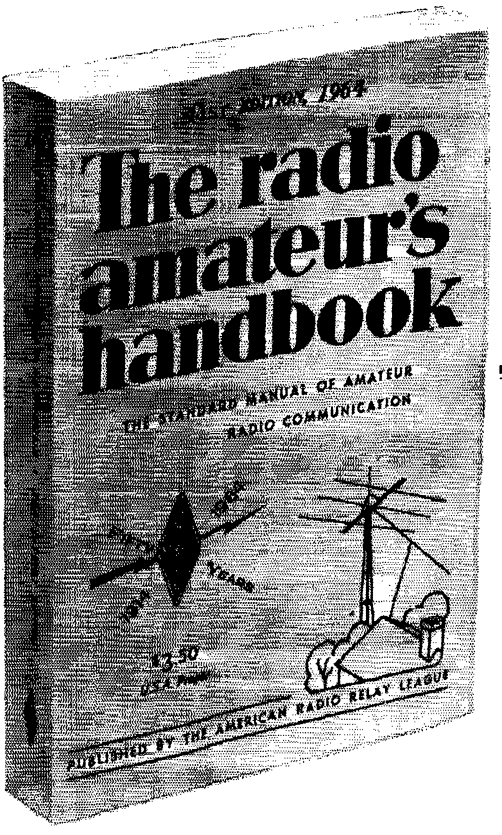


3-400Z



3-1000Z

1964 EDITION



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NEWINGTON, CONN. 06111

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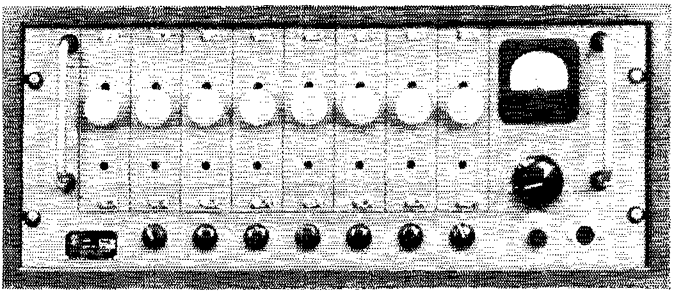
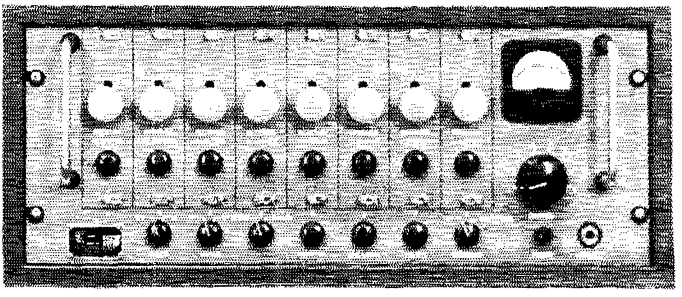


A COMPLETE SOLID STATE SSB RECEIVER SMR-I

providing



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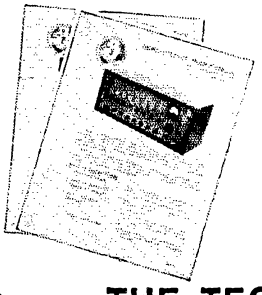

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors.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

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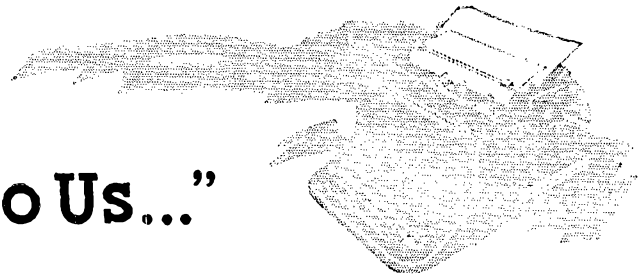


"It Seems to Us..."

High Standard of Conduct

ONE OF THE PURPOSES for which we amateurs have joined ourselves together in the ARRL — as stated in the masthead opposite this page each month — is the maintenance of a high standard of conduct. The editorial pages of *QST* and other League publications, the specialized bulletins issued to members of the field organization, and club and convention talks by League officers, directors, field officials and staff members, all can be — and are — used to promote this aim.

But, perhaps to a greater degree than any other aim of the League, the maintenance of a high standard of conduct is an individual responsibility of each and every member. Every one of us from time to time should stop and think about his own obligation, and appraise his own conduct in this respect. It is all too easy — in the heat of a contest . . . when trying to snag a rare DX station . . . when the message hook is full and conditions punk . . . when the neighbor is complaining about TVI — temporarily to lose sight of some of our principles.

A number of members, in their comments on the League program, have expressed similar views and suggested that *QST* should more frequently call attention to the Amateur's Code. We agree, for we feel that the Amateur's Code is still the most concise and personal guide to "Golden Rule" operation in what remains the world's most fascinating avocation.

The Amateur's Code

ONE

The Amateur is Gentlemanly . . . He never knowingly uses the air for his own amusement in such a way as to lessen the pleasure of others. He abides by the pledges given by the ARRL in his behalf to the public and the Government.

TWO

The Amateur is Loyal . . . He owes his amateur radio to the American Radio Relay League, and he offers it his unswerving loyalty.

THREE

The Amateur is Progressive . . . He keeps his station abreast of science. It is built well and efficiently. His operating practice is clean and regular.

FOUR

The Amateur is Friendly . . . Slow and patient sending when requested, friendly advice and counsel to the beginner, kindly assistance and cooperation for the broadcast listener; these are marks of the amateur spirit.

FIVE

The Amateur is Balanced . . . Radio is his hobby. He never allows it to interfere with any of the duties he owes to his home, his job, his school, or his community.

SIX

The Amateur is Patriotic . . . His knowledge and his station are always ready for the service of his country and his community.

— PAUL M. SEGAL

THE SEAMAN CASE

Our recent correspondence indicates that a number of amateurs have become concerned over the case of Charles A. Seaman, K3IOP, of Elizabeth, Pa. Because of earlier TVI difficulties, Seaman was recently issued a General Class license (upgraded from Technician) with an FCC restriction prohibiting his use of the 50-Mc. band.

The League has been aware of, and involved in, the Seaman matter for almost a year. Like so many other serious TVI cases, local personality and political aspects were dominant in the early stages, including at one time a threat of Congressional legislation aimed at broad restrictions on the amateur service. The League felt it inadvisable to publish at that time what would necessarily (because of the time lag in publication) be an incomplete report on developments in a highly-delicate situation. The matter has more recently been steered to the proper track of a factual appraisal rather than one of personalities and emotions.

At the League's suggestion, Seaman has requested a hearing by FCC on the question of whether his operation on 50 Mc. should be prohibited. Two attorneys in Pittsburgh, Irwin I. Tryon, W3WFR, and John Elder, W3RSB, have volunteered their services in Seaman's behalf, as has Quayle B. Smith, W3KDR, a former ARRL counsel. The League's General Counsel, Robert M. Booth, Jr., W3PS, has been to Pittsburgh to confer with Seaman and his attorneys and is prepared to file a petition for ARRL intervention, as an interested party, in any hearing the Commission may designate.

OUR COVER

Our cover photograph this month is a below-chassis view of W1HDQ's new "plumber's special" two-meter amplifier, described in this issue. That pipe is the plate tank "coil" and coolly handles a kilowatt.

There are a six-meter kilowatt and matching control unit, too. It all starts on page 11.

OPERATOR OF THE MONTH

Vote Once

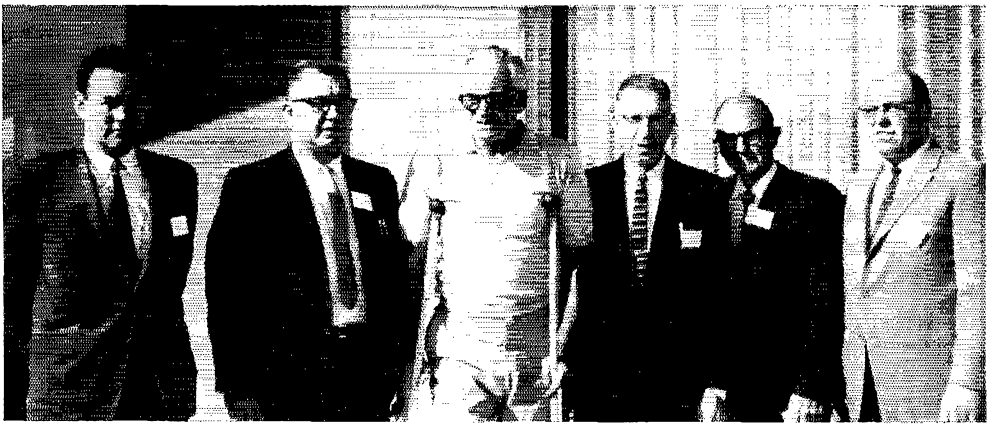
Can you think back over the past month and pick out one operator who, by virtue of his clean signal and extra-special skills and courtesy merits your "vote" as operator of the month?

Considerations to bear in mind include good keying, careful enunciation, correct procedures, judgment and courtesy. The League's Operating Aid No. 11 lists further examples.

If you come up with one nominee (just one, please), jot down his call, the band and mode on a postcard along with *your* name call and address and send along your vote for "Operator of the Month" to the ARRL Communications Department, 225 Main Street, Newington, Connecticut 06111.

Strays

SPARCS—the Society for the Promotion of Amateur Radio Communication Services—is in the process of being incorporated as a non-profit society under Arizona law. Resulting from several months of discussion among prominent amateurs in government, industry, and League organizational fields, SPARCS has been formed in order to promote amateur radio in areas of the world where there is now little ham activity. SPARCS plans to operate through a number of channels to provide educational material and equipment to encourage would-be foreign hams. The most recent organizational meeting of SPARCS took place on December 28 at the home of Senator Barry Goldwater, K3UIG/K7UGA, in Phoenix. Elected to the Executive Committee of SPARCS were those pictured below: (l. to r.) John Ryan, W7KVU; Herman Middleton, W7TPG (chosen president of SPARCS); Senator Goldwater; Elmer Olson, K7GPZ (Executive Secretary); Leon Faber, W7EH; and George Beeler, K7BXS (Treasurer). Others present at the meeting included W1IKE, W6UF, K8BYP, W8RAE, WØGFQ, KØGHK, WØLTE, and WØURN. Al Kahn, W8DUS, who was unable to be present, was elected chairman of the board of SPARCS. Several ARRL officials are on the Board of Directors of SPARCS, and *QST* will carry more about the society as its program develops.



Though low power works wonders on the v.h.f. bands when conditions are right, and is adequate for local work at any time, it is nice to be able to "pour on the coal" when you need it. The amplifiers shown here work well at moderate power levels, and are, in fact, used that way most of the time by the author. But when high power is needed they will take all that the law allows, producing as big a signal as can be generated legally in amateur circles.

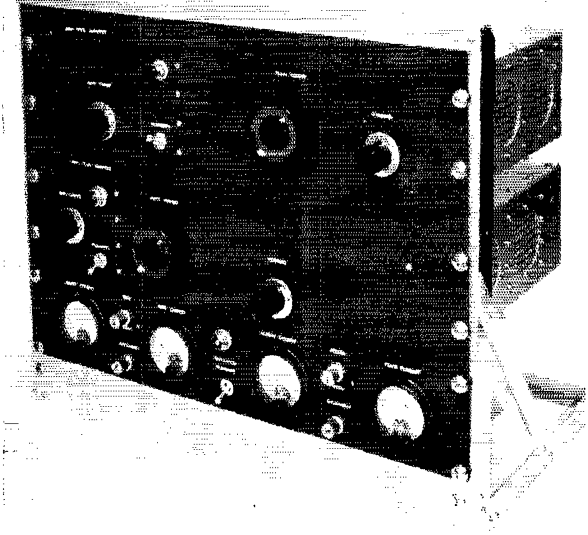


Fig. 1—The kilowatt amplifiers for 50 and 144 Mc., in a rack made from aluminum angle stock. At the bottom is a meter panel with controls for meter and mode switching.

Kilowatt Amplifiers for 50 and 144 Mc.

High-Efficiency Designs for A.M., C.W. and Sideband

BY EDWARD P. TILTON* W1HDQ

GONE are the days when we had to put up with transmitters that just barely worked on the v.h.f. bands. With some care in circuit design and layout and by selecting the right tubes, we can now achieve transmitter efficiencies of the order expected on much lower frequencies. Admittedly, the choice of tubes is not as wide at 144 Mc. as at 14, for even at 50 Mc. we are near the upper limit of frequency for many tubes that work well on lower bands. A transmitter for 3.5 through 50 Mc. is practical, but going to 144 calls for something special in the way of both tubes and circuits.

In recent years amateur v.h.f. transmitter design has almost standardized on the external-anode type of tube. First it was the 4X150A, a type still popular because of its occasional availability at moderate cost on the surplus market. Now this tube has many offspring, resulting in a sometimes confusing choice to be made by the would-be builder of high-powered v.h.f. gear. At least a dozen variations of this general type are now available, all with special claims to fame. We selected the 4CX250R, recently introduced by Eimac, favoring its special qualities for linear amplifier service, and its mechanical similarity to its predecessors, the the 4CX250B and 4X150A. Anyone having a supply of these earlier types can follow the layouts shown, making only minor modifications in operating conditions.

Parallel or Push-Pull?

On lower bands the use of tubes in parallel has come to be almost universal. Above 30 Mc. we have tended to stick with push-pull to avoid the harmful effects of high output capacitance on plate-circuit efficiency. At 144 Mc. and higher the push-pull layout is still king where more than one tube must be used, but as will be seen here, parallel operation is practical at 50 Mc. By using something other than the conventional variable capacitor we can keep down combined tube and circuit capacitance to the point where there is little adverse effect on over-all efficiency.

Tubes have been paralleled at 144 Mc., but unavoidable buildup of circuit capacitance and lead inductance almost rules out anything but push-pull for high power at this frequency. External-anode tubes work well single-ended in coaxial circuits up to 500 Mc. or so; but two tubes are needed for a full kilowatt input, so push-pull seems the logical choice for 144-Mc. service at the legal power limit.

Both amplifiers take a kilowatt on c.w. or s.s.b. with ease. The 144-Mc. model must be held to 600 watts input for plate-modulated service to stay within the manufacturer's ratings. On 50 Mc. the three tubes in parallel loaf along at 1000 watts in the low-duty-cycle modes. The permissible input on a.m. phone is 900 watts. Class C efficiency is on the order of 75 per cent, over a wide range of plate voltages. We have run all the

* V.H.F. Editor, *QST*.

way from 800 to 2000 volts on the amplifier plates at W1HDQ without altering screen voltage or drive levels appreciably.

Mechanical Layout

The amplifiers are similar packages, to mount together harmoniously, though this is of only incidental interest to the fellow concerned with one band or the other. They are built in standard 4 by 13 by 17-inch aluminum chassis, mounted open side up and fitted with shield covers. In the author's station a single blower is used for all transmitters. This explains the air-intake sleeve seen on the back of each amplifier. An air hose from the remote blower is pushed into the amplifier being used.

The transmitters are all hooked up together, to meters, power circuits, audio equipment and power supplies common to all. Changing bands involves mainly the switching on of the desired heater circuits, and the insertion of the air hose in the proper intake sleeve. Separate antenna relays are provided for each final stage, and power switching and plugging and unplugging are largely eliminated.

Tube sockets are the air-system type, mounted on 4-inch high partitions with folded-over edges that are drawn up tightly to the top, bottom, front and back of the chassis with self-tapping screws. Air is fed into the grid compartments at the left side, as viewed from the front. Its only path is through the sockets and tube anodes, and out through screened holes in the right side of the chassis. Panels are standard 5¼-inch aluminum. Controls for the amplifiers are similar, though their locations are slightly different. No attempt was made to achieve symmetry through mechanical gadgetry, since the unbalance of the front panels is not unpleasing. The rack shown in Fig. 1 was made up from aluminum angle stock to fit the job. Several screen and bias control arrangements were tried before the circuit shown in Fig. 6 was settled upon. Meters read driver plate current, and amplifier grid, screen and plate currents. Switches enable the operator to check the grid and screen currents to each tube in the 144-Mc. amplifier separately, and the screen currents in the 50-Mc. amplifier likewise. A mode switch provides proper screen operating conditions for a.m., linear or c.w. service.

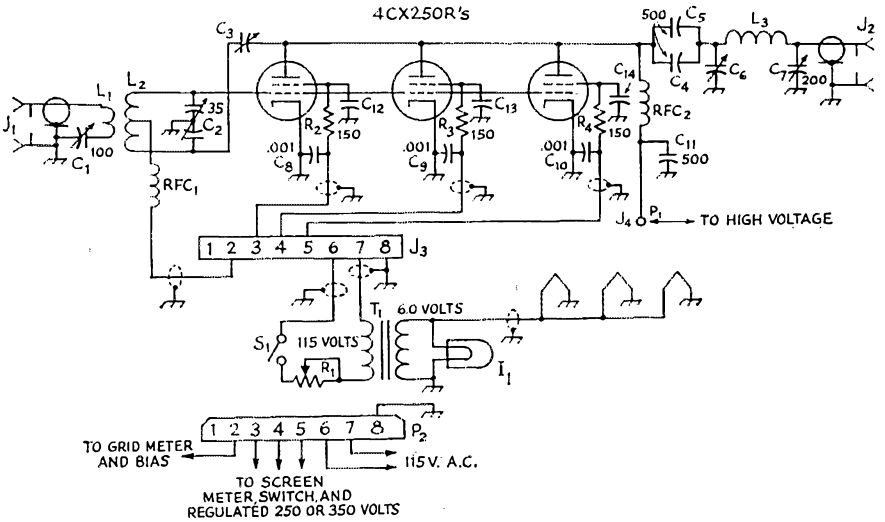


Fig. 2—Schematic diagram and parts information for the 50-Mc. amplifier.

C_1—100-pf. miniature trimmer (Hammarlund MAPC-100).
C_2—35-pf. per section split-stator (Hammarlund HFD-35X).
C_3—Neutralizng capacitance—see text.
C_4, C_5, C_{11}—500-pf. 5000-volt transmitting capacitor (Centralab 858S-500).
C_6—Tuning capacitor made from 3-inch aluminum disks—see text and Fig. 3.
C_7—200-pf. variable, .03-inch spacing (Johnson 167-12 or 200L15).
C_8, C_9, C_{10}—.001-μf. disk ceramic.
C_{12}, C_{13}, C_{14}—Bypass built into special air-system socket.
I_1—Green-jewel pilot lamp holder.
J_1, J_2—Coaxial chassis receptacle.
J_3—8-pin male power fitting.
J_4—H.v. power connector female (half of Millen 37501).
L_1—1 turn insulated wire about 1-inch diam. Make from inner conductor of coax running to J_1. Strip jacket and braid back about 4 inches. Insert between center turns of L_2.
L_2—8 turns No. 14, ⅝-inch diam., 1¼-inches long, center-tapped.
L_3—3 turns 2 inches diam., 3 inches long, ¼-inch copper tubing.
P_1—High-voltage power connector, male (half of Millen 37501).
P_2—8-pin cable connector to match J_3, female.
R_1—20-ohm 10-watt slider-type resistor. Set so that heater voltage is 6.0 at socket.
R_2, R_3, R_4—150-ohm ½-watt resistor. Connect at socket screen terminal.
RFC_1—No. 32 enamel wire, close-wound full length of 1-watt resistor, 10,000 ohms or higher.
RFC_2—No. 28 d.s.c. or enamel-wound 1¾ inch on ½-inch Teflon rod. Space turns 1 wire diam. 8.3 μh. For winding information see *QST*, Nov. 1963, p. 43.
S_1—S.p.s.t. toggle.
T_1—6.3-volt 8-amp. Adjust R_1 to give 6.0 volts.

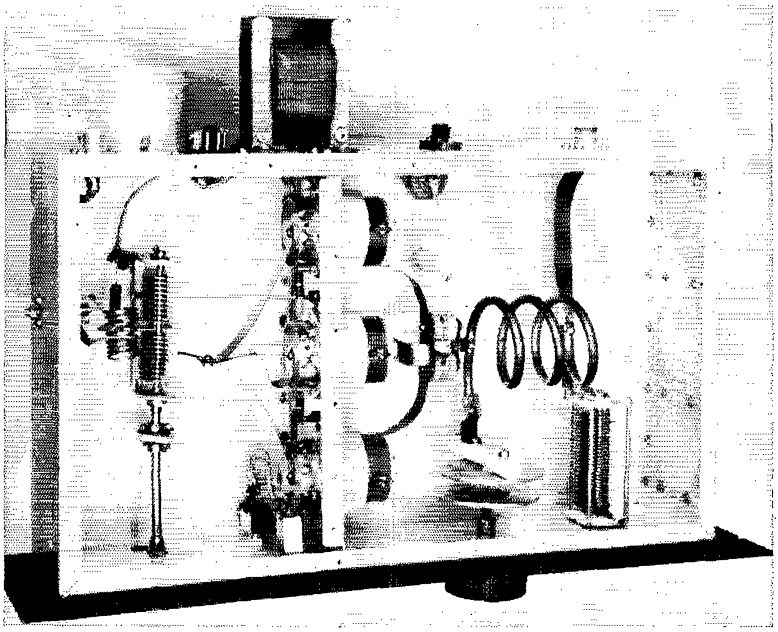


Fig. 3—Interior of the 50-Mc. amplifier. Note method of paralleling grid and plate connections. Cylinder at upper left is for detachable air hose.

The 50-Mc. Amplifier

Chip Brown, W1ZIG, who did most of the work on the amplifiers, and the writer, who put the finishing touches on them, approached the paralleling of three 4CX250Rs with some trepidation. We expected parasitics, unbalance, excessive tank circuit heating, and all manner of troubles that never materialized. The use of paralleled tubes seems to have introduced no problems on its own, and the ease with which the amplifier takes a kilowatt input is a joy to behold. Achieving this happy state involved a few basic considerations that may bear emphasis here.

1) Paralleling straps in the grid and plate circuits were made "three of a kind." The two going to the outer grids were bent identically, and then the one for the middle tube was bent back on itself as necessary to use the same total length of strap. The same was done in the plate circuit.

2) The grid circuit was split-stator tuned, to get a reasonably-sized grid coil, even with the combined input capacitance of the three tubes plus circuit capacitance — some 60 pf. or more. This also provided a means for easy neutralization.

3) The pi-network plate circuit is tuned with a handmade disk capacitor. This has a far lower minimum C than the more conventional tuning capacitor, and it is devoid of the side bars and multiple ground paths that are so often the cause of parasitics in v.h.f. amplifiers. We can find *no* parasitic resonances in this amplifier, other than that around 100 Mc. introduced by the r.f. choke. This caused a blowup when grid-plate feedback developed with a similar choke in the grid circuit. The problem was solved easily by use of a low-Q choke of different inductance in the grid circuit. Do *not* use a high-quality r.f. choke for RFC_1!

4) All power leads except the high-voltage one are in the grid compartment, and made with shielded wire. Where the high voltage comes into the plate compartment it is bypassed at the feed-through fitting.

5) The plate circuit is made entirely of copper strap and tubing, for highest possible Q and low resistance losses. It may be of interest that the entire tank circuit was silver-plated after the photographs were made. Efficiency measurements made carefully before and after plating showed identical results.

Looking at the top view, Fig. 3, we see the grid compartment at the left. The coaxial input fitting, J_1 in Fig. 2, is in the upper left corner of the picture. Coax runs from this, out of sight on the left wall, terminating in a loop, L_1, made from its inner conductor. This is inserted between turns at the center of the grid coil, L_2. The series capacitor, C_1, is just visible on the left chassis wall. It is not particularly critical in adjustment, so no inconvenience results from its location away from the front panel.

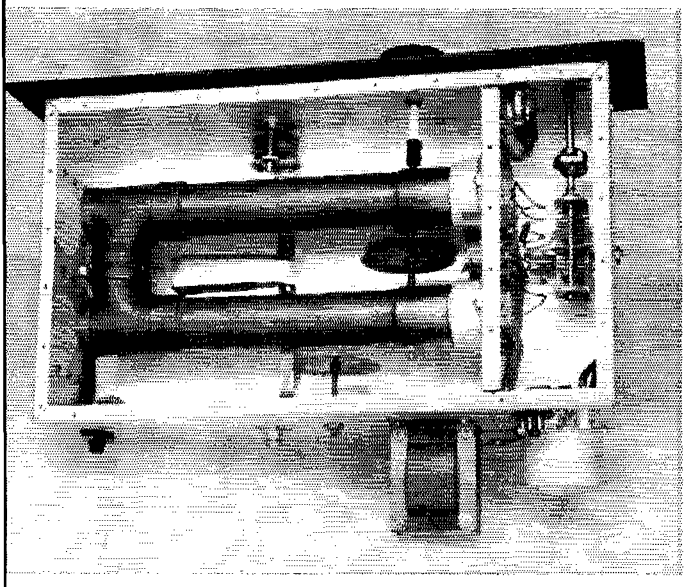
Screen voltage, bias, and 115 volts a.c. come through an 8-pin fitting, J_3, mounted between the air intake and the heater transformer, T_1. On the front panel are the heater switch, S_1, and the pilot-lamp holder.

The three air-system sockets (Eimac SK-600 or Johnson 124-111-1 with chimneys) are cen-

tered on the partition, spaced so that there is about ¼ inch between their flanges. The small angle brackets that come with the sockets should be tightened down with their inner ends bearing against the ceramic chimneys, to hold them in place. Note that the 150-ohm isolating resistors R_2, R_3 and R_4 are connected right at the screen terminals.

Both grid and plate straps are cut from flashing copper ⅝-inch wide. Lengths are not critical, except that all grid straps should be the same length, and all plate straps identical. The plate straps are made in two pieces soldered together in T shape, to wrap around the anode and join at the coupling capacitors, C_4 and C_5. These

Fig. 4—Interior of the 144-Mc. amplifier, showing the plate circuit made from standard plumbing components. Brass pipe junctions make connection to the anodes, and T fittings are modified to form the short at the end of the line.



T-shaped connections could be cut from a sheet of copper in one piece, with a little planning.

The copper-tubing plate coil, L_3, is mounted on stand-off insulators not visible in the picture. Connections to the coupling capacitors, the tuning capacitor, C_6, and the loading capacitor, C_7, are made with copper strap. It will be seen that these various pieces are bolted together, but they were also soldered. The connection from C_7 to the output fitting, J_2, is a single strap of copper, bolted and soldered to L_3.

The disk tuning capacitor can be made in several ways. Flashing copper is easy to work, and the 144-Mc. capacitor was made of this material. A more sturdy disk can be made from ⅛-inch aluminum. Those shown in Fig. 3 were 3-inch meter cutouts from an aluminum panel. Disk-type neutralizing capacitors (if you can find them; they're not common catalog items these days) provide ready-made disks and lead screws for tuning. For the latter we used 3-inch ¼-20 brass screws from a neighborhood hardware store. A panel bushing with brass nuts soldered to it provided the lead-screw sleeve. The stationary disk is supported on ½-inch-diameter Teflon rod, a material also used for the r.f. choke form. Teflon works easily and is unexcelled for insulating applications where high temperatures are encountered. We found it reasonably priced, in various diameters, at a local plastics supply house.

The plate r.f. choke, RFC_2, is important. You'll probably have to make it to get one of sufficiently good quality. For more on this see information under Fig. 2 and "R. F. Chokes for the V.H.F. Bands," *QST*, November 1963. Two coupling capacitors were paralleled because we've experienced trouble with exploding capacitors in pi-network plate circuits in the past. Maybe one would have handled the job, but two do for sure.

Some Possible Variations

It is always risky to suggest variations on a design unless they have been checked out in use, as bugs may develop in unforeseen ways. The following are ideas only, to be used at the builder's risk, since they have not been tested by the writer.

You might not care for three tubes in parallel. Two should work equally well, handling a kilowatt except in a.m. linear or plate-modulated service.

For those who can afford it, a vacuum variable capacitor should be ideal for C_6. One with about 10 pf. maximum capacitance should do nicely.

For lower tube cost, 4X150As from surplus should work without mechanical changes. Use plenty of air, if you intend to push the ratings of the 150As. A 100-c.f.m. blower is not too much. The cooling fins are the main difference between the 150A and later versions of this tube, and some people have gotten away with 250 ratings with 150-type tubes. In this connection, the 50-Mc. amplifier will take a kilowatt at 1200 to 1500 volts, if your power supply will handle the current. This approach, plus plenty of air, is preferable to using plate voltages much in excess of the 4X150A ratings.

The 144-Mc. Plumber's Special

Use of 1⅝-inch copper tubing for a 2-meter tank circuit is by no means new; we've had two fine designs in *QST*.[1] We simply went one step further and made the entire circuit from standard plumbing components. All the heavy metal you see in the plate compartment of Fig. 4 came from the plumbing counter of the local

[1] "High-Efficiency 2-Meter Kilowatt," *QST*, Feb. 1960, p. 30. "Top Efficiency at 144 Mc. with 4X250Bs," Breyfogle, *QST*, Dec. 1961, p. 44.

Sears store. The picture and Fig. 5 should be largely self-explanatory.

At the tube end of the plate line, L_4 in Fig. 5, we have brass castings normally used to join sections of the copper pipe. They make a nice sliding fit over the tube anodes. For tighter fit, cut thin brass shim stock and insert as much as needed between the anode and the sleeve. The short at the B-plus end of the line is made with two T fittings, with their flanges cut down to ½ inch and slipped over a short section of the pipe that is not visible. Joints throughout the assembly were silver-soldered with a torch, but conventional soldering should do equally well. It is possible that solderless joints would work, if the contact surfaces are polished clean before assembly, and then pinned together at several points around the joint with self-tapping screws. The flanges at the open ends of the T fittings are cut down to about ¼-inch in length.

The output coupling loop, L_5, is cut from a single piece of flashing copper, ½-inch wide. This was measurably more efficient than any loop we could make from wire, for what reason we're not quite sure. W1DXE reports a similar improvement in efficiency from a recent installation of a strap-coupling loop in his 144-Mc. amplifier.[1] The loop and plate line are supported on Teflon rod insulators. The r.f. choke is also wound on Teflon. Note its position *outside* the U of the plate line. First mounted inside the loop, it went up in a furious burst of smoke when high power was applied to the amplifier.

Our tuning disks are 3-inch sheets of flashing copper. For nicer appearance and better mechanical stability, use ⅛-inch aluminum as in the 50-Mc. model. Three-inch brass ¼-20 screws are threaded through the pipe fittings. The rear one is held in place with a lock nut, and the other is rotated by the tuning knob, a bakelite shaft

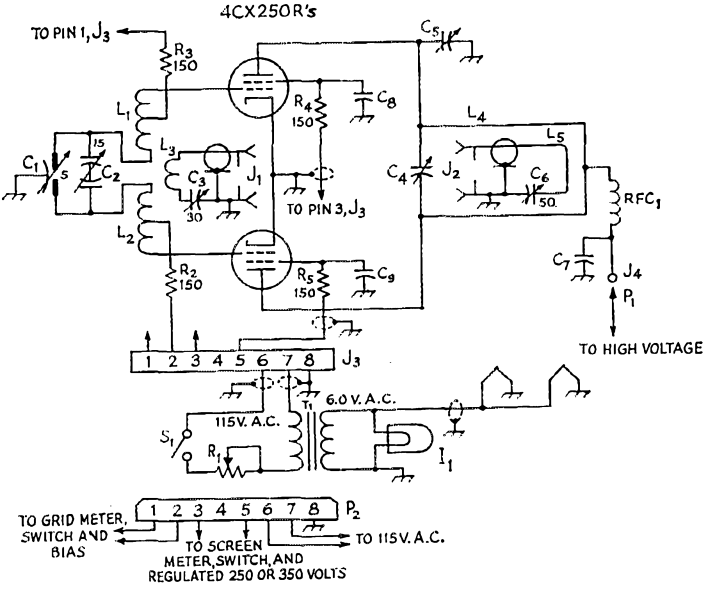


Fig. 5—Schematic diagram and parts information for the 144-Mc. amplifier.

C_1—5-pf. differential trimmer (Johnson 160-303 or 6MA11).

C_2—15-pf. per section split-stator (Hammarlund HFD-15X). Leave rotor ungrounded.

C_3—30-pf. miniature trimmer (Hammarlund MAC-30).

C_4—Tuning capacitor made with 3-inch disks. See text and Fig. 4.

C_5—3-inch disk movable with respect to L_4. See text and Fig. 4.

C_6—50-pf. variable (Hammarlund MC-50).

C_7—500-pf. 5000-volt (Centralab 858S-500).

C_8, C_9—Bypass capacitor built into air-system socket.

I_1—Green-jewel pilot lamp holder.

J_1, J_2—Coaxial chassis receptacle.

J_3—8-pin male chassis connector.

J_4—High-voltage power connector, female (half of Millen 37501).

L_1, L_2—3½ turns No. 14, ⅝-inch diam., turns spaced ½-inch. R_2 and R_2 tap on about 1 turn in from grid end. See text.

L_3—1-turn inner conductor of coax from J_1, about ¾ inch diam. Remove jacket and braid about 3 inches. Adjust position with respect to L_1, L_2 for maximum grid current.

L_4—Plate line 1⅝-inch copper pipe, with junctions and T fittings. Exposed portion of pipe is 8 inches long. Cut right end of T fittings to ¼-inch shoulder, and joined ends to ⅜-inch shoulders.

L_5—½-inch strap of flashing copper, U portion 4 inches long and 1¼ inch wide. Make loop and connections from single piece. Support L_4 and L_5 on standoffs of ceramic or Teflon.

P_1—High-voltage connector, male (half of Millen 37501).

P_2—8-pin female cable connector to match J_3.

R_1—20-ohm 10-watt slider-type. Adjust for 6.0 volts at socket.

R_2, R_3, R_4, R_5—150-ohm ½-watt resistor.

S_1—S.p.s.t. toggle.

T_1—6.3 volt 8-amp. Adjust R_1 for 6.0 volts.

RFC_1—2.15 μh. r.f. choke. No. 22 enamel closewound 1 3/16 inch on ¼-inch Teflon rod.

coupling, and a length of ¼-inch Teflon rod running in a panel bushing.

A third disk is mounted adjacent to the rear portion of the tank circuit. Its position is adjusted to achieve perfect balance in the tank circuit, but in practice this turned out to have no measurable effect. It is felt that a really good choke at RFC_1, and careful adjustment of C_1, can practically eliminate the effect of any slight unbalance if the point of connection of RFC_1 to the tank circuit is not bypassed to ground.

The 144-Mc. grid circuit, L_1L_2, looks like two coils, but actually is a coiled-up half-wave line. This is somewhat more compact than a half-wave line with its conductors out straight, and it seems equally effective. The grids are connected to the outer ends and the tuning capacitor to the inner. The point of connection of the bias-feed resistors should be determined in the same way as with the usual half-wave line: by coupling in 144-Mc. energy and touching a pencil lead along the inductance while watching the grid current. The correct point for final connection of the resistors is that at which no reaction on grid current is observed. Isolating resistors here, and for feeding screen voltage to the sockets, are preferable to r.f. chokes. The inner conductor of the coaxial line is used to make the coupling loop, L_3, which is placed between the inner ends of the grid circuit.

Balanced drive is maintained by adjustment of the differential capacitor, C_1, connected in parallel with C_2, and mounted on the side of the chassis adjacent to it. The series capacitor, C_3, is out of sight under the tuning capacitor, which is mounted on stand-off insulators. It is adjusted by inserting a small screwdriver in a hole in the side of the chassis, but if we were doing it again we'd mount C_3 on the side wall, just under C_1, to make it more readily adjustable. Note that the rotor of C_2 is ungrounded.

About Neutralization

These amplifiers were tested without neutralization and we almost got away with it, but use of all modes, particularly a.m. linear and s.s.b., imposes strict requirements on stability. Conventional cross-over neutralization employed in the 144-Mc. amplifier is omitted from Fig. 5 in the interests of clarity. The schematic representation, C_3 in Fig. 2, is not very informative either.

In the 50-Mc. amplifier the lead visible in Fig. 3, attached to the rear stator terminal of C_2, runs to a polystyrene feed-through bushing (National TPB) mounted in the partition between the rear and middle sockets. Even this bushing's wire stub projecting into the plate compartment turned out to be too much "C_3" and it was trimmed off 1/16th inch at a time, until minimum feed-through was indicated on a wavemeter coupled to L_3 and tuned to the driving frequency.

Similar feed-through bushings are used in the 144-Mc. amplifier, but here a small wire had to be added to each one. The wire connected to the grid of the front tube is aimed toward the anode of the rear tube, and vice versa. Small sheets of thin brass or copper should be fastened under the adjacent edges of the sockets, and bent up at right angles to the partition. These ¾-inch high barriers act to shield the screen rings of the tubes from the feedback "capacitors" and assure that the coupling is from grid to opposite plate, and not to the screen. Length and position of the feedback wires are adjusted for minimum feed-through of driver energy to the plate circuit, as described above. About a half inch of wire was needed in addition to the terminal stub in this case.

When used as linear amplifiers the tubes must be biased to permit them to draw considerable plate current with no drive, so perfect neutralization is a "must." Properly neutralized, the amplifiers will be stable when run at or near maximum safe plate dissipation with no drive, even when the grid and plate circuits are swung through their entire ranges. If they will not pass this test the amplifiers are not ready to be used for linear service.

Controls and Metering

Everyone who builds his own gear has a pet way of controlling it. We happen to like lots of power supplies, each with its primary broken by the main control switch. We frown on relays, except where needed for send-receive switching. We feel lost without plenty of meters, and facilities for occasional metering in almost every circuit. Power supplies and speech equipment at W1HDQ are away from the operating position, with a cable to carry all voltages to the r.f. gear. This helps to explain Fig. 6, the metering and control setup used by the writer with these amplifiers.

At the left, J_1, J_3, J_4 and J_5 are terminals carrying all voltages from the power-supply position. These are distributed through meters, controls and output fittings, J_6, J_7 and J_8, to various transmitters. Circuit breakers at the supply position are used to turn everything off when the station is closed down.

Adjustable bias, 50 to 90 volts negative, is brought in through Pin 2 to a 50-ma. meter and appropriate shunts that keep the circuit that is not being metered closed. The switch S_1 enables the operator to read the grid currents separately in the 144-Mc. amplifier. Grid voltage may be read when required, at J_2.

Similarly, a 500-volt positive source is connected through Pin 3, a voltage-regulating system, an audio choke, a 100-ma. meter and a 3-position switch, S_2, to the screens. Currents can be read separately here, too, and this facility is important in determining that all tubes are running within ratings. The VR system is switched by S_{3A} to provide regulated 250 or 350 volts to the screens. Ganged to it is S_{3B}, which shorts the audio choke for all modes except plate-modulated a.m. This must be done, as the choke will cause trouble on the other modes. The series-parallel VR-tube bank is by no means an ideal regulating system, but it prevents soaring of the screen voltage under conditions of low or nega-

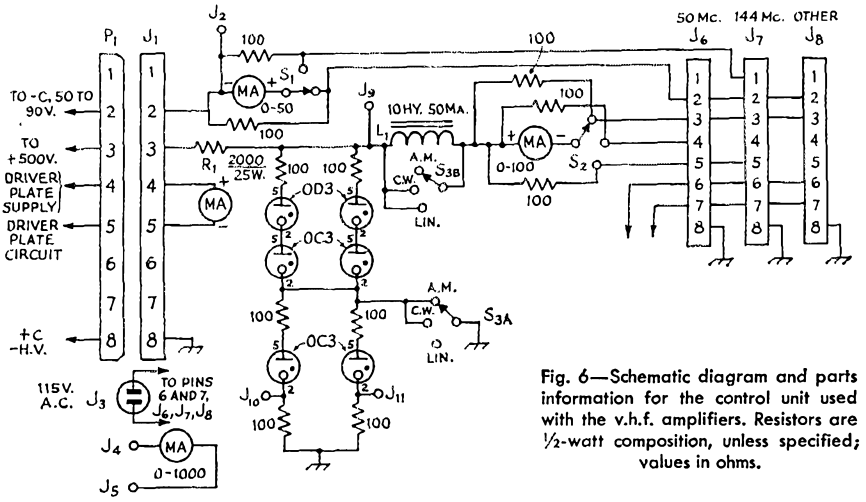


Fig. 6—Schematic diagram and parts information for the control unit used with the v.h.f. amplifiers. Resistors are ½-watt composition, unless specified; values in ohms.

J_1—8-pin male power connector.
J_2, J_9, J_{10}, J_{11}—Tip jack.
J_3—A.c. connector, male.
J_4, J_5—High-voltage feed-through connector (Millen 37501).
J_6, J_7, J_8—8-pin female power connector.
L_1—10 hy. 50-ma. choke. Must be shorted out for other than plate-modulated service.
P_1—8-pin female cable plug.
R_1—2000-ohm 25-watt resistor. Value may be reduced to as low as 1000 ohms if regulation at high values of screen current is desired, provided current measured in J_{10} and J_{11} does not exceed 40 ma. under low-screen-current conditions.
S_1—Single pole 2-position switch.
S_2—Single-pole 3-position switch.
S_3—Double-pole 3-position switch.

tive screen current. These occur only in linear operation, and on c.w. when the key is up. It is not particularly important that screen voltage be held constant for high screen current, as in plate-modulated a.m. and key-down c.w. conditions with low plate voltage. The screen voltage will be kept down by the heavy load on the supply at such times. Actually a single string of three regulator tubes will do the job quite well, and both amplifiers have been worked successfully with this simpler screen arrangement.

Operation

Because a variety of tubes may be used, with a wide range of conditions as to plate voltage and drive, we're not going to be too specific here. If you follow the tube manufacturer's recommendations for the plate voltage you intend to use you won't be far wrong. All tubes of this class are quite versatile as to drive level and plate voltage; unless you are running close to the maximum plate-input ratings the principal factor to watch is screen dissipation, as far as safety of the tubes is concerned. Set up your amplifier with a dummy load and then try the various conditions given in tube data sheets, observing the operation on all meters. In this way you'll soon learn your way around. A few words of preliminary advice may, however, be in order.

First, don't feel that you have to run a kilowatt right off the bat. Put a Variac in your final plate supply primary and run the voltage down for initial testing, or use a lower-voltage supply until you become familiar with the way the rig works. Watch the screen current closely, particularly at low plate voltage or with high grid drive or light loading. The provision for checking individual screen currents is important, otherwise you may learn too late that one tube has been taking all or most of what you have seen on a meter that reads total screen current only. In the push-pull amplifier it may be advantageous to balance screen currents by adjustment of C_1, rather than grid currents, if balance of both screen and grid currents does not occur at one setting.

Tune up for Class C and get the feel of the amplifiers before trying linear operation. Then, if linears are unfamiliar to you, read up on them before jumping in.[2] Get yourself a scope; there is no sure way to set up and operate a linear without one. We use a Heath Monitor Scope, HO-10, ideal for this job because of its built-in tone oscillator and in-the-transmission-line features. Running a linear, either sideband or a.m., without a scope check is inviting trouble, and may let you radiate a signal that your friends on the v.h.f. bands won't care for at all!

Finally, if you must use an a.m. linear, don't expect 70 per cent efficiency from it. Don't expect 50. Expect and see that you *get*, no more than 35 per cent from a Class AB_1 linear, or no more than about half the rated plate dissipation for the tubes used. This means 350 watts out of our 50-Mc. amplifier with a kilowatt in, even though

(*Continued on page 142*)

[2] "Linear Amplifiers for the V.H.F. Man," Technical Topics, *QST*, Dec. 1956, p. 28. There is also much useful information on linear amplifiers in the ARRL publication, *Single Sideband for the Radio Amateur*.

More on the Filterless Terminal Unit for F.S.K.

Modification for 60-Ma. Printer Magnets

BY HAROLD E. DAVIS,* W8MTI

EVERY so often something is in style, goes out of style and returns again, like a cycle. One such thing is the filterless terminal unit described by K6PYB in July 1958, *QST*. More correctly designated a "converter," this unit filled the need for someone who had a Model 26 teletype printer and wanted to get copy without a complicated receiving RTTY converter using tuned filters. In 1958 many of the up-to-date RTTYers were using Model 26s, and receiving units such as the W2PAT RTTY converter in the *Handbook* were used to make copy.

After building several types of RTTY converters, I came to the conclusion that there just isn't one type that will fill all needs. Converters using TV-width coils gave fair selectivity, filterless types gave little if any selectivity, and toroid-filter types gave good selectivity. But on the other hand, toroid-filter types require quite accurate tones and frequencies, width-coil types are more tolerant of the incoming tones, while the filterless type is capable of good results from any number of tone combinations that would be unusable in a filter type. Where a.f.s.k. is used, as on 6 or 2 meters, this often is a very important consideration since we don't all have accurate standards for setting the shift from mark to space, or to the exact frequencies of the mark tone or the space tone. It is for this main reason, in addition to some minor ones, that the author has just completed his fifth K6PYB filterless unit.

* 4761 Baldwin St., Onondaga, Michigan.

The theory and operation of the unit are fully covered in the original article by K6PYB, and the reader is urged to review that article.

In the past few years, more and more hams are using later-model RTTY machines and much of this newer equipment requires 60 ma. for proper operation. While many articles on RTTY converters do not include information on the keying current available, the K6PYB article does, and a number of RTTYers have not built this unit because it was clearly stated to adjust the current to 30 ma. This just isn't enough for most Model 15 printers and most Model 14 tape gear.

I felt that if the unit would key a 60-ma. circuit it would be just the ticket for both MARS h.f. net f.s.k. operation, where stations vary a little as to frequency, and v.h.f. operation with a.f.s.k., where many of the fellows are using something other than the standard 2125/2975 c.p.s. tones and 850-c.p.s. shift. Another consideration is that with mechanical-filter receivers better receiver response can be obtained on frequencies lower than the 2125 and 2975 c.p.s. used for the large majority of converters for RTTY.

Perhaps the most important change from the original unit is the use of a heavier power transformer, so the 60 ma. in the keying circuit would not impose a serious overload on the *B* supply. As one half of the 12BH7 would key a 30-ma. circuit nicely, it figured that two halves in parallel ought to key a 60-ma. circuit. In order to avoid installing another tube, socket and heater wiring, a newer type tube was used in place of the original 12AT7. This tube, the General Electric 6D10 Compactron, is the equivalent of three halves of a 12AT7. As shown in Fig. 1, the 6D10 replaces the entire 12AT7 and the first half of the 12BH7 of the original circuit. This allows parallel operation of the 12BH7 sections. The only other change was the current-regulation rheostat in the plate line of the 12BH7. The original circuit had a 5000-ohm unit, but in the modified converter a 2000-ohm resistor was used.

The power transformer used in the modified model, rated at 225 v.d.c. at 110 ma., allowed a maximum current of 59 ma. to flow in the selector magnet winding. Resistor R_1 of the original circuit was not used, since the voltage was already slightly lower than that recommended by K6PYB in the original article. A salvaged TV power transformer would most likely deliver higher voltage. In case the transformer used supplies more than 250–275 volts at the high-side terminal of the input capacitor, the use of the series resistor, R_1, is recommended.

If occasional operation is intended where a current of only 30 ma. is required, it is recommended that a 5-watt rheostat be used in place

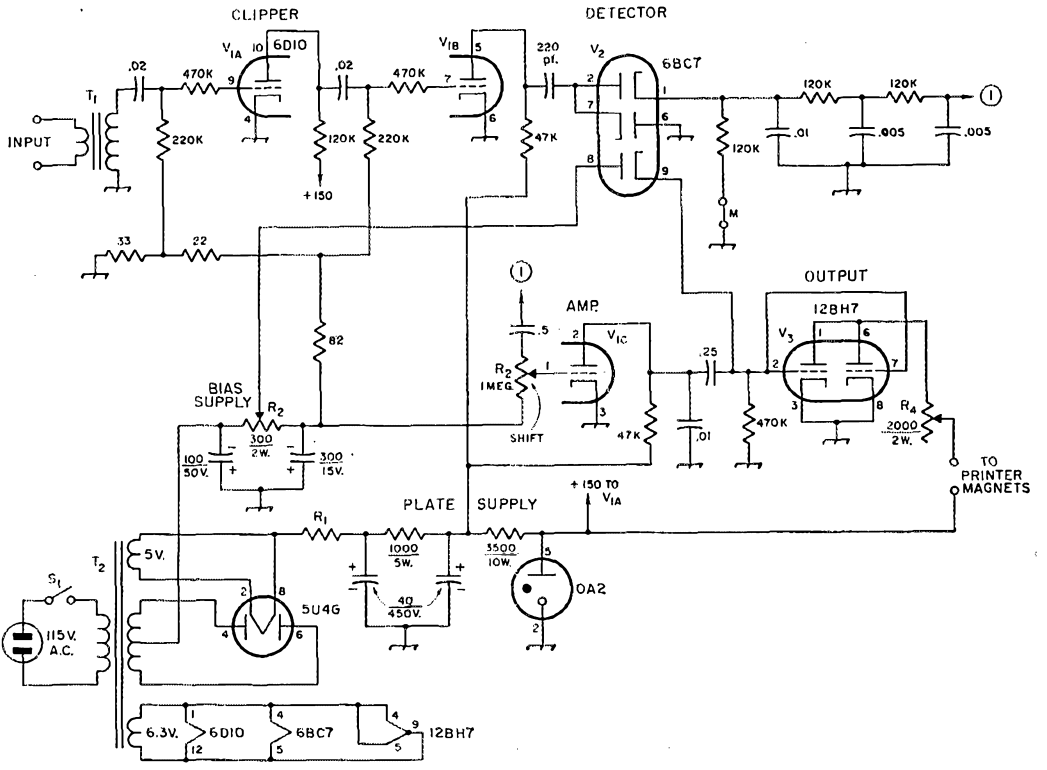


Fig. 1—Modified circuit of the K6PYB terminal unit described in July 1958, *QST*. Capacitances are in μf. except as specified otherwise. Resistances are in ohms (K = 1000); resistors are ½ watt except as specified.

M—Terminals for microammeter.
R_1—To drop plate voltage to 250; see text.
R_2—Wire-wound control (clipping adjustment).
R_3—1-megohm control.
R_4—Wire-wound control (printer-magnet current adjustment).
S_1—S.p.s.t. toggle.
T_1—Audio transformer, approx. 50 to 1 turns ratio (output transformer, 10,000 to 4 ohms, suitable).
T_2—Power transformer, to deliver 250–275 volts d.c. at approximately 75 ma.; 6.3 volts at 1.5 amp. or more; 5 volts, 3 amp.

of the 2-watt one and that the value be 5000 ohms. Also, a single-pole, single-throw switch should be used to lift one of the cathodes of the 12BH7 from ground.

The operation and adjustment of the modified unit are the same as for the original converter, with the exception of adjusting for 60 ma. instead of 30 ma. QST

Strays

Visiting or vacationing in France soon? Join French hams of the Paris Dinner Club at 7:30 P.M. the sixth of any month at 66 Quai de l'Hotel de Ville, Paris 4e, Metro Station, Pont Marie. — *F2BO.*

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Echo II Launching Imminent

If there were no hitches to cause further postponement, the reflective satellite Echo II was to be launched during the week of January 23, exact date yet to be determined at time of writing. Launch time was estimated to be between 1300 and 1400 GMT. As soon as known, the actual date and lift-off time should be announced by W1AW bulletin.

The planned orbit will have a period of 111.113 minutes and an inclination of 81.9 degrees. Exact figures after actual launch will be bulletined by W1AW as soon as determined by NASA.

The satellite will carry two transmitters of 30 milliwatts each, operating continuously on 136.02 Mc. and 136.17 Mc.

On the basis of the planned orbit, the 40th-parallel intercepts will be as follows:

Northbound, altitude 793 miles

58.2 W long.	at 7 hours 53.2 min. after launch
86.1 W	at 9 hours 44.3 min.
114.0 W	at 11 hours 35.4 min.
61.3 W	at 31 hours 59.1 min.
89.2 W	at 33 hours 50.2 min.
117.1 W	at 35 hours 41.3 min.

Southbound, altitude 795 miles

65.3 W long.	at 19 hours 32.6 min. after launch
93.2 W	at 21 hours 23.8 min.
121.1 W	at 23 hours 14.9 min.
70.4 W	at 43 hours 36.6 min.
98.3 W	at 45 hours 27.8 min.
126.2 W	at 47 hours 18.9 min.

See October 1962 *QST*, page 64, for information on using 40th-parallel intercepts.

Some Notes on Reducing Power

BY E. LAIRD CAMPBELL,* W1CUT

POINT FIVE of the ARRL recommendation concerning minimum power (page 65 of *QST*, March 1963) emphasizes the principle that every amateur station should be equipped to reduce power at times when it is appropriate. This practice is not only just a question of good manners and of taking up less room in our bands, but it is also outlined in Section 324 of the Communications Act of 1934, as amended, which we must all observe by reason of law.

Whether the power reduction is appropriate because of a brief contact, as in a contest, or for working cross-town vs. DX, the question is: how do you reduce power? The answer, of course, depends upon many things. What kind of power are you running now? What is the emission — s.s.b., c.w., or a.m.? Answers to all of these questions can only be general in substance, since each and every equipment — whether it is commercial or home-built — will require its own power reduction scheme. However, suggestions in a broad sense can be made, and some of them are outlined here.

Output Controls

If the station consists of a commercial or home-built s.s.b. transmitter in the 100-watt class, reducing power should take nothing more than turning down the gain control. Most transmitters in this class are tuned up by inserting carrier, resonating the final stage and adjusting the loading for rated output. Once this is done, the carrier is removed and the gain (usually labeled "microphone gain") is increased while talking until the proper output level is attained. Once the optimum tune-up condition is reached,[1] the microphone gain (or whatever the control is labeled) can be simply cranked down to any desired level. You won't damage the equipment in doing this and, in fact, most likely will improve the over-all linearity and suppression! Hum and noise-to-signal ratio may increase somewhat as the gain control is turned down, depending on where the noise is being introduced. If the hum enters before the gain control its effect will probably be small. Also, the ratio of carrier to signal may increase when the gain is reduced, but it will also be at negligible levels.

When operating c.w. with s.s.b. transmitters, the same "turn down the gain" technique is used. However, instead of the microphone gain control, reduce the amount of carrier inserted.

A.m. output from s.s.b. equipment is usually low to start with because of the linear operation of the amplifiers. If it is necessary to reduce power in this mode, a combination of carrier and speech gain reduction should do the trick. Here again, an oscilloscope is a necessity for optimum adjustment.

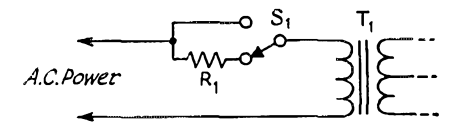


Fig. 1—Placing a resistance, R_1, in series with the plate transformer primary will reduce the secondary voltage.

Plate Voltage Methods

What about Class-C c.w. and a.m. equipment? Many ideas have popped up over the years for reducing power to these rigs. Probably the simplest method is to reduce the plate voltage by inserting resistance in series with the plate transformer primary as shown in Fig. 1. The resistance, R_1, can be a 120-volt lamp or the element from an iron or toaster. If R_1 requires about the same power as the plate transformer load, the resulting voltage output from the plate supply will be cut in half. Since the Class-C stage plate current will drop about one half, the power input to the Class-C stage will be cut to approximately one quarter.

Another arrangement, shown in Fig. 2, involves the use of plate transformers having a dual primary (could be two plate transformers with the secondary windings joined together to form a center tap and then connected to a full-wave rectifier system). With switch S_1 in the parallel position, the windings are connected in parallel and full output voltage is obtained from the sup-

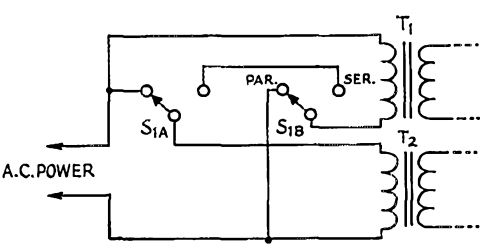


Fig. 2—Plate voltage can be cut in half by switching the plate transformer primaries in series.

* Technical Assistant, *QST*.

[1] Although most equipment is furnished with some kind of indicating device, usually a meter, only an oscilloscope can show when the proper operating point is reached; that is, with maximum output and minimum distortion.

ply. Switching the primaries in series cuts the voltage in half.

If the plate transformer normally operates with 240 volts on the primary, dropping the voltage to 120 will reduce the secondary voltage to one half.

Another system used for reducing transmitter output is adjusting the plate voltage by a variable autotransformer (such as the Variac) in the primary of the plate transformer. These variable autotransformers are available in power ratings of from a few watts up to several kilowatts.

If the Class-C stage is modulated, simultaneous plate-voltage control of the modulator and r.f. amplifier can vary the input over a considerable range. If beam tetrodes or zero-bias triodes are used in the modulator (with the screen voltage derived through a dropping resistor from the plate voltage in the case of the tetrodes) the plate transformer of the modulator can be connected across the same controlled primary voltage that supplies the voltage to the Class-C stage. There are limits to the voltage spread over which the system can be used before a serious impedance mismatch takes place, but it should be possible to drop the power input as much as ninety per cent without difficulty, even when beginning at the kilowatt level. If zero-bias triodes are used in the modulator, the gain control in the speech amplifier stage should be turned down along with the plate voltage. With biased triodes, it will be necessary to change the bias along with the plate voltage. Use a scope for final adjustment.

Screen Voltage Methods

Another vacuum-tube element that makes it convenient to control tube gain is the screen grid. Reducing the screen voltage reduces output. One of the most common screen-control power-reducing methods is shown in Fig. 3. Voltage for the screen is picked up from the plate-voltage supply and dropped to the desired value through the voltage divider, R_1 and R_2. Control R_1 is the output control. This system shouldn't be used where screen keying is involved. The alternative method where screen keying can be used is shown in Fig. 4. Here, the screen voltage is furnished by a separate screen supply. Output is controlled by varying the control-grid bias on the stage through the voltage divider R_1, R_2 and R_3. In both of these grid methods the resistance values of the voltage divider will depend on the tube type and

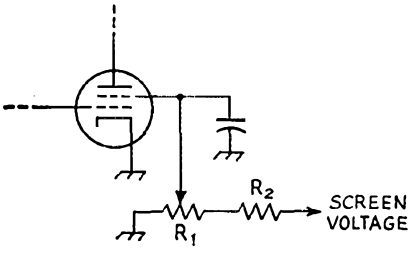


Fig. 3—Output from a screen-grid tube can be controlled by varying the screen voltage.

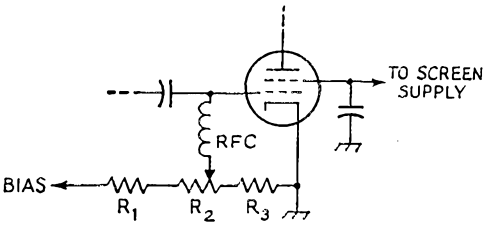


Fig. 4—Reducing tube gain by bias control.

voltage, and therefore can't be specified in general terms.

For r.f. amplifiers using a clamp tube, the circuit in Fig. 5, suggested by W1ORP, can be used to give output control over a wide range. When excitation is applied to the stage (in this case an 807), screen voltage is indirectly controlled by the potentiometer, R_1, which is set at whatever value is required for the desired output.

All of the above grid methods of power reduction should be treated cautiously when considering keying, and especially when modulation of the stage is involved. Key clicks, modulation distortion, and other discrepancies can occur with improper application of the methods. The best rule to follow when using any of these is to check the resulting signal carefully, both at the shack (with the scope) and on the air.

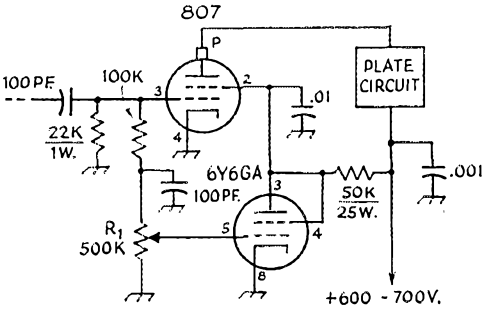


Fig. 5—A combined screen-protective and output control circuit. R_1 is the output control. Unless specified otherwise, capacitances are in μf., resistances are in ohms, resistors are ½ watt.

Brute Force Method

If you are averse to digging into your equipment and modifying it for power reduction, the simplest (but certainly not the most efficient) system is to use a power attenuator or "swamper." These devices have been used for some time now to reduce driver output for linear amplifiers. However, there is no reason why they can't be used between the transmitter and the antenna, except in the case of very high power where the power dissipation of the attenuator components would become impracticably large.

The diagram in Fig. 6 shows an r.f. attenuator described by W9ERU in *QST* several years ago.[2] The circuit is a T-pad designed with an input and

[2] Hubbell, "A Step-Type R.F. Attenuator," *QST*, Dec. 1959, p. 20.

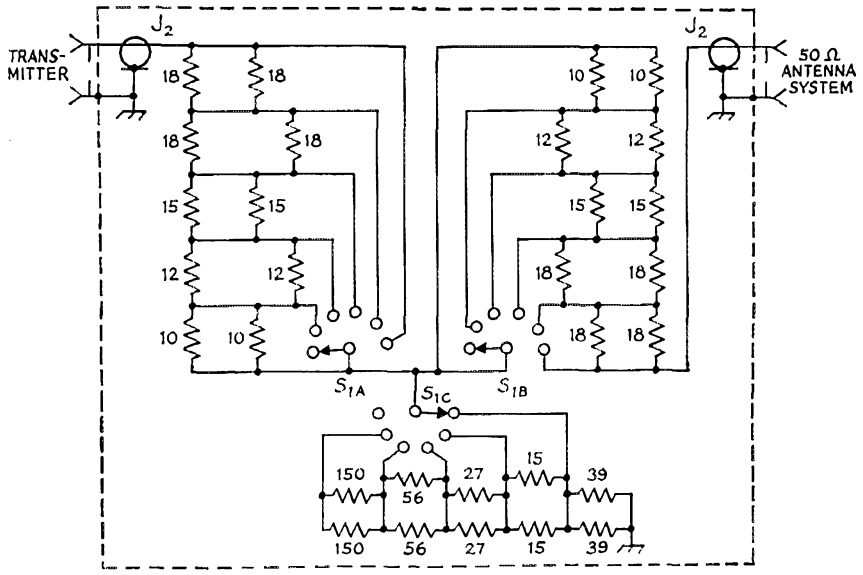


Fig. 6—Circuit of the T-network attenuator. Resistances are in ohms, and resistors are 10 per cent, 2-watt composition. J_1 and J_2 are chassis-mounting coax receptacles (SO-239). The switch, S_1 is described in the text and is shown in the maximum-attenuation position.

output impedance of 50 ohms, and a maximum power rating of about 100 watts. Five steps of attenuation are available: 3, 6, 9, 12, and 15 db. With 100 watts input to the unit output may be selected for 100, 50, 25, 12, 6, and 3 watts.

The resistors used in the attenuator are 2-watt types made by Ohmite or Allen-Bradley. Do not use wire-wound types! The attenuator can be built in a metal box, although perforated aluminum covers should be used to insure good ventilation. The switch, S_1, is a special one, made up of Centralab index kit P-121 and two ceramic sections, one having two poles and five positions, and the other a single pole and six positions. The two-pole section actually has six positions, one of which is "off" where the rotor contact is made. The index stop is adjusted to use this sixth position in the maximum-attenuation position. Hardware furnished with the index kit includes sufficient $\frac{1}{2}$-inch spacers so that the two switch sections may be assembled on the index. Place the single-pole section next to the index and the double-pole section away from it. The sections used may be either types T and R (shorting), or X and B (nonshorting).

Although wiring and layout of the attenuator are not critical, detailed information on construction can be obtained from the original article.[3]

Using the attenuator is simply a matter of inserting it in the transmission line between the transmitter and a 50-ohm antenna system.

Amplifier Power Reduction

Except for the plate voltage reduction schemes described earlier, most of the systems discussed are for transmitters in the 100-watts-or-less class.

[3] This issue of *QST* is no longer available from ARRL. However, it probably can be found at most large libraries.

What about transmitting systems that include high-power amplifiers, such as linear amplifiers popular today to follow up s.s.b. and c.w. exciters? The easiest way to reduce power here is simply to switch out the amplifier completely and run the exciter "barefoot," that is, connected straight to the antenna. The circuit in Fig. 7 shows a switching arrangement for doing this.

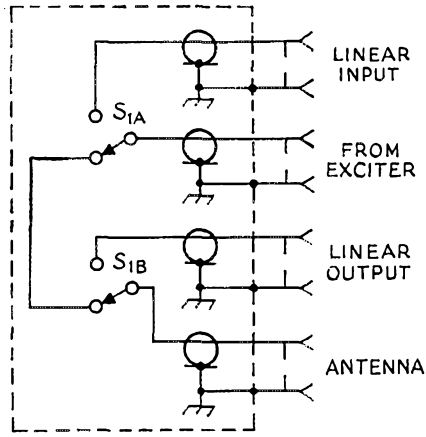
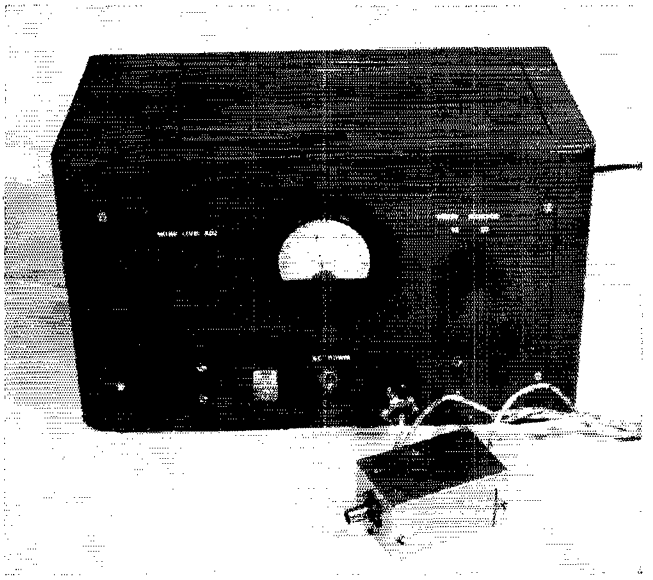


Fig. 7—Switching arrangement for bypassing a linear amplifier and running the exciter directly to the antenna.

The circuit uses a double-pole double-throw switch, S_1. The switch can be a relay, rotary switch, or one of the commercial coaxial switches designed for just such applications.

Being able to reduce power is a necessity and every amateur should consider it for his particular equipment. Digestion of this material should give the reader some ideas on how to go about it. QST



The noise generator and power supply. The noise diode is housed in a subassembly, separate from the power supply and metering circuits to simplify construction and make for easier use.

A V.H.F. Noise Generator

Principles and Construction for Noise Measurements to 400 Mc.

BY JOSEPH A. HUIE,* K2PEY

A particularly difficult problem for the radio amateur is the accurate evaluation and test of the equipment he builds. Good test equipment is expensive and, if home built, is a heavy drain on time and often difficult to calibrate. A noise generator, however, is extremely simple to construct; it essentially requires no calibration, and is a very valuable tool for the serious v.h.f. man. It can be used for noise-figure measurements, of course, but also can be used to measure cable attenuation and as a primary standard in the calibration of signal generators. It can be used to measure ambient atmospheric noise levels and as a reference in propagation-loss measurements.

This article discusses the various types of noise sources used for receiver measurements and describes a very simple-to-build thermionic generator which can be used up to 432 Mc. Test results are presented in terms of measurement comparison with commercially built equipment.

Theory of Operation

The four types of noise generators in common use are the temperature-controlled resistor, the gas tube, the crystal diode and the thermionic diode. The temperature-controlled resistor is probably the most accurate source, but is only recently finding even limited usage. This type of source is based on the fact that the available noise power from a resistive load is directly proportional to its absolute temperature. The load may be either heated or cooled. The cooled load is used for high accuracy when measuring devices having very low noise figures, such as parametric amplifiers and masers.

The gas-tube source is most often used at frequencies above 1000 Mc., the tube being built directly into a section of waveguide. The high noise level produced is the result of electron energy build-up in the positive column of the gas discharge.

A crystal diode biased in the reverse direction is the simplest of all noise sources.[1] However, this type of generator should be regularly checked against a reference, and therefore must be ruled out for serious work.

The fourth type of generator, the thermionic-diode noise source, has found widest use at frequencies below 1000 Mc. It is very easy to build and the only calibration required is that of a d.c. milliammeter. Accuracy becomes limited at

* 52 Hillside Road, Penfield, N. Y.

[1] Tilton, "Noise Generators — Their Uses and Limitations," *QST*, July 1953.

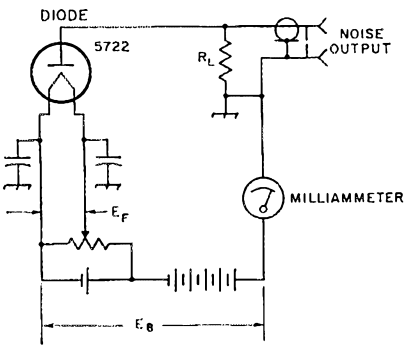


Fig. 1—Essential circuit of a thermionic-diode noise source.

high frequencies by tube reactances and transit-time effects. The highest useful frequency for coaxial diodes is about 3000 Mc., while for tubes of more conventional construction 400 to 500 Mc. is the limit. The thermionic-diode noise source has been discussed by Ed Tilton (see footnote 1). In this article we present further detail on the device and performance-test results for frequencies to 400 Mc.

A simplified schematic of the thermionic-diode noise source is shown in Fig. 1. The diode is operated in the temperature-limited region. All the electrons emitted by the filament reach the plate. Thus, varying the plate voltage has little effect on the plate current, but rather the filament temperature and thus the filament current is the controlling factor on plate current. The random emission of electrons from the filament causes fluctuations in the plate current of the tube. These fluctuations represent the component of noise current in the total plate current. The current, when passed through a load, generates a noise voltage which forms the noise-generator output. It turns out that for a temperature-limited diode the noise component of the plate current is very precisely related to the d.c. plate current, and to vary the noise current it is only necessary to vary the d.c. plate current (see Appendix).

In usual noise-figure measurements, the noise generator is connected to the input of the receiver with the diode plate current set to zero. The noise power in the i.f. of the receiver is then measured. Next, the diode current in the generator is increased until the noise power in the i.f. just doubles; i.e., increases 3 db. The value of the diode plate current in milliamperes is then the noise figure of the receiver, expressed as a power ratio.

Design and Construction

Invariably, directly-heated tungsten-filament diodes are used in noise generators, because this type responds rapidly to changes in filament

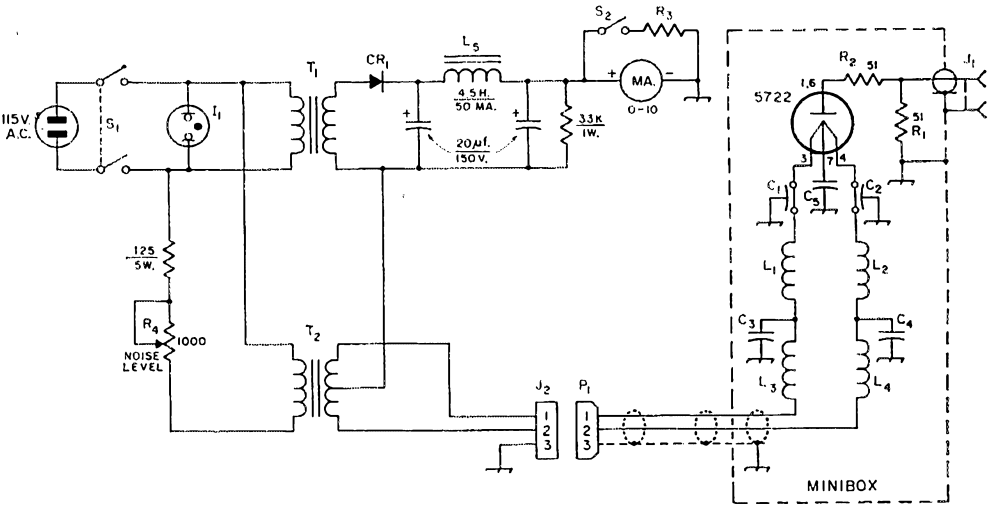


Fig. 2—Circuit diagram of the noise generator. Resistances are in ohms; K = 1000.

C_1, C_2—0.001-μf. 500-volt feed-through (Centralab MFT-1000).
C_3, C_4—0.005-μf. 500-volt disk ceramic.
C_5—0.001-μf. 500-volt button or disk ceramic.
CR_1—Selenium, 50 ma., 360 p.i.v.
I_1—Pilot light, 115 volts (Drake 105).
J_1—BNC or UHF chassis-type coaxial connector.
J_2—Octal socket.
L_1—L_4, incl.—Approx. 1 μh.; 22 turns of No. 24 enam. on high-value 1-watt resistor. Must carry 2 amp. max.
L_5—Filter choke, 4.5 henrys at 50 ma. (Stancar C-1706).
P_1—Octal plug.
R_1, R_2—51 ohms, 5 per cent, composition.
R_3—5× meter shunt; see text.
R_4—1000-ohm 50-watt rheostat (Ohmite Type J).
S_1—D.p.s.t. toggle.
S_2—S.p.s.t. wafer (contacts must be kept clean to prevent erratic meter readings).
T_1—Power transformer, 125 volts at 50 ma. d.c. (Stancor PA-8421).
T_2—Filament transformer, 6.3 volts at 3 amp., with center tap (Stancor P-6466).

The three articles presented here as a group examine noise-figure measurement from various viewpoints — the theoretical basis, optimum construction techniques at v.h.f. and u.h.f., practical pointers on avoiding errors in measurements. Taken together, they give you what we believe to be a pretty complete picture of the subject, one well worth holding on to for future reference.

current. Oxide-coated cathodes, besides being sluggish in response, tend to give erratic noise output. High-frequency operation is limited by transit-time effects and stray reactances. For operation to a maximum of 3000 Mc., a coaxial diode such as the Bendix 6144 is used. At frequencies up to about 400 or 500 Mc., however, a tube of lower cost is the Sylvania 5722. This is a tungsten-filament tube designed specifically for noise-generator application. The tube cost is $6.60.

The noise generator described uses the 5722 tube and the schematic is shown in Fig. 2. Because of the tube's insensitivity to plate voltage changes, the high voltage is not regulated. Sufficient filtering is provided to reduce the ripple to about 2 volts peak-to-peak at 50-ma. drain. The filament voltage is adjusted by a rheostat in the transformer primary. Filament-voltage regulation was not included, as actual operation of the generator showed it to be sufficiently stable. A worthwhile improvement, however, would be the addition of a "fine-tuning" control (100-ohm rheostat) for the filament current. The 1000-ohm rheostat alone is adequate, but a little coarse in adjustment.

The power supply and the metering circuit will handle up to 50 ma., permitting direct noise-figure measurements to 17 db.

The meter used is a 10-ma. full-scale unit with a shunt providing range extension to 50 ma. The shunt (R_3) is made of No. 33 copper wire wound on a 2-watt resistor. The number of turns is adjusted to make the meter read 50 ma. full scale; this was 44 turns for the particular meter used.

It is important that the filament leads to the tube be well filtered to prevent conducted interference from introducing error into the measurements. To simplify the construction and at the same time provide good shielding, the noise diode itself is mounted in a separate 3¼ × 2⅛ × 1⅝-inch Minibox. (This construction was suggested by W2JTE.) The internal wiring is shown in Fig. 3. The high-frequency performance of the generator is directly dependent on the use of short leads to minimize lead inductance and capacitance. It turns out that the frequency limitation on the tube is due to lead reactance and not transit time. Even at 500 Mc., transit time contributes theoretically less than 0.2 db. error.[2] The measured strays of the tube with and without socket are given in Table I, together with calculated resonant frequency.

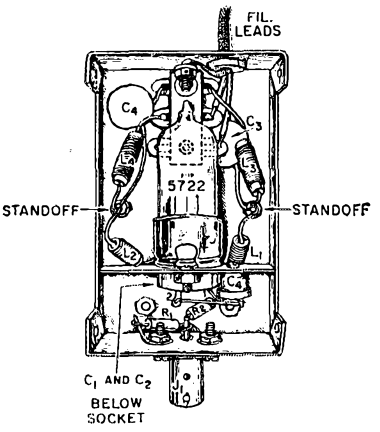


Fig. 3—The 5722 tube is mounted in a small Minibox. The socket is mounted on an L-shaped plate of copper. Filament connections are made by feed-through capacitors. All leads to the tube should be kept as short as possible. This is particularly important for the 51-ohm resistor, R_1. It should be checked after soldering to insure that its value did not change. In operation, Sylvania recommends that the 5722 be mounted vertically or with leads 3 and 4 in a vertical plane.

When the generator was first checked against a commercially-built coaxial-diode source, it was found that at higher frequencies the 5722 tube tended to indicate better noise figures than the coaxial diode. The error was about −1.5 db. at 200 Mc. This was apparently caused by the resonant effect of the tube and socket reactances. A lumped equivalent circuit is shown in Fig. 4. The calculated error for this circuit is −0.64 db. at 200 Mc. and −2.7 db. at 400 Mc.

To essentially damp out the resonance, a 51-ohm resistor (R_x) was added in series with the diode plate lead. This improved the results both experimentally and by calculation. The calculated error at 400 Mc. is +0.5 db. and the experimental

[2]Slinkman, "Temperature-Limited Noise Diode Design," *The Sylvania Technologist*, October 1949.

Table I

	Plate to Filament Capacitance	Effective Lead Inductance	Calculated Resonant Frequency
5722 tube alone	2.5 pf.	0.0099 μh.	1010 Mc.
5722 tube with 7-pin phenolic socket	4.3 pf.	0.012 μh.	700 Mc.

Table II

Frequency	PRD Type 904	KAY Mega Node 240B	5722	Diff. PRD	Diff. KAY
400 Mc.	5.6 db.	5.9 db.	5.4 db.	−0.2 db.	−0.5 db.
250	10.1	10.0	9.3	−0.8	−0.7
220	10.1	10.2	9.6	−0.5	−0.6
144	8.8	9.2	8.6	−0.2	−0.6
100	8.6	8.8	8.3	−0.3	−0.5
50	6.4	6.8	5.9	−0.5	−0.9
30	5.2	5.6	4.7	−0.5	−0.9

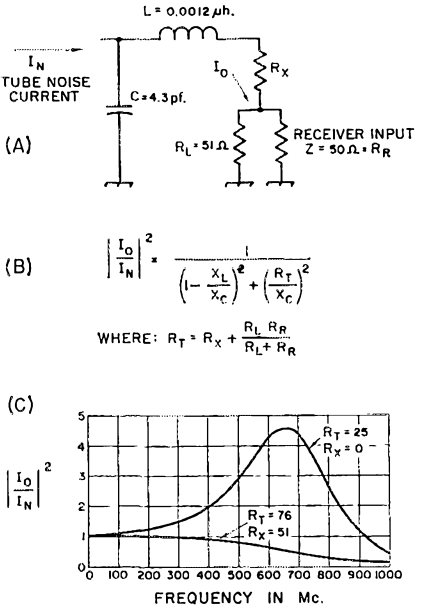


Fig. 4—The noise source equivalent lumped-constant circuit is shown in (A). I_n is the tube noise current calculated from the equation $I_n^2 = 2eI\Delta f$. I_0 is the effective tube noise current. It differs from I_n because of the resonance effect of L, C and R_T. The equation for $\left|\frac{I_0}{I_n}\right|^2$ is given in (B). Ideally, this ratio would be unity over the entire frequency range. A plot of $\left|\frac{I_0}{I_n}\right|^2$ as a function of frequency is shown in (C) for the two values of series resistor, R_X. At the higher frequencies the curves become in error because the actual circuit is distributed and not lumped as simplified in (A).

results are shown in Table II. The noise-figure measurements were made on a telemetry receiver, using the 5722 source and two commercial coaxial-diode generators. The 400-Mc. figures are for a converter using GL-6299 preamplifier tubes. Transit-time correction was made for the coaxial-diode generators. Why the 5722 source consistently indicated a slightly better noise figure regardless of frequency was not determined (meter calibration was ruled out and the 5 per cent high termination would account for only 0.25 db. error.).

Another parameter of the noise source is the internal impedance. This is difficult to relate to accuracy directly, but ideally it should be 50 ohms resistive. The impedance of the 5722 source was measured at several frequencies and the results below are in terms of v.s.w.r.

Frequency	*V.S.W.R.*
420 Mc.	1.48
400	1.46
350	1.39
300	1.34
250	1.34
200	1.18
144	1.09
100	1.05
50	1.05
20	1.05

The low-frequency v.s.w.r. was limited to 1.05 because the termination was actually 52.5 ohms rather than 50.

Use of the Noise Generator

One of the problems in determining noise figure is that the r.f. noise power in the i.f. amplifier output of the receiver must be measured. A calibrated thermistor bridge is the best choice, but this usually is not available to the amateur. A second choice which has worked out quite well at 455 kc. is an audio v.t.v.m. (such as the Heathkit AV-3), which has fairly good response up to 455 kc.

The audio output of the receiver cannot be used as a direct measure of the i.f. power because of the nonlinear response of the second detector. However, the receiver b.f.o. will effectively eliminate the detector nonlinearity, provided the b.f.o. voltage at the detector is at least several times greater than the noise voltage. Then the audio noise output of the receiver can be used in measuring the noise figure. Diagrams of typical test setups are shown in Fig. 5.

The measurement steps are:

a) The noise-diode plate current is set to zero and the receiver noise output measured (with a.g.c. off).

b) The diode current is then increased until the receiver noise output power doubles. The current in milliamperes is the noise figure and 10 log I (ma.) is the noise figure in decibels.

Care must be taken to see that the receiver is not overloading, otherwise the measured noise figure will be much worse than the true value. This is more likely to happen in transistorized receivers. Observing the noise on a scope will often indicate overloading. Another way is to make noise-figure measurements at different

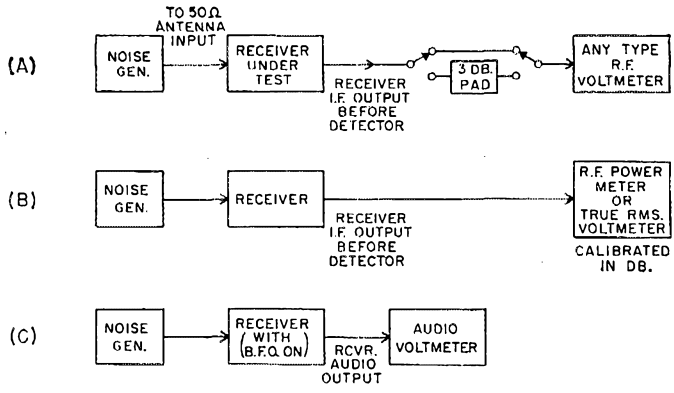


Fig. 5—Noise-figure measurement test setups.

(A) The receiver i.f. noise output measured with an r.f. voltmeter. The voltmeter is not used as a calibrated instrument, only as an indicator. The 3-db. pad provides the calibration. A peak, average or r.m.s.-type meter may be used.

(B) Same setup as (A) except that the r.f. meter must be calibrated in db. and have the same response law to noise at the calibration points used in the measurement. A power meter or true r.m.s. type voltmeter is most desirable here. The Heathkit AV-3 voltmeter also has worked out well.

(C) If the receiver b.f.o. is used, the noise may be measured at the receiver audio output. The accuracy is somewhat uncertain, however, unless the linearity of the detector with b.f.o. is checked.

settings of the r.f. gain control. If the noise figure increases as the gain is increased, overloading is present.

Another source of error is the image response of the receiver. If this is comparable to the main response, the measured over-all receiver noise figure may be as much as 3 db. (when image response equals main response) better than the actual value. This condition is most likely to occur in receivers where the first intermediate frequency is very low compared with the input frequency. The power ratio (R) of the image response to the main response must be known in order to make a correction. The actual diode current is multiplied by the factor ($1 + R$) to get the effective current for determining noise figure.

A final precaution is to make sure the power-measuring device is actually measuring noise power and not 60-cycle hum or some other parasitic signal.

The value of small attenuators or the insertion loss of coaxial cable can be measured with the noise generator, since an attenuator placed ahead of a receiver increases the effective noise figure by the attenuation in db. Thus, a 3-db. loss in the antenna cable will increase the effective receiver noise figure by 3 db. To measure an unknown attenuator, it is simply necessary to measure the receiver noise figure with and without the unknown between the noise source and receiver. The db. difference in noise figure is the value of the attenuator, assuming the system impedances to be matched.

The output of a signal generator can be calibrated with the noise diode, if the effective noise bandwidth of the receiver is known (practically speaking, this is the 3-db. bandwidth of the i.f. amplifier). The signal generator is connected to the receiver and the output adjusted until the i.f. amplifier power reaches some reference level. The noise source is then substituted for the signal generator and its output increased until the i.f. output reaches the same level. The signal generator power output (P_g) is equal to the noise-diode output summed over the receiver bandwidth. That is,

$$P_g = \frac{R_L e \Delta f I}{2}$$

where I is the diode current in amperes and Δf is the receiver bandwidth in cycles per second. For a receiver with 50-ohm input impedance and a 50-ohm generator,

$$P_g = 4 \times 10^{-21} \Delta f I \text{ watts.}$$

where I is the diode current in milliamperes.

The effective noise temperature of an antenna can be measured if it is matched and if the receiver noise output increases, compared with the noise from a dummy 50-ohm load, when the antenna is connected. The receiver noise output is measured with the antenna. Then the noise diode is connected in place of the antenna. The diode current is increased until the receiver noise output is the same as with the antenna. The effective antenna temperature (T_a) is:

$$T_a = 290\ (1 + I) \text{ degrees Kelvin.}$$

Appendix

The noise current squared is

$$I_n^2 = 2eI\Delta f$$

where:

e = charge on an electron = 1.602×10^{-19} coulomb
I = d.c. plate current (amp.)
Δf = bandwidth over which the noise is considered (c.p.s.)
I_n = r.m.s. noise current

The noise diode acts as a constant-current generator with a very high internal impedance. The impedance of the over-all generator is determined by the load resistor, R_L, the shunt capacitance of the diode, and the lead inductance. The resistor is chosen to have the same value as the load into which the generator will normally work, usually 50 ohms.

The diode noise power delivered to such a matched load is:

$$P_N = \frac{R_L I_a^2}{4} = \frac{R_L e I \Delta f}{2}$$

Actually, when the tube noise drops to zero ($I = 0$), the generator output noise does not go to zero. Rather, the noise level drops to the thermally-generated noise in the resistor R_L which is

$$KT\Delta f = P_{NR}$$

where:

K = Boltzmann's constant = 1.38×10^{-23} joules/°K
Δf = bandwidth over which the noise is considered
T = absolute temperature of R_L in degrees Kelvin, usually taken as 290°K.
P_{NR} = noise power delivered by the generator resistor to the load.

The total noise output from the generator is:

$$P_T = KT\Delta f + \frac{R_L e I \Delta f}{2}$$

This, for the values of K, T, and e given above, reduces to:

$$P_T = KT\,(1 + 20R_L I)\Delta f$$
$$= 4 \times 10^{-21}\,(1 + .02R_L I)\Delta f$$

where I is now the d.c. plate current in milliamperes. If R_L is taken as 50 ohms:

$$P_T = KT\,(1 + I)\Delta f.$$

The noise figure of a receiver may be defined as the ratio of the total noise power output, referred to the input, to the noise power in the input resistance. That is,

$$N.F. = \frac{KT\Delta f + N_R}{KT\Delta f}$$

or expressed in db.,

$$N.F.\ (\text{db.}) = 10 \log \left[\frac{KT\Delta f + N_R}{KT\Delta f}\right].$$

N_R is the noise power generated in the receiver referred to the input and T is defined to be 290°K. Thus, when the receiver noise reduces to zero (the perfect receiver), the noise figure becomes unity or zero db.

When the noise-diode current is zero, the receiver noise power referred to the input is $KT\Delta f + N_R$. The receiver noise power for the second reading is $KT\Delta f\,(I + 1) + N_R$. If the second reading is adjusted to be exactly twice the first:

$$KT\Delta f\,(I + 1) + N_R = 2\,(KT\Delta f + N_R)$$

and

$$KT\Delta f I = KT\Delta f + N_R$$

so

$$I = \frac{KT\Delta f + N_R}{KT\Delta f} = N.F.$$

QST

The Noise Diode Caper

BY HANK OLSON,* W6GXN, ex-KR6CC

"THE latest poop from Sam Harris' column says that the boys in Fairbanks will be on two meters this week for moon-bounce trials. After all the time we've spent getting our antenna farm up and stringing low-loss line, we are finally up against *the* schedule. Here at the Azalea Mire, the three of us all feel that each of our personal two-meter converters is the best and should be used tomorrow night for the tests. At the present rate of arguing we won't resolve the question *ever* as the noise figures, ultimate sensitivities, noise factors, equivalent input temperatures, and such terms are cheerily tossed about, and the technical chaff gets deeper. How in the world will we resolve the question before it's too late to meet the moon-bounce sked, and before fists start flying at the Azalea-Mire V.H.F. Society?" Let's use a noise diode and compare performances, if we can decide *which* noise diode is adequate.

There are many good articles on the use of temperature-limited thermionic diodes for measurement of receiver noise factor.[1,2,3] In general, these articles all show the technique of measuring the power output of the receiver due to its internal noise (with the input properly terminated in the proper resistive, room-temperature dummy-antenna), then doubling the power output using the noise diode having a similar impedance. A simple formula then yields the noise factor as a function of diode plate current. In fact, if the receiver input impedance is 50 ohms, which is increasingly common, the noise factor is read *directly* from the plate milliammeter of the test diode (i.e., 3 ma. equals a noise factor of 3 and so on). This system of noise-factor measurement is very attractive because it is simple and because the noise-bandwidth of the receiver need not be known.

For measurements of receivers that were available to hams in 1949 when Goodman's excellent article first appeared,[1] the techniques presented were adequate and, for the first time, provided amateurs with a definitive measure of the "goodness" of h.f. and v.h.f. receivers. The examples in this early article describe comparisons on 28 Mc. of 6AK5 *vs.* 6J6 preamplifiers, with the best noise factors obtained being about 4. Nowadays, the v.h.f.-banders are arguing on 2 meters every evening the relative merits of the W.E. 416, W.E. 417, 7877, 6CW4, 8087 and other such tubes as v.h.f. r.f. amplifiers. Anyone with a 6J6, 6J4, 6AK5, or even a 6BQ7 front end won't even be listened to in these QSOs, as the whole

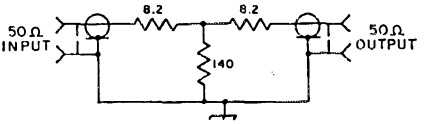


Fig. 1—T attenuator for reducing power by one-half. Resistances are in ohms; resistors are ½-watt composition, 5 per cent tolerance. The 140-ohm is composed of four 560-ohm resistors in parallel. Leads should be kept short, and the two 8.2-ohm resistors with their associated coax connectors should be shielded from each other. J_1 and J_2 are coaxial chassis-mounting connectors of the UHF or BNC series.

* Stanford Research Institute, Menlo Park, Calif.

[1] Goodman, "How Sensitive Is Your Receiver?" *QST*, September, 1947.

[2] Tilton, "Noise-Generator Techniques for the V.H.F. Man" *QST*, August, 1949.

[3] Tilton, "Noise Generators — Their Uses and Limitations" *QST*, July, 1953.

argument is about the fine region between 1 and 2, noise-factor-wise.

At this point it is worth mentioning that the arguments do rage, but sometimes not because of the relative goodness of each protagonist's receiver but because of misunderstandings of definitions or lack of careful measurement techniques, or both.

The first source of misunderstanding is the confusion between noise "figure" and noise "factor." Strictly speaking they are the same, but usage has favored noise factor to be given in numerical terms and noise figure in decibels. The practice of using figure for db. and factor for numerical power ratio, I feel, *helps* relieve confusion.

Perhaps the second most frequent source of confusion is in the method of measuring the true system-noise output power. Usually the noise-voltage output is increased by 1.4 times and this is assumed to double noise power. The problem with this method is that most often the detector is a diode-rectifier type, which has been shown to be not only nonpredictable with sine waves, but even worse for noise. In short, a diode detector performs as a square-law device at small voltages and as a linear device for large voltages. Since white noise is a random combination of large, medium, and small voltages, we can see why the diode detector is not so accurate.

However, the diode detector, or any other of the nonpredictable detectors, may be used as a *comparison* device. If we first measure the system noise output using a meter that reads detector output, and then insert a 3-db. r.f. attenuator somewhere before the detector, we can (with the noise-diode) bring the meter up to the same reading as before attenuation and feel sure we've done the job correctly. Note that we've used our nonpredictable detector as a comparison device only, and haven't relied upon its characteristics at all. A convenient place to put the attenuator is between the converter and the receiver serving as the i.f. amplifier. Since most good v.h.f. converters have at least 30 db. gain, small error is involved here.

The attenuator can be a simple "T," as shown in Fig. 1, built in a small box chassis with coax

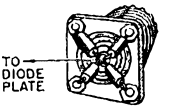


Fig. 2—Recommended method of constructing the 50-ohm termination, using four 200-ohm composition resistors. One resistor is connected to each of the four mounting screws of the UHF coaxial fitting (SO-239).

input and output. The attenuator can be checked with a signal generator (sine waves) and an ordinary r.f.-probe voltmeter at a high signal level.

A second and very likely source of error is concerned directly with the noise source. Is it being used above its frequency limitations? Is its diode terminated in a 50-ohm load that is truly at room temperature? The 5722, 24G and 15E have shown their worth in amateur noise measurements up through the 2-meter band,[2,3] and one can feel safe using these types with 50- or 70-ohm loads if a parallel-resonant circuit is placed across the resistor for the band of interest. In the case of the 5722 it may be that the parallel-tuned circuit is not needed,[3] but the use of such a tuned circuit assures one of being able to compensate for diode output capacitance, stray wiring capacitances, and any reactance the load resistor may have. Also, since the coil has essentially zero d.c. resistance, the 50-ohm load does not further degrade the power-supply regulation (that is, it keeps the voltage across the diode more nearly constant).

If one would rather not have the resonant circuit across the load, so as to make the noise generator useful on *any* of the v.h.f. bands below 150 Mc., care must be taken. The generator is best made for 50 ohms only, with an N or UHF coax panel jack (UG-58 or SO-239) immediately adjacent to the plate terminal of the diode to avoid strays. The 50-ohm load should be made of four 200-ohm ½-watt carbon resistors spaced around the coax panel jack (one to each of four screw holes). Arranging the four 200-ohm resistors in this way is better than simply putting them side by side in parallel, since one can see, by inspection of Fig. 2, that we have begun to approximate a resistive sheet — which would be one of the best types of terminations — across the

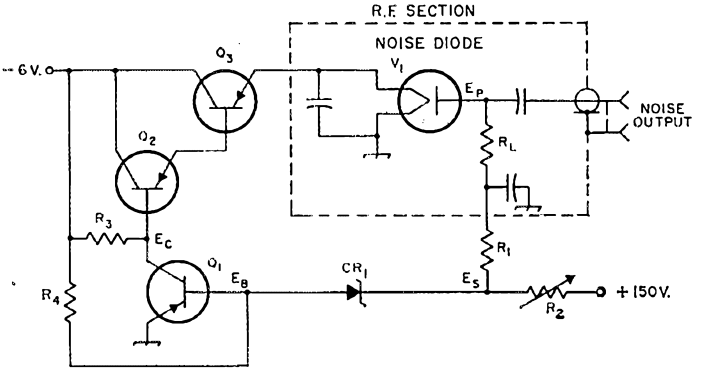


Fig. 3—Basic filament-regulator circuit. Practical circuit for the 5722 noise diode is incorporated in Fig. 4.

coax jack. (In precision diode noise generators that are used to 1000 Mc., a resistive-sheet type termination *is* used, and the diode is of such configuration that it resembles a piece of 50-ohm coax, the plate being the outer conductor and the filament the center conductor. The Bendix 6144/TTI is representative of this type of diode, but is too expensive for most amateur use: $150, with a life of 30 hours).

The requirement that the diode and its associated terminating resistor be close to each other makes for a problem (although a small one compared to strays). The heat from the diode warms up the load, unless we're careful. Either a tuned circuit or a v.h.f. r.f. choke across the 50-ohm load prevents d.c. plate current from heating it, but the sheer presence of the load in the vicinity of the hot diode may raise the resistor's temperature. The *error* introduced by the load being hotter than room temperature will be 1 db. if the

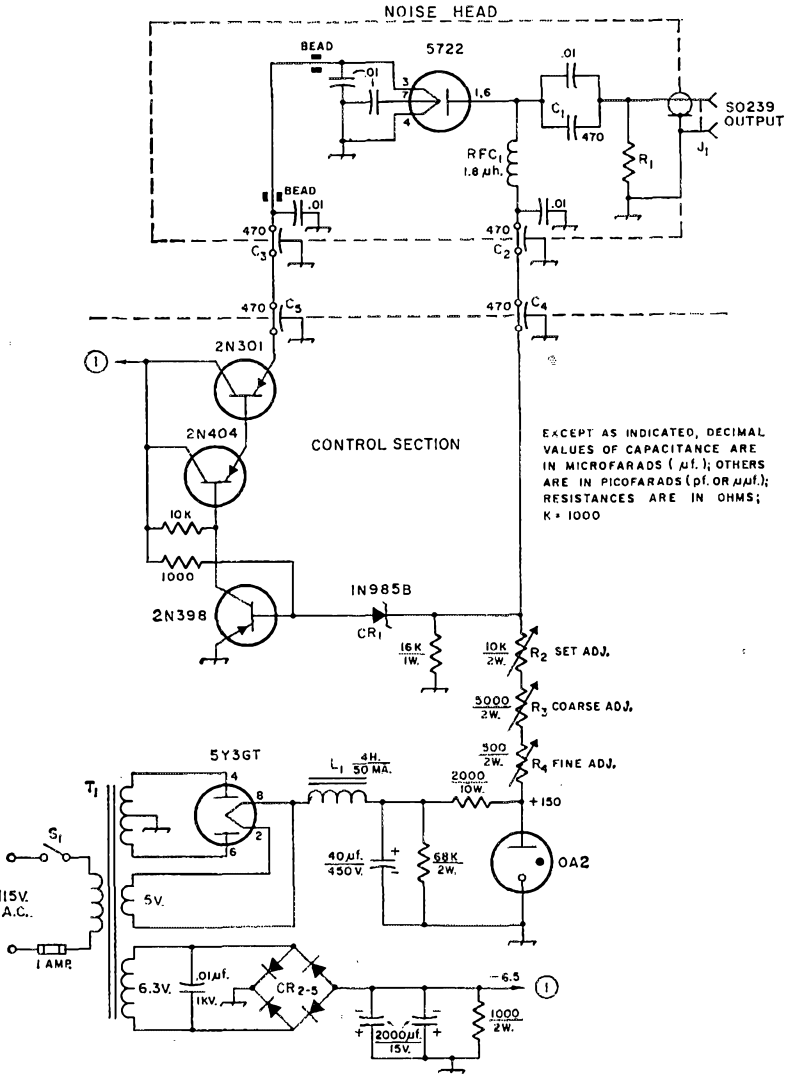


Fig. 4—The noise-generator circuit. Fixed resistors are ½-watt except as indicated; 0.01-μf. fixed capacitors are disk ceramic.

C_1—470-pf. standoff type.
C_2-C_5, inc.—470-pf. feedthrough type.
CR_1—Zener diode, 100 volts (Motorola 1N985B).
CR_2-CR_5, inc.—Silicon, 750 ma., 200 p.i.v. (DI52 or 1N3277; see text).
J_1—Chassis-mounting coax connector (SO-239).
L_1—Filter choke, 4 henrys, 50 ma. (Triad C4X).
R_1—Four 200-ohm 5-per cent tolerance ½-watt composition resistors in parallel (see Fig. 2).
R_2, R_3, R_4—2-watt potentiometers wired as rheostats.
S_1—S.p.s.t. toggle.
T_1—Power transformer, 600 volts c.t., 50 ma.; 6.3 volts, 2 amp.; 5 volts, 2 amp.

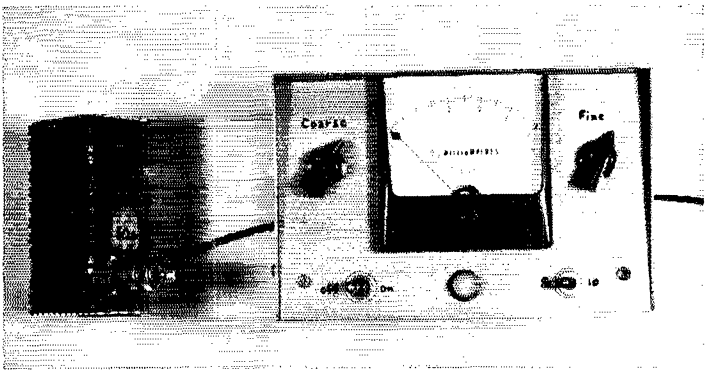


Fig. 5—The noise-generator "head", left, and power-supply/control unit.

resistor temperature is 90°C. The solution to this possible problem is to provide ventilation (without adversely affecting shielding) by convection or by means of a small blower.

Diode-Current Adjustment

The method used generally for adjustment of the diode current is to put a Variac or large rheostat in the filament-transformer primary. My own experience with either a small Variac or a large wire-wound rheostat has been disagreeable. They both have the annoying feature that the output voltage and resistance are discontinuous rather than linear and smooth. This is the property of the slide contacts on the windings of the two devices, and makes adjusting the diode, to *exactly* some current, difficult. I've finally used a type 10 Variac and a 100-ohm 2-watt Allen-Bradley type pot together. The Variac sets the coarse current and the pot (as a rheostat) is used for a fine adjustment. The molded carbon construction of the Allen-Bradley pot (made by Ohmite) gives smooth, continuous adjustment.

Now one would think that everything possible has been done for convenience of measurement, but we have yet another annoying problem. As small variations occur in the line voltage, these are directly transformed by the filament transformer, percentage-wise, and the diode filament voltage varies similarly. The trouble is that a temperature-limited diode has no space charge and consequently the plate current varies approximately as the *seventh* power of filament voltage. (That is, if the filament voltage were doubled, the plate current would go up by a factor of 128 times.) So very tiny line variations make large changes in diode plate current, forcing the operator of a noise-diode measurement setup to be constantly fiddling with the diode "filament-adjust" control.

One solution to this problem of line-voltage fluctuation is to use a line voltage regulator, such as a Sola, G.R., or Sorensen unit. These, of course, are expensive unless you already have an old TV type Sola around anyway for steadying the family "boob-tube." It is worth noting that the better line-voltage regulators *use* a temperature-limited diode in their servo systems as the line-voltage sensing element, the d.c. plate current being amplified to control an a.c. saturable reactor.

A solution used in our shack was discovered because we wanted to use a noise diode as a stable source of "signal" to test our v.h.f. receiving system to see if its gain was constant over, say, a period of a week. (The need for gain stability of this order was essentially for radio astronomy reasons.) In short, a servo system was used to stabilize the diode current. It is an all-transistor unit, using d.c. to light the diode filament so that saturable reactors can be eliminated, and it actually comes out to be rather simple. A simplified circuit of the system is shown in Fig. 3, and its operation is as follows:

Assume that the noise diode is lighted and drawing plate current ($E_F = 2$ volts, $I_F = 2$ amp., $I_P = 2$ ma.). The total of R_L and R_1 in series is say 3000 ohms and R_2 is say 2000 ohms. Then the total voltage drop across R_L, R_1, and R_2 (neglecting a tiny current drawn by the zener diode, CR_1) is (3000 + 2000) (2 ma.) = 10 volts, so E_P is +140 volts, which is just fine for our diode plate voltage. E_S is then +146 volts. If CR_1 has a regulating voltage of 147 volts (zener current supplied by R_4), E_B is at −1 volt and Q_1 is forward biased. R_3 serves as a load resistor for Q_1 (a d.c. amplifier) which drives the two emitter-followers Q_2 and Q_3, which drive the filament of V_1 as a d.c. load.

To visualize how it regulates, let's imagine that the plate current, I_P, of V_1 drops slightly. This causes E_S to rise and CR_1 (serving as a sort of "d.c. coupling capacitor") causes E_B to change identically in size and direction. Since E_B rises, Q_1 is driven towards cutoff and less collector current flows, making E_C more negative. The emitters of Q_2 and Q_3 "follow" this increased negative change in voltage, and so more negative voltage is put across the load (the filament of V_1) and it gets hotter, increasing I_P and compensating for the original drop in I_P.

Complete Noise Generator

The complete circuit is shown in Fig. 4. Although the presence of three transistors and one zener diode may make it look as if the unit is expensive in terms of parts, every effort has been made to use the least expensive semiconductors compatible with performance. The 2N301, 2N398, and 2N404 are about the cheapest tran-

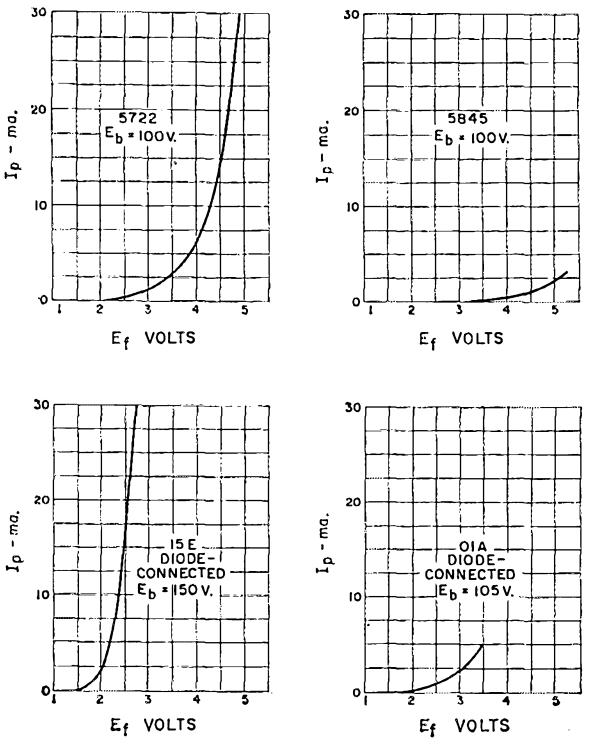


Fig. 6—Filament voltage (E_f) vs. plate current (I_p) curves for four types of noise diodes.

sistors available in their categories. The rectifiers are also very inexpensive; 1N3277s (DI52s) are about 60 cents each. The most expensive semiconductor is the zener. A 400-mw. type is large enough; I used a 1N985B at $4.00, but sorting through a batch of 100-volt p.i.v. silicon rectifiers would probably turn up an equally useful unit with the proper reverse breakdown voltage. (I often use 49-cent Hoffman HB1 general-purpose silicon diodes as 10-volt zeners in similar fashion.)

The control unit was built in an L.M.B. W1A utility box and the "head" in an L.M.B. No. 00 box-chassis, with the U section replaced by an identical piece bent up from perforated aluminum stock. Two "shielding beads" of ferrite are used in the decoupling of the 5722 filament supply lead. These simple and cheap little beads make the wire through them appear to *any* r.f. above a few megacycles as if it were roughly 100 ohms resistive plus 100 ohms inductive. The units are sold by Ferroxcube [4] at only a few cents each. The 5Y3 rectifier and 0A2 regulator were used in the interests of low cost; appropriate 1200 p.i.v. silicon rectifiers and a 150-volt 10-watt zener regulator may be used by purists (except that the 5722 remains to spoil "all-solid-state" aims). Motorola MR322s and MR322Rs (a pair of each) would probably serve better as low-voltage rectifiers than the DI52s presently used, since the latter are run close to their 750-ma. ratings. The Motorola units are 73 cents each.

The complete noise generator is shown in Fig. 5. Note the separate noise-diode "head," with its SO-239 output terminal. Being separate, the head is only subject to the heat generated within itself and is conveniently connected *directly* to the rear antenna jack of the receiver under test with a male-to-male UHF fitting (Dow-Key DFK-2). If the head is made with a type N (UG-58/U) fitting, then a UG-57/U fitting may be used to connect the head directly to the receiver. The 5722 diode is inside the head to provide a loose-fitting shield, cutting the plate-to-ground capacitance in this untuned unit. Letting the tube stick outside a smaller head chassis and using a tight-fitting tube shield would increase the stray capacitance. Note also the perforated construction of the head in the aim of keeping the load resistor at room temperature, and also preventing excessive 5722 bulb temperature.

I have found that the servo diode is a dream to use on any ham bands from 10 meters through 2 meters, and also for 108- and 132-Mc. satellite converters, taking all the fuss out of noise-figure measurements.

It would not be fair to write on noise diodes without a short reference as to which diodes (specifically) work well. The author has had experience with several: the 5845, 5722, the 15E, and 01A. The E_F-I_P curves of these tubes are presented here because they are *not* readily available and are needed if servo-type noise-diode generators are to be designed around these tubes. The 01A is presented not to be funny but because for one 30-Mc. application it has one superior operating

[4] Ferroxcube Corp. of America, Saugerties, N. Y.

characteristic to the others. By the way, for the 01A, remember the old precept: "burn base down." Fig. 6 presents these curves.

For additional reading on temperature-limited diodes I'd recommend the old standby, *Vacuum Tube Amplifiers*, by Valley and Wallman[5]; a tongue-in-cheek bit, "Noisemanship," by J. C. Greene[6]; a more general article on the *many* uses of temperature limited diodes, "Temperature Limited Diodes," by Magida,[7] and a "tack-it-to-the-lab-bench" paper, "Noise Figure Primer," by Hewlett Packard.[8] QST

Acknowledgments

The author wishes to thank Mike Villard (W6QYT) Rolf Dyce (K6DSJ), and Boyd Fair for their helpful comments during the writing of this article and also Gene Howell (W4RLU) for the photograph of the equipment.

[5] Valley and Wallman, "Vacuum Tube Amplifiers" — McGraw Hill, New York.

[6] Green, J. C. "Noisemanship" *Proc. I.R.E.*, July, 1961.

[7] Magida, N. H., "Temperature-Limited Diodes" — *Electrical Design News*, February, 1962.

[8] "Noise Figure Primer," Hewlet Packard Application Note No. 57, June, 1962.

Noise Generators for 420 Mc. and Up

BY HANK OLSON*, W6GXN, ex-KR6CC
AND
GENE LEHMAN*, WA6JZN, ex-DL9GC

IN ANOTHER article,[1] one of the authors discussed the design of a temperature-limited diode noise generator for v.h.f. The temperature-limited diode discussed is the easiest to use and best calibrated noise-generator we have at our disposal at v.h.f. With care, its range of usefulness can be extended to at least 1000 Mc.; however, for ham use the price of a noise diode that will perform well above 230 Mc. is too high. What, then, can we use to check out our new 420–450-Mc. and 1215–1300-Mc. receivers?

A look at the microwave measurement-gear catalogs will show us that the way that noise, of a predictable nature, is generated at frequencies above 2500 Mc. is by gas-discharge tube noise generators. These formidable-looking gadgets seem to be great chunks of waveguide with cylinders (containing a mysterious "gas discharge tube") protruding out the sides at a special angle whose magnitude surely must have been computer-derived or a closely-kept company secret. What all else is in the great metal box must also be secret.

Now let us look at what there *is* to a gas-discharge-tube generator. It is just a piece of waveguide, for the frequency band of interest, with a hole drilled through it at some angle to allow one to stuff a fluorescent lamp into it. The hole is at an angle to allow more of the gas-tube to take part in generating noise, and to present the conducting gas discharge gradually to the r.f. waves traveling down the guide and thus minimize reflections. There is nothing special about the type of fluorescent tube used, so pick your favorite color — purple if you so desire! Fluorescent tubes all have mercury in them, and it is the radiation from the mercury discharge which determines the noise temperature. Configuration, lamp current, age and such are not critical, as pointed out by Mumford[2] and Johnson.[3]

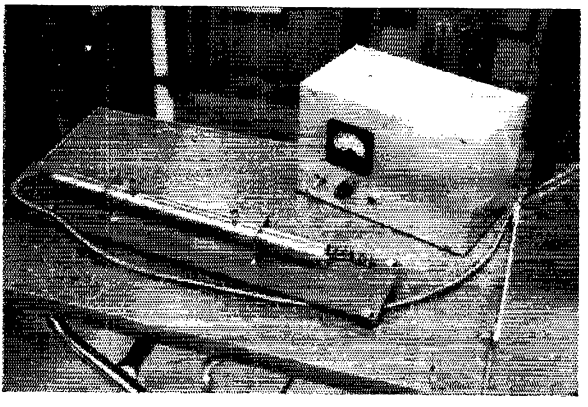
Now that we have determined that the gas-discharge noise source is not beyond us and really could be built by amateurs, let us have a look at some of the small points. The discharge must

* Stanford Research Institute, Menlo Park, Calif.

[1] Olson, "The Noise Diode Caper," *QST*, this issue.

[2] Mumford, "A Broadband Microwave Noise Source," *Bell System Tech. Jour.*, Vol. 28, p. 608, 1949.

[3] Johnson, "Gaseous Discharge Super-High Frequency Noise Sources," p. 908, *Proc. I.R.E.*, Aug. 1951.



Gas-discharge noise generator using coaxial construction. R.f. connections are through the BNC receptacles on top of the brass tube.

Fig. 1—Setup for using a gas-tube noise generator.

be d.c. powered, to avoid 60-cycle modulation of the noise output. The bulb diameter must be small enough so that the round metal tube, which protects and shields the part of the bulb outside the waveguide, will be too small to act like a waveguide itself (i.e., don't use a 40-watt, 1½-inch diameter fluorescent tube for a 10,000-Mc. noise source). The ends (filaments) of the tube must be well outside the waveguide to prevent interference with r.f. waves in the guide. The gas-discharge noise generator is *fixed-output* type, and so we would have to vary the noise input to the receiver under test by use of an r.f. attenuator, *between* the source and the receiver, if we were to use the same technique of noise-figure measurement that we are accustomed to using with temperature-limited diodes.

A waveguide attenuator for use with a gas-discharge noise source *could* be built along the lines of the one described by Troetschel,[4] except that we would make it out of waveguide roughly eight times as big for 1215 Mc. as for 10 Gc.

In lieu of a microwave r.f. attenuator, it is possible to use an attenuator of easier construction in the i.f. and use the "Y-factor" method of measurement. This is shown in Fig. 1, and the noise figure is:

$$N.F.\ (\text{db.}) = \log\left(\frac{T_D}{T_O} - 1\right) - 10 \log (Y\text{-}1),$$

where T_D = temperature of noise generator, T_O = 290°K (room temperature), and Y = i.f. attenuation, or ratio of signal power when noise generator is on to signal power when noise generator is off. We know T_D from the type of gas that is used in the generator, so for tubes containing mercury (common fluorescent lamps)

$$10 \log\left(\frac{T_D}{T_O} - 1\right) = 15.8 \text{ db., and}$$

$$N.F.\ (\text{db.}) = 15.8 \text{ db.} - 10 \log (Y\text{-}1).$$

For argon tubes (commercial noise tubes), this factor is slightly lower: 15.3 db.

To put it more simply, we measure the receiver output with the input terminated (through the turned-off noise diode if that is convenient, since it looks like a piece of coax when not fired), then we fire the noise diode, and crank in enough i.f. attenuation to bring the noise back to the original reading. The noise figure is then 15.8 db. less the number of db. attenuation we had to crank in.

The waveguide mounting of the gas-discharge tube is the simplest, most reliable method of utilizing this type of source. However, the use of waveguide at 1215 Mc. is not general except at power levels higher than that at which coax will survive, and so coax is generally used by amateurs. So, our waveguide noise source, although very good inherently, is rather a "left-hand" device. To use it we need a waveguide-to-coax adapter, which is another problem to build and adjust. Incidently, 1200-Mc.-cutoff waveguide is 5 inches across, which explains why it is not more generally used. It's about as easily handled as cast-iron sewer pipe!

Another configuration that can be used to couple noise from a gas-discharge tube to coax is the method of making the gas tube the center of a helical coax as shown in Fig. 2. This system suffers from slightly greater s.w.r., but is useful directly with coax systems and typically can be used over a greater than 10-to-1 frequency range (200–2500 Mc.) which the waveguide-mounted type cannot.

One commercial 200-to-2500-Mc. coaxial-noise source uses a Bendix TD-40 argon tube. This tube is about a foot long over-all and has a useful discharge length of about 7 inches. Its diameter is ⅜ inch in the discharge portion, and wound around it is a helix of approximately 8 turns per inch. The ends of the helix go to N connectors, and the tube and helix are put in a cylindrical shield to form a coax line with the ends of the tube sticking out into shielded areas where the cathode and anode leads are connected.

Home Construction

The coax gas-discharge noise generator we constructed used a common 8-watt flourescent tube (Sylvania FST5/CWSX), also about a foot long, which, curiously enough, had the same pin size and spacing as the $50 Bendix tube. This tube is about ½ inch in diameter, and the helical inner conductor of the coax was wound around approximately 5 inches of it. Fig. 3 shows the details of the device. The filament pins on each end of the tube were connected by means of Amphenol 80-PC-2F microphone connectors, which just fit by coincidence. The first step in making the helix

[4] Troetschel, W. O., "A Parametric Amplifier for 1296 Mc.," *QST*, Jan. 1961, p. 13.

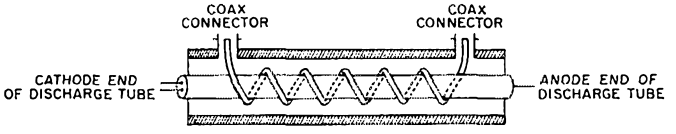


Fig. 2—Cross-section view of the basic construction of a coaxial gas-discharge noise generator. The inner conductor of the coax assembly is wound helix-wise around the gas-discharge tube.

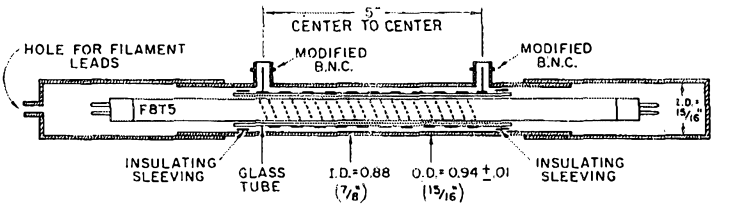


Fig. 3—Construction details of the noise generator shown in the photograph.

is to cut a piece of 20-mil copper sheet to a width of 0.150 inches ± 5 mil, with a pair of tin-snips or a shear. A length of about 46½" of this (20 by 150 mil) copper conductor is then tightly wound on a 6-inch long piece of glass tubing having an inside diameter of 15 mm. and an outside diameter of 18 mm. The 46½-inch length is spaced to give a uniform-pitch helix with the ends 5 inches apart. The glass tube is temporarily removed from the helix, and the helix is carefully slipped into a 6-inch long brass tube through which BNC connectors have been soldered 5 inches apart, center-to-center. The center pins of the BNCs are then soldered to the helix ends. Then the glass tube is reinserted in the helix and held centered by a ring of insulating sleeving squeezed over each end of the glass tube, between the glass tube and the brass tube. Brass covers are slid over the brass tube ends so that the appropriate filament leads can be attached in one end and ground connections in the other. These leads go through two shielded wires back to the power supply.

Table I

Frequency	*S.W.R. Commercial*	*S.W.R. Homemade*
1200	1.14	1.13
1100	1.11	1.09
1000	1.09	1.075
900	1.04	1.05
800	1.04	1.03
700	1.07	1.05
600	1.02	1.02
500	1.01	1.01
400	1.01	1.01
300	1.03	1.03

1296-Mc. moonbounce receiver, the noise output with the homemade generator was consistently 0.5 db. higher than that with the commercial unit (as predicted). In addition, the s.w.r. of the generator in the "unfired" state was measured from 300 Mc. to 1200 Mc. (the range of the measurement equipment that we could borrow),

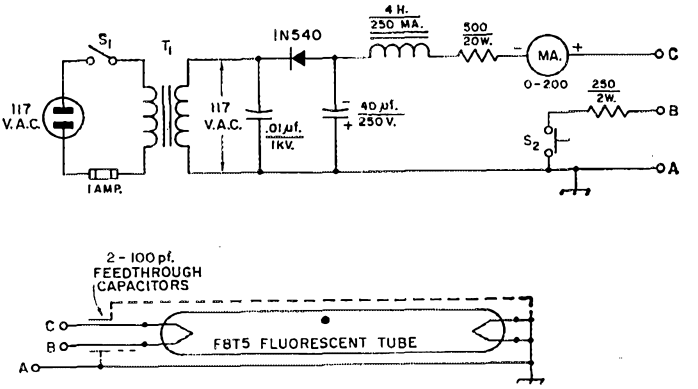
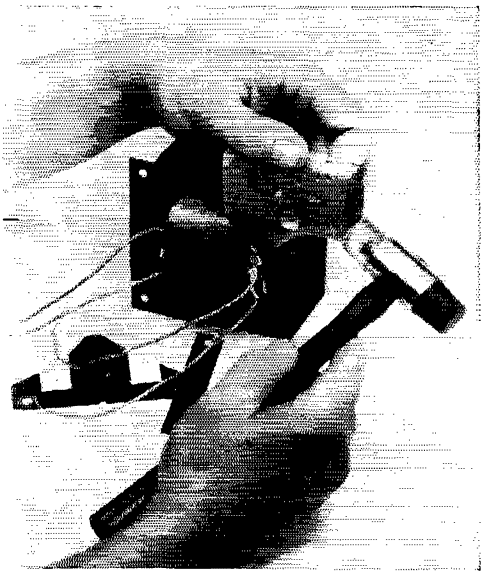


Fig. 4—D.c. supply and ballast for the fluorescent tube. Resistances are in ohms.

S1—S.p.s.t. toggle.
S2—Push-button switch.
T1—Isolation transformer, 115–115 volts, 35 va. (Triad N51X).

To excite either the coaxial or a waveguide-mounted gas-discharge noise tube, a d.c. supply and a simple ballast system (for the filament) are required. This is shown in Fig. 4.

The completed gas-discharge noise source, shown in the photograph, was compared with a commercial equivalent noise source that used an argon tube. On several tests of WA6JZN's and it was found to be very good (Table I). Since the v.s.w.r. of the "fired" generator is better than it is "unfired," we can feel certain that over the range measured, the generator will give a true 15.8-db. excess-noise output. To be conservative, the range of usefulness must be given as 300 Mc. to 1300 Mc., but the unit may very likely work above and below these limits. QST



As described in the text, first free the laminations with a knife blade. The laminations can be driven out of the stack. A piece of wood butted against the lamination ends and gently tapped with a hammer will drive out the pieces.

An Almost-No-Cost

Power Transformer

BY LEWIS G. McCOY,* W1ICP

The voltage-doubling power supply has it over the center-tap and bridge circuits in practically every department, especially in the 750-volt range. The catch is that you can't find a suitable transformer in the catalogs. If you really want a supply that will handle up to a quarter kilowatt, though, you won't let that stop you. The bonus is that you can save money, too.

Tailor-Made Volts

As MANY readers know, *QST* has featured several rigs using parts from old TV sets — particularly TV power transformers — as a means of saving money. The only trouble with the TV power transformer is that often it isn't exactly right for the job. An ideal transformer for a good many amateur rigs would be one that could be used in a voltage-doubling circuit making use of the low-cost "surplus" silicon rectifiers. With a transformer having a total secondary voltage of, say, 300 volts, with plenty of current rating, it would be possible to build a supply that would give 750 volts d.c. at 300 ma. or more, and do it simply and cheaply. Unfortunately, there "just ain't no such animal" available commercially, at least not economically. Until some of the transformer manufacturers take the tip and make such a unit, the only way to get one is to build it yourself. That is exactly what we did.

The average TV transformer will deliver 300 watts plus, which is ample power, so actually what would be required for our purposes? We would want the above-mentioned 300 volts a.c. with plenty of current; also, a 6.3-volt winding to take care of the heaters, and maybe a bias winding to eliminate the need for a separate bias transformer. Well, old TV transformers seem to be abundantly available, either on a give-away basis or for a few bucks from TV servicemen. How about rewinding one? Don't throw up your hands in horror — the job is really quite simple. We did exactly that and wound up with just what we wanted. The job took about seven hours from start to finish. Transformer winding isn't exactly a lost art, but few hams seem to know much about it. In this article we hope to show you how easy it actually is.

Before getting into the actual description of winding a transformer, let's take a look at a typical power transformer to see how it's made. A power transformer consists of a laminated iron core, windings of various sizes to provide the necessary voltages and currents, insulating paper, nuts and bolts to hold the unit together, and metal covers to protect the windings.

The iron laminations consist of E- and I-shaped sections as shown in Fig. 1. These are assembled in a stack to make up the total core. The method of stacking is also shown in Fig. 1. In the actual construction of a transformer the laminations may be put together in groups. In other

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words, there might be three E and I sections stacked the same way, then three more of each type section stacked in the alternate arrangement. An insulating and bonding agent, usually varnish or shellac, is applied between laminations. This reduces the power loss in the core and serves to make a tight form, minimizing hum or vibration.

The windings are put on in layers, each layer of wire being separated from the next by an insulating layer of paper. The current-carrying capability of a winding is determined primarily by the size of wire used in it. Fig. 2A is the schematic diagram of a typical TV power transformer. Such a transformer usually has several filament windings plus a high-voltage and primary winding.

How To Determine Power Capability

One of the first things a builder must know when scrounging an old TV power transformer is how much power it will handle. If we are going to build a transmitter that requires 300 watts of power, we cannot get it from a transformer that has only 200 watts capability. The amount of power that a transformer will handle can be determined quite closely from the cross-sectional area of the core. This is the cross-sectional area *inside* the windings, and does not include the area of the part of the core that surrounds the winding. Fig. 3 shows this area.

It isn't actually necessary to take the transformer apart to measure the area. Lamination sizes are standardized, so if you know the outside width, length, and height of the lamination stack it is easy to determine the power capabilities. Nearly all TV transformer cores have the same width and length, but the height of the stack will vary. The width and length are commonly 3¾ by 4½ inches, and for a core of this size the tongue of the E lamination is always 1½ inches wide. With such a core all you then need for finding the cross-sectional area is the height of the stack. For example, suppose the height is 2¼ inches. This multiplied by 1½ equals 3⅜ square inches. Looking at the graph in Fig. 4 we see that 3⅜ square inches gives a power capability of 350 watts. This means that we can rewind a transformer having a core of these dimensions and expect to get about 350 watts from it.

There are two things to look for when getting an old TV transformer. First, take the one with the highest stack of laminations. This will be the one with the best power capabilities. Second, some transformer manufacturers soak the coils in tar. This type can be rewound but it can be a rather messy job and is best avoided. You may have to remove the housings on the transformer to make sure the windings aren't coated with tar. However, the tar-coated jobs are fairly rare, in our experience.

Taking the Transformer Apart

The first step in the rebuilding process is to remove the transformer from the TV chassis. At this point you can save yourself some further

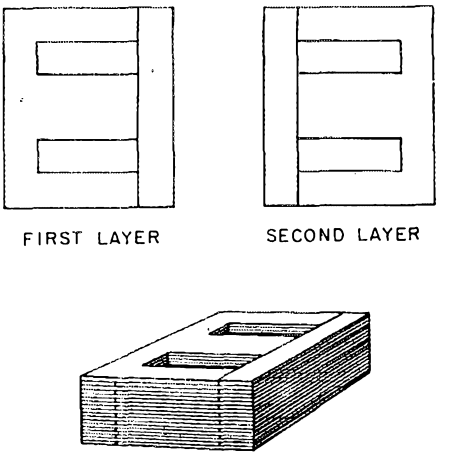


Fig. 1—How the core is assembled. Alternate layers have the E laminations facing oppositely. Sometimes two or more laminations of the same kind are grouped together and handled as a single lamination, to save assembly time.

work if you first check out the windings and label them. The primary or input winding will be connected to the a.c. line, probably through a switch on the front of the chassis and a fuse or fuse holder on the rear. The 5-volt winding will be connected to the filament terminals (2 and 8) on the rectifier socket, which is usually a 5U4G. Two of the leads from the high-voltage winding will be connected to the plate terminals (4 and 6) on the rectifier-tube socket. The center-tap lead of the high-voltage winding probably will be grounded to the chassis. There will probably be two 6.3-volt windings. The leads from one of these will go into the shielded compartment on top of the TV chassis and be connected to a tube socket in the compartment. The other 6.3-volt winding — and this is the one that you'll probably keep intact on the transformer — supplies

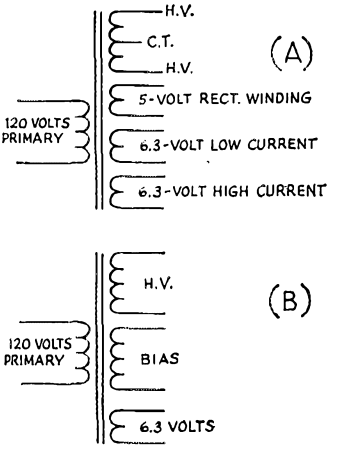


Fig. 2—(A) Typical schematic of a TV power transformer. (B) The same transformer as rewound according to this article.

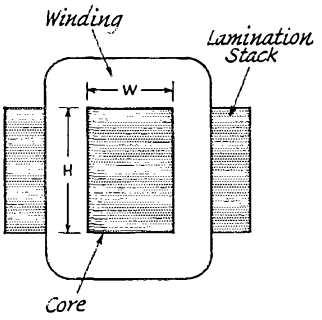


Fig. 3—This is a cross-section drawing of a typical power transformer. The cross-sectional area referred to in Fig. 4 is determined by multiplying the tongue width by the height of the center core.

all the other tube heaters in the set. Tag all leads before removing the transformer.

If you get a transformer that has *already* been removed from the set, get someone with an a.c. voltmeter to check out the various windings and mark them for you, assuming you don't have a meter yourself. There is a color code for the transformer leads and the information for identifying the leads is given in the construction practices chapter of the ARRL *Radio Amateur's Handbook*. However, the leads are not always marked according to the code. Also, the colors tend to fade with age, so it is best to actually check the transformer with a meter.

When checking out the transformer with a meter you'll find that the voltages are slightly higher than what is actually called for because you'll be checking them without a load on the windings. For example, the 5-volt rectifier winding will show something over 5 volts. However, if the leads came off the rectifier socket, the winding *is* a 5-volt winding.

After identifying the windings, remove the

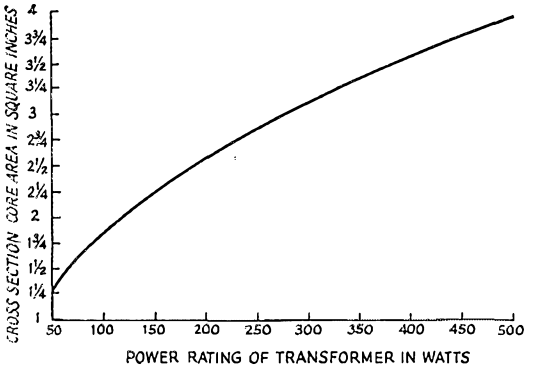


Fig. 4—This graph provides a simple means for determining the power capabilities of an unknown transformer. First determine the cross-sectional area of the core. Find your cross-sectional area figure on the vertical axis and then go across the graph to the curve. Drop from intersection point vertically to the bottom of the chart to find the power in watts.

four nuts and bolts that hold the transformer together and also take off the metal covers, assuming the unit has them. Don't worry about the transformer falling apart when you remove the bolts; it won't. Look the unit over carefully and try to determine which layers of windings are which. In most cases the winding nearest the core will be the primary. Usually the order will be something like this: first, the primary; next, the high voltage; then, the 5- and 6.3-volt low-current filament windings; and last, the heavier-current 6.3-volt winding.

Examine the lamination arrangement. Note that the laminations are probably inserted in groups. On one side of the stack there may be three I units and below that three E units, alternating through the entire stack. Note how the top and bottom of the stack are assembled so that you'll be able to put it back in this same order when you complete the winding job.

Getting the laminations apart is not a difficult job, but it should be done carefully. Insert a thin knife blade between the end piece and the rest of the core to break the varnish seal, so the end piece will be loose. Using a block of wood butted against the edge of the piece, drive it out of the core with light taps of a hammer. Alternate between the two ends so the piece will come out straight. Continue by breaking the next group of laminations free with the knife blade, then carefully driving them out. After a few groups have been removed the hammer won't be needed, as the broken-loose laminations can be pulled out by hand. Be careful not to bend the laminations when removing them. If the edges get nicked in hammering, file them smooth before reassembling the core after the new windings are finished.

Once the laminations are removed you are ready to go to work on the windings. The first thing to do is remove the high-voltage winding by pulling out the wire. If you are lucky you can start it just by pulling on one of the high-voltage leads. However, it is more than likely that the end of the winding will break off, because the wire size will be rather small. If it breaks you'll have to dig in with a knife or probe to get at the wire. Once you get it started the layers come out rather easily. Wind the wire that is removed on a spool or piece of wood as you may want to save enough to use for a single-layer bias winding when rewinding the transformer. When you get most of the high-voltage winding out you'll see that you can separate the primary winding section from the outer windings, as shown in the photograph. Be careful not to disturb the insulation around the primary winding. Incidentally, in the unit we took apart, and this will probably hold true for most TV transformers, the wire size on the primary was No. 18 enameled.

After you've cleared away the high-voltage winding, remove the 5-volt rectifier-filament winding and *most* carefully count the number of turns. There will probably be approximately 10 turns, but count them to make sure. The number of turns on this winding will tell you how many turns you need for each volt you expect to get

from the new windings you will put on. For example, if there are 10 turns on the 5-volt winding, the transformer is wound on the basis of two turns per volt. It doesn't make any difference whether the windings are near the center of the core or the outside; the turns per volt will be the same.

Next, check to see which 6.3-volt winding has the smaller-size wire winding and remove that one. Set the 6.3-volt winding with the larger wire aside for later use. You are now ready to start winding the new high-voltage coil.

Putting On the New Winding

In the transformer shown in the photograph we wanted a high-voltage winding for a voltage-doubling circuit that would provide 750 volts d.c. at about 300 ma., plus some additional current to take care of the other tubes in the transmitter. To arrive at an approximate figure for the a.c. voltage required for a voltage-doubling circuit, divide the desired d.c. voltage by 2.2. In our case this worked out to about 340 volts a.c. At 2 turns per volt this amounted to 680 turns of wire. One nice thing about winding your own transformer is that you can put taps on the winding to allow for any variations or mistakes you might make in figuring. We tapped at 520 turns and again at 600 turns just in case a lower voltage was wanted.

In our case the wire size needed for the high-voltage winding at the current desired was No. 24. Table I gives the current-carrying capacity and other pertinent information you'll need for all the wire sizes (enameled) between No. 18 and No. 30. Having selected a wire size, make an estimate of the area the entire winding will occupy. Allow a little space between each end of a layer and the core when calculating the number of turns on a layer. In our case the safe winding length was 2 inches, so we allowed 90 turns for the first layer and guessed that we might average 80 turns per layer throughout the winding. With 680 turns, this meant that about 9 layers would be needed. Based on the turns per inch in the table, the thickness of a 9-layer winding would be about ¼ inch for the wire alone, but some allowance also has to be made for the paper wrap between layers. Use your best judgment in deciding whether you can get all the needed layers in. If it looks as though you can't, use the next smaller wire size and try again.

You can calculate how much wire of a given size you'll need by measuring the average distance around the winding form — in other words, how long a piece of wire is needed to make a single turn. The table gives the number of feet per pound. In our case the length was about one foot per turn, so we needed about 680 feet. No. 24 runs 817 feet per pound, so two half-pound spools of wire did the job. We used Belden Nylclad wire, the Nylclad being a very tough insulation material.

If you are going to wind more than one transformer you may want to devise some type of winding jig, but for a single transformer it isn't worth the bother. We ran off about 40 feet of wire from the spool and then clamped the spool in a vise. Starting at the free end of the wire, and making sure there were no kinks, we started winding the wire over the section that had the primary winding. Start as close to the edge as possible and keep the wire taut as you wind on the turns. The reason for starting close to the edge is that as you put layers on, each layer has to be progressively narrower, otherwise the end turns may slip off. After the first layer is wound, hold the ends in place with Scotch tape. Ordinary household waxed paper can be used between the layers. A single layer or sheet of paper is adequate insulation between layers. (We measured and cut up a supply of waxed-paper sheets beforehand.) Wrap a sheet tightly around the first layer of winding and fasten the end of the paper with small pieces of Scotch tape. Try to keep the starting point for the next layer as close to the outside turn of the previous layer as possible and always wind in the same direction. No. 24 winds 45 turns to the inch, and we got two full inches on the first layer, or 90 turns. It took nine layers altogether, and on the last one we were down to about 70 turns. Take your time, keep the wire taut, and by all means keep track of your count by making notes. It is easy to lose your place in counting; needless to say, this can be highly provoking. Be sure to bring all leads and taps out on the same side of the core so the transformer covers will go back in place without interference. Note how it was done originally, before taking the transformer apart.

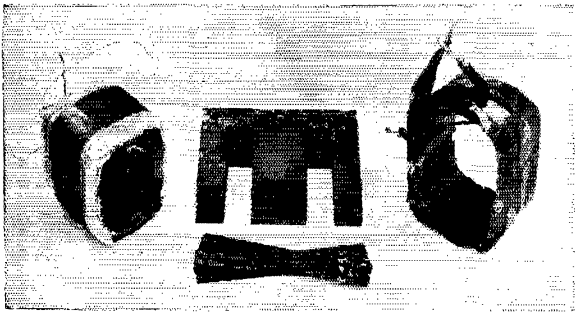
Winding the high-voltage layers is the toughest job as it requires the most care. Keep the turns close together and take your time. It took us a few hours to complete the job. We made our taps at the edge of the layer as we figured this would cause fewer complications than taking taps inside the layer. The taps don't have to be

Table 1

Wire Size	*Turns Per Inch Enamel*	*Current-Carrying Capacity in Amperes*
18	23.6	2.32
19	26.4	1.84
20	29.4	1.46
21	33.1	1.16
22	37.0	.918
23	41.3	.728
24	46.3	.577
25	51.7	.458
26	58.0	.363
27	64.9	.288
28	72.7	.228
29	81.6	.181
30	90.5	.144

NOTE: The turns-per-inch figures may vary a little, depending on the enamel thickness, and in any case it is rarely possible to wind exactly the theoretical number in an inch of space. However, the figure gives a reasonably-close approximation of the winding space required.

The current-carrying-capacity figures can be increased as much as 40 per cent without danger of overheating the wire. For example, No. 24 can carry as much as 800 ma.



At the left is the new high-voltage winding which is wound over the primary layers. When completed, this entire winding assembly will be fitted into the 6.3-volt winding section shown at the right. Some of the laminations are shown in the center.

at *exact* numbers of turns; even if the tap is "off" by as much as 30 turns the difference is only 15 volts.

When the high-voltage winding is completed it should be wrapped with several layers of paper for mechanical protection and to insulate it adequately from any winding that may go on next. At this point we put on a single-layer winding of 100 turns for bias voltage, using wire from the old high-voltage winding. We wanted about 40 volts of bias for a planned rig, so 50 volts a.c. would be adequate. When this layer was completed there was still ample room to slide the entire assembly inside the section carrying the heavy 6.3-volt winding, so we took up the slack by covering the new winding with Scotch electrical tape.

The high-current 6.3-volt winding often is made with two wires in parallel instead of using a single wire of the same total current-carrying capacity. The transformer we rewound had two No. 15 wires in parallel, the equivalent of a single No. 12. If your transformer is built this way, you can unsolder the parallel connections and bring out separate leads from each coil. These can be connected externally either in parallel for 6.3 volts or in series for 12.6 volts — or used separately if two unconnected 6.3-volt windings are desirable for some special reason.

Reassembling

Putting the laminations back in was rather simple. We put a little thin shellac on each group just before inserting it into the winding. When about half the laminations were back in, and before the shellac had a chance to dry, we clamped the partly-completed core in a vise to take up the slack and then proceeded with the remaining laminations. We found that we could get all of the laminations back in with the exception of one. *Don't* try to force those last few laminations in; you might damage the winding. The amount of iron left over wouldn't be that important to the transformer. Put back the bolts, tighten the nuts securely, and your new transformer is complete.

We tried our unit out as soon as completed and the most surprising thing was that the transformer was quieter than before rewinding. One of the problems with rewinding transformers is avoiding lamination vibration or hum. Make everything secure and you won't have the problem.

One last thing: the rewinding job described here was based on the fact that the primary was the bottom winding. You can rewind transformers when the primary is an outside winding, but it is a more ticklish job. In such cases it is probably better to remove the primary wire, which will no doubt be No. 18 enamel and will be easy to work with. Rewind it on the form at the bottom, next to the core. This will take a little extra work, but will probably save time in the long run.

There's one nice thing about winding your own transformer — you end up with exactly what you want and need, and save a lot of dough in the process. QST

Strays

Country leaders in the PACC Contest for 1963 have been named by the VERON Contest Committee. They included c.w. winners PAØLV, DL4FT, F3PK, G3EYN, GW3IAD, HB9QA, LZ1KSA, OD5LX, OH5PT, OK3KAG, ON4CE, OZ1LO, SM7BUE, SP6TQ, UA3KHA, UB5KBA, UH8KHA, UI8CO, UM8KAA, UP2QQ, VE2IL, W4HOS, YO3JF, YU1SF and 4X4MJ. Phone awards go to PAØHSJ, DJØGI, GW3LAD, and SP9AHA.

—···—

W3KW would like to hear from hams he worked from the schooner *Nanuk* in the frozen north of Alaska and Siberia during the winter of 1929–30. Calls used were WKDB and K7ABF.

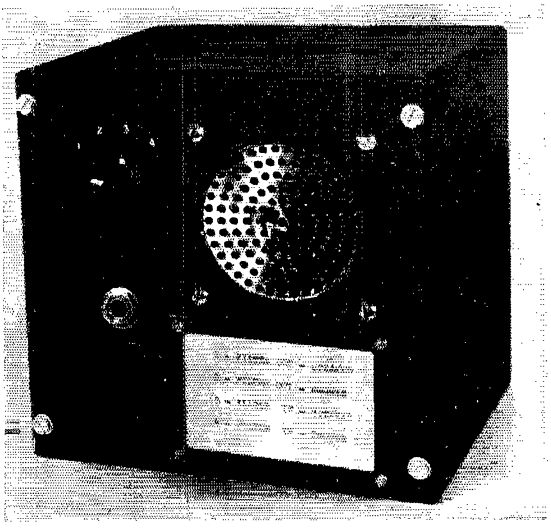
—···—

K1UAK would like to meet some American Indians who are hams. Write Marie Hennelly, 100 Cedar Street, Waltham, Mass. 02154.

—···—

Feedback

In the circuit of W2DUD's product detector in the issue for Oct. 1963, the 0.01-μf. capacitor shown connected to Pin 1 of the 6BE6 should be connected to the screen, Pin 6.



The selective audio filter unit is housed in a box measuring 6 inches on each side (Bud C-1798). Switch dial plate is Mallory (30-degree indexing). The chart identifies the switch positions.

Selective Audio Filter

for C.W. Reception

BY GILBERT L. COUNTRYMAN,* W4JA

The Black Box

This filter is based on an inexpensive surplus unit. The measured bandwidth is 200 cycles at 20 db. down and 250 cycles at 40 db. down.

ALL you sidebanders and other phone men can stop reading now, but save this issue because someday you may be back on c.w. and be interested in this little Black Box.

For some reason, receiver manufacturers today ignore the fact that a large number, possibly a majority, of hams still operate c.w. Except in the case of a few receivers priced well beyond the reach of the average ham, commercial-receiver design effort has been directed primarily toward s.s.b. or a.m. reception, and the resulting products are hardly adequate for present-day c.w. reception. The minimum bandwidth is usually 500 cycles at 6 db. down, and this width is unacceptable, especially since the i.f. curves are rarely steep-sided.

The unit to be described has a measured bandwidth of 200 cycles at 6 db. down, also 200 cycles at 20 db. down, and only 250 cycles at 40 db. down. What is equally important, this selectivity is attained with virtually no attenuation. That, my friend, is selectivity.

The author has experimented with audio filters for years, has constructed many[1] and bought every type made available on the market. All have been either marginal or downright unsatisfactory and were eventually discarded. Many of them, such as the FL-5 series, result in intolerable attenuation. To use some properly, it is often necessary to dig into your precious receiver, and frequently additional audio amplification is necessary.

Some time ago, Frank Hughes, W9KJ, reported on a bandpass filter manufactured by Federal Telephone and Radio Corporation, their model FR-2409. Normally quite expensive, these are available as new surplus from various sources, among them, Joe Palmer, P.O. Box 6188CCC, Sacramento, California (his stock number 23P009), for the price of $6.95. One was procured and this proved to be the best investment ever made. Input and output impedances are 600 ohms, so connection to the 500-ohm output of the receiver gives acceptable matching. For speaker use, a miniature 500-ohm-to-voice-coil transformer is likewise adequate. The use of 600-ohm phones results in a perfect match and is preferable to using a speaker. The filter peak is 1105 cycles. This is somewhat higher pitch than is preferred by most c.w. men but, after a few hours of operation, one becomes accustomed to the higher note.

It was soon learned that, for casual tuning, the filter should be out of the circuit because of its extreme selectivity, so the Black Box was designed to permit quick switching from normal output to filter, and for either speaker or phones in either mode. Because of the narrow passband, the s/n ratio is greatly improved, and many c.w. signals that cannot be read without the filter are solid copy with the filter switched in.

Constructional Hints

No difficulty will be experienced if the wiring

* 75 East Bay St., Charleston, South Carolina.

[1] Countryman, "A QRM Eliminator," *CQ*, June, 1949; Countryman, "A C W Filter," *Radio & TV News*, November, 1949.

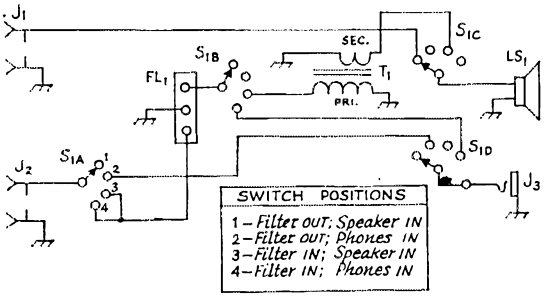


Fig. 1—Wiring diagram of the selective audio filter.

FL_1—Audio filter unit (see text).
J_1, J_3—Phono jack.
J_2—Open-circuit headphone jack.
LS_1—3-inch speaker, 3.2-ohm voice coil.
S_1—Rotary switch 2 sections, 4 poles, 4 positions (Centralab PA-2011 or PA-1013 only 4 positions used).
T_1—Output transformer, 500-ohms-to-voice coil (Chicago Standard A-8101 or equivalent).

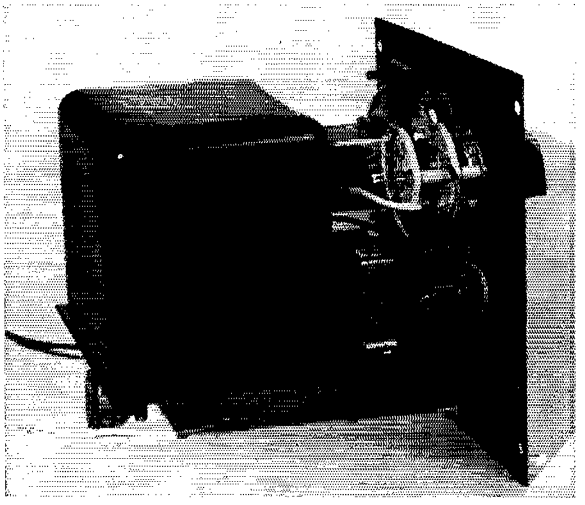
diagram and photographs are carefully studied. Not wanting to drill a couple of dozen holes for the speaker in the steel front panel, a 2¼-inch meter punch was used, and a 17-cent drain protector served admirably as a grille. It is important to remember that the cabinet lip extends ½ inch all around, so placement of components on the panel must be such that this lip does not interfere. In the case of the two 4-40 screws holding the chart frame at the bottom, two small cutouts were made in this lip to provide clearance for the small nuts.

On the chassis, the bandpass filter should be located first, all the way to the back, and centered right and left. Next, install the transformer T_2, as close to the filter as possible, on the side opposite the speaker. Wiring will be simplified if leads to the transformer winding are soldered in place, and the leads to the ground lugs soldered before the transformer is mounted.

Care must be exercised when wiring S_1 as it is easy to confuse terminals. Before installing the switch, the connections between S_{1D2} and S_{1A2} should be made, and also the connection between S_{1B4} and S_{1D4}. S_{1A3} and S_{1A4} should be connected together, and a length of flexible insulated wire attached to run down through the chassis to one of the end terminals on T_1. Then the switch may be mounted and the other terminals will be easily accessible. All four insulated leads coming through the chassis pass through one rubber grommet in a ⅜-inch hole directly behind the speaker. Incidentally, it makes no difference which of the end terminals on FL_1 is used as output or input. The center terminal is grounded.

Mounted on the back cover of the box are the two phono jacks, J_1 and J_2. It is, of course, important that the cables from these jacks go to the correct receiver output terminals. Two color-coded wires run back to these jacks for soldering just before the back is screwed in place (2 inches of slack wire is sufficient). The jacks are appropriately identified on the outside of the back cover plate.

The last thing to be done is to buy or make four small angles ½-inch wide and bolt these to the back cover so that the rear edge of the chassis will slip between them as shown in Fig. 2. The bandpass filter is quite heavy, and the chassis is welded only to the front panel, with no rear support. Since the filter is mounted at the rear of the chassis, these braces are important, especially if there is any chance that you will ever ship the unit. The braces should be carefully located so they will support each side of the chassis, above and below. There is just room for them on each side of the bandpass-filter unit, assuming that it has been centered correctly. The author fashioned his angles by hacksawing four out of a strip of ½-inch aluminum angle, filing them smooth, and drilling one hole in each to accept a 4-40 machine bolt.



Interior view of the Black Box filter. The prop under the rear end of the chassis is not part of the assembly.

How long does construction take? A total of six hours was spent drilling, mounting components and wiring, including fabrication of the two input cables. Over two hours were spent in determining the proper parts placement;. one evening should suffice, starting from scratch, provided all components and necessary tools are on hand.

Operation

In many receivers, including the author's RME-6900, one side of the 3.2-ohm output winding is grounded. If there is no response when the speaker is running straight through (switch position 1), merely reverse the connections to the 3.2-ohm terminals on the receiver.

The b.f.o. must be carefully adjusted for an 1100-cycle note for optimum results. Only when this adjustment is made will there be no attenuation when the filter is switched in. Two things are necessary for maximum utilization of this filter — a stable receiver, and a ham on the other end whose transmitter does not drift. Make no mistake; the selectivity is razor-sharp. For this reason, normal listening should be done with the filter out of the circuit, and the filter switched in after a signal is tuned in. It may be possible to tune across one of the c.w. bands without the filter and find it full of activity. Switch the filter in and tune across at the same rate, and it appears that the band is dead. Only when the band is carefully scanned will the signals pop in and out amazingly.

Once again, c.w. operating can be a pleasure, and your inexpensive receiver can perform on c.w. as well or better than some costing much more. QST

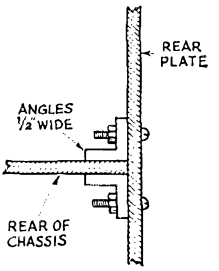


Fig. 2—Method of supporting rear of chassis on rear cover plate.

COMING ARRL CONVENTIONS

April 3-5 — Great Lakes Division, Detroit, Michigan
May 9-10 — New England Division, Swampscott, Massachusetts
June 12-14 — West Gulf Division, Brownwood, Texas
August 21-23 — ARRL National, New York City
September 11-13 — Southwestern Division, Palm Springs, California

Hamfest Calendar

California — The Northern California Chapter of QCWA will hold their annual banquet on February 15 at International Inn, 2 miles north of San Francisco Airport on alternate U. S. 101 (the Bayshore Freeway). Contact W6WF, 2456 Johnson Place, Santa Clara.

New Jersey — The first annual W2-DX banquet will be held Saturday evening, March 21, at Schrafft's County Restaurant in Scarsdale, New York. Cocktails and general conversation begin at 4:00. Dinner (prime ribs and all the trimmings) at 7:30. Write for reservations to dinner Chairman Bob Stankus, W2VCZ, 30 Pitcairn Avenue, Ho-Ho-Kus, New Jersey.

Ohio — Hams and friends in the Toledo-tristate area are invited to the Toledo Sports Arena for the ninth annual Toledo Mobile Radio Association ham auction beginning at 1:00 P.M., February 16. Tickets on sale now for a dollar, $1.50 at the door. Contact K8LFI for ticket, sale, or other information.

Texas — Old timers will be honored and antique gear displayed at a special meeting of the Houston Amateur Radio Club on February 7. Contact W5ZPD for details.

Strays

The Outstanding New England Amateur Radio Operator will be honored at the ARRL New England Division Convention again this year. The award carries a cash prize of $150 and a handsome plaque. Nominations are requested. More information will appear in the next issue of *QST* and is available from Mr. Eli Nannis, W1HKG, 37 Lowell Street, Malden, Massachusetts.

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Bill Halligan, W9AC, chairman of the board of the Hallicrafters Co., was guest of honor at a surprise party in Chicago on Monday, Dec. 9. Attended by some 75 of his amateur radio friends, it commemorated his fiftieth year in electronics and his 64th birthday. Bill first became interested in amateur radio in 1913, and founded the Hallicrafters Company in 1933. Above right, he receives a certificate of congratulations from the Headquarters staff of ARRL, presented by Dave Houghton, ARRL treasurer and QST circulation manager.

Building Fund Progress

The ARRL Building Fund made substantial progress during 1963, shown most strikingly by comparing the position of our little man on the tower with his height a year ago. Two ARRL divisions went over the top of their quotas; others were close behind. For all practical purposes, individual membership contributions lack only 10% of reaching the top, since such amounts are doubled by matching funds.

The division breakdown at the end of the year:

New England	**111.6%**	Roanoke	72.0%
Dakota	**109.5**	Pacific	65.6
Hudson	86.1	Delta	62.7
Northwestern	83.8	Rocky Mt.	58.2
Southwestern	78.9	Atlantic	57.5
Central	77.1	West Gulf	55.0
Canadian	75.8	Great Lakes	47.5
Midwest	72.4	Southeastern	43.6

ARRL commemorates its 50th anniversary in 1964. The Building Fund goal will be reached during this year. Let's see if it can be accomplished by May, the actual anniversary month. Make your check or money order payable to the ARRL Building Fund, and mail it now!

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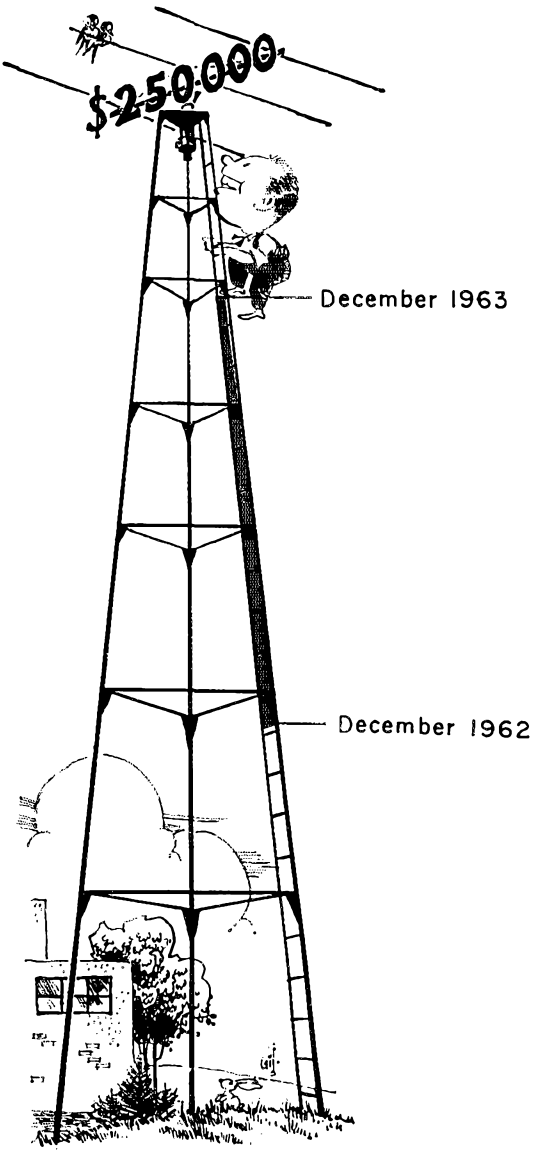


Members Are Saying

I happened to be one of the early contributors to the building fund and at that time I had the call letters W8IMY. Recently the FCC restored my old two-letter call; obviously this argues for another contribution. Besides I'd like to see the Great Lakes division a little higher in the list! — *W8IS.*

Enclosed is a very small contribution. Thanks for all the help given me through *QST*, and also through my answered inquiries. — *WA8DNZ.*

. . . I'm glad to give what I can. I can't begin to thank ARRL for all the wonderful things it does: helpful publications, code practice, operating activities, technical help, representation of the amateur, and many more which I don't even know about. Thank you! — *WN8KGO.*

I imagine that your drive for building funds would have been greatly simplified if each of the nation's 250,000 amateurs invested a dollar in their ARRL. Such is not the case, however.

As far back as the time of Aristotle, it was noted that a minority of all men were leaders. The great majority, then as now, preferred to sit back and watch the action. Such being the case, here's my contribution. Perhaps it will help make up for some of those 9 out of 10 men who prefer to "sit and watch." — *W20LU.*

Enclosed is my second contribution. We shall need a strong ARRL and IARU in coming years. Keep up the good work. — *VE2VG.*

I wish I could send more, but if tuition keeps on rising my gear may be destined for your classified section. At least, I'll have the satisfaction of knowing that if I do sell my gear and give up "the art" for several years, you'll protect my rights. — *W12QGU.*

It's been on my mind for quite some time but I've been so busy I just forgot all about the Fund. Hope this will help out! — *W12HGI.*

Wish it could be more but guess every little helps. Have been a ham since the spark days from 1910 on and have always appreciated what the League has done for us. — *WØSIE.*

Enclosed find check for the building fund. This is the cheapest way I know to enjoy a million dollar hobby for a few dollars. — *VE3ELL.*

We are very happy to enclose our [second] check. This, in a way, may be construed as our answer to those persons who have been critical of the League's proposal to the FCC for a restoration of incentive licensing. In other words, we are now even more firmly behind the League in its constructive policies. — *Aeronautical Center Amateur Radio Club, Inc., Oklahoma City, Oklahoma.*

"Ya Fer It - - - - -

OR

- - - - - Agin It?"

BY JOHN G. TROSTER,* W6ISQ

I TELL you Charlie, those sun spots have this band so messed up I just don't have any incentive for much DXing . . ."

"Oh, so you're agin Incentive Licensing, eh, friend?"

"I didn't say Incentive *Licensing*, Charlie. I was talking about DX. But now you mention it, sure I'm for Incentive Licensing. Aren't you? Isn't everybody?"

"Them's fightin' words, friend. Watch your language! And just let me tell you — if you're fer it, your crystal's cracked. Don't ya know what them fellas back there is tryin' to do? They're tryin' to take your license away, friend. You oughta tune in on the high end and let the boys explain the facts of the spectrum to ya — you'll find out what them fellas back there is *really* tryin' to do!"

"Hold it now, Charlie. Sure I listen to the boys on the high end. But the only thing the fellas back there really want to do is to start up the old Class 'A' license again. What's wrong with that? I used to have a Class 'A' . . . greatest thrill of my ham career . . . memorized . . . errr . . . studied all the questions and . . ."

"Ok . . . ok . . . so, it was a big deal then. But how about now? Don't ya realize they're gonna make ya take a big all-day exam on high-power theory? All about how a radio works and what's this s.s.b. stuff — and RTTY stuff — and radar — and things like that."

"Aw, come on Charlie. I never heard the fellas back there wanted to include radar."

"And how's your code speed, friend? Take 35 w.p.m., solid?"

"Naw, Charlie, not that high. I heard it was only 30 w.p.m."

"Well friend, you just better listen a bit more careful to the boys on the high end. You're gonna need a college degree to take that exam."

"Naw, Charlie, no problem . . . just memorize the answers again . . . like last time . . . haw."

"Oh yeah . . . well, friend, you won't think it's so funny when they stand y'up there and make ya design and build that transmitter and receiver — right up there in front of everybody! Think of them poor fellas who never even had 'hold of a hot iron."

"Ya really think they'd stand us up there, Charlie . . . and . . . design . . . a rig . . . and . . . built . . . ??"

"That's what the boys on the high end is sayin'."

"Well . . . I dunno now . . . sounds kinda bad. Don't mind so much the way they're going to divide up the bands . . . but this transmitter-design stuff . . ."

"What's that, friend? What's that about 'divide up the bands'?"

"Thought you knew, Charlie. The fellas back there are going to give each Class of license its own band. 160 and 80 goes to the Novices and Technicians . . . 40 to the Conditionals and CBers . . . 20 to the Generals . . . 15 to the Advanced . . . and the Extra Class gets 10. Then they start all over again with 6 meters."

"Where did ja read that, friend?"

"Aw, Charlie, that's straight dope. Heard fellas talking about it on the high end last night.

"Oh . . . well, then . . . must be right. Soooo . . . the fellas back there is gonna divvy up the bands . . . hmmm . . . Extrie Class gets ten meters . . . yeeeeaaahhh . . ."

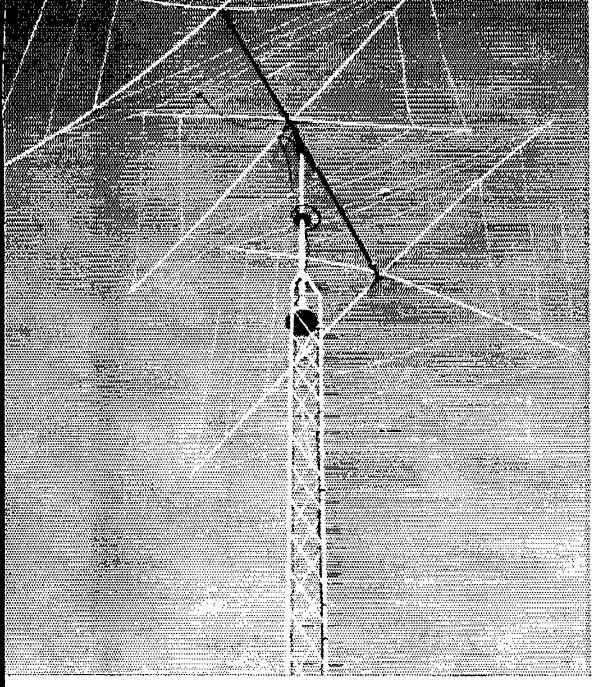
"That's right, Charlie . . . straight from the high end. But look . . . ahhh . . . I dunno . . . maybe you're right after all about the Incentive stuff! With those fellas back there trying to make us take all those theory exams . . . and code tests . . . and then building a rig — maybe . . . well, maybe after all . . ."

"Friend, you say you heard that Extrie Class absolutely gets ten meters all to themselves . . . you heard that positively from the boys on the high end?"

"Why absolutely, Charlie . . . sure as you're radiating! And . . . ahhh . . . Charlie . . . I

(*Continued on page 142*)

*45 Laurel Ave., Atherton, Calif.



The short quad at WA8BHK. Three elements on 10 and 15, two elements on 20.

Smaller Dimensions with Loaded Elements

The Short Quad

BY WALTER PINNER,* WA8BHK

MANY articles have been written on the quad antenna. The well-known desirable features of this antenna are its low cost and light weight compared to other types of beam antennas of comparable gain. Its chief drawback is the difficulty of arriving at a mechanical design that will not be too cumbersome to handle and that will stand up well against weather. The problem is not so serious at 10 and 15 meters, but a 20-meter quad is a different story.

A 12-foot boom was used in my original installation. At one end of the boom was the 20-meter driven element with the 10- and 15-meter directors concentric with this driven element, as indicated in Fig. 1. At the other end of the boom were concentric reflectors for the three bands. At a point 7 feet from the reflectors, the concentric 10- and 15-meter elements were mounted, leaving a space of 5 feet between the 10- and 15-meter driven elements and their directors. Thus, I had two elements on 20 and three elements on the other two bands. Separate feed lines were used to each driven element.

Loaded Elements

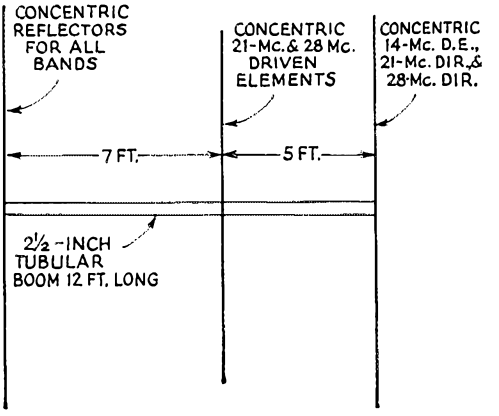
After working with full-size 20-meter elements for several months with good results, I decided to see what could be done to make the brute less cumbersome and more weather-resistant. The original sides, which were 17 feet 7 inches long, were shortened to 14 feet 7 inches, and loading coils were inserted in the top horizontal strands of both the driven element and the reflector to maintain resonance.

Tests with the loaded elements over a considerable period of time, at both short and long distances, have convinced me that the performance is fully as good as with the original full-size elements. The mechanical rigidity has improved markedly, not only because the spreaders are 30 inches shorter but, equally important, because the average spreader diameter increased when the original bamboo poles were cut to a shorter length. In fact, the spreaders are now stiff enough so that when the antenna is completely assembled, it will support its own weight sitting on the ground. Furthermore, the dimensions have been reduced to the point where I am able to remove the antenna from a fold-over tower with the aid of an 8-foot stepladder. The approximate weight of the three-band array is 45 pounds.

Construction

The 20-meter loading coils each consist of 14 turns of No. 12 wire wound on a form 2½ inches in diameter, with the turns spaced to give coil length of 2½ inches. (Barker and Williamson and Airdux Coil stock has also been used.) The coils are enclosed in plastic refrigerator jars to protect them against the weather.

Fig. 1—Sketch showing the placement of the various elements of the 3-band quad on the 12-foot boom.



*23955 West LeBost, Novi, Michigan.

Bamboo poles having an original length of 14 feet were used for the spreaders. They were left at this length until the antenna elements had been mounted on them and finally adjusted. Each of the bamboo joints was wrapped with cloth tape, and covered with two coats of enamel.

Several methods of constructing the spreader mountings, or "spiders," have been described in earlier articles. I simply used two 2-foot lengths of 1-inch aluminum angle, 3/16-inch thick, placed at right angles with two flat sides together, and welded them together at their mid points, as shown in the detail photo. The boom mounting is a 1-foot length of 2-inch aluminum angle, also 3/16-inch thick, one end of which rests snugly in one of the right-angle crotches formed by the 1-inch spreader mounts, where it is welded to both 1-inch angles. Adjustable "airplane"-type hose clamps were used to fasten the bamboo poles in the spider, and 3-inch U bolts secure the assembly to the boom. The boom is a 12-foot length of 2½-inch aluminum pipe.

When the three spiders are complete, and the bamboo spreaders mounted, lay one assembly flat on the ground with the boom mounting sticking upward. Cut wire lengths according to the dimensions given in the table plus several inches to spare for tuning. Make sure that you include the stub lengths if you want to keep the stub and element wire in one continuous piece to avoid soldering. I used No. 12 Copperweld for the largest element on each set of spreaders, and No. 12 soft-drawn for the smaller ones.

Measure off the side lengths of each element, making a right-angle bend at each corner. As each element loop is completed, lay it in position across the spreaders. Starting with the lowest-frequency element, temporarily tie the corners of the wire to the spreaders, adjusting the tie points to keep them equally spaced from the boom mounting and to take as much slack out of the wire as possible. Short loops of No. 12 wire, adjustable in length and attached to the spreaders a few inches beyond the element corners, will facilitate this adjustment. You may want to put enough tension in the wire to pull the spreaders up into a slight arc. This will tend to keep the wires taut after the antenna has been raised. Add the higher-frequency elements, using the same procedure.

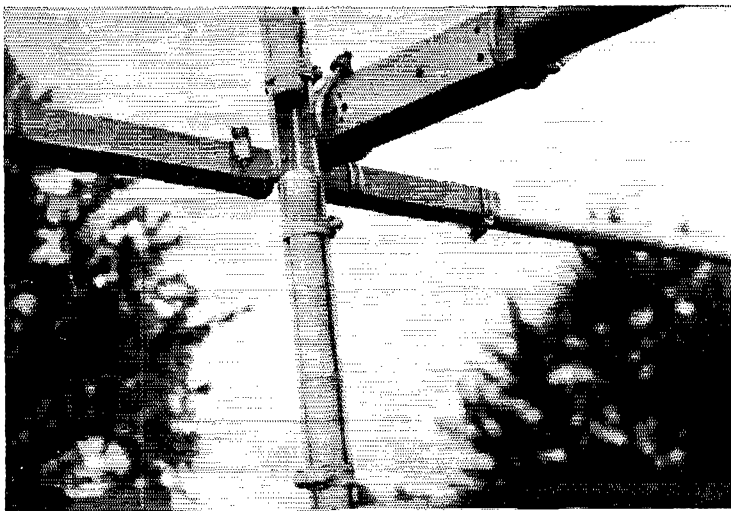
At no apparent sacrifice in performance, the author uses loading coils to reduce the size of the 20-meter elements in this three-band quad. The result is a structure that is stronger and easier to handle.

If you have a fold-over tower as I do, it will be a relatively simple job to mount the three sets of elements on the boom. Otherwise, you may have to devise a method of your own, depending upon the facilities available. Remember, if they are not handled too roughly, the spreaders will support their own weight and the weight of the boom.

Adjustment

The tuning of the quad elements can either make or break the antenna as a performer. However, correct adjustment is not difficult to obtain. The various elements were adjusted to resonate at the frequencies shown in the chart, using a grid-dip meter monitored on a calibrated receiver as the indicator. These adjustments should be made with the array elevated as high above ground as possible since the tuning of the loaded elements, in particular, will be affected by proximity to ground and other surrounding objects. This will usually mean restricting the height to where the bottom horizontal strands may be reached from the ground or a stepladder. The elevation can be adjusted to the desired point quite easily, of course, with a tilt-over or crank-up tower. With a tilt-over tower, the boom clamps can be loosened temporarily to swing the bottom element strands parallel with the ground. Some form of temporary support may be required for other types of mast or tower.

The driven elements were tuned by forming the excess length added for adjustment into a short closed stub, and the stub was trimmed for resonance, after which it was opened for connection to the feed line. The parasitic elements were tuned by adjustment of their stubs. I found that resonating the elements to the frequencies given in the table was much superior to the use of a field-



Spreader mountings and boom attachment are a simple assembly of aluminum-angle sections as described in the text.

Band	*28 Mc.*			*21 Mc.*			*14 Mc.*	
Element	Ref.	D.E.	Dir.	Ref.	D.E.	Dir.	Ref.	D.E.
* *Length each side*	8′ 8″	8′ 8″	8′ 6″	11′ 8″	11′ 6″	11′ 2″	14′ 7″	14′ 7″
Resonant freq. (Mc.)	28.0	28.8	29.5	20.3	21.3	22.0	13.6	14.2
Stub length	24″		24″	36″		36″	40″	
Spacing from driven element	7′ 0.25λ		5′ 0.2λ	7′ 0.2λ		5′ 0.15λ	12′ 0.2λ	

* Includes length of loading coil (2½ inches) in 14-Mc. elements and 3-inch insulators at stubs and feed points, but does not include allowance for adjustment as described in the text.

strength meter. After adjustment, the stubs were folded up and tied with nylon line.

In the original arrangement, I used separate feed lines for all three driven elements. However, subsequent checks of the s.w.r. showed no significant increase using a common feed line for 10 and 15 meters. A single line of RG-8/U is used to feed these two driven elements, while the 20-meter driven element is fed with RG-58/U. The feed points of the 10 and 15-meter driven elements are brought to a single-strain insulator where the connection to the common feed line is made.

S.w.r. readings made with a Knight s.w.r. bridge, with the antenna 65 feet above ground, indicated a maximum s.w.r. of 2 to 1. This maximum occurred at the extremes of the 28-Mc. band.

Since building this quad, WA8BHK has consistently come out on top in pile-ups, and is frequently reported to be one of the strongest. In the first few months of evening and week-end operation with a DX-100B, I've worked 54 countries and all continents and have seen the quad ride out 75-m.p.h. winds on several occasions with no damage. The total cost was about twenty-five dollars. QST

Gus In Bhutan

Some Random Thoughts of a DXer on the Roof of the World

BY GUS M. BROWNING,* W4BPD

WHEN THE BANDS OPEN HERE, it's *always* at mealtime. During breakfast, it's long path to W6-land; during dinner, long path to the east coast. There have been no openings as of now to W5, 7, 8, 9, or Ø. Just about dinnertime I'll be on c.w. just getting along fine and someone will say, "Gus, how about some s.s.b.?" So I will say okay and we'll start a QSO on sideband and someone else will call and before you know it we'll be going full blast on s.s.b.

Just about then they will bring my meal in to me and there I am with a good hot meal in front of me and trying to talk at the same time. With no heat in these houses, you don't let your meal sit there, because it will get cold — and I mean *cold* — fast. So just try to eat and talk and write in the log at the same time. This happens seems like every day without fail. So you ask, "Why not pull the switch and just eat?" Well, the openings only last 30 to 45 minutes and by the time you finish eating, the band is dead. I tried telling the cook I wanted to eat earlier, but when you can't talk Bhutanese, Nepalese, Tibetan, or Hindi (the cook uses all these), you just can't get through. They seem to think I *want* to eat while I'm operating.

I've been trying to use forty meters here, but you can't imagine the *big mess of QRM* that band is over here! And I mean it's *all over the band, too* — RTTY, BC stations with 200% modulation, point-to-point s.s.b., badly tuned a.m. and T6 c.w.; and then a lot of just plain crud that doesn't seem to be anything but a new kind of *QRM!*

By careful hunting, I can find just a small hole in all this QRM and I jump in. So fellows, when (and *if*) you hear me on 7 Mc., I suggest you exactly zero me to call. It's a safe bet to assume that my transmitting frequency is a clear spot for me.

It's always interesting to hear stations coming in S9 here that are *real DX* from the States; such prefixes as UI8, UJ8, UM8, UH8, BY, JT, HS, 9M2, VS1, VU2, AP, and others. These are the QRM here, and with some of the notes T9X it's *rough* on me!

I love this friendly, unspoiled and beautiful country! When you come up from India, the lay of the land is flat until you suddenly see the Himalayas in the distance. Where they start, Bhutan starts.

The whole country is mountains. They are all covered with virgin forests at least to about 14,000 feet. Many of the valleys have never been visited or seen by anyone. The snow line is at about 16,500 feet. This is a sight that is hard to describe for, especially at sunrise and sunset, you can see the clear blue skyline and the mountains in all their majesty!

They look a little lonesome, and they are. There is only one motorable road, the jeep road from Phontscholing to Thimpu. It is only 127 miles long, but it takes two days to travel. When you go to Thimpu,

(*Continued on page 144*)

* Orangeburg, South Carolina. Ex-AC5A, AC7A, YA1A, VQ9A, VQ1A, 6O1AA, LII4C, FL5A, etc.

Announcing

GOLDEN ANNIVERSARY ESSAY CONTEST

What ARRL Means To Me

As part of the commemorative program of the League's 50th anniversary year, each ARRL member is invited to submit an entry in a Golden Anniversary Essay Contest on the subject, "What ARRL Means To Me."

Through the years, the League has meant many things to many people. Perhaps to you the most impressive function of your association is its public-service field organization of traffic nets and emergency preparation; perhaps it is W1AW code practice, representation of the amateur service in domestic and international regulatory affairs, training aids for clubs, division conventions, Field Day; perhaps it mostly means receiving *QST* each month. You pick the subject, but make the theme, "What ARRL Means To Me."

From those submitted the judges will select two which in their opinion are outstanding; the winners will receive handsome trophies and cash awards of $100 and $50, and of course the essays will be published in *QST*.

Any ARRL member, full or associate, is eligible. All entries should be typed (double space) or neatly handwritten in English on one side of unruled paper and sent to the ARRL Essay Contest Committee, 225 Main Street, Newington, Connecticut 06111, and received by May 1, 1964. The decisions of the judges will be final; all entries become the property of ARRL. Suggested length of entries is between 1,000 and 2,000 words.

Dust off your mill, or ball pen, and tell us what the League means to you! QST

Strays

WWVB and WWVL, Bureau of Standards v.l.f. stations in Colorado, cut service to six hours a day starting January 1. They are now operating daily from 1630 to 2230 UT. The cutback was made as an economy measure in the face of reduced operating funds.

—•••—

Cursillistas contact K7URN.

—•••—

VE6WN wants to know if a divorced amateur and his wife are called "ham and x."

—•••—

And a discouraged K8AJD quips, "stations that call CQ QRP, seldom ever answer me."

QST Article Contest

As a feature of the League's 50th Anniversary year, you are invited to submit entries in a monthly *QST* article contest covering the broad fields of more efficient use of amateur frequencies and more effective amateur performance in the public interest, convenience and necessity.

Observe procedures as you operate in the amateur bands, h.f. or v.h.f. Analyze your own operating techniques and those of others. Study the principles of good operating recommended by the Board and incorporated in Operating Aid No. 11 (see p. 64a, September 1963, *QST*). Then sit down to put your constructive thoughts on paper to submit for the contest. Or you may choose to discuss accounts of club and leadership experience, training programs, ARPSC-RACES plans and activities, public relations projects. We want to present ideas that have been or should be tried for fuller development of organization patterns and public service capabilities.

Some possible specific subjects: Getting the successful v.h.f. net underway, mending our operating defects, recommended s.s.b. techniques, hints on message handling and net operation, more effective self-policing, best contest and DX procedures, courtesy in operating, band-switching to v.h.f. for local contacts, teaching-group techniques, using low power in every shack, a public relations program that worked, efficient station layout.

The author of the article selected by *QST*'s staff as best of those on hand each month for the remainder of 1964 will receive a $25 U.S. Bond. The first winning article will appear in the March issue, for which the deadline was January 25, but articles may be submitted at any time throughout the year up to October 25 (deadline for the December issue). Approximately 1,000 words is an ideal length, and copy submitted typewritten and double-spaced will be helpful. Articles will be selected on the basis of originality and general value to the amateur fraternity. Give this contest a try whether your ideas relate to emergency drills, club training programs, code proficiency, or getting the most out of your amateur operating. Be sure to mark your contribution "for the *QST* article contest."

MEMBERSHIP CHANGES OF ADDRESS

Four week's notice is required to effect change of address. When notifying, please give old as well as new address. Advise promptly so that you will receive every issue of *QST* without interruption.

Readers of Part I of this series may have noted that we offered few black-and-white, yes-or-no answers to the questions commonly asked in the field of v.h.f. antenna design. This seemingly evasive line will be followed as we discuss methods of matching and feeding antenna systems, for just as there is no one "best" antenna for the v.h.f. man, so there is no one transmission line or matching device that is ideal for all purposes. The reader must make a choice based on his own circumstances, taking into account many mechanical, electrical and economic factors that may not be covered in most written material on antennas and feed systems.

V.H.F. Antenna Facts and Fallacies

Part II — Choosing the Right Transmission Line

BY EDWARD P. TILTON,* WIHDQ

THE best antenna in the world is of little value if it cannot be made to take power from the transmitter and transfer the signals it intercepts to the receiver with reasonable efficiency. Thus the selection of the right transmission line for the job at hand, and an effective means of matching it to the antenna system, are of utmost importance, especially at 50-Mc. and higher frequencies where transmission line losses are inevitably higher than in our lower bands.

If one type of transmission line was "best" we would not still be using three. Each has its uses, and line-loss figures in the *Antenna Book* and the prices quoted in your distributor's catalog don't tell the whole story, by any means. Let's consider line-loss data first. Experienced v.h.f. men almost know the figures by heart, but how many know whether their installations actually achieve the performance implied in these tables? Losses given in published information are for new lines, properly used, in dry weather. Nearly all amateur installations are less than perfect in one or more of these respects.

Coax, Twin-Lead or Open-Wire

Coax has relatively high loss in the tables. RG-8, perhaps the most commonly-used line, reputedly has a loss of about 2.5 db. per 100 feet at 144 Mc. This means that 100 watts output at the transmitter will be reduced to about 57 watts at the antenna, with a 100-foot line — *if* the line is working perfectly. In the 420-Mc. band that same line, in new condition and perfectly matched, will dissipate about 70 watts in a 100-foot run between a 100-watt transmitter and its antenna. Discouraging as these figures seem, they're only half the story, and the smaller half at that. Transmitting loss can be made up at least partially by increasing power, but in receiving, the signal lost can never be recovered.

Good coax, on the other hand, is tolerant of installation. It is almost impervious to weather changes, and it can be installed anywhere. Tape it to a steel tower, or bury it; let it wrap around the tower and unwrap again as the beam is rotated — the loss will stay the same, almost regardless of conditions that adversely affect other types of lines. Another prime advantage of coax is that you can measure the performance of the system readily, with fairly inexpensive equipment. You know your s.w.r. and line loss, and the effect of any adjustments is immediately apparent. This is not easy with other forms of transmission line.

Twin-Lead is inexpensive and convenient to use. Its advertised losses look good on paper compared to coax. The best grade of tubular Twin-Lead, transmitting type, is quoted at 1.25 db. per 100 feet at 144 Mc., and 2.3 db. at 420 Mc. But anyone who has used it knows that polyethylene-insulated balanced line is a terror in rain. Flat ribbon types give the most trouble, but even the best tubular line will give you a bad time with fluctuating loading in heavy rain conditions. Cheap lines with small conductors and thin insulation should be avoided like the plague, unless the line is to be only a few feet long, and used indoors.

Book figures make open-wire line look best of all. If a good open line has only a 0.2-db. loss per 100 feet at 144 Mc., why doesn't everyone use it? Even at 420 Mc. the loss per 100 feet should be under 1 db. — it says here. This picture has the biggest "ifs" of all, however. Such fine performance is achieved, if ever, only with large conductors, spaced so that radiation is nil, and held in precise alignment with a minimum of insulating spreaders. It should be installed without any sharp bends, and the conductors must be balanced to ground.

These conditions definitely are *not* met in most amateur installations. We use TV-type lines, with too-small conductors, and spacings generally too wide, at least at 420 Mc. These lines have spreaders every few inches, and we usually have to go around several corners in an average home installation. The author was sadly disillusioned with a 220-Mc. open-wire-line job some years

* V.H.F. Editor, *QST*.

ago.[1] With a 125-foot run, installed with a fair amount of care, and using half-inch-spaced line, we found that 70 watts output at the transmitter showed up as less than 25 watts at the antenna.

This was the best line available ready-made at moderate prices. Where did that 4-db. loss come from? First, there were two coaxial baluns. Our transmitters have coaxial output, and rightly so. To get from this to a balanced transmission line requires an antenna coupler or a balun. There is bound to be some loss in either, and the loss increases with frequency. Another balun was used at the antenna end, so that coax could be used for a trouble-free rotating section. But most of the trouble probably came from radiation at bends in the line, and from unbalance introduced at insulating supports attached to the tower. Our installation was better than average in these respects, but obviously it was not good enough. We suspect that nearly all v.h.f. antenna installations using open-wire line have far higher losses than their proud owners realize.

Making Open Line Pay Off

The poor results described above did not entirely disenchant the writer in regard to open lines. We felt that a good system could be made for frequencies up through at least the 420-Mc. band, so we set up an experimental line recently to measure losses under near-ideal conditions. A 100-foot line was made of No. 12 enameled wire, spaced $\frac{5}{8}$ inch. Spreaders were nylon rings left over from another project, and they were put in at 6-foot intervals. They determined the spacing; even closer might have been better, at least at 432 Mc. Spreaders of nylon or teflon rod stock would be equally good. The line was strung up parallel to and a few feet above ground, and pulled up tightly with a turnbuckle. This line has an impedance of just over 300 ohms.

The test setup is shown in Fig. 1. Power from the transmitter was monitored at meter M_1, and the power delivered to the load by meter M_2. The position of the short at the transmitter end of the line, and the point of connection of the input balun, were adjusted for zero reflected power at M_1. A similar adjustment at M_2 was made for maximum power transferred to the load, and the adjustments at the sending end were rechecked. Measurements were made on this line at 144, 220 and 432 Mc., with results as shown in Table I. Checks were also made with the two baluns butted together without the 100-foot open line, so that we could tell, for sure, where our losses were coming from. A 100-foot length of the TV line used in the 220-Mc. installation previously mentioned was also measured on 432 Mc. in the same manner, as was a G-Line installation to be described later.

It will be seen that the combined balun-and-line loss with the No. 12 line was down to very respectable proportions on all three bands; vastly lower than anything but the most expensive coax could produce. This line has since been installed to feed the 48-element 432-Mc. collinear array at W1HDQ, where it is currently giving highly satisfactory results. It is fed with a balun and adjustable short at the transmitter end, as shown in Fig. 1. At the antenna end it is connected to a section of tubular Twin-Lead long enough to serve as the movable portion when the beam is rotated. Strain insulators are used at each end, and the line is pulled up tightly on a turnbuckle. There is only one slight bend in the entire 100-foot open-wire section of the line.

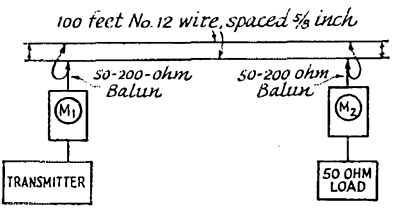


Fig. 1—Test setup used for determining the properties of open-wire line at 144, 220 and 432 Mc. The same system may be used in applying the balanced line to a transmitter and antenna combination designed for coaxial feed. The point of connection of the balun at the transmitter end is adjusted, along with the position of the short, for zero reflected power, indicated in meter M_1. A similar adjustment is made for maximum power indication at the load end.

These experiments indicate that much of the trouble with our 220-Mc. open-line installation mentioned earlier must have been due to unbalance and bends in the line, as the loss in the 100-foot test section of this line turned out to be only 2.3 db. — and at 432 Mc., rather than 220. The small size of the conductors, No. 18 hard-drawn copper, and the large number of spreaders, one every four inches, are minor adverse factors.

Tricks with Baluns

Part of the loss in such a system is due to the baluns used to convert from coaxial output to balanced line. The easy way to make a balun is with a piece of coax electrically one-half wavelength long, doubled back into a loop and connected as shown at Fig. 2A. The problem is to know how long to make L in Fig. 2B. A balun at 50 Mc. is easy. If you know the velocity *factor* of the line, which is the percentage of a physical half wavelength that makes an *electrical* half wavelength, you're all set. The length of the

[1] Tilton, "A 66-Element 220-Mc. Array," January, 1959, *QST*.

Table 1

Line loss per 100 feet measured at 144,220 and 432 Mc. with open-wire and G-Line systems, as shown in Fig. 1. Loss includes baluns, where used.

Freq., Mc.	Transmission Line	System Loss, Db.
144	No. 12, spaced $\frac{5}{8}$ inch	1.1
220	Same	1.35
432	Same	1.56
432	No. 18 TV line	2.3
432	* G-Line, 4 bends	6.
432	* G-Line, straight	2.7

* G-Line modified for coaxial feed at transmitter end.

leads required for the connections will not be particularly critical. These leads become a greater percentage of the total balun length with each band higher in frequency. At 432 Mc., a balun loop is something around 8 inches long. A little mechanical variation here can throw the balance the balun is supposed to produce quite a bit off.

Different kinds of coax, particularly with various kinds of insulation, can show large variations in velocity factor, so we should check the loop electrically in some manner. The easiest way is with a dip meter, as shown in Fig. 2B. With leads of the length to be used in making the connections, short one end and make a loop of the other. Couple the dip-meter to this, and find the resonant frequency. No dip-meter at 432 Mc., you say? Then use your transmitter, or a simple 432-Mc. oscillator, and couple the loop to the grid circuit. Trim the length until it absorbs power, as indicated by the greatest drop in grid current. You can afford to spoil a loop by going too far — it's only 8 inches of coax lost.

In making a balun loop in this way for 144 Mc., check it for resonance at 432 as well. You

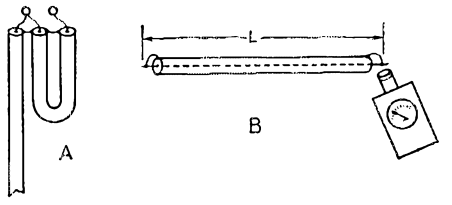


Fig. 2—A balun for working from coaxial to balanced line is shown at A. Impedance at the balanced end, top, is four times that of the coaxial line used. The loop is an electrical half wavelength. Its resonant frequency may be checked with a dip meter as shown at B.

may find that a single balun can be made to serve for both bands.

There is a temptation to use small coax for baluns, as it handles so nicely, particularly for the small loop required at 432 Mc. Don't do it. Losses in small coax may be very high when it is used for baluns. Soldering operations nearly always weaken and distort the insulation, and the small conductors break off very easily. Our first measurements on the 432-Mc. open line were made with baluns of RG-58, and losses from these alone were about 2 db. This was reduced to less than 1 db. per pair when good-quality RG-8 was substituted.

To make the initial adjustments of the shorts on the line and the point of connection of the baluns, some form of sliding contact is helpful. We found that narrow strips of Reynolds perforated aluminum stock were fine for this. The metal has its holes already drilled, and the rough edges left when the stock is cut help it to bite into the copper of the line. One of these clips is shown in Fig. 3.

Tips on Selecting Coax

Any coax costs money and good coax is quite expensive, but all things considered the best may turn out to be a good investment. Cheap coax is likely to be old, and its measured loss may be higher than figures given in the *Antenna Book*. More important, older types of coax and some inexpensive new ones deteriorate quite rapidly when used outside. Be sure to find out whether or not the coax of your choice will stand up in outdoor service. "Non-contaminating" is the word for it. Coax guaranteed for 15 years of use, underground or otherwise exposed, is now available at moderate cost.

Coax is available in infinite variety. Worth looking for is the "polyfoam" version of standard types. These cost slightly more than solid-dielectric types, but losses are typically one-third less. Watch the velocity factor, however. Reduced density of insulation generally means a higher velocity factor. An electrical half wavelength will be a greater portion of a physical half wavelength with foam or other low-density dielectric.

Various lines are made with semiflexible sheathing, usually aluminum, and with spiral wrap or foam insulation. These are fairly costly, but they deliver excellent results and are fine for permanent installation. Flexible sections for rotation are needed with these, and a good way to handle a multiband installation is to put in a remotely-operated coaxial switch to permit the use of one line for all antennas.

About Coaxial Fittings

If you go to the expense of a good coaxial line, it is approaching the ridiculous to pinch pennies on the fittings to be used with it, particularly on 220 Mc. and higher. The so-called "UHF" fitting isn't to be trusted in the u.h.f. range, especially if you want to be able to measure antenna and feed-line performance with any degree of accuracy.

Probably the best fitting, for most of us, is the series N, a constant-impedance type that can be bought at moderate prices on the surplus market. It gives a constant impedance through the connection, and can be had in all types required. Properly installed, it is weatherproof.

Series C fittings provide constant impedance, and are weatherproof. In addition, they are quick-disconnect, and very handy on that account. However, they are not on surplus, and are quite expensive.

The BNC Series is nice, but too small for the RG-8-size line. The Type HN is a constant-impedance series, for the larger sizes of coax. Whatever series you select, be sure that the installation job is done properly. Water leaking into fittings will ruin the best system in short order.

How Good Is G-Line?

Most u.h.f. amateurs are aware that there is a single-conductor transmission line, invented by Goubau, and called "G-Line" in his honor. Papers by the inventor appeared some years ago, in which seemingly fantastic claims for

low line loss were made: losses under 1 db. per 100 feet in the microwave region, for example.[2] Isn't this something we should be using on 420 Mc. and higher bands? Especially attractive was the claim that the matching arrangement used was a broadband device, making it appear that a single G-Line system might work well on both 432 and 1296 Mc.

When u.h.f. TV first appeared on the scene about 10 years ago, a G-Line kit was put on the market. Mainly because of its high cost (about $30.00, plus installation) it never got off the ground as a home receiving system for TV use, but it has since come into use in cable TV systems. Here very long lines must be used and losses must be held to a minimum, so the G-Line is getting some play. How about its worth for amateur purposes? To find out, we set up a G-Line experiment similar to the one used with the open-wire line.

The idea is that a single conductor can be an almost lossless transmission line at ultra-high frequencies, if a suitable launching device is used. Another launcher is placed at the far end. Basically the launcher is a cone-shaped extension of a coaxial line. You might say that the cone gets the energy used to traveling on the inner conductor of the coax, as the outer conductor is gradually removed. I'm not sure that Dr. Goubau would approve of this explanation of his invention, but you get the general idea. Incidentally, he says that the single conductor must be fairly heavily insulated. The wire in the kit is No. 14, with a vinyl covering about as thick as the diameter of the wire itself.

The kit is intended for use with u.h.f. TV antennas and receivers, so the small end of the horn launchers is fitted with a balun of sorts. Usually 300-ohm Twin-Lead is used for the short runs at the ends of the G-line. The G-line is very sensitive to bends, which must be made (if absolutely required) on a very large radius. The line must be kept several inches away from any metal, and preferably away from all insulators as well. This, obviously, is impossible, but our experience indicates that, with bends at least, the inventor was not fooling.

Our initial checks showed some promise, so for a practical test we put the G-Line on our 48-element 432-Mc. collinear array. In fact, it was the first line used on this antenna. It worked reasonably well, and the added height and gain of the 48 enabled us to hear and work stations that were out of range with a lower 16-element collinear. Some of the first results mentioned in Part I were with the G-Line in use on the 48. We then took it off and substituted the No. 12 open line of Fig. 1. The average signal level on reception increased by about 2 db., in line with original rough checks made on the ground.

But G-Line was supposed to be the best thing possible, next to air-insulated coax, or perhaps waveguide, so we looked for ways to improve it. The first thought was that the baluns supplied with the kit, being made for 470 to 900 Mc., could hardly be expected to be the optimum size for use on 432 Mc. Further, why use baluns at all, since we come out of our transmitter and receiver with coax anyway?

So, we extended the horn of one launcher with a sheet-metal cone that tapered down to about a half-inch hole, and fastened the end of this cone to an N-type coaxial receptacle. The G-line was soldered directly to the center terminal on the receptacle. The launcher at the far end was left as supplied, for the time being, and an adjustable stub, balun, meter M_2 and 50-ohm load were connected, as shown in the open-line test. Meter M_1 was inserted close to the modified launcher.

The system turned out to have a 70-ohm input impedance when modified for all-coax feed. The s.w.r. on our 50-ohm line was 1.4:1, but this was not important for the purpose of the test, as we were interested only in the power going into the system, and the power coming out.

First, out of curiosity as to the effect of bends, we suspended the line roughly in the shape of a letter C, using a 100-foot line tied up at four points about equally distant from one another. The angle at each rope tie was very obtuse; not less than 150 degrees. This installation showed a loss of nearly 6 db.!

Then the line was suspended in a straight line, requiring no supports on the G-Line part of the system. With no other change, the loss dropped to 2.7 db., for the 100-foot line, the two launchers, and the Twin-Lead and balun at the load end. This began to look interesting, as experience with many kinds of line previously had shown that it takes a very good system to better 3 db. per 100 feet appreciably at 432 Mc.

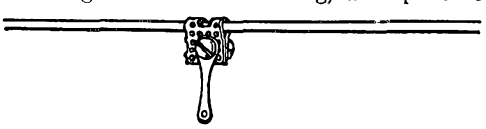


Fig. 3—Clip for use in adjusting the point of connection of a balun, or the adjustable short of Fig. 1, made from a piece of perforated aluminum. Balun leads are soldered to the lug. When the adjustment process is completed, the clip may be removed and the connection soldered permanently to the line.

We suspect that the way to make the Goubau invention pay off at 432 would be to convert it to all-coax launchers, feed it with 75-ohm coax, make the horns much longer (theory says 3 wavelengths, and the kit launchers are less than 1 wavelength at 432 Mc.), eliminate the baluns at both ends, and install the line in as near a straight line as possible and with the fewest possible supports. Since the loss in the line itself is extremely low when properly installed, the G-line system should be especially useful where very long runs are required in u.h.f. and microwave work. QST

Part III, "The How and Why of Matching," will follow in an early issue.

[2] Goubau, "Designing Surface-Wave Transmission Lines," *Electronics*, April, 1951, p. 180.

Third World-Wide RTTY Sweepstakes Results

PARTICIPATION was up about 35 per cent over last year in spite of very poor propagation conditions during the contest week end, October 18–20. Unfortunately, only about 25 per cent of those taking part turned in their logs. Bruni Riffeser, I1RIF, last year's winner, managed to repeat his victory in spite of the adverse band conditions. Despite rumors to the contrary, I1RIF runs a barefoot exciter rather than depending on high power to overcome contest QRM. His success is due in large part to his excellent operating practices, plus the fact that his ideal location on the roof of a 350-foot office building in downtown Milano gives his signals a chance to get off to a good start. A Telrex beam, set up on top of his 350-foot "ham shack," also contributes to the fine signals from I1RIF.

Second place in total competition, and highest score Stateside, went to Floyd "Skipper" Ziehlm, W2RUI, of Lockport, N. Y. W2RUI has been right near the top in all three of the world-wide contests, but this year he held on to win the North American honors handily. He amassed a grand total of 153 contacts in 31 states, and 22 band/countries in five continents. Similarly, the next five places went to stations who were in the top ten in the '62 contest.

The efficacy of the rather complicated bonus-multiplier system used in this contest was proven by the fact that five different countries in four continents were among the 11 highest scorers. This would seem to indicate that this scoring system gives hams in every remote corner of the globe an equal chance to win the top position. Although a few of the gang had a bit of trouble in figuring their scores, the great majority apparently had no difficulty.

Many of the gang, including a large number from overseas, asked about the possibility of having another DX-type contest in the early spring when conditions might possibly be improved.

TOP TEN

I1RIF	39,320	KØDOM	22,590
W2RUI	31,486	ZS6UR	21,750
K8MYF	27,176	W9HHX	21,180
WØNFA	25,308	W7ESN	20,556
K3GIF	23,250	DL1VR	17,600

Because the SCARTS is presently sponsoring two RTTY contests a year, it was suggested that perhaps another RTTY group, preferably an overseas society, might wish to take on the job of handling a second DX sweepstakes. With this in mind, the South Pacific Teleprinter Society (SPRATS) is now working on this idea.

Europe was especially well represented this year with stations participating from England, Scotland, the Netherlands, Norway, Denmark, Italy, and Germany. One W station also logged a c.w. report from UA1OMX, who was apparently printing RTTY but was not able to transmit on this mode. Only two stations, ZS6UR and KW6DS, managed to work all 6 continents during the 48-hour contest period.

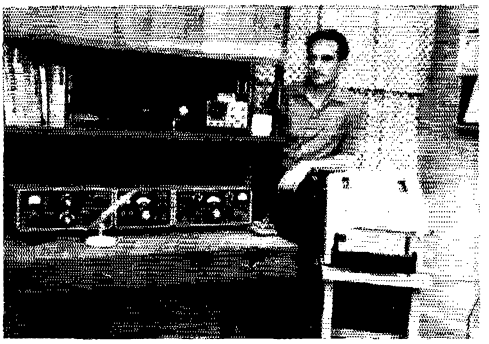
A rough check of all the logs submitted showed that upwards of 325 stations participated in the '63 test. This is a marked increase over previous sweepstakes. — *W6CG*

The listing to follow shows exchange points, number of states worked, countries and continents followed by the final score. Conterminous U.S. stations are shown first.

Scores

W1ZPX	90-	18-	3-	3420
W1AOH	68-	22-	2-	2296
W1FSH	24-	7-	3-	1968
W1AW	26-	8-	1-	608
W1BGW	20-	8-	1-	160
W2RUI	306-	31-	22-	31486
WA2LKF	188-	24-	7-	8712
W2FAN	88-	23-	4-	4424

The winner! (below) I1RIF adjusts the converter while YV1EM and friend look on. (at the left) The 350-foot, 30-story ham shack" of I1RIF.



(left) YV1EM, the second highest scorer in South America. (right) KW6DS, high scorer for the Pacific area.

W2IGO....52-23-4-3-3599
K2AMI....30-5-1-1-350
WA2ZVL....32-3-1-96
K2QIB....28-1-1-28
K2ECQ....10-1-1-10
K2TRN....10-1-1-10

K3GIF....170-25-19-5-23250
W3WGC....156-27-3-3-6012
K3RZX....54-16-2-1-1064
W3MHD....42-15-2-1-1030

W4AIS....110-26-9-5-12260
W4BOC....76-19-7-4-7044
W4GJY....86-21-4-4-5006
K4QVD....94-26-3-2-3644
WA4OCY....104-25-2-2-3400
W4JP....92-18-3-2-2856

W5SH....124-22-6-3-6328
W5CME....70-15-3-2-2250
W5BOT....16-7-2-2-912

W6CG....116-27-10-4-11132
W6WLI....170-26-5-2-6420
W6MTJ....104-25-6-3-6200
W6LVQ....62-18-6-4-5916
WA6FKN....112-24-4-3-5088
W6QID....66-20-5-3-4320
WB6AQR....70-18-6-2-3660
WA6VVR....46-12-5-3-3552
K6MTX....24-8-1-192

W7ESN....276-31-12-5-20556
W7PHG....170-28-10-4-12760
W7FEN....112-20-10-4-10240
W7CBY....110-23-4-3-4930
W7HFH....118-20-4-1-5160
W7LI....58-15-3-2-2070
W7BAJ....32-13-3-2-1616

K8MYF....296-31-18-5-27176
W8DKW....186-31-10-5-15766
W8VMP....130-26-12-4-12980
W8YFE....94-22-4-3-4468
K8JTT....60-16-5-3-3960
W8FWG....74-21-1-1554
K8YJQ....26-10-2-3-1460
W8QMI....32-13-1-2-816
K8DDC....12-4-1-2-448

W9HHX....270-34-12-5-21180
W9CMC....146-27-6-4-8742
K9UHR....34-9-4-3-2706
K9BJM....40-10-2-3-1600
W9UMJ....48-16-2-2-1568

WØNFA....268-31-17-5-25308
KØDOM....230-33-15-5-22590
WØGUS....250-34-7-4-14100
WØDOP....128-32-2-2-4896
WØRX....104-21-4-2-3784
WØASO....84-19-1-1596

KØFQW....32-14-1-448
KØAAR....2-1-1-2

DL1VR....350-16-12-5-17600
DJ4KW....50-3-2-1250

G2HIO....80-4-6-4-5120

I1RIF....840-23-20-5-39320

KH6AX....154-26-5-2-6004
KH6ANR....62-13-6-3-4406
KH6DLE....86-14-8-2-4404

KL7DTR....66-6-6-2-2796
KL7MZ....2-1-1-1-202

KR6BE....50-3-3-1850

KW6DS....410-10-10-6-16100

LA6J....120-2-6-4-5040

OZ8US....80-2-6-3-3760

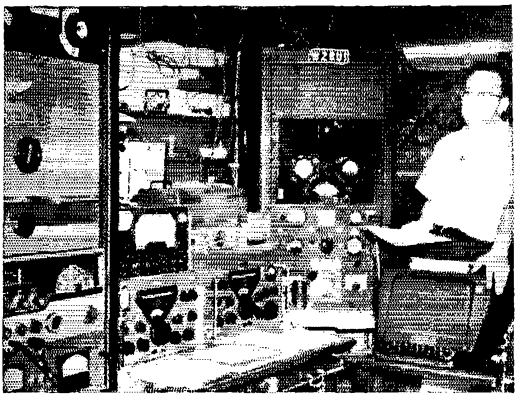
VE4BJ....90-24-3-3-3960
VE3BIJ....70-20-6-2-3800

VK4RQ....230-7-10-5-11840
VK3KF....100-2-7-4-5800

YV5AVW....52-14-5-5-5728
YV1EM....78-23-5-3-4794

ZL1WB....150-5-9-4-7950

ZS6UR....450-19-11-6-21750



W2RUI, the highest scorer in North America.

DXpedition to Kuria Muria

● Admiralty charts place the Kuria Muria Islands at 17° 32′ N, 56° 05′ E, give or take 2¾ miles. They are hot, barren chunks of limestone and granite rising from the Red Sea off Aden. Chief exports, 1963: fish and QSL cards. Population, 1963: 60 assorted British subjects plus operators of the Royal Air Force Amateur Radio Society.

It will surprise few DXers that the RAFARS journeyed to Kuria Muria for their second almost-annual DXpedition last year, though it surprised many that reasonable, sober flyboy types would even want to *visit* there. Here's their story.

BY J. M. HERN, FLIGHT LIEUT., RAF*
G3NAC, VS9AAA, VS9HAA, VS9KAA

* 114 M.U., B.F.P.O. 69, London, England.

IN OCTOBER 1961 the Royal Air Force Amateur Radio Society mounted a highly successful DXpedition to a "new country": the Red Sea isle of Kamaran. That trip was so successful that members decided to make similar trips yearly.

Well, *almost* yearly — 1962's trip to Kuria Muria failed at a very late date, so the journey was postponed until 1963. That meant we had nearly two years to figure a way to get onto the island with all supplies, stay there the allotted time, and get off again.

Kuria Muria is a group of four islands in the Red Sea. Only the largest, Hallaniyah, is inhabited. It falls under British political advice from Bahrein and Aden; and is locally ruled by Shaikh Said Bin Muhammad. It is practically devoid of vegetation, water is unpredictable in supply, and ships seldom stop there.

At first we planned to charter a dhow at Masirah (VS9O), but discovered that a motorless dhow would run up weeks of costly charter time in getting back to port. Flying was considered but discarded. It was finally decided to approach a local shipping company which had a boat going to Masirah monthly. For the sum of £100 we were granted permission to take this boat — if we did our own cooking. They would offload us at our destination and pick us up on the return trip eight days later.

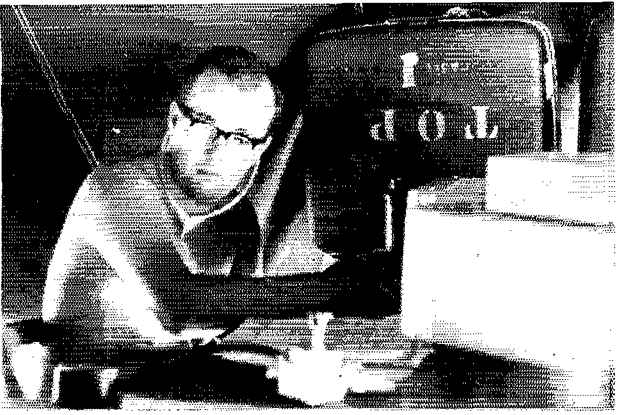
We recruited a party of twelve, which was divided into two groups, one to make a geographic-geological survey of the island, and one to serve as a base support group. Squadron Leader A. Silvester was in charge of the group. He was also the geography expert. The party was to include a doctor and an interpreter.

The equipment required was slowly gathered together at Aden. Gus Browning flew in from Afghanistan during October, in time to join our party on the twenty-fifth. Ken Smethurst, VQ4IN had arrived by October 25 and whiled away the time fishing at Aden. Ross Kelley, VS9ARK, and myself were already at Aden.

Meanwhile, much was going on behind the scenes. Permission had to be obtained from the political advisor in Bahrein to land on the island. Permission had already been obtained from the Postmaster General to operate from Hallaniyah. As VS9K had already been issued for Kamaran, VS9H was suggested for Hallaniyah and duly issued. Radio links on service channels had to be arranged. Royal Air Force flights already scheduled to pass near the islands on their way to Masirah were rerouted slightly to pass over the main island. Finally, the estimated time of arrival and commencing of operations had to be passed over the air from Aden to as many DX operators as possible.

Special permission had already been obtained from the Postmaster General at Aden for Gus, W4BPD, to operate from the Kuria Murias and Aden if he used my call when I was there. He stayed longer than expected at Aden and managed to keep VS9AAA very active.

We loaded our ship, the *M. V. Seiyun*, on November 9, and departed the next afternoon. The trip took six and one-half days, during which we played bridge or conducted sextant practice. Most of the party slept out on deck among orange crates, drums of aviation fuel, and sundry items. We had two complete stations aboard; we had originally planned for three, but the third genera-



(Left) The VS9H expedition set up shop on a beach in a small cove on Hallaniyah. Author Hern is shown at the operating position of VS9HAA. Nobody could wear a shirt when it got hot in those tents!

tor had failed to materialize at the last minute (it was held up in India!)

Unloading our equipment into a pitching ship's boat took about four years of the lives of the owners of the equipment. All went well however, and after five trips we were all on the island safe even if a little soaked in sea water.

Our first job was to let the local population know they were not invaded, so we dispatched our interpreter to talk with the shaikh. The tents then went up on the sites selected and the radio equipment was set up.

Before leaving Aden a considerable amount of thought had gone into antennas required. We found that 70 per cent of the active radio world could be contacted either long or short path via the northwest. We would also have an antenna for Masirah, and a system for minimum QRM between our two stations.

For one station, we set up a TA-33 Jr. beam thirty feet high and pointed northwest. A two-band trap dipole served to cover directions the beam did not.

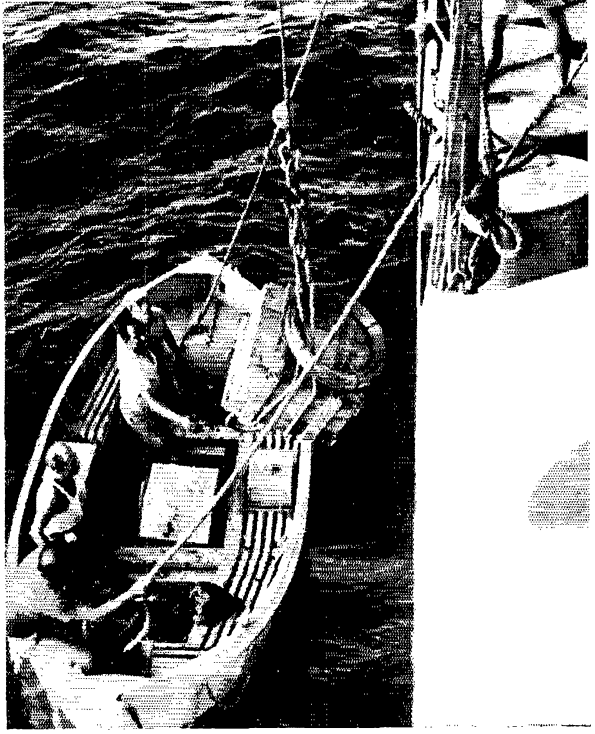
To the southwest of our operating tent was a small valley in which we placed two four-band verticals fed in phase by carefully measured coaxial links. It acted as a vertical beam on all bands used, 40-20-15-10.

Operators kept two-hour watches for the first two days, until we finally devised a system which gave everyone six whole hours' sleep in every forty-eight. It proved impossible to sleep during the day because of flies and heat.

Lessons learned during the 1961 expedition were remembered, and both stations operated twenty-four hours a day for eight days. To persons listening to a VS9H calling CQ and not receiving a reply this may have seemed pointless, but we went there to give a new country to as many as possible. If in fact we made ten QSOs in four hours on a nearly dead band — well, that's what we went there for.

Conditions on the bands were relatively poor. Few massive pile-ups were encountered. The

(Continued on page 162)



(Above) Loading the *Seiyun* at Aden. Unloading in heavy surf at Hallaniyah was another matter.

(Below) Putting up the TA-33 Jr. The mast would bend or break if we were not very careful!

Hints and Kinks For the Experimenter

CLEANING SILVER IDEA

I SOMETIMES need to use silver-plated parts from the junk box which are badly tarnished. I have found that the finish can easily be restored by a 5- or 10-second immersion in the "silver dip" cleaning solutions obtainable in jewelry or department stores. The dip should be followed by a detergent wash, hot-water rinse and careful drying. This treatment is very effective for parts with hard-to-reach contact surfaces, such as wafer switches, coax connectors, cavities, etc. — *George Scheicher, W9NLT*

SOLDER BLOTTER

WHEN cleaning solder from joints or parts use a length of braided wire as a solder blotter. Hold the braid behind and against the unmelted solder. Heat the joint with a soldering iron and the solder will flow into the braid, removing it from the heated area.

— *William Horstman, KL7ERC/5*

TWO-WIRE REVERSIBLE MOTOR

THE CIRCUIT IN Fig. 1 is used in my station to operate an electric windshield wiper motor which controls a loading coil in my attic. The system probably has greater possibilities in mobile applications for remote antenna resonating and matching.

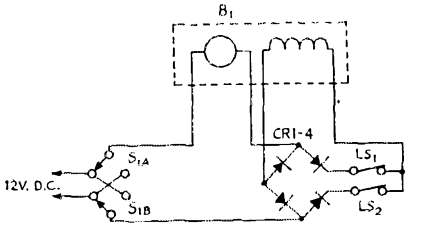


Fig. 1 — K2VRS's reversible motor needs only two control leads.

A look at the circuit in Fig. 1 will show how the motor, B_1, is reversible even though only two control leads are used. A full-wave bridge-rectifier circuit using inexpensive semiconductor diodes, CR_1 through CR_4, keeps the flow of current in the field coil of the motor in the same direction regardless of the polarity reversal of the power supply. Since the reversing switch, S_1, can change the polarity of the current in the armature, the motor can be reversed depending upon the position of the d.p.d.t. switch.

The limit switches, LS_1 and LS_2, are added to stop the motor when the roller on the loading coil reaches the coil ends. A zero-center ammeter in the circuit will show when the motor is running and also its direction of rotation.

— *George R. Cogswell, Jr., K2VRS/2*

R.F.-ACTUATED TRANSCEIVER-AMPLIFIER T.R. SWITCH

THE switching arrangement shown in Fig. 2 was inspired by the circuit used in the Heath HW-30 "Twoer." R.f. energy from the transmitter is applied to the diode, CR_1, is rectified, filtered, and applied to the coil of relay K_1.

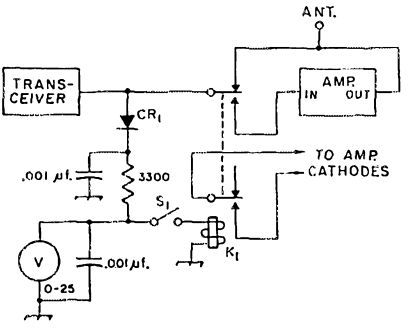


Fig. 2—Circuit for the transceiver-amplifier switch. Relay K_1 is a 12-volt d.c. coaxial type with auxiliary contacts.

When the relay closes, it automatically switches the antenna from the transceiver to the amplifier input. A spare set of contacts on the relay opens the cathode circuit of the amplifier during receive. On receive, the antenna is connected to both the amplifier and the transceiver, but I have not observed any loss of signal strength due to this.

The unit is built into a small Minibox that measures 3 × 2 × 2 inches. Neither parts placement nor wiring are particularly critical. By adding a 0- to 25-volt d.c. voltmeter to the circuit the meter can be used to measure relative output from the transceiver and will aid in tune-up. Switch S_1 allows for using the transceiver "barefoot." — *Harvey B. Rock, W12BWQ*

ANOTHER USE FOR OCTAL TUBE SOCKETS

WHEN breadboarding transistorized circuits, mount the transistor through the center hole in an octal socket and use the pin connections on the socket for tie points. In fact, this arrangement makes for a good permanent mount for transistors in the finished product!

— *Peter A. Franke, K2LTC*

CODE-PRACTICE OSCILLATOR

THE transistorized code-practice oscillator shown in Fig. 3 can be thrown together in a few minutes with junk-box parts or can be built by the beginner with new parts for only a few dollars. The power supply is made from two flashlight cells; the pitch control, R_1, is a standard volume control. About the only critical item in the unit is the headphones; they must be the 2000-ohm magnetic type. Since the headphones, HT_1, along with other components in the circuit, determine the frequency of oscillation, it may be necessary to select values for C_1 for the desired tone. Transistor Q_1 can be any of the common audio types. — *L. Jacques Filion, VE2AES*

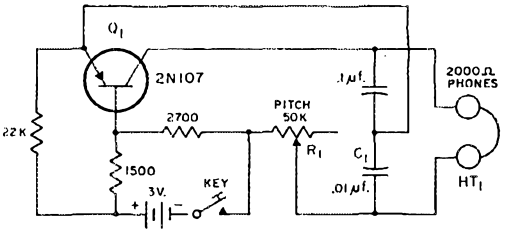


Fig. 3—VE2AES's code-practice oscillator.

HEAT DISSIPATING TUBE SHIELDS

IN Hints and Kinks, *QST*, October 1963, K9APE and K9TYH suggest that HX-30 owners boil the tube shields (except that of the 6360) in salt water in order to blacken them and thus increase their heat radiating ability.

I tried this process and found that it did not work with the shields supplied with my HX-30. I did, however, find a source of heat-radiating shields available in small quantities for one dollar each from the William M. Jones Co., 1107 Echo Court North, Hampton Village, Towson 4, Md. The 6U8, 12AX7 and 12AT7 tubes require shield No. TR 6-6020-B, the 6AK6 and 6CB6 size is No. TR 5-5020-B and the 6AL5 size is No. TR 5-5015-B.

By using these shields and a 4-inch low-speed fan on the back of the cabinet, the HX-30 runs extremely cool and stable, and short tube life is no longer a problem.

— *David S. Blew, WA2KWM*

MORE ON MINIATURE KNOBS

W1ICP's Hint & Kink in *QST*, October 1963, prompted me to suggest a similar hint used at my station.

Most toothpaste and similar tubes today are supplied with a colored fluted cap. Such a cap, when fitted with a metal bushing, makes a neat miniature knob for mobile or similar equipment.

Quarter-inch bushings are usually obtainable from junk boxes or surplus gear whilst smaller bore bushings can be made from easily drilled brass stock. Fitted with an Allen grub screw and cemented inside the toothpaste cap, the completed item makes an attractive and effective knob. A selection of caps of similar design but different colors makes for quick identification of the various controls. — *H. N. Kirk, G3JDK*

SPEECH COMPRESSOR

THE hookup shown in Fig. 4 is the speech compressor I use between the microphone and my SB-10. Quality reports have been good with the unit and I find that my VOX system seems improved too. The transformer, T_1, is an interstage job with a primary-to-secondary ratio of 1 to 5. — *M. W. Richardson, W9CZZ*

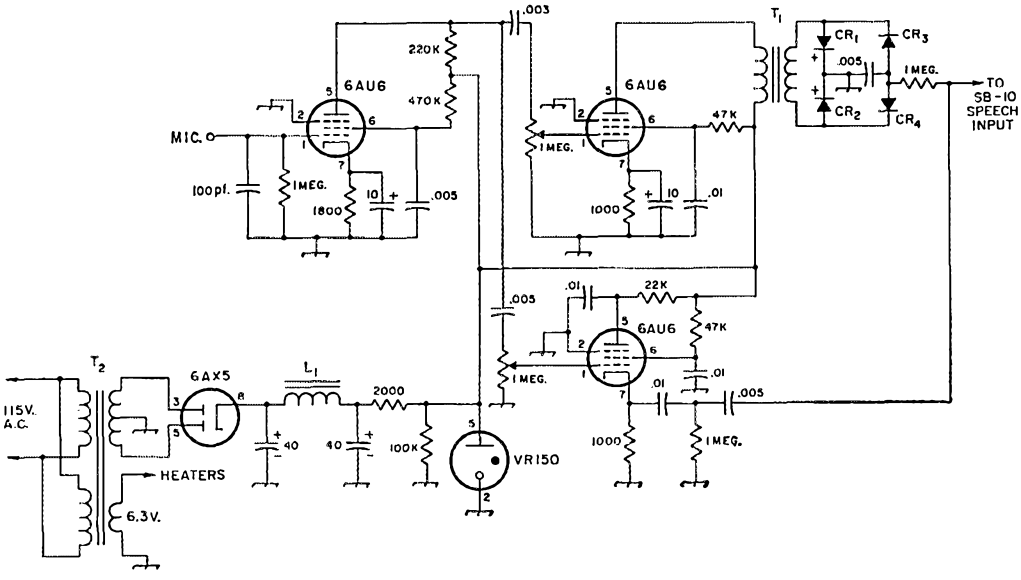


Fig. 4 — W9CZZ's speech compressor. Unless otherwise indicated, capacitances are in μf., resistances are in ohms. Except for the 2000-ohm, 2-watt resistor in the power supply, resistors are ½-watt. T_2 is a receiver-type power transformer. The diodes, CR_{1-4}, are 1N34As.

E—T—A—O—N—I—S

Teaching New Hams Their Stuff

BY F. P. HUGHES, VE2AQJ

5 Oak Street, Kenogami, Quebec.

September.

THERE WAS A KNOCK at the door of my office. With a practised hand I slid a page of obscure mathematics over the design of the ideal rig I had been doodling. Not a moment too soon, for they entered without waiting for me to say "come in."

They stood in front of me, hopping from one leg to the other, the two lab assistants who do the pullee haulee work around here. They slid their fingers round their collars, and stammered, and bit their nails. It dawned on me at last that they had something on their collective mind. Because I am old, fat, and grey-haired, with an office of my own, they were a little shy.

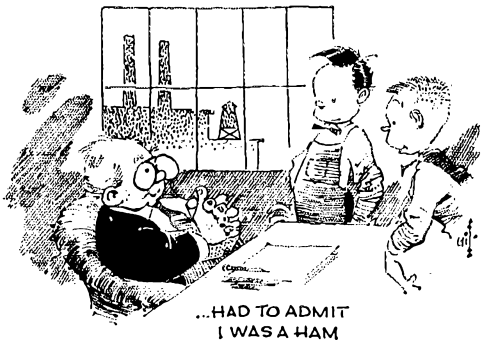
At last they managed to stammer it out. They had noticed I got that magazine with the queer title of 3 letters — was it amateur radio — er, — did I — could I —?

I admitted I was a radio amateur.

Now they screw up their courage to the sticking point. (How remote and authoritative senior staff were to *me* at their age!) "How — how do you become one?"

"By taking the government examinations in the telegraphic code and a technical examination."

The next step almost strangles them. "Would I — would I — would I help them?"



...HAD TO ADMIT I WAS A HAM

"If you will collect a group of at least five people," I promise, "and arrange a meeting place, I will teach you the code, and help you with the theory."

That night I gloomily ponder hours of 4 w.p.m. — that's what I have let myself in for — and write to ARRL for help.

October, first week.

Over 20 people are crowded into the basement of the Memorial Hall. Steve (who took on the job of secretary and did the organizing after he left my office) calls for order and introduces me.

I tell them a little about our service. I describe the license structure and promise to teach them code, though I remind them proficiency can only come from their personally practising it steadily. I talk a little about ARRL, pointing out to them that the literature being given to them came from the League. I show them a *Handbook*, and recommend that they purchase one. I also tell them to beg, borrow or otherwise procure a pair of earphones. I direct their attention to the paper with the code on it, wire my key to an old buzzer I have found, and we start on E T A O N I S .

October, second week.

Those who thought it was a course in radio and TV repair have dropped out. The young lad with the thick glasses tells me about the wonderful things he means to do, all complete, in a minute or two. I have built an electroscope and start to show them how to understand the nimble electron.

October, third week.

Those whose imaginations got as far as seeing themselves firmly grasping the push-to-talk have dropped out. Since several of the lads now have phones, the little bit of money in the kitty is spent on a little oscillator and a code table. Next week, I tell them firmly, no more buzzer. The *ennui* of sending at 4 w.p.m. is beginning to grip me, but I press on with such cheerfulness as I can muster.

October, fourth week.

I disconnect the SX-100 from all the interconnects, sling it over my shoulder and let them hear what is going on in the great world outside. W1AW is sending a bulletin and I tell them (a) that is 18s, (b) it is perfect code, (c) that the same transmitter will roll in with code practice at their speed four nights a week. It is difficult after this to turn their attention to theory, so we tune around and I give a commentary. Someone is handling some traffic over to Guam. They are enthralled. Twenty is open later than usual that evening and one or two of them can read the UAØ call I run across. They are inspired. We tune across a pile-up, and I explain what is happening. They are intrigued. A WA6 is calling CQ DX. I explain that the lad is the only ham in California, so all the rarer stations are pining to work him. . . . The time is ripe, I tell them, to get themselves a receiver for code practice and familiarize themselves with the bands.

November.

The Patron Saint of electronics, whoever he is, be praised! No more 4s. We are doing 5s now, and my poor nerves are therefore a little better. I tell them that they will not be passed on to the examiner until they have learned substantially over 5s, to give them a cushion for nervousness. I have brought in a pair of Lecher wires and show them what a wavelength is, and how an antenna works, and so on.

(*Continued on page 160*)

Now *There's* a Receiver!

BY WAYNE EASON,* WA4ISG

YESSIR. What can I do for you today?"

"Well . . . ah . . . I was thinking of buying a receiv . . ."

"Looking for a hearing aid, eh? Wellsir, you're at the right place! Whaddija have in mind, OM?"

"I'm . . . ah . . . getting on six meters and . . ."

"Well now take a look at *this* little beauty right here! Now *there's a receiver!* Fella that owned it used it on six . . . hottest thing in the country . . . already got a converter right on it."

"I was thinking along the lines of . . ."

"Yessir, had a voltage regulator added to it, too. Steady as a rock, as the saying goes, heh heh."

"It . . . ah . . . looks a little . . . ah . . . rough . . ."

"Those little scratches and the spots around the knobs where the paint is rubbed off? Why, those're just character marks . . . like the wrinkles you see on the faces of sweet little old ladies. Hasn't been mistreated a bit, nosiree . . . just been used some. The fella that had it always used it on Field Day . . . the club just wouldn't use any other receiver for anything that important . . ."

"Uh . . . I read that it wasn't very . . . ah . . . selectiv . . ."

"Aaaand it has the perfect i.f. in it, too . . . just the thing for six! Nice and wide so you can really copy that f.m. on it."

"Uh huh. Ah . . . I believe it's a little too h . . . ah . . . more than I wanted to put into . . ."

"And these jobs really hold their resale value, too! Yessir, it's a real investment. It was a good year for this model . . . receivers are like wine, you know — some years are good years for certain models. Word gets around when it's been a good year for a certain model . . . that makes it hold its value. Actually, it's probably better now than when it was new. Y'see, when a piece of gear is new, its components haven't settled down yet . . ."

"Ah, do you have the book on . . ."

"And here is the schematic on it with all the modific . . . ah . . . improvements marked on it and . . ."

"Well it's rather hard to make much out of . . ."

"Ummm . . . looks like the Thermofax was set a little dark, I guess, heh heh. But nothing ever goes wrong with one of these babies. Nosiree, you can't go wrong with this little jewel!"

"Well, I . . ."

"Wish you could have seen the fella I got it from. He came in here and really drove a hard bargain . . . he just wasn't the sentimental type at all . . . but before he left, he came back here and put his hand on the knob and then he patted it like it was a faithful dog he was saying goodbye to. I almost got a lump in my throat, watchin' him. I could see he was forcing himself to grin to keep from breakin' down . . . Any of the boys in the store will tell you how he was grinning when he left. Yessir. A man can really get attached to a piece of fine gear like that!"

"Well . . . ah . . . if you're sure it's OK . . . I guess . . ."

"Mighty fine choice, sir. Yessiree, mighty fine. It'll *sure* do the job for ya . . ."

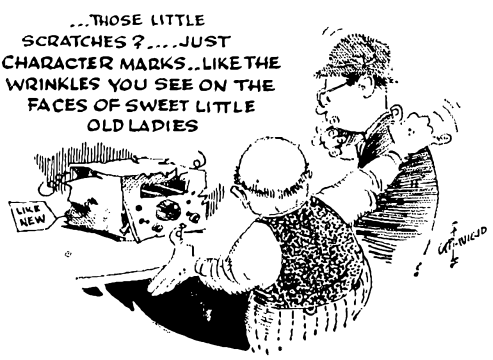
—•••—

"Yessir. What can I do for you today?"

"Well . . . ah . . . I was thinking of trading receivers, and ah . . ."

"That's what I'm here for. Heh heh . . . lessee whatcha got there. Hmmm . . . not much demand for this model . . . Kinda rough, too . . ."

"Well, you said it had been on Field Day and



so I guess it got a little scratch . . ."

"Field Day, eh? Heh, heh . . . looks like they drove the tent pegs with it . . . heh heh . . . been butcher . . . ah . . . modified quite a bit, too . . . What's this on the back? Uh . . . converter, oh yeah. Have to give Lloyd ten bucks to take that off and it'll still have the holes . . . Got the book on it?"

"Uh . . . all I have is this schema . . ."

"No book, huh? Can't hardly give 'em away without the book. Can't figure what people do with those books. Must wipe up spilled coffee or something . . ."

"But I didn . . ."

"Fella brought one of these in yesterday . . . had to turn him down . . . got a bunch of them in the back . . . can't afford to waste counter space on 'em.

"But the i.f. — good for f.m. ".

"And the selectivity, wow! You could drive a truck through that bandpass!"

"But you said when I . . ."

(*Continued on page 164*)

* 1803 Eleventh Avenue, Haleyville, Ala.

You're Only A Novice Once

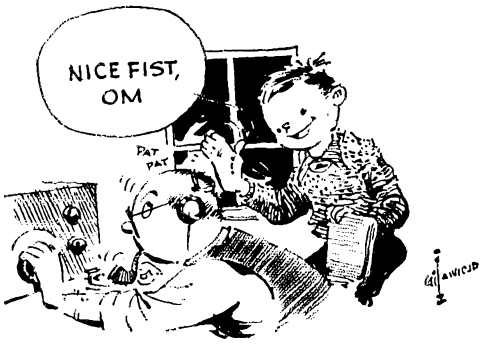
BY VERNE O. WILLIAMS,* WA4ITK

THE happy day finally comes when you master the 13 words per minute and remember the theory long enough to struggle through the General exam.

But, somehow, when the moment of parting with Novice status actually arrives, escape doesn't seem so wonderful after all. Looking back, you realize that you've had some memorable experiences. For almost a year, perhaps, you were part of an earnest circle of apprentice hams who shared the same joys and trials. You had something special in common, like initiation in a fraternity or basic training in the service.

In part, this eulogy to my months among fellow Novices is prompted by the awareness that the sunspot cycle is crowding more and more Generals into the limited space on 40 and 80 meters. And a few Generals, one suspects, think it would be a fine idea to abolish those noisy Novices.

Most hams are generous people so there isn't much danger of this happening. I hope not, anyway. But one still hears the advice to skip the Novice year and go straight for the General. With this I fervently disagree.



For instance, there's something special about DX worked as a Novice that is in its way as big a thrill as making the DXCC honor roll. I doubt that as a General you'd get any kicks out of mentioning to a fellow ham that you had just worked your first VE3 — unless, of course, you were up around 420 Mc. But as a Novice you can nonchalantly buzz a local buddy and, flicking lint off your key, say, "Why don't you try listening down 10 kc. from me. Just worked a YV5 there."

In part the kudos comes from the knowledge that you're turning the trick with low power and under generally adverse circumstances. That is, when you raise a WH6 in Honolulu or a WL7 in Soldotna, Alaska, on a DX-40 and a piece of wire, you are somewhat more entitled to run whooping around the house than if you perform it with a more sophisticated bit of weaponry.

Maybe you think you're too old for the Novices. I had misgivings. But there's a wonderful spirit and youthful enthusiasm abroad in the Novice bands that's worth remembering later as you light the filament in your kilowatt and swish your beam toward an AP5 in Pakistan.

There was, for instance, the young WN8 in Ohio who came back at me with a crisp 15 w.p.m. during my first week on the air. After my despairing QRS he obligingly slowed down and added encouragingly that he thought I was doing very well at my stumbling five words a minute. Then he queried:

"Age hr 12, OM, hw abt u?"

I was tempted to pretend that I hadn't copied the question. But, gathering courage, I replied, "Real old man here bt age 42 bt es 2 harmonics."

Back he came with the kindest comment I will ever get on the air. "U have nice fist, OM. keep up gud wk." My sending undoubtedly sounded like it was done with a hammer and a knife switch by an intoxicated simian. Would a General have been so patient?

Perhaps all the young Novices don't go on to bigger things. But they've plainly learned something as useful as the Morse code — the courtesy and cooperation inherent in the amateur's code. And where else today among U. S. teen-agers do you find this?

Young Novices may send everything twice and fill the air with strange sounds, but they'll hang onto a weak QSO through a chorus of ear-splitting interference as though their lives depend on it.

Make no mistake about it. These kids know how to operate a rig. Ever listen at night to that howling collection of banshee heterodynes that's laughingly called the 40-meter Novice band? I mean, listen to it on a $60 broad-tuning receiver while trying to work through the "Voice of Moscow" with 75 watts?

That's what a lot of the kids do. And somehow they pile up the contacts through dint of persistence. The obstacles they overcome makes you ashamed of your own complaints.

Thus, one 14-year-old in Alabama told me rather proudly one morning before breakfast that he had 30 states confirmed on 40 meters only. I expressed admiration and asked what crystal and frequency he used to dodge between the nightly shortwave broadcast stations that occupy most of 7150–7200 kc.

This young DXer replied, "Cudn't tell u, Verne. Not allowed on nites. TVI hr. Wk all mine before school."

There's another nice thing about Novices, young or old. From my experience they QSL virtually 100 per cent. Some of them improvise with drugstore postcards or simply fill in those

* 4031 Woodridge Rd., Miami, Fla.

standard blank QSL cards available from certain equipment makers. But they send them and there's a real kick in going to your mail box during those busy Novice months.

(In time one does become aware of the frightening similarity of the bulk of QSL cards and their unvarying eagles, strokes of lightning and maps of the USA. And I came to wish that the Walter Ashe Radio Co. — no offense, gentlemen — would do something, or anything, to vary their ubiquitous cards which seemingly are used by every second or third Novice in the land.)

However, not only do Novices QSL faithfully, they'll answer a letter at the drop of a key. In response to my query about his vertical 40-meter antenna's powerful punch, 16-year-old Dave at KN1VQF promptly sat down and sent back full data and a diagram. It was, incidentally, a 32½-foot length of telephone wire slanting up to a tree from the family house trailer.

"From much experience I have learned that a vertical works well only when a good ground connection is made to the shield of the coax," Dave warned me. "I would recommend at least two 32-foot pieces of No. 14 aluminum wire buried six inches in the ground.

My own interest in verticals stemmed from a desire to achieve a "Worked All States" certificate before graduating to General. A lot of beardless Novices have succeeded in this, but it's no cinch. That, of course, is what offers the challenge.

I wanted an antenna that would put my 75 watts into KN7 land from Florida on 40 meters so I could catch up with three elusive states — Montana, Idaho and Nevada. Daytime efforts on 15 meters landed me all around but never in those sparsely-populated states.

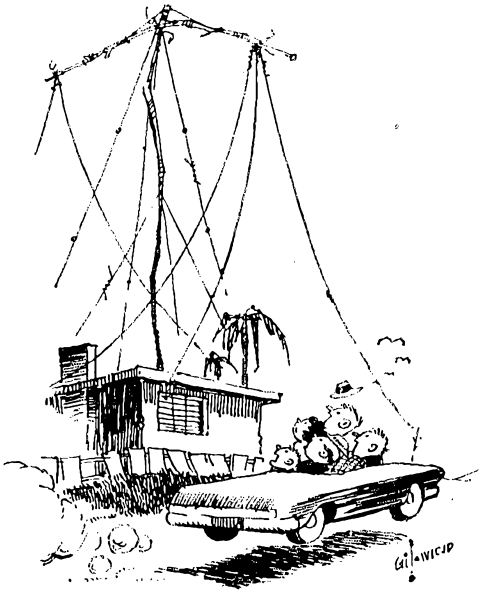
In the course of this I erected a 40-meter wire beam that always startled visiting hams, to say nothing of passersby, into a second look. This skyborne monstrosity consisted of a pair of folded doublets driven 135 degrees out-of-phase and hung as inverted Vs from a boom hovering 40 feet above the house.

To give the contraption its due, it beamed a signal into the Northland that was two S-points better than my vertical. I was growing fond of the thing when it collapsed all around me one windy day like a stricken octopus. But, to make the point, part of the fun of being a Novice is playing around with hunks of wire, instead of a store-bought tribander.

My final score as a Novice was only 46 states worked and 45 confirmed. But I'm proud of it and am going to keep all the aforesaid cards hung in plastic packets under my first c.w. key on the wall. But I would like to meet a Vermont Novice in person some day and pinch gently to see if he, or she, is real.

True, Vermont is listed in the *Callbook*. There were 54 Novices with Vermont addresses in the Fall 1962 edition. I know. I wrote every one of them down on a card, carefully picking them from amongst Massachusetts, Maine, etc. I posted this card by the rig but never heard one of the calls.

Another reason for not skipping over your right to be a Novice is the annual ARRL Sweepstakes Contest. Frankly, as a new General, it doesn't look likely that I can win for years, if ever. There's some gents with a mite of operating experience in there rolling up the scores. But, as a Novice you're on the same footing with fellow contestants — power, experience and opportunity. You can give it a real try and have it mean something.



Besides, there is nothing quite like an SS contest in the Novice bands, even if you don't win. The effort of trying to keep a contest log for the first time while simultaneously copying those date-and-time numbers can be hilarious. And, at least once you're going to send your terse little SS message — and get back a chatty description of the other fellow's rig, receiver, weather and "say what's this SS bizness, OM?"

You can also get contestant's buck fever and do what I did to one startled General in Denver, Colo. He made the tactical error of calling an ordinary CQ near me at the height of the SS. I came back with my number and SS data and a feverish request to reciprocate. He was nice. He politely receipted and made me his NR 1 — which only goes to prove, I guess, that Generals are all right, too. QST

Strays

WA2LBO would like to hear from hams who are members of Jehovah's Witnesses.

G3PQR wants to "meet" U. S. hams who are connected with agriculture.

Happenings of the Month

COURT SUSPENDS LICENSE FEES

The U.S. Court of Appeals for the Seventh Circuit, in Chicago, on December 31 ordered a sixty-day postponement to the effective date of FCC's license application fee plan. The temporary injunction allows time for the court to study a petition filed by aeronautical communications interests that FCC be prevented from charging fees without specific authority from the Congress.

Amateurs may, therefore, continue to send in applications without remittance until February 29 at least. Any further action by the court may take place late in February, much too late to be reported in the March issue of *QST*; amateurs anticipating the necessity of filing an application after March 1 should, therefore, listen for a late bulletin from W1AW or another official bulletin station.

FCC RULES RENUMBERED

The FCC has recently rearranged most of its regulations so that they will conform in style to other titles of the United States Code. Title 47, Chapter I has been organized into four subchapters: Subchapter A — General; Subchapter B — Common Carrier Services; Subchapter C — Broadcast Radio Services; and Subchapter D — Safety and Special Radio Services.

The rules and regulations governing the amateur radio service, formerly Part 12, have now been redesignated as Part 97. The various sections of old Part 12 have also been reshuffled: the table below indicated the new numbers opposite the old.

Old	*New*
12.0	97.1
12.1	97.3(a)
12.2	(b)
12.3	(c)
12.4	(d)
12.5	(e)
12.6	(f)
12.7	(g)
12.9	(h)
12.10	(i)
12.20	97.5
12.21	97.9
12.22	97.11
12.23	97.7
12.25	97.83
12.26	97.57
12.27	97.13
12.28	97.79
12.29	97.59(a) and (c)
12.30	97.141
12.31	97.143
12.41	97.19
12.42	97.21
12.43	97.23
12.44(a)	97.29, 97.27
(b)	97.35(c)
(c)	97.29(b)
12.45	97.35
12.46	97.25
12.47	97.29(d)
12.48	97.31
12.49	97.33
12.50	97.29(c)
12.60	97.45
12.61	97.37
12.62	97.39
12.63	97.41
12.64	97.43
12.65	97.59(b)
12.66	97.81
12.67	97.47
12.68	97.85
12.69	97.139
12.70	97.49
12.81	97.51
12.82	97.87
12.85	97.53
12.86	97.55
12.90	97.95
12.91	97.97
12.93	97.99
12.94	97.101
12.101	97.89
12.102	97.111
12.103	97.113
12.104	97.115, 97.93
12.105	97.117
12.106	97.91
12.107	97.69
12.111	97.61
12.113	97.63
12.114	97.65
12.131	97.67
12.132	97.71
12.133	97.73
12.134	97.93
12.135	97.75
12.136	97.103
12.137	97.105
12.151	97.77
12.152	97.131
12.153	97.133
12.154	97.135
12.155	97.137
12.156	97.107
12.157	97.119
12.158	97.121
12.159	97.123
12.160	97.125
12.161	97.127
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12.200	97.161
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12.202	97.165
12.211	97.167
12.212	97.169
12.213	97.171
12.214	97.173
12.215	97.175
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12.242	97.205
12.243	97.207
12.244	97.209
12.245	97.211
12.246	97.213
12.251	97.215
12.252	97.217
12.253	97.219
12.254	97.221
12.255	97.223
12.256	97.225
12.257	97.227
Appendices 1-4	Appendices 1-4

FURTHER EXTENSION RM-499 TIME DENIED

The FCC denied, on December 16, a petition by the Foundation for Amateur Radio, Inc. of Washington, D. C., to extend for an additional sixty days the times for filing initial comments and replies to initial comments concerning RM-499, the League's "incentive licensing" proposal. Pertinent parts of the Commission's order include:

". . . The Commission has already received numerous comments, both formal and informal, representing a wide variety of viewpoints . . .

"In the event the Commission finds merit in proposals contained in RM-499, a notice of proposed rule making will be issued which will afford interested persons ample opportunity to file comments either in support of or in opposition to the specific rule making changes proposed by the Commission . . .

"In view of the foregoing considerations, a further delay in the consideration of the petition RM-499 on its merits is unwarranted . . ."

While the League supported the first extension of time to December 11 for initial comments and to December 26 for replies, as proposed by W4RLS (See page 79, January *QST*), the League opposed the Foundation's request for further extension of time, believing that the

Commission now has ample material on which to decide whether a Notice of Proposed Rule Making should issue and what form it should take.

ARRL REPLIES TO COMMENTS ON RM-499

The preliminary phase of the League's request for rulemaking to extend incentive licensing and reactivate the Advanced Class license ended on December 26, the deadline for comments in reply to initial comments filed earlier. The League's reply comments, including a summary of petitions for rulemaking now pending before the Commission, appears below:

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington 25, D.C.

In the Matter of Amendment of Section 12.21(b) 12.23(c), 12.42 and 12.43 of the Rules and Regulations in the Amateur Radio Service.	RM-499

REPLY COMMENTS

The American Radio Relay League, Incorporated, by its General Counsel, submits its reply comments and again respectfully requests that the Commission (1) issue a simple order to make the Advanced Class amateur radio operator license available immediately to qualified General and Conditional Class licensees,[1] and (2) issue a notice of proposed rule making to amend its rules and regulations so as to permit radiotelephone operation on certain high frequency (h.f.) amateur bands only by Amateur Extra and Advanced Class licensees after certain specified dates.[2,3]

The response to the League's petition has been most gratifying. Although the vast majority of the comments submitted to the Commission merely indicate support or opposition to the proposal[4,5], a significant number offer further reasons for strengthening the existing incentive licensing structure. A much smaller number offer arguments as to why no changes should be made. When all comments are considered, the conclusion is inescapable that a strengthening of the incentive licensing policies should be initiated by the Commission at the earliest possible date.

Many amateurs have not realized that the subject of strengthening the existing incentive licensing structure was pending before the Commission long before the League's petition was submitted. Other petitions, and the dates of filing, include the following:

RM-365 Filed September 12, 1962 by Kermit A. Slobb, W9YMZ — To limit radiotelephony in amateur bands below 25 Mc. to single sideband (s.s.b.).

RM-378 Filed October 26, 1962 by Chester L. Smith, K1CCL — To assign two-letter calls to Amateur Extra Class licensees.

RM-385 Filed November 9, 1962 by Chester L. Smith, K1CCL — To create a new Intermediate Class with radiotelegraph privileges on all amateur bands and radiotelephone privileges above 21 megacycles.

RM-389 Filed December 4, 1962 by Martin K. Barrack, WA2ZKR — To remove Novice Class privileges from the 144 Mc. band, to limit Technician Class privileges to 420 megacycles and above, and to upgrade Technician Class examinations.

RM-455 Filed June 5, 1963 by Roy R. Cone, W9YLU — To limit c.w. operation in 50-kc. portions of the 3.5-, 7-, 14- and 21-Mc. bands to Amateur Extra Class licensees, to limit radiotelephone operation in the 3.5- and 14-Mc. bands to Amateur Extra and Advanced Class licensees, to permit Technician Class radiotelephony above 29 Mc., and other amendments.

RM-480 Filed September 11, 1963 by Ellen W. Ackerman, WA4FJF — To make Advanced Class licenses available to General and Conditional Class licensees after one year service.

RM-481 Filed September 11, 1963 by Ellen W. Ackerman, WA4FJF — To permit s.s.b. radiotelephony between 14,180 and 14,200 kc. by Amateur Extra and Advanced Class licensees.

RM-516 Filed October 28, 1963 by George H. Goldstone, W8MGQ — To make Advanced Class licenses available to General and Conditional Class licensees after one year service. [Using Examination Element 4(B) — *Editor*]

RM-517 Filed October 28, 1963 by Lowell E. White, K9UQX — To limit Technician Class licensees to 200 watts power input, to permit Technician Class radiotelephony above 29 Mc., to expand the 3.5-, 7- and 14-Mc. radiotelephone bands, to assign distinctive two-letter prefixes so as to identify class of license, and to restrict portions of the 3.5-, 7- and 14-Mc. radiotelephone bands to Amateur Extra and Advanced Class licensees.

RM-538 Filed November 22, 1963 by Leland W. Aurick, K3QAX and George S. Gadbois, W3FEY — To create new Communicator and Experimenter Classes, to reactivate the Advanced Class, to abolish present General and Conditional Classes, to limit radiotelephony below 29 Mc. to Amateur Extra and Advanced Class licensees, and other amendments.

RM-545 Filed August 19, 1963 by Lucius M. Coley, W5DYR — To allocate separate portions of the 3.5-, 7-, 14-, 21- and 28-Mc. bands to a.m. and s.s.b. operation.

Many of the comments to the League's petition have included similar proposals, and others have suggested increased code speed requirements, limitation of c.w. on certain h.f. bands to Amateur Extra and Advanced Class licensees, sub-allocations in the h.f. radiotelephone bands for use by various classes of licensees, and power restrictions for various classes of licensees. Many of the other proposals and suggestions were considered before the League's proposal was finalized and filed with the Commission.

A strengthening of the licensing policies and structure is but one phase, although a most important one, of the League's comprehensive long

(*Continued on page 156*)

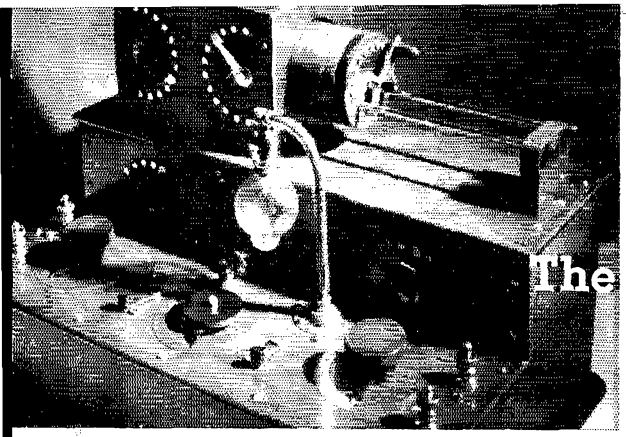
[1] The League's petition, filed October 3, 1963, requests amendment of Sections 12.21(b), 12.42 and 12.43 of the Commission's Rules. These sections have been redesignated as Sections 97.9(b), 97.21 and 97.23.

[2] The League's petition requests amendment of Section 12.23(c). This section has been redesignated as Section 97.7(c).

[3] The League's petition proposes that an Amateur Extra or Advance Class license shall be required for radiotelephone operation in the 14 megacycle band after July 1, 1965, in the 7 and 21 megacycle bands after July 1, 1966, and in the 3.5 megacycle band after July 1, 1967.

[4] One set of comments in support of the League's proposal bears the signatures of approximately 2,500 licensed amateurs.

[5] Many comments merely indicate opposition to all forms of incentive licensing without realizing that incentive licensing already exists through the Novice and Technician Classes.



ARRL The Early Years

How was it to operate an amateur station in 1914? There were few rules, broad spark signals, limited range — but a world of enthusiasm. Once the first crude receiving equipment showed some response, it was quite an occasion to call in the family to hear the new scientific wonder. Equipment was hard to come by, and putting a transmitter together for the first two-, ten-, then thirty-mile contact was a signal accomplishment. But we amateurs were masters of a new art, explorers in a new realm of communications. There was a challenge, as today, to find and work new stations, and the aim was success in contacts just beyond the very limited local horizons.

Until the formation of the League, early amateur operating appears to have been largely without direction. There was some ragchewing, some experimentation, some sending of messages, the inevitable search for DX. But there was no unity of purpose, no useful organization of amateurs beyond the horizons of the local radio club.

At the urging of Hiram Percy Maxim, 1WH, the Radio Club of Hartford voted at its April 6, 1914 meeting to create a "relay committee," the members to be named by the club president, David L. Moore, 1WK. Though the minutes are not specific, this committee likely consisted of Maxim, Clarence D. Tuska, 1WD, William W. Howe, "SNK," and Moore, with R. C. Palmer," "HKW," being added later. Maxim's concept was that of a national association of competent amateur operators, joined together to relay messages beyond individual station range. Accordingly, the original name suggested, "The American Amateur Radio League," was passed over and "The American Radio Relay League" was adopted. The committee set right to work, and at the club meeting of May 18, 1914,[1] passed around application forms for membership in the new organization. These forms were also sent to every amateur in the country of which the committee could obtain knowledge. Response was overwhelming. By August there were two hundred members from all sections of the country, and by October, four hundred.

ARRL was thus born on the relay principle. By August 1914, the earliest successful relay routes were formed — Hartford to Buffalo, and Boston to Denver. Soon they covered much of the eastern United States. The success of these relay routes was in no small measure due to the availability of a special 425-meter wavelength secured from the Department of Commerce by Mr. Maxim on behalf of the League with its use granted under special authority to selected amateur stations. Applications were screened by the League; if the applicant had good apparatus and operating techniques, and appeared to be an asset to the relay system, his request was endorsed and forwarded to the Department.

ARRL Goes Independent

As has been reported, the League and the Hartford club came to a parting of the ways in January 1915, in a dispute pinned to expenditures of funds by the League — but perhaps due more to the fact that the tail was now starting to wag the dog. At the February 1, 1915, meeting of the club, Maxim and Tuska resigned their memberships, and Moore resigned as club president; Maxim announced that he had removed the League from all influence of the Club.

And indeed, he had. On January 29, 1915, the Connecticut Secretary of State recorded the incorporation of the League under the following three articles:

"*Article 1.* The name of said corporation shall be The American Radio Relay League Incorporated.

"*Article 2.* The purposes for which said corporation is formed are the following, to wit: The promotion of amateur radio telegraphy, the organization of amateur radio telegraph stations, the promotion and regulation of amateur radio inter-communication, and of the relaying of messages from station to station, and the printing and publishing of docu-

Portions of this story, in contrasting type, are from "*Two Hundred Meters and Down*" by Clinton B. DeSoto.

[1] This date is considered the official birth date of ARRL.

ments, books and pamphlets necessary or incidental to any of the above purposes.

"*Article 3.* The said corporation is located in the town of Hartford and State of Connecticut."

Incorporators were Maxim, Tuska and an attorney, Lawrence A. Howard.

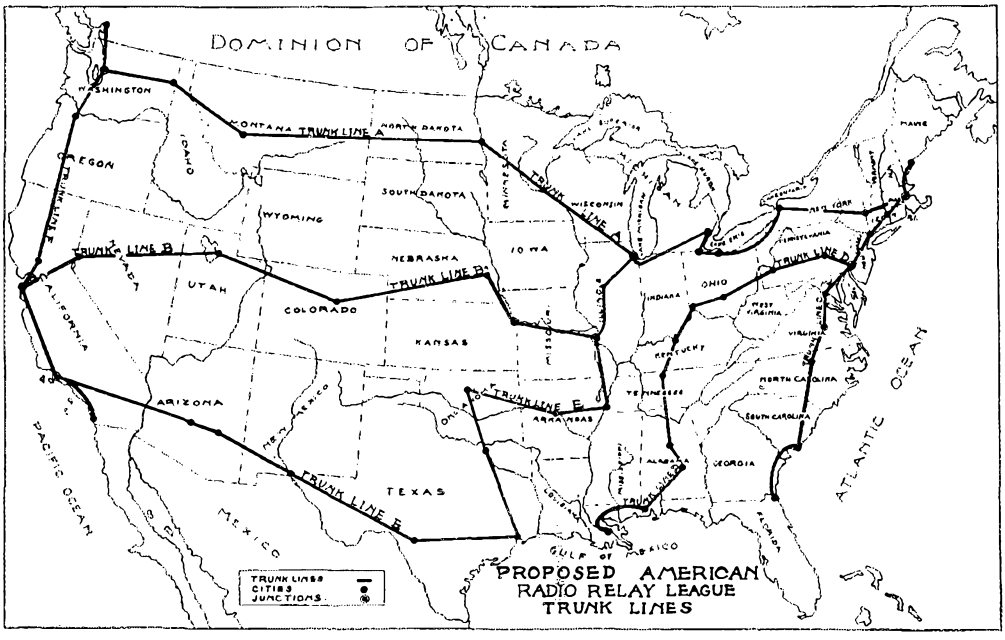
Early records are sketchy, to say the least, but it appears that the original committee, with the addition of Howard, formed a self-perpetuating Board of Directors which managed the League until the adoption of a formal constitution in 1917. True, there was a bulletin to members in early 1915 which proposed the formation of a board of control with one to four representatives from each state (depending on the number of members in each); but no evidence can now be found that this plan ever developed, and later references to decisions of the League always mentioned the "directors at Hartford."

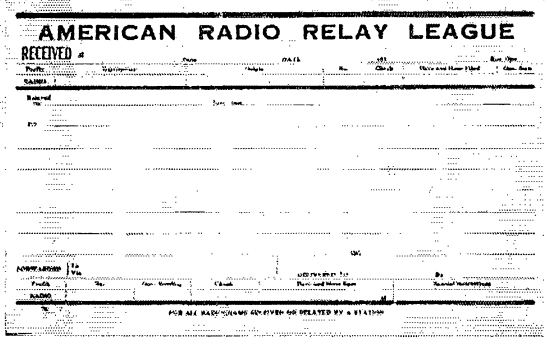
Threats of War

War had begun in Europe in 1914, and the threat of its spreading to the U.S. soon took definite form. Hiram Percy Maxim in late 1915 addressed letters to the Secretaries of War and Navy offering the services of ARRL and its members in the event of emergency. Charles Apgar, 2MN, with an ingenious hookup from his receiving apparatus to a wax cylinder recording device, gathered evidence sufficient to cause our government to shut down the German Telefunken radio station WSL, on Long Island, for violation of the neutrality code. His accomplishment was described as "the most valuable service ever rendered by a radio operator to this country." The League contemplated formation of a Volunteer Radio Corps, along the lines of the ambulance corps in Europe. A modified version, grandly called the

This was the Hartford home of Clarence Tuska in 1914–1915, and it was in the attic of this house that ARRL paperwork was handled and the first issues of QST were put together.

ARRL Department of Defense, was adopted in February 1917 (thus anticipating by 30 years our present RACES system). An early forerunner of the Armed Forces Day test occurred in October, 1916, at the instigation of the League. This test was designed to prove to the military, particularly the Navy, that amateurs were capable of good relay work on short notice. The established relay routes proved their mettle; while far from perfect, the tests sufficiently impressed the Navy that a Naval Radio Reserve was announced in April, 1917, with amateurs given special ratings depending on their class of license.




AMERICAN RADIO RELAY LEAGUE

RECEIVED at

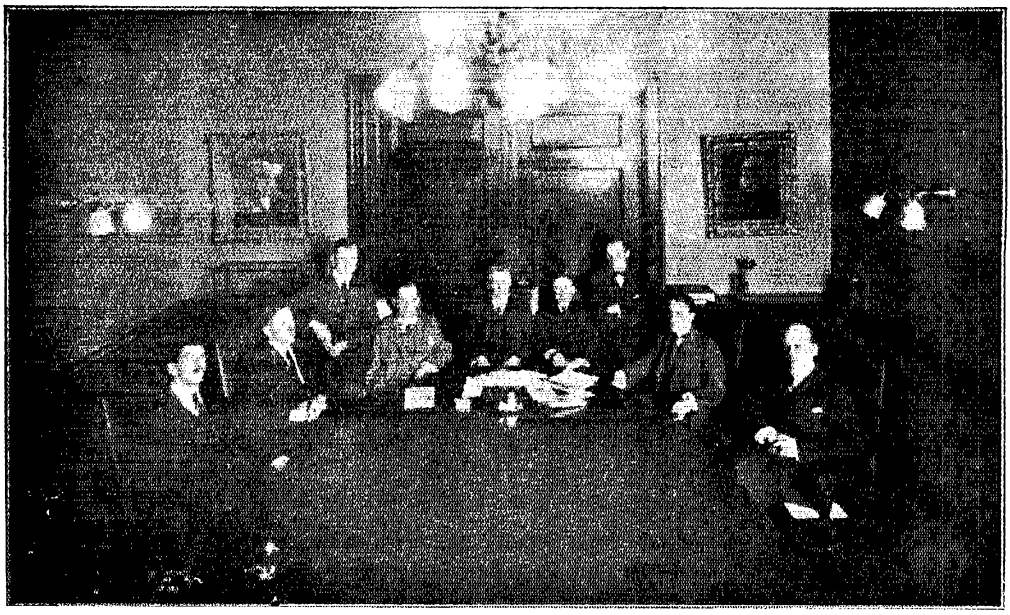
Early ARRL message blanks were designed for pencil copy.

QST first appeared in December, 1915, a private publishing venture by Maxim and Tuska, although it in effect became the voice of the League. It had an immediate beneficial effect: membership jumped sharply, from 635 on December 1 to 961 on January 10, 1916. It also served, more effectively than before, to inform members — and posterity — of what the League was doing.

Trunk Lines

H. P. Maxim had come to two conclusions: first, that the time was ripe for the organization of six trunk lines, to cover the entire United States, three horizontally and three vertically across the map; second, that regular tests in the form of drills should be performed by the stations on these trunk lines to keep them in training. He outlined his plan in the February, 1916, issue of QST. *The practicality of these ideas was evidenced by the success of the first country-wide relay, on Washington's birthday anniversary in 1916.*

On December 31, 1915, Wm. H. Kirwan, 9XE, had originated an emergency QST (general) message with the idea of covering the United States with it in the shortest possible time. The success of this experiment led to the planning and announcement of a gigantic test to be held on Washington's birthday, February 22nd. Under the plan, a message was to be originated by Colonel W. P. Nicholson of the Rock Island, Ill., Arsenal, addressed to the governors of every state in the Union and President Wilson. Selected transmitting stations were appointed all over the country. The cooperation of the ARRL, the National Amateur Wireless Association, and the Radio League of America was secured. When the results were tabulated, it was found that the message—"A democracy requires that a people who govern and educate themselves should be so armed and disciplined that they can protect themselves . . . Colonel Nicholson" —had been delivered in 34 states and the District of Columbia. The Pacific Coast got the message fifty-five minutes after it started at 9XE; the Atlantic Coast, sixty minutes after; New Orleans and Canada each had it in twenty minutes. The success of this test, although not 100 per cent, created wild enthusiasm and led to the prediction in QST



At this organizational meeting of ARRL in 1917 there were present (l. to r.) C. D. Tuska, Secretary; H. L. Stanley; Victor F. Camp; T. E. Gaty; Hiram Percy Maxim, President; A. A. Hebert, Vice-President; C. R. Runyon, Jr., Treasurer; Miller R. Hutchison; and J. O. Smith. Unable to be present for this photo were Directors R. H. G. Mathews, J. C. Cooper, Jr., F. M. Corlett, W. H. Smith, H. C. Seefred, W. T. Fraser, and W. T. Gravely.

that a transcontinental message would eventually be sent with but two intermediate relays.

In 1916, too, the government began cracking down hard on violations of the radio law, primarily operation without a license. Maxim was called in one such case to testify as an expert witness for the government. In another case, a 16-year-old was arrested for transmitting false SOS signals, and another 17-year-old for interfering with Army communications. (For a time, no amateur licenses were issued or renewed in Texas south of Austin, because of general amateur behavior in respect to War Department stations.) These cases probably helped get the "big boys," those using transformers and spark gaps, in line, but perhaps the most serious problem to amateurs was the QRM from hundreds of "little boys with spark coils," most of whom had no licenses. Several forms of action were tried or suggested. One proposed that the special license stations could report offenders to the Department of Commerce. Another proposed the appointing of Deputy Inspectors, volunteers, from among the better amateur operators. The most practical solution was to get the spark-coil set into the local radio club, and then arrive at a time-sharing arrangement whereby no local work such as ragchewing and testing, was done between 9 P.M. and 7 A.M., so that the serious traffic-handling amateurs could go about their business, troubled only by their number 2 enemy, QRN. The latter was so serious in the spark days that the Central trunk lines closed down during the summer months, the first Transcontinental Relay was washed out in January 1917 because of it, and *QST* seriously asked in June 1916 whether it should suspend publication during the summer (it didn't; as a result of the question, enough subscriptions came in to keep the magazine going). In August 1916, *QST* ran an article, "Summer Working" by S. Kruse, later Technical Editor of *QST*, to encourage some kind of activity during those months.

In March, 1916, ARRL Trunk Line Managers for four of the six routes contemplated under the original Maxim plan were appointed. . . . Test messages were to be sent each Monday night; the objective of each trunkline manager was to see how far these messages could be relayed on each successive drill. . . . By the end of the year more than one hundred and fifty cities were linked by these main trunk lines, with branch lines completing national coverage.

Almost the entire interest of amateur radio at this period seems to have been in the development and improvement of operating practices and technique. Technical interest had fallen largely by the wayside, insofar as the typical amateur was concerned. There were routine arguments about the relative efficacy of high and low spark tones, and some discussion about the proper circuits and operating voltages to be used with audions, but the pervading spirit was one of complete complacency with regard to the technical status of the art.

Everything had a fixed relationship to

A. R. R. L. DIVISIONS

In the early years of ARRL there were six divisions, and the first Division Managers were: Atlantic, J. O. Smith; East Gulf, J. C. Cooper, Jr.; Central, R. H. G. Mathews; West Gulf, Frank M. Corlett; Rocky Mountain, W. H. Smith; and Pacific, H. C. Seefred.

everything else. The small ½-inch spark coil would work five miles. The ¼-kilowatt spark set would work three or four hundred. The advanced amateur would put in a 1-kilowatt transformer, a rotary gap, the highest antenna with the largest number of wires his facilities would permit, a galena or silicon crystal detector (or an audion, or one of E. T. Cunningham's new Audiotrons, regenerative, perhaps, if he were extremely fortunate and wealthy) with a loose coupler, and he did not doubt that he had achieved the ultimate. There was nothing more for him to try for, except to improve his operating proficiency, the number of his contacts, and the number of messages he handled.

The change in the character of amateur radio from the group of eager electrical experimenters of ten years before could not have been more complete. It was not until the war had crumbled all the solid earth from under everyone's feet that this condition ceased to prevail.

This great body of organized hobbyists swept into the year 1917 bent on accomplishing one long-hoped-for objective—the first transcontinental relay. They were all the more hopeful because of two new tools that had been released for their use—complete audion regenerative receivers for amateurs, developed by two different manufacturers, which offered sufficiently increased sensitivity and range to make an actual transcontinental relay feasible.

The first attempt, on January 4, 1917, was broken up by static. But on January 27th the great feat was finally accomplished. . . .

But this accomplishment was quickly overshadowed by a greater one. On February 6th a message was started from the East Coast, relayed to the West Coast, and an answer received in the record time of one hour and twenty minutes! . . . QST dared to predict that the time might be cut to twenty minutes before the summer weather began, for, after all, the relay nets of the country were now so thoroughly organized that there were three possible routes for a transcontinental message.

The month of February 1917 is of historic importance in amateur radio because during it was begun the change which was that year brought about in the governing structure of the ARRL. For nearly three years, Maxim and Tuska, serving as president and secretary respectively, had been the sole officers of the League. By 1917 it had reached such size and importance that a more suitable organization was deemed advisable. Consequently, on February 28, 1917, a group of leading amateurs met at the Engineers' club in New York City to consider the problem. After a succession of meetings they had written and adopted a constitution that outlined the policies of the League, specified the machinery for the election of officers, divided the country into six divisions, elected by vote twelve ARRL directors and four officers, and declared membership open to anyone interested in radiotelegraphy or radiotelephony. . . .

From that time until March, 1919, the administrative office of the League was the business office of the new General Manager, Arthur A. Hebert, at 50 Church St., New York City; and its affairs were handled from his home in Nutley, N. J.

But Destiny again interfered with amateur radio, and it decreed that there were not to be many affairs to handle. In April, 1917, all licensed amateurs received the following letter from the office of the Chief Radio Inspector of the Department of Commerce:

"To all Radio Experimenters,

"Sirs:

"By virtue of the authority given the President of the United States by an Act of Congress, approved August 13, 1912, entitled, 'An Act to Regulate Radio Communication,' and of all other authority vested in him, and in pursuance of an order issued by the President of the United States, I hereby direct the immediate closing of all stations for radio communications, both transmitting and receiving, owned or operated by you. In order fully to carry this order into effect,

Sidelights, 1915-1917

The latest baseball scores were transmitted nightly by ham radio — QST, May 1916 . . . *The end-of-message signal, AR, is nothing but the American Morse letters VN (...-.-.), meaning "Finish", and the sign-off, SK, is simply the landline 30 (...-..-) which meant half-past the hour, and thus, the end of the operator's shift.* — July, 1917 . . . Electrical Experimenter *refused an ad on behalf of* QST, *feeling that* QST *was a competitor, and ARRL was competitive to the Radio League of America, sponsored by them.* — July, 1916 . . . *Postcard acknowledgements, forerunner of the ever-popular QSL, were suggested to be sent when amateurs hear a distant station* — June, 1916 . . . *But amateurs were slow to answer cards received, then as now* — February, 1917 . . . *An amateur worked a military airplane over distances up to 114 miles.* — September 1916 . . . *Car generators were suggested as a source of power for portable spark stations* — October, 1916 . . . *A Cuban amateur was ready to get on the air. Soon amateurs would be enjoying truly international amateur radio QSOs.* — October 1916 . . . *A tube transmitter and receiver were demonstrated to the public by amateurs at the Iowa State Fair.* — October, 1916 . . . *The Wouff Hong, the Rettysnitch and the Uggerumph, all instruments of torture to help insure good operating practices, were revealed to eager amateurs by The Old Man in his fabulous story, "Rotten QRM".* — January, 1917 . . . *A correspondent commented on how long it took amateurs to say goodbye.* — March, 1917 . . . *A League member proposed higher technical standards, harder license examinations and 12 w.p.m. instead of 5 w.p.m.* — March, 1917.

I direct that the antennae and all aerial wires be immediately lowered to the ground, and that all radio apparatus both for transmitting and receiving be disconnected from both the antennae and ground circuits and that it otherwise be rendered inoperative both for transmitting and receiving any radio messages or signals, and that it so remain until this order is revoked. Immediate compliance with this order is insisted upon and will be strictly enforced. Please report on the enclosed blank your compliance with this order; a failure to return such blanks promptly will lead to a rigid investigation.

"Lieutenant, U.S. Navy,
District Communication Superintendent."

Immediately following this crushing blow, amateur radio was called upon to defend itself from a legislative menace. The Padgett Bill, H.R. 2753, introduced in the House on April 9, 1917, proposed that all radio communications in the United States, including amateur, commercial, and extra-Naval governmental stations, were to be turned over to the Navy.

Naturally, all the radio world rose in protest. Individual amateurs generally disapproved the bill in principle, even though none of them dared say when they would actually be allowed to operate stations again. Charles H. Stewart, representing the Wireless Association of Pennsylvania and a number of other clubs, was heard in protest during the House Committee hearings. The N.A.W.A., through The Wireless Age, *fought the measure bitterly. Hiram Percy Maxim, representing the ARRL, went to Washington to confer with the sponsors of the bill, and secured an exception from its provisions for amateur stations, if and when they should be permitted to reopen. The bill was eventually killed in committee but the incident is of historical significance in that it showed that even at this early date the ARRL was accepted as the organization which represented amateur radio. Its membership total of about 4,000 was not as high as that claimed by competitive organizations, but by far the greatest percentage of licensed amateurs was enrolled among its numbers.*

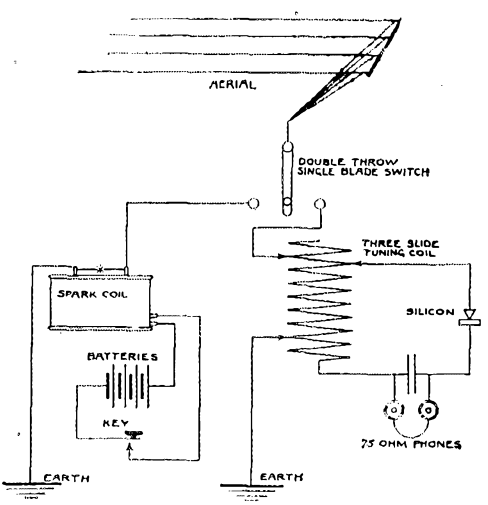
That threat over, amateur radio settled down to its next job, that of helping Uncle Sam to win the war.

Early Techniques and Equipment

IN 1914 radio was in its late teens, ready for bigger things but still on the callow side. Born with Marconi's 1896 demonstrations in the British Isles, it had survived childhood maladies to become a potent force for safety at sea, favorably — although not well-known to the general public through occasional marine disasters such as the sinking of the *Titanic* some two years earlier.

Possibly it was the attraction of youth for youth that made wireless a young man's game in those days. Certainly a very large proportion of amateurs were little, if any, older than the art itself. Today's teen-agers, brought up with sound and television broadcasting as a home utility, have almost no way of relating the radio they know to the radio of their 50-year-earlier counterparts. What sort of equipment did they have, and what kind of results could they get with it at the time ARRL was formed?

This was a time when amateur radio was exclusively telegraphy, when the miracle of communicating over long distances without visible connection was fresh and exciting, firing the youngster of scientific tastes with the ambition to do it on his own. It was a time, too, when signals had to get through without amplification — an almost inconceivable thought today. DeForest's audion, progenitor of the vacuum tube, was not "commercial" — no two bulbs were alike — and as an amplifier was still almost a laboratory curiosity. The few amateurs who had audions used them as simple detectors, as a more-sensitive replacement for the mineral-crystal and electrolytic detectors then widely used.



This a complete station diagram? Yes, indeed, in the era when the spark coil and crystal detector were supreme. From the Wireless Age of June, 1914.

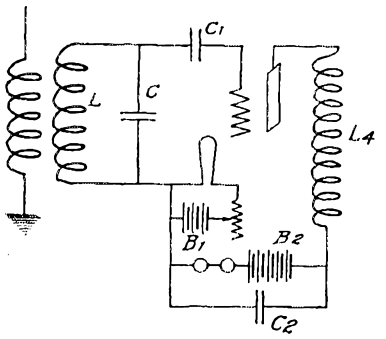


FIGURE 9

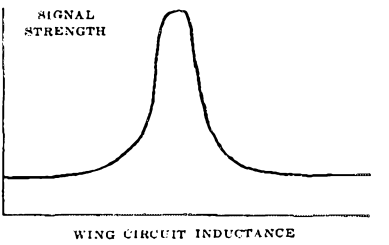


FIGURE 10

Early regenerative audion circuit and a graph showing the amplification achieved by varying the inductance in the plate circuit. This is the original "Armstrong"—tuned-plate, tuned-grid—circuit, taken from the first published paper on regenerative reception (*Proc. I.R.E.*, September, 1915).

Station Equipment

Most receiving equipment had just four major components — a "slide tuner" or, more elaborately, a "loose coupler", a crystal detector, usually galena, silicon or carborundum, a "blocking condenser", and a headset. Plus an antenna or "aerial", of course, and a ground connection — receiving was hopeless without a ground. The amateur of that day spent a large part of his time just listening — mostly to high-power commercial stations on wavelengths above 600 meters, because this was the happy hunting ground of the DXer.

The standard aerial of the time was a "flat top", formed with two or more parallel wires supported at the ends by spreaders. The higher and longer the better; lengths up to a few hundred feet were not uncommon. Single-wire aerials, if long enough, were sometimes conceded to be good enough for receiving, but not for transmitting.

Owning a transmitter was not a prerequisite to being considered an amateur — a receiver was enough to qualify you — but if you did have one, it was a spark set. Depending on the state of your pocketbook and whether your house was wired with a.c., the heart of the transmitter was either an induction coil or transformer. The transformer was the heftier job, and it would work with a rotary spark gap, the type used in the better transmitting stations. The "flivver coil", product of Mr. Ford's factory, was a favorite in the less-affluent circles; it and other induction coils were used with a "straight" or "fixed" gap, where the spark simply jumped between two electrodes of adjustable spacing. The coil, gap, and antenna-ground were enough to get you on the air, but a better signal could be turned out by using a condenser to store up electrical energy between sparks, thus giving each one more punch. As a last refinement, the condenser could be tuned and inductively coupled to the antenna circuit, theoretically putting all of the energy on one wavelength.

DX?

This was the typical station equipment of 1914. With skill, it could be made to reach out on 200 meters, over distances that, for the most part, would cause a present-day v.h.f. Novice with a "gooney-box" to turn up his nose. Although a handful of amateur stations had been heard at ranges up to a few hundred miles, such stations were exceptional indeed. On the average, a kilowatt was good for 20 or 30 miles and most spark-coil operators were glad to be able to reach their pals a couple of city blocks away. A pitiful communication picture by modern standards? Maybe so, but it held all the kicks we get out of our super-sophisticated equipment today. Merely having your signal heard at all was a tremendous satisfaction; distance could come later.

And come it did — almost overnight. Within two years, communication between amateur stations over distances of hundreds of miles was commonplace. By April, 1917, when our entrance into the World War abruptly ended all activity, amateur signals had been heard by ships far out in the Atlantic and the Gulf, and at least one East-Coast station had been heard in California. All this with what, essentially, were the same transmitters — refined somewhat, as technical knowledge among amateurs increased, but still sparks, nominally limited to 200 meters and a kilowatt transformer input.

Such startingly rapid development had to have a more-than-ordinary reason.

Regeneration

That reason was the regenerative audion circuit, certainly the biggest step forward in increasing receiver sensitivity and selectivity up to that time. It is doubtful, in fact, that any receiver development even in subsequent years did, or could, bring about such a revolution in amateur communications.

Consider the status of things before regeneration. With no amplification, the signal heard in

the headset had to come *directly from energy received from the transmitting* station — energy that was microscopic at amateur wavelengths and with amateur power limitations. The signals were broad; spark was essentially a pulse transmission and covered lots of spectrum. With only the selectivity afforded by one or two coupled tuned circuits in the receiver, it was impossible to hear a weaker signal through a strong one, so if a "local" was on the air, you either listened to him or quit.

The regenerative receiver was the almost-incredibly effective answer to the problems of sensitivity and selectivity, by the standards of those days. It was the invention of an amateur, Edwin H. Armstrong, in his undergraduate days at Columbia University. Under development in 1913, it did not reach amateur circles until its public disclosure through the Radio Club of America and the Institute of Radio Engineers in early 1915. A year later there were at least two commercially manufactured regenerative tuners on the market, and innumerable homebuilt versions of the circuit. Combined with gradual improvements in the audion, receiving had reached a peak of effectiveness, for the frequencies and types of signals then in use, that could hardly be exceeded by the equipment we have today. Regeneration continued to be the principal ingredient of amateur reception for at least the following two decades, and has not been discarded even now. What else, for example, is a *Q* multiplier than a regenerative amplifier?

The alacrity of the amateur to adopt new and useful techniques brought him achievements that put to shame most of the commercial and government communication of the era. The same eager interest developed operating skills that were unmatched by the run-of-mill non-amateur commercial operator. The tradition established then has continued undiminished.

What of tube transmitters in those pre-World-War-I days? By 1917 there were some experimental transmitters on the air, and some attempts at radiotelephony. But tubes and equipment, as well as knowledge, were lacking. Spark had not yet felt the challenge of c.w. Wartime developments, during the close-down, solved some of the problems, but amateurs had to wait until 1919 to begin getting acquainted with the vacuum-tube transmitter. That story will be recounted in a subsequent issue.

The secondary coil proper is built in a similar manner but wound with twenty-five turns of No. 26. No taps are taken off and the terminals are connected to two flexible conductors to allow for the coupling which moves on arm E. A wooden disc is fitted into the end of the secondary on which arm E is fastened.

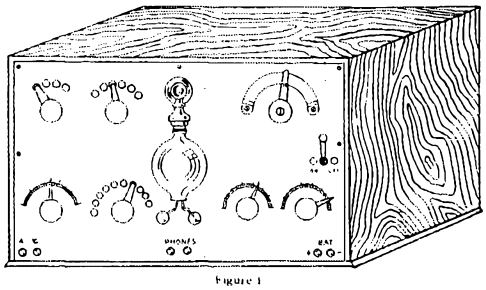


Figure 1

inches long, wound with 100 turns of No. 26 double cotton covered wire. Taps are taken out from every ten turns, giving a total of ten taps, the first turn being connected to the secondary proper as shown in the wiring diagram, Fig. 4. A connection is made between the last tap and the switch which acts as a reducer for the dead-end effect since it short-wave circuits the unused turns. One variable condenser is used to get the regenerative effect and this may be any of the small condensers

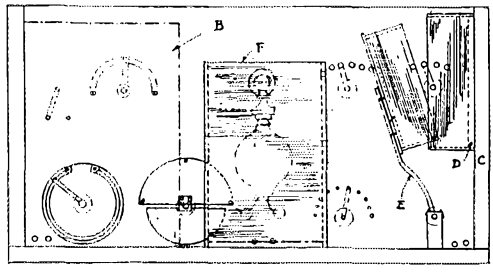


Figure 2

The secondary loading coil F. Fig 2, is placed at right angles to the secondary and primary to avoid undesirable inductive effects. Its size is 4 inches in diameter, 6

The "QST Regenerative Receiver", copied by hundreds of amateurs of the day, did much to establish QST's reputation as a magazine for the radio enthusiast. It was written up in the December, 1916, issue.

Early Manufactured Gear

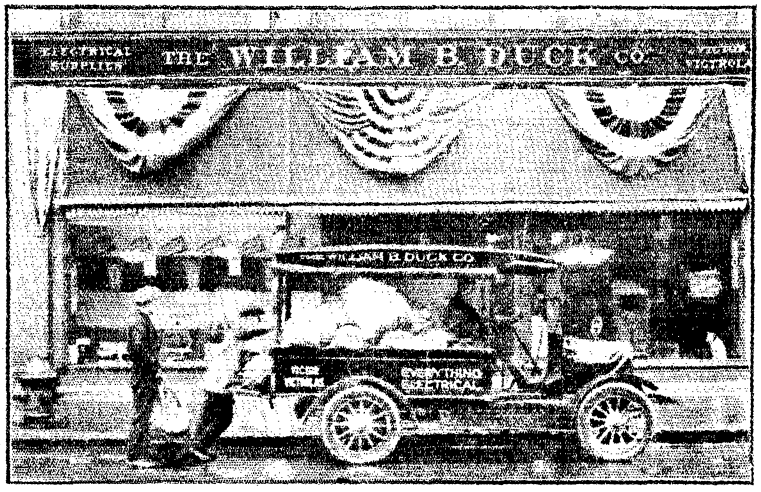
A REASONABLY accurate picture of the availability and development of wireless components for amateur receiving and transmitting is given by the advertisements in *QST*. Let's go way back, back to the first issue, December 1915.

At that time equipment that we now call receivers and transmitters did not exist. A few companies mounted pieces of apparatus on a mahogany board to make a wireless station, but nearly always these pieces were sold separately. In this first *QST* the ads were on rotary spark gaps, head sets, crystal detectors, tuners and the Multi-Audi-Phone which came in a black box with admonitions not to break the seal, and looked for a while as if it might rival the audion. (And what was an audion? De Forest's name for the first vacuum tube.) It is interesting to note that early ads on loose couplers and other receiving apparatus stressed ability to hear commercial stations. "I copied KPH press at a distance of 2100 miles". "Receive POZ, KET, OUI, NAA . . ."

During 1916 and during 1917 through September, the last issue of *QST* before World War I, the same kind of apparatus was shown in the ads, but with vacuum tube advertising substantially increasing. *QST* for February 1916 carried the announcement of a new detector,

the Crystaloi, which the inventor hoped would compete successfully with the audion. DeForest Telephone and Telegraph Company advertised the audion for the first time in March. The March 1916 issue also carried a full page ad for the Wm. B. Duck Company of Toledo, a pioneer wireless mail order firm. Duck's catalog with its pictures and descriptions of shiny, commercially built apparatus was the ultimate. We'd read the pages over and over until some of the copy was learned by heart, dreaming of a miracle that would bring us an Arlington loose coupler or a Boston key with a genuine Italian marble base.

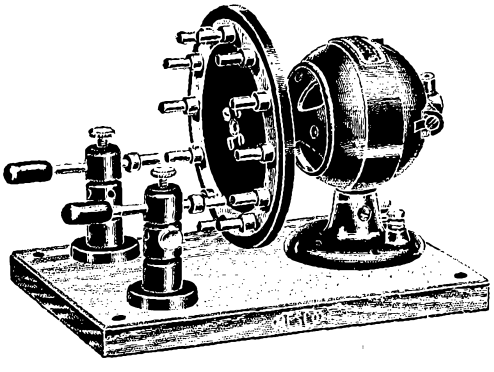
In April 1916, DeForest brought out the Tubular Audion and the Ultraudion "for damped and undamped waves" in June. The Audiotron was advertised in April. Thermo Tron made a bid for its share of the new tube business in July. The Oscilaudion was announced in August. The Audio Tron people reappeared as Pacific Research Labs with The Electron Relay in the same month and in September with the Moorhead tube. In December 1916 Multi-Audi-Fone with new spelling of its name went along with the tide and offered a receiver with audion and amplifier: the amplifier probably used the com-



15,000 of our catalogs ready for delivery to eager electrical and wireless enthusiasts in all parts of the world. One of ten consecutive shipments of catalogs to our patrons during last November.

pany's old device, still sealed.

In September the first ad on a short wave regenerative receiver appeared: Grebe. The same unit, evidently, was advertised consistently under both the Grebe and Mesco names. October carried the first ad on the Paragon RA-6, the



famous "amplifying" (regenerative) receiver responsible for Godley's later name of Paragon Paul. Although "receiver" was the word in use, "tuner" would have been a more accurate term. No one offered all the parts in one box. The detector was a separate instrument and so were the tuning condensers. Power for the vacuum tube was from batteries.

The first machine advertised for teaching code at home, the Omnigraph, appeared in *QST* for October 1916. It was used by the Federal Radio Commission — and how we trembled and nearly dropped the pencil when the Radio Inspector wound it up and adjusted the governor for the code test. And the cost of a full page ad in *QST* before World War I? Twenty dollars!

Some of the names as familiar to the hams — wireless operators — of 45 years ago as your favorite manufacturer is to you now:
Loose couplers and tuners: Mignon, A. H. Grebe, Adams-Morgan, Chambers, Clapp-Eastham. Head sets: Brandes, Murdock, Holtzer-Cabot. Rotary spark gaps: Klitzen, Mesco, Cos-Radio. Stores included Bunnell and Mesco in New York City, Radio Distributing in Lombard, Illinois. The Southern Carlifornia Electric Company in Los Angeles advertised "Wireless Expert In Charge".

CONDUCTED BY JEAN PEACOR,* K1IJV

"Quints" in Amateur Radio

THE SAME DAY that the Fischer quints were born in South Dakota, the Okinishi family in Hanapepe, Kauai, Hawaii had occasion to also share a new sense of pride in the number five. As news flashed around the globe spreading word of the exciting South Dakota event, the mails delivered an envelope (cherished by all radio amateurs) containing a new radio station license and bearing the call letters, WH6FHQ, to Sylvia Okinishi. Thus, the Okinishis became amateur radio "quintuplets."

Their radio history all began when Toshio Okinishi, KH6SN, first became licensed as K6CQV in 1931. Just as laughter can be contagious, so was his enthusiasm for amateur radio which has since spread to most of his children.

His first son, Robin, received his license, KH6BMD, in 1956. Robin now also has the call WA6SJF. He is attending Los Angeles State College.

In 1958 daughter Madge passed the exam and received the call KH6COD. Since graduating from Los Angeles City College, Madge has been working in California where she operates as WB6DXO.

Another son, Willis, became KH6CTM in 1959. Willis has since been issued the call WB6GAE while attending Los Angeles Technical College.

For four years the Okinishis numbered four licensed amateurs until another daughter, Sylvia, a freshman in high school, recently received her Novice license.

Toshio does not profess to have a hidden secret for such family radio interest. He does know that with guidance his children learned the code in as little as four weeks and that the enjoyment derived from becoming radio amateurs has proved to be well worthwhile to them all.

A Remarkable YL

If a Mother-of-the-Year YL operator were to be named, Minerva Fronhofer, WN2 and WB2JNL, of Salem, N. Y., would be a prime candidate. Minerva and her OM, Lennie, WA2SVZ, are the very proud parents of ten children — soon to be eleven.

Minerva's warm friendly voice is familiar to many on the 75- and 6-meter bands where she has often joined her OM during his QSOs with other stations. Her interest in amateur radio thus sparked, she has studied during her spare moments until she now proudly possesses two station licenses. She recently received the Novice call WN2JNL, and within three weeks, having passed the Technician exam as well, she also became WB2JNL.

When chance permits, Minerva can be heard pounding brass on 3736 kc. Passing her General exam is her next goal.

Minerva has set a fine example. Life may become increasingly busy, but she has proven that it's possible to find time for advancement in something that you really want to do.

Notable YLs

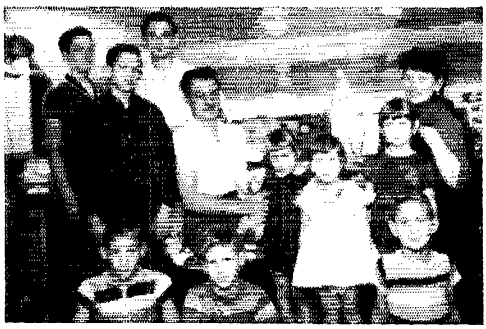
When YN3KM in Nicaragua made an emergency plea via amateur radio, Ellie Hornor, K4RHL, came to the rescue. Ellie demonstrated how efficiently emergencies can be handled and aid supplied when needed.

YN3KM voiced the urgent need for serum for four eleven-year-old girls who had been bitten by a rabid dog. Not being able to locate the serum in Florida, Ellie enlisted the help of Mabel, K5SGJ, who did a fine job of locating the serum in New Orleans and making the necessary arrangements to have it flown to Nicaragua.

Ellie also assisted the American embassy in Liberia by obtaining special programming informa-

* YL Editor, *QST*: Please send all news notes to K1IJV's home address: 139 Cooley St., Springfield, Mass.

Four of the five licensed Okinishis. Left to right are Robin, KH6BMD-WA6SJF; Madge, KH6COD-WB6DXO; Willis, KH6CTM-WB6GAE; and Sylvia, WH6FHQ.



(left) Esther Sutfin, WA8ECN, of Burlington, Mich., is mother of four and a grandmother, along with the many duties of being a farm wife. A short-wave receiver Esther purchased for her OM three years ago stirred her interest in radio. She now relays many messages, is active in CD drills, and is prepared for any standby operations. (right) Two proud parents, Lennie, WA2SVZ, and Minerva, WB2JNL, shown with ten fine reasons for their pride.

tion they requested following the death of President Kennedy. With the help of Dud, K3OJU, information was obtained from the Director of the African Division of the Voice of America in Washington, D.C. and relayed to EL2E, a Voice of America associate in Liberia.

Coming Events

Buckeye Belles — OMs-Only Party, Feb. 4–6. See rules in the Jan. column.

Buckeye Belles — YLs-Only Party, Mar. 9–13. Rules will appear next month.

WRONE Week — March 9–13. Rules will appear next month.

15th YL-OM Contest — Sponsored by the Young Ladies Radio League. Phone, Feb. 29–March 1. C.w., March 14–15. See rules in this column.

Silent Key

It is with deep regret that we record the passing of Opal Jones, W6PCA, of Esparto, California, in November. Opal, the wife of W6PJB, was a very active radio amateur and will be long remembered by her many good friends. QST

RULES 15TH ANNUAL YL-OM CONTEST

TIME:

PHONE — Sat. Feb. 29, 1964, 1300 EST to Sun. March 1, 1964, 2400 EST. (1800 GMT Sat. to 0500 GMT Mon.)

C.W. — Sat. March 14, 1964, 1300 EST to Sun. March 15, 1964, 2400 EST. (1800 GMT Sat. to 0500 GMT Mon.)

ELIGIBILITY: All licensed OM, YL, and XYL operators throughout the world are invited to participate.

OPERATION: All bands may be used. Cross-band operation is not permitted.

PROCEDURE: OMs call "CQ YL." YLs call "CQ OM."

EXCHANGE: QSO number, RS or RST report, ARRL section or country. Entries in log should also show band worked at time of contact, time, date, transmitter and power. (ARRL section list available for s.a.s.e. to YLRL V.P.)

SCORING: (a) Phone and c.w. contacts will be scored as separate contests. Submit separate logs.

(b) One point is earned for each station worked, YL to OM or OM to YL. A station may be contacted no more than once in each contest for credit.

(c) Multiply the number of QSOs by the number of different ARRL sections and countries worked.

(d) Contestants running 150 watts input or less at all times may multiply the result of (c) by 1.25 (low-power multiplier).

(e) S.s.b. contestants running 300 watts p.e.p. or less at all times may multiply the result of (c) by 1.25 (low-power multiplier).

LOGS: Copies of all phone and c.w. logs, showing claimed scores and signed by operator must be postmarked not later than March 31, 1964, and received no later than April 11, 1964, or they will be disqualified. Please file *separate* logs for each section of the contest. Send copies of logs to Martha Edwards, W6QYL, 44303 North Date Ave., Lancaster, Calif.

AWARDS:

1st place phone: YL — Cup OM — Cup

1st place c.w.: YL — Cup OM — Cup

The winner of the phone cup is also eligible for the c.w. cup. Certificates will be awarded to c.w. and phone winners in each district and country.

No logs will be returned. Be sure it is a *copy* of your log you send for confirmation.

Strays

The Duluth, Minn., *Herald* recently ran a classified ad offering to sell a super header odyne receiver. Must be one of those new foreign models.

— • • • —

The Birmingham (Alabama) Radio Club recently earned top public relations plaudits for their help on "Take It Away Day," a local clothing-and-furniture drive for charity. They worked with the Salvation Army, the Lions Clubs and several trucking firms: a fine job of communications.

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The Rockaway ARC (New York) holds Field Day every year at a place called the AC Field.

— *WA2YNH*

The World Above 50 Mc.

CONDUCTED BY SAM HARRIS * W1FZJ

THE past year of v.h.f. activity might be classified as a getting-ready period. The new power limit on 420 Mc. stimulated the first 420-Mc. moonbounce signal effort by W5SDA and company. Since his efforts (reported in March *QST*), several separate efforts have been initiated to provide a two-way 420-Mc. moonbounce contact. Nobody has quite made it yet, but all the projects are still active and with luck 1964 should be the year.

W6DNG and OH1NL exchanged the first 144-Mc. signals between Finland and the United States via the moon, as reported in May *QST*. Further efforts by K1HML, W6DNG and OH1NL didn't quite bridge the gap to a two-way 144 Mc. *contact* but all parties are primed for '64.

The King Phillip Radio Society established the first two-way crystal-controlled 10,000-Mc. contact but efforts to establish a new record weren't completed before snowfall. This year should produce a new record on this band from either the K1OOR gang or the present record holders who haven't been sleeping (see November *QST*, "Crystal Control on 10,000 Mc.", by W7LHL and W7JIP).

The 2300-Mc. DX record was extended to 170 miles. Plans for 1964 by W1QMN, W2BVU, K1JIX and W1EHF should extend both this record as well as the 3300-Mc. record. Meanwhile several groups of east coasters are eyeing that 34-mile 5650-Mc. record which has been held by W6VIX/6 and K6MBL since 1957.

In fact, every amateur band above 220 Mc. has at least two active groups whose avowed purpose is to extend the DX record on their favorite band.

144 Mc. and Up

The meteor-shower schedulers have been making hay on 144 Mc. during the Orionids, Leonids and Geminids showers. W7PUA/2, at Denville, New Jersey, brought his total up to 18 states worked in 7 call areas during the Orionids in October. Bob has been at the New Jersey location since March of 1963 and sez there is quite a difference between operating in Washington and Jersey. At Melbourne, Florida, K4IXC upped his states worked total when he worked W1AJR in Rhode Island, W4FJ in Virginia and W3GKP in Maryland for a grand total of 26 states worked in 8 call areas. John sez he has had several near misses with WØEMS, who has a good signal, and has heard WA2VFA and WA2YXS on a number of occasions. Maine, Vermont, Delaware and Tennessee are the states east of the Mississippi for which John is watching closely; they are all he needs to work to have covered the eastern states. On 432 Mc. he has heard WA4BYR, W4GJO, W4UWH and WA4GHK but still has to work on multiplier and final of his own transmitter. Won't be long now, sez John.

Another Floridian, W4MNT in Orlando, worked WØBFB, WØLFE and K9SGD during the Geminids, bringing his total up to 18 states in 8 call areas. During the same showers W5UKQ worked W3SDZ and W9OII for a total of 16 states in 8 call areas. John sez band conditions have not been good but skeds are kept with W4TLV (about 230 miles) and they've made it each sked "by brute force." At Albuquerque, New Mexico, K5TQP kept Geminids skeds with eight stations, four of which were successful.

WØBFB, W8PT, K9UIF and K9AAJ all added New Mexico to their two-meter listings when their skeds were successful with Fred, K5TQP. For Fred, total states now stands at 15 in 6 call areas. Although W7JRG did work K9UIF in Indiana during the Geminids it was a state already worked by Ken, so his total stays at 19. Skeds were also kept with VE3DIR and W8MVE but nothing heard from those boys. W8KAY asks that his total states worked be corrected to read 39, Wyoming being the only new one worked recently.

In Michigan, W8PT reports that his contact with K5TQP makes state #40 for him on two meters and produces the following "firsts": "First W8 to work New Mexico on two meters; first Michigan/New Mexico contact on two meters; first W8 to work all the states in the fifth call area; first W8 to work 40 states on two meters."

W9IFA asks to be entered in the "States Worked" box for 144 Mc., having worked 26 states in 6 call areas. George sez that skeds were kept with K4IXC with only partial success until October 6 when bursts came through followed by what may have been a tropo plus m.s. signals both ways with signals building up to 599 and a beautiful seven-minute QSO. George is looking for m.s. skeds to the east and west for states around 800 miles or farther.

At Sparta, Illinois, K9SGD had quite a time during the Geminids. "Had skeds lined up with W1JSM but got sad news from him that he lost his

* P.O. Box 334, Medfield, Mass.

Two of the many v.h.f. men attending the West Virginia ARRL Convention last July. On the left is well-known two-meter DX man, K8AXU; on right ye editor, W1FZJ.

antenna. Had sked to try Vermont and the fellow moved two weeks before the shower. Did manage to keep sked with W4MNT in Orlando and made the grade on the night of December 13. Gave him a new state and also made #30 for me. Would be glad to keep skeds with anyone needing Illinois, and would like skeds into Vermont and New Hampshire for any of the showers in 1964."

WAØDZH sez: "So meteor-shower skeds *do* pay off in the long run! Although it hasn't worked out very good for me in the past, I did keep skeds with W7PUA/2 when he asked for a sked. The shower seemed to peak on the 13th and 14th and although we received a good burst on the 13th we had no contact. The 14th was a sure thing because I received a good one-half second burst with calls and signal report. The next few minutes I heard a series of 'rogers' and even later received 'SK 73.' Put me down in the standings box as 20–7–1170." Lou has recently finished his 432-Mc. transmitter with 120 watts output with a 4CX250B in a cavity. Receiver has been completed and 52 elements are ready to go up. Cold weather will delay erecting the antenna at any great height until spring but it will be up there somewhere 'til it can go higher.

Out in California K6HMS sez that although he hasn't had the time to be on the air much recently, he did manage to work W7JRG in Montana during the Leonids. "Skip" sez he sure needs someone in Texas, Idaho and Oregon to keep m.s. skeds with, but that so far no one seems interested.

WØLFE sez he's had a few nice openings on phone and one big aurora. "Gave W0EYE in Colorado his Missouri contact during October meteor-shower sked. Would be interested and looking for anyone on s.s.b. and glad to make skeds. Can run 800 watts to a pair of 8-over-8 slots." Ed now has 31 states worked on 144 Mc.

In Rhode Island W1AFO brought his total to 19 states when he worked W8BKI on an aurora opening during October. Equipment used at Stan's QTH consists of an 829B and an 11-element antenna. He hopes to add a kilowatt amplifier along with a better antenna come spring.

A radiogram received from WB2ALF sez that he is looking for 144-Mc. c.w. skeds with stations in Vermont, North Carolina, West Virginia and Wisconsin, so you fellas be a-looking for John. He gets on the air each morning around 6:30 A.M. and calls CQ for the first 30 seconds of every minute on 144.05 c.w. WA2DRP reports that most of the wiring has been finished on his two-meter rig and it won't be long now. Jim also sez that he has heard a station testing out RTTY equipment but doesn't know who it is. Doesn't say which of the v.h.f. bands he's hearing it on. K2OEI has completed an s.s.b. transmitter for 144 Mc. — 120 watts p.e.p.

At Fort Walton Beach, Florida, W4ZGS has installed a two-meter vertical (???) beam fixed to the northeast to get W4COD at Defuniak Springs. (Be careful there, Til!) He tells us that the two-meter gang is pretty active on 145.2; that WA4OGB has installed a new Finco 6 and 2 beam and worked into Texas on initial check; that WA4HNI has his beam up on a tower now; that W4SMM raised his antenna and that W4COD raised his beam to 60 feet. WA4BOZ and W4ZGS are both working on gear for 220 Mc. At Orlando W4AWS sez that although conditions were generally poor during November there were several weak tropo openings into Alabama and Georgia when he worked W4LSQ and K4SJF. WA6JHY tells us that he has very good reports on two meters from his QTH on top of Mt. Davidson, but best DX so far is Los Gatos; and W6AEY in Eureka has a fine 120-watt rig on 144 Mc., but nobody to talk to.

Jack Woodruff, W8PT sez that pipeline between K4IXC and himself is still intact. On November 3

2-Meter Standings

W1REZ	32	8	1300	W5EDZ	8	5	1375
W1AZK	28	8	1205	W5YVO	7	4	1330
W1KCS	24	7	1150	W5UNH	6	3	1200
W1AJR	21	7	1130				
W1MMN	22	8	1200	W6WSQ	15	5	1390
W1JSM	22	7	1330	W6NLZ	12	5	2540
W1HDQ	22	6	1020	W6DNG	9	5	1040
W1IZY	20	7	1080	K6HMS	7	3	1010
W1AFO	19	6	920	W6AJF	6	3	800
K1CRQ	19	6	800	W6ZL	5	3	1400
W1MEH	18	6	1000	K6GTG	4	2	800
K1AFR	17	6	675	W6MMU	3	2	950
W2CXY	37	8	1360	K7HKD	20	7	1330
W2ORI	37	8	1320	W7LHL	10	4	1170
W2NLY	37	8	1300	W7CJM	5	2	670
W2BLV	36	8	1020	W7JIP	4	2	900
K2LMG	31	8	1290	W7JU	4	2	235
K2GQI	35	8	1365				
W2AZL	29	8	1050	W8PT	40	9	1260
K2IEJ	27	8	1060	W8KAY	39	9	1210
K2CEH	25	8	1200	W8SDJ	37	8	1220
W2AMJ	25	6	960	W8IFX	35	8	980
W2ALR	24	8	1100	K8AXU	34	9	1275
W2RXG	28	8	1200	W8SFG	34	8	1040
W2SMX	23	7	1090	W8LOF	32	8	1060
W2LWI	22	7	1050	W8GGH	32	8	1180
K2HOD	22	7	950	W8BAX	32	8	960
W2DWJ	23	6	860	W8RMH	32	6	910
W2PAU	23	6	753	W8MVE	31	9	1155
W2ESX	21	6	750	W8NOH	31	8	1090
K2KIB	21	5	700	W8EHW	31	8	860
W2UTH	20	7	880	W8SVI	30	8	1080
W2WZR	19	7	1040	W8EHW	30	8	860
W2RGV	19	8	720	W8LPD	29	8	850
WA2EMA	19	6	1010	K1CRQ/8	28	8	690
W7PUA/2	18	7	1220	W8WRN	28	8	680
WA2PZE	18	6	750	W8DX	26	8	720
W2RLG	17	6	980	W8ILC	25	8	800
K2OEI	16	6	1010	W8JWV	25	8	940
WA2YXS	16	6	720	W8WNM	25	8	900
K2JWT	16	6	550	W8GFN	23	8	540
				W8LCY	22	7	680
W3RUE	33	8	1100	W8BLN	21	7	610
W3SGA	31	8	1070	W8GTR	17	7	550
W3TDF	30	8	1125	W8NRM	17	7	550
W3GKP	30	7	1180				
W3KCA	28	8	1110	W9KLR	41	9	1160
W3BYF	28	8	1070	W9WOK	40	9	1170
W3FPH	22	8	1100	K9UIF	38	9	1000
W3LST	22	6	800	W9AAG	35	9	1050
W3LNA	21	7	720	W9GAB	34	9	1075
W3NKM	20	7	730	K9AAJ	33	8	1070
W3LZD	20	7	650	W9REM	31	8	850
K3HDW	12	6	1015	K9SGD	30	8	1100
				W9ZIH	30	8	830
W4HJQ	38	8	1150	W9PBF	28	8	820
W4HHK	37	9	1280	W9LVC	27	8	950
W4LTU	34	8	1160	W9OJI	27	9	910
W4ZXI	34	8	954	W9UPA	26	6	1000
W4WNH	34	9	1050	W9ZHL	25	8	700
W4MKJ	34	8	1149	W9BPV	25	7	1030
W4AO	30	8	1120	W9CUX	24	7	1000
W4IXC	26	8	1225	K9AQF	24	7	900
W4LVA	26	8	1000	W9WDD	23	7	900
K4EUS	26	7	1130	W9LF	22	7	825
W4EQM	25	8	1040	W9KPS	22	7	690
W4AIB	25	8	900	W9ALU	18	7	800
W4RFR	24	9	820				
W4TLV	23	7	1000				
W4JC	23	6	725	WØBFB	39	9	1350
K4QIF	22	8	1000	WØLFE	31	9	1040
W4RMU	21	7	1080	WØIHD	31	8	1030
W4OLK	20	6	720	WØLFE	39	7	970
W4LNG	19	7	1080	WØSMJ	29	9	1075
W4MNT	18	8	1170	WØQDH	27	9	1300
K4YUX	18	8	830	WØENC	25	6	1225
K4VWH	18	6	590	WØRUF	23	7	900
W4MDA	17	6	775	WØMOX	23	6	1150
				WØIC	22	7	1360
W5RCI	39	9	1280	KØITF	21	6	940
W5FYZ	33	9	1275	WØINI	21	6	830
W5AJG	32	9	1360	WØTGC	21	7	870
W5JWL	29	7	1150	WØRYG	20	8	925
W5DFU	29	9	1300	WØDQY	20	7	700
W5PZ	28	8	1300	WØJAS	19	7	1130
W5LPG	25	7	1000	WAØDZH	20	7	1170
W5KTD	23	8	1200	WØAZT	18	7	1100
W5SWV	20	5	960	KØAQJ	16	6	1120
W5UKQ	16	8	1150	WØIFS	16	6	1100
W5ML	16	6	700				
K5TQP	15	6	1170	VE1CL	8	4	800
W5KFU	15	5	1360	VE3DIR	37	9	1330
W5UGO	13	4	635	VE3AIB	29	8	1340
W5FSC	12	5	1390	VE3BPR	24	7	950
W5HEZ	12	5	1250	VE3BQN	23	7	1180
W5CVW	11	5	1180	VE3AQG	18	8	1300
W5NDE	11	5	620	VE3DER	17	8	1340
W5WAX	11	5	735	VE3HW	17	7	1350
W5VY	10	3	1200	VE6HO	1	1	915
W5BEP	9	3	1000	VE7FJ	2	1	365

The figures after each call refer to states, call area and mileage of best DX.

220- and 420-Mc. STANDINGS

220 Mc.

W1AJR	12	4	480
W1AZK	9	3	412
W1BU	14	5	600
W1HDQ	12	5	450
K1JIX	11	4	615
W1OOP	12	4	400
W1RFU	15	5	480
W2AOC	15	5	530
K2AXQ	9	3	240
WA2BAH	4	2	167
K2CBA	16	7	660
K2DIG	4	3	140
W2DWJ	15	5	740
W2DZA	12	5	410
K2DZM	12	5	400
K2ITP	10	5	265
K2ITQ	11	5	265
K2JWT	6	3	244
K2KIB	12	4	300
W2LRJ	10	4	250
W2LWI	12	4	400
W2NTY	12	5	300
K2PPZ	11	4	400
K2QJQ	13	5	540
W2SEU	11	5	450
K2UUR	6	3	210
W3AHQ	1	3	180
W3FEY	11	5	350
K3IUV	8	3	310
W3JYL	8	4	295
W3JZI	4	3	250
W3KKN	10	4	255
W3LCC	10	5	300
W3LZD	15	5	425
W3RUE	10	5	480
W3UJG	13	5	400
W3ZRF	5	4	112
K4TFU	8	4	400
W4TLC	5	1	315
W4UYB	7	5	320
W5AJG	3	2	1050
W5RCI	8	5	700
K6GTG	2	1	240
W6MMU	2	2	225
W6NLZ	3	2	2540
K7ICW	1	1	250
K8AXU	11	5	1050
W8IJG	9	5	475
W8LPD	6	4	480
W8NRM	8	4	390
W8PT	10	5	660
W8SVI	6	4	520
W9JCS	6	2	340
W9JEP	9	4	540
W9OVL	6	3	475
W9UED	4	4	605
W9ZIH	10	5	500
KØDGU	5	3	425
KØITF	6	3	515
KH6UK	1	1	2540
VE3AIB	7	4	450
VE3BPR	3	3	300

420 Mc.

W1AJR	12	1	410
W1BU	11	3	390
W1HDQ	9	3	210
K1JIX	8	2	230
W1MFT	8	3	170
W1OOP	11	3	390
W1QWJ	10	3	230
W1UHE	10	4	430
W2AOD	6	4	290
W2BLV	12	5	360
K2CBA	8	4	220
WA2DTZ	6	3	200
W2DWJ	10	4	196
W2DZA	5	3	130
K2DZM	10	4	390
WA2EUS	7		
K2GGA	4	4	383
WA2HQE	8	4	280
K2KIB	4	2	100
W2NTY	3	2	100
W2OTA	10	4	300
K2UUR	9	3	280
W2VCG	9	4	280
W2YPM	6	3	300
K3CLK	9	4	
K3EOF	6	3	250
W3FEY	8	4	296
K3IUV	7	3	310
W3LCC	3	2	
W3RUE	6	4	410
W3UJG	2	4	350
W4HHK	9	4	550
W4RFR	5	2	665
W4TLV	4	2	500
W5AJG	6	2	665
W5HTZ	5	3	140
W5RCI	12	3	660
W5SWV	7	3	525
K6GTG	1	1	180
W7LHL	2	1	180
K8AXU	5	3	660
W8HCC	3	2	355
W8HRC	3	2	250
W8JLQ	6	3	275
W8NRM	3	2	390
W8PT	8	5	400
W8RQI	6	2	270
W8TYY	9	5	580
W8UST	3		25
K9UIF	8	5	390
W9AAG	8	4	525
K9AAJ	7	3	425
W9GAB	9	4	608
W9OJI	6	3	330
KØITF	3	2	158

The figures after each call refer to states, call areas and mileage of best DX.

the boys caught a four-minute burst on 144 Mc., long enough to allow the set-up of a 432-Mc. sked. Jack sez the new shack and antenna farm will be ready to move into by the first of the year. Antennas *may* have to wait a while but as *soon* as outdoor work is possible up they'll go.

At Tiffin, Ohio K8YWF tells us that there are 30 stations in Tiffin that have two meter gear and 45 in Seneca County. Jerry also tells us that on November 24 WN8IYH worked W5PMJ on 144-Mc. phone; and that on the 28th he (WN8IYH) worked W5QS on two meters. Both of the 5s located in Texas. Wonder if anyone else has any unusual contacts to report for those dates? According to K8RXD in Newark, Ohio, things have been pretty average on 144 Mc. during November. Dean is anxious to get on 220 Mc. and is working on conversion of an old TV tuner for that band. He's not happy with results so far. In Ypsilanti, Michigan, K8PBA tells us that the s.s.b. roundtable on 145.050 Mc. (Sunday nights at 2200 EST) has been regularly covering four states including W4ZCM in Kentucky, W9OAC in Indiana, K8LFC in Ohio and K8PBA in Michigan. Other stations than those mentioned are also in the roundtable but these are the states covered. Bob is presently working on a parametric amplifier for 144 Mc. and s.s.b. equipment for 432 Mc. We understand that K8LFC of Toledo now is running 250 watts of s.s. on two meters. At Saginaw, Michigan W8FZ sez he is just about completely set up in the new location although the beam has yet to be erected.

An interesting letter received from W8CRD in Buchanan, Michigan sez: "the station at this QTH has finally evolved into 300 watts c.w. and s.s.b. with a 13-element *long john up 60 feet*. This has helped increase the range of 'normal conditions' contacts quite a bit. Consistent contacts up to 250 miles are now easy. On most nights when signals are strong out to 250 miles there would be no problem increasing the range if anyone were on. It appears to be the same problem all over, lots of listening and no transmitting. (Ain't that the truth!) I would like to informally set aside one night a month where everyone would make a point of getting on the air on c.w. or s.s.b. At least on this night you would be sure of a few stations and possibly some new states if conditions are up. Let's start with the second Wednesday of the month from 8:00 P.M. on. If there is any interest in this type of operation it might be extended to twice a month or every week. Most v.h.f. hams are on at least this often and if we all got on at one time we might even create some QRM!" Sounds like a good idea, Jack. Those interested in this idea might contact Jack by writing W8CRD, 1005 Chippewa, Buchanan, Michigan.

At Appleton, Wisconsin W9FBC tells us that on November 6 he heard WØRWC on 144 Mc.; on the 9th he worked W8HHS in Michigan and heard him again on the 20th; and also on the 20th heard WA9DOT at Grafton, Wisconsin. KØFLE sez: "Hastings has gone hog-wild over two meters. There was no two-meter activity in this area before November 1, 1963 and now (end of November) there are at least six stations on almost every night, with four or five more expected to be on the band by the end of December.

From Toronto, Ontario and VE3BQN we hear that he and VE3MR are planning a remote 50, 144, 220 and 432-Mc. station, which will be located on a 1500-foot hill about thirty-five miles northwest of Toronto. The boys have a 110-foot tower with a 35-foot mast on which they plan to have forty-four foot optimum space, eleven-element six-meter beam; a 38-element two-meter beam; a 29-element one-and-a-quarter beam and a 32-element collinear beam. Sounds like Ted and company are planning big things. Total states for Ted now stands at 23 worked in seven call areas with Missouri being the last one added.

K7ICW reports that the Monday night two-meter Las Vegas Net has had exceptionally good attendance recently with a dozen stations in attendance. Al sez he has started work on a two-meter s.s.b. mixer but progress is slow due to repair of breakdowns in "store-bought" equipment; and that his 432-Mc. quad array is awaiting parts. At San Francisco K6NCG is working on two-meter RTTY, but is having a little trouble with the Space Tone. He is planning on seeing what a 32-element collinear will do on two meters, having just finished alignment and revamping of an SRR-13. Plans on using with an AZL on two meters and hoped to be ready by the first of the year.

(Continued on page 146)

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

Last month's spoof of kilowatts engraved on the heads of pins brought us an admonition that we ain't seen nothin' yet. Electronics engineers already are cramming 10,000,000 components into a cubic foot of space, and a computer that once filled an entire room now can be duplicated in a shoebox. The march of microminiaturization toward invisibility goes on, but Jeeves & Co. still prefer equipments discernible to the naked eye.

Our annual notebook shakeout, a housecleaning of "How's" odds and ends that didn't quite make print during the old year, produces a few items worth noting briefly as they fall toward File 13. Did you know that the first attempt to promulgate a world-wide time system was made by New Zealand a century ago? Daylight Saving Time first appeared in Germany in WW I, showed up in this country in 1918, and in Russia by 1930. . . . Ham experimentation with speech equipment is almost a lost art, so here's a suggestion for exploitation of a "dead" 10-meter band: double-mike split-sideband hi-fi. "We"-type phone fellows then can "we" in stereo. . . . Horrors! Space rockets are said to be polluting our ionosphere, men. "Their fluorine wastes wash out electrons and may some day make long-range radio communications impossible." Hamdom's DX hounds will find a way. . . . The granddaddy of all hidden pirate treasures still lures pick-and-shovel teams to TI9. You can read all about it in *Lost Treasures of Cocos Island*, by R. Hancock and J. Weston [Nelson, 325 pp., $5] . . . . W9GLT calls our attention to another tome, a 160-p. paperback on short-wave propagation published by *Telephony* magazine. The author is Stanley Leinwoll, the tag is $3.90, and one of its highlights is a discussion of one-way skip, an eerie phenomenon that baffles every DX man now and then. . . . Referring to our April '62 treatment on OM Morse and colleagues, K1PLG points out that among the myriad watts, ohms, oersteds, angstroms, curies, etc., only one major electrical unit is named after an American: the henry, for Professor Joseph Henry. . . . Here we go again! ZD8JP wrote W2DGW from Ascension isle, "Had good results with an underground aerial consisting of a quarter-mile length of insulated wire buried about three inches below the surface." . . . Gosh, hams were using frequency modulation 40 years ago, before the commercials figured out what it was. Now we see that old-fangled f.m. still handily outshines newfangled modulations like s.s.b. in a host of tropo-scatter, moving-source, telemetry and utility point-to-point applications. Is amateur radio missing an important boat by practically ignoring VOX-style f.m. experimentation?

There are other gleanings in the grab bag but it's time to get on with the business portion of this month's meeting.

What:

What ho — ARRL DX Contest time again! If early winter propagation conditions are any tip-off, every h.f. band from 10 through 160 will catch the long-haul fever and merit your serious attention. Hours of darkness will find the brethren jammed into the lower ranges, then daybreak will signal a DXodus to 20, 15 and 10. The tricky long-path breakthroughs so prevalent these days are sure to flip the flock. Fun ahead! Meanwhile, down on

10 phone we find **Ks** 2YFE 3SLP and **WA5AER** yakkin' it up with such as **FG7XL** (28,720 *kc.*) *2128 GMT*, **HI3JR** (503) 22, **KZ5VF** (800) 20, **PY3VA** (715) 21, **TG9MP** (630) 20, **XEs** 1OE (500) 16, 2I (570) 21–22, 3CP, **YV5ED**, **ZEs** 1JJ 7JR (450) 17–18, **ZSs** 6BDU (508) 17–18, 7L (450) 17–18, **5As** 1TW (510) 16, 5TW (515) 16 and **9G1EC** (390) 17 . . . . . **Ten c.w.** keeps **Ws** 7DJU 8YGR, **K2YFE** and **WA6VAT** busy with folk like **CXs** 1OP 2CO 18–19, **HI8MMN**, **HK7ZT** 18, **JA1BRK**, **KZ5LC**, **LU7BN** 20, **XE1FN**, **ZL2MO**, **ZSs** 3NZ (70) 16, 6AD, **9Q5s** AB (52) 16 and TJ 19–20.

15 c.w. stays very much alive, too, according to reports filed by "How's" sleuths **Ws** 2BTQ/KH6 8YGR, **Ks** 1RHZ 2YFE 6SXX/4 7PIG 0AID 0JPL, **WAs** 2HLH 5AER 5EAM 6VAT 8AIL 9AEA 9CYI 9GEB 9GRC 9ICQ 9IIJ, **WB6s** AKZ and CGP who signaled successfully with **CE1AD**, **CN8FW**, **CP2GR**, **CRs** 6BX 6DX 19, 6FW 18, 7IZ 17, **CT1JJ**, **CX2CO**, **DU7SV**, **FR7ZD** 17, **HAs** 5KFR 7PJ, a half dozen **HKs**, **HI8MMN** 16, **HP1IE**, **JAs** 1ACA 1BRK 1BWA 1BY 1DCY 1DFQ 1EM 1IZZ 1KSO 1LPZ 2AKD 2TH 3ASF 3BQU 3CHQ 3EBE 3EGE 3JM 3TY 4ACH 5FQ 6AKW 6CMM 6CRX 7AD 7AO 8AXL 8BI/1 8OW 0AHX 0SU, **JT1CA** (28) 1, **IT1AGA** (60) 16–17, **KB6CP**, **KC6BO**, **KGs** 4BL 4BX 6AAY, **KR6BQ**, **KZ5s** HK LC, **LZ1BZ**, **OAs** 3M 4CG 6W, **OEs** 2WDI 5PWL, **OX3AB** 18, **PI1PT**, **PJ2AE**, **SV0WAA**, **TG9FA**, **UP2KNP** 15, **VPs** 5NK 6LX 7BG 7NQ 7NT, **VQs** 1IZ 2BC 16, 2W, **VR2EII**, W4WQQ/**VP9**, **WH6FEK** (150), **XEs** 1NL 1VT 2AAG, **YV5s** BOW MY, **ZB1s** CR RM, **ZD6OL** 17–18, **ZE2JC** 17, **ZK1AR**, **ZP5LS** 17, VK-ZL-**ZSs** in gobs, 4X4MR (34) 14, **5A1TW** 16, **5B4AK**, **9Q5s** AB 17 and TJ 19.

*7862-B West Lawrence Ave., Chicago, Ill. 60656.

15 phone ranks high in the esteem of **Ks** 1RHZ 2YFE 7PIG ØAID ØJPL, **WA5s** AER EAM, **WBs** 2BEV 6AKZ and 6CGP because of **CT1JJ, EA8**DM (243) 19, **HC1RY, JAs** 1DIO 2CYE 7BQY 7UJ 8AST ØUR, **KB6s** CP* EPQ*, **KGs** 4BP 6AJP*, **KR6s** DI GM*, KX6s BQ* DB*, **KZ5AX, OA5AH***, **TN8AA** (254) 19, **UB5UN** (420) 13-14, **VK2ADE, VP9AK**, Ws 4VGL/**KM6*** 8KHB/**KJ6***, WA6DFZ/**KJ6***, XE1NC and **9Q5UC** (278) 18-19, the asterisks representing single-sideband stalwarts.

15 Novice kilocycles bear the brunt of **WNs** 2HOK 2IJK 4MHU and 6FHH encounters with **Gs** 3IDG 5LK **JAs** 1KC 3YR 4FW 5YR 6CPN 6HW 8BY, **KG6AO, KL7CGE, KP4s** APR ATY, W7UXP/**KH6, WH6**FEX, **WP4s** BOR BPR, XE1WB and **YV5FX**. Anyone know a more delightful way to practice code?

40 c.w., prime nighttime DX hunting grounds, is a favorite subject of **Ws** 1ECH 2BTQ/KH6 5KNE 6YKS 7DJU 7POU, **Ks** 3JGJ 3SLP 4TWJ 5JVF 6SXX/4 6TZX 7QXG ØJPL, **WAs** 2HLH 2OND 6USU 6VAT 8EWT 9CYI 9GRC, **WBs** 2BEV 6AKZ 6AYK 6AZI and 6DEJ who key up a storm with items like **BYs** 1PK 3BJ 9SB 7, CN8FW (11) 4, **CO2BB, CTs** 1DJ (1) 23, 3AB (2) 0, **DU7SV, FG7XC, FY7YK** (10) 0, **HC2AC** (15) 12, **HI3PC, HKs** 4DB 7AJP, **HM1BW** 11, **HR3HH, IT1ZGY, JAs** 1ACA 1AEA 1BAX 1BRK 1BYL 1CWZ 1DDW 1EVN 1FCQ 1FOP 1FSL 1FSS 1GKP 1HVI 1HXX 1IBX 1ISL 1KGE 1KXI 1KYR 1LPZ 1LTR 1LWI 1OIO 1XS 1YDJ 1YL 2AGP 2AIR 2BAY 2BFW 2BGH 2BP 2BVL 2BY 2CBK 2CYB 2DCV 2DMZ 2WB 3AOV 3BAC 3BQH 3BYQ 3CAF 3CHO 3CYZ 3DDG 3EDF 3EGF 3EXJ 3FIP 3XY 3YT 4AKL 4YAR 4VX/mm 5ADR 5AJQ 5FQ 5IP 5YAP 6AKW 7AB 7AD 7AGO 7AKQ 7BVA 7BWT 7XF 7YL 8BP 8ZS ØRC all 10-15 GMT, **KA2KS** 10, **KC4USK** 10, **KG6AAY** 10, **KR6AF** 10, **KR6ML, OA4FM** (8) 6, **TI2LA, UAØs** EJ 11, FF KCU 10, KFG MF (3) 14-15, **VE8DL, VKs** 9CL ØVK, **VPs** 2KJ (20) 11, 2VS 3YG (12) 10, 4GH (20) 3, **6AT 9BO, VS1LP** 11, W4WQQ/-VP9 (8) 6, WA6RTB/**KH6**, **YV5s** AJ ANJ, **YNs** 1AA (16) 10, 1OC (16) 5, 3KM, **ZE3JJ** (2) 3, **ZK1AR, ZL4JF** of the Campbells, **ZS2s** HI RM and **9G1HO** (11) 4. . . . . **WN6FHH** has the pitch on **40 Novice**, skipping the water for **WH6s** FAL (167) and FDV (175).

80 c.w. is pressed into DX production when 40 turns squeafnish in the wee hours. **Ws** 1SWX/1 6YKS 7DJU, **Ks** 4TWJ 5JVF and **WA2HLH** traded **73s** with **DJs** 1PN 3KR, **DL1KB, EI9J**, a hatful of **Gs, GW3NAM, HI8MMN, HKs** 3AH 7ZT, **JAs** 1BRK 1DMX 2WB 3JM 6AK 7MJ ØVZ/1, **KH6**EYP, **KP4s** AOO CC, **OKs** 1MG 5SNL, **OX3s** DL RC, **OZ7OF, SP3ART, VE8RG, VK5JE, XE1s** AX (2) 6, OK, YV5ABS, **ZK1AR, ZLs** 2BAA 2GS 4BO 4GA (50) and **6YAXG**.

160 c.w. DX results are running far ahead of last season, according to **W1BB** who lists such delicacies as **DL1FF, EI9J, GC3EML, GI6TK, GM3KIA, HB9QA, HR3HH, OH3NY, UB5WF, VK9GL, VPs 7NY 8GQ, VS1LP, ZB1BY, ZE3JO, ZS2FM, 5B4s** FB RF, **5N2JKO, 5Z4IV** and **6YAXG** in the target category. The spillover in Gs gets right down into the W/K/VE clothesline-antenna class on a hot week end, and one has to look twice at one's receiver dial to make sure it's not on 40 or 80. Between transoceanic breakthroughs you can live it up locally like **WA2HLH**: "I've worked eight states on 1.8 Mc. with less than one watt input." **Ws** 1WY 7DJU and **K5JVF** mention much 160-meter fun, too. Don't forget that February 2nd and 16th are dates designated for concentrated 160-meter DX effort in the 1963-64 Transatlantic and DX Tests fostered by W1BB and cohorts. Also, if you're new to 1.8 Mc., be sure to study page 60, July 1963 *QST*, for details on frequency and power privileges in your area. Good fishin'!

* * *

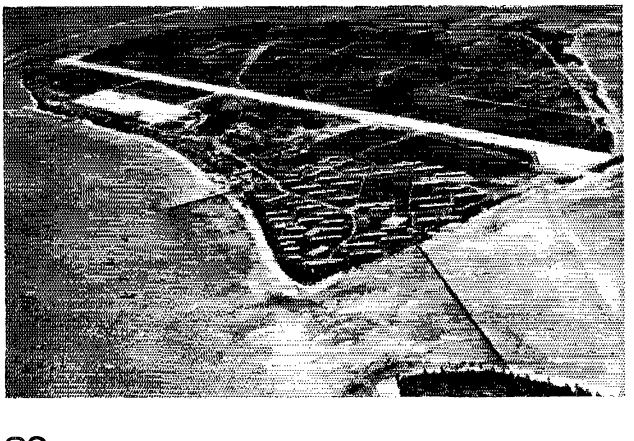
Out of space again, so the 14-Mc. c.w. reports of **Ws** 1YYM 2BTQ/KH6 7DJU 8YGR, **Ks** 1RHZ 2SPG 2YFE 3SLC 3SLP 6SXX/4 7PIG ØJPL, **WAs** 2HLH 4OZM 5EAM 6VAT 9AEA 9IIJ, **WBs** 2ALF 2BEV 2FMK 6AKZ 6CGP 6DEJ, and 20-phone data supplied by K3SLP, **WAs** 2HLH 5AER 5EAM 9AEA, **WBs** 2BEV and 6CGP will have to be held over. Besides, this is an ARRL DX Contest month and all you need is a fair receiver to assemble your own 14-Mc. stalk list in no time!

Where:

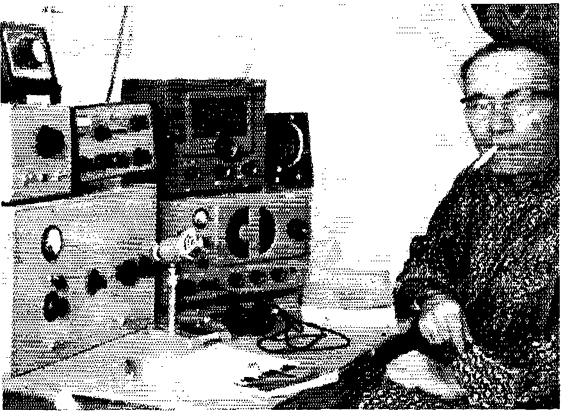
AFRICA — "Just returned from Egypt," writes VE3BGV/SU, "and I know that many W/K/VE contacts have not yet received QSLs from me, particularly those who sent cards via the VE3 bureau since I did not have them reshipped from Ontario to Egypt. My QSL policy was to reply upon receipt. For 880 QSOs I received 263 cards, so there must be quite a backlog. I've now sent out 645 QSLs and will have another 250 printed to accommodate each future applicant who QSLs with s.a.e. and one IRC. VE3FKU/SU is my replacement in Egypt and his address is the same as mine was: for W/K/VE/VOs, 56th Cdn. Sig. Sqdn., UNEF, CAPO 5019, Belleville, Ont.; and for others, 56th Cdn. Sig. Sqdn., UNEF, c/o UNEF Base P.O., Beirut, Lebanon. In a few months VE3FKU also will be replaced but the QSL QTH should remain the same." . . . . . 6O1KH stresses that P.O. Box 17, Mogadishu, Somalia, or the address in the list to follow, is his proper QSL address . . . . . W1BPM apprises Wls TS and WPO, "I've received TL8SW logs for contacts through October 28, 1963, but the usual weekly shipments failed to show up thereafter, at least into early December." . . . . . "Tell the guys back home we may get a little behind in answering QSLs," pleads ET3GC (K2PWS) to W1YYM of ARRL Hq. With plenty of W/Ks on the premises making QSOs under various Ethiopian calls it's rather complicated to sort and deliver QSLs incoming to APO 843 . . . . . WGDXC hears that ZS6BBB now holds the 1962 logs of ZS6PC/9 and will respond to valid inquiries bearing s.a.e. and IRCs.

ASIA — Syrian story from YK1AA via Ws 1WPO 7QYA, K4RJN, WA2YBR and L. Waite of NNRC: "Our QSL bureau receives thousands of QSLs for stations outside Syria using our prefix without authorization. At present there are only twelve authorized YKs, 1AA through 1AL. For QSLs it is necessary to obtain the proper addresses of these stations when contacting them." K4RJN adds, "Pass the word along that I'm manager for YK1AA QSLs. Rasheed is rebuilding his rig for more QSOs in the U.S.A. direction." Morris deserves the usual self-addressed stamped envelope courtesy from W/Ks, self-addressed envelopes with International Reply Coupons from others . . . . . There was doubt as to who would be handling EP2DM confirmations, but WB2FMK informs, "EP2DM's W/K logs through November 13, 1963, have arrived, and his G logs are en route. S.a.s.e. to my address will get fast response." . . . . . "Please excuse the late QSL," apologizes RV1USA's Ed Graham to W1YYM. "Typhoon Gloria put our station completely under water." . . . . . LIDXA notes that W3KVQ has the 1962 logs of 4S7PG, and WGDXC says K8VDV's VS1LV QSL managership deals with QSOs made since September 30, 1963. S.a.s.e. and Greenwich Mean Time only, of course.

OCEANIA — "Last June and July I contacted approximately 1200 amateurs from Johnston Island on 20-meter c.w.," declares WA6QVR/4. "I've sent out hundreds of QSLs but, as I could not find addresses for many stations



VS9MB's tight little Maldives island, Gan, is our QTH of the Month. All the group's atolls comprise only 115 square miles of thickly populated land some 400 miles southwest of Ceylon. VS9MB's ham shack is the building with the pink patio. (Photo via K1IGO)



YK1AA, a favorite with the straight-a.m. 14-Mc. crowd, expects increased activity by club station YK1DF and other Syrian amateurs before long. Rasheed's SB-175 and rotary dipole are most audible from the world's oldest city at 0330-0430 and 1330-1630 GMT. (Photos via W7QYA and K4RJN)

worked, some QSOs have not been confirmed. QSLs for contacts with WA6QVR/KJ6 and KJ6BZ in the months specified should be mailed to me at [the address in the roster to follow]." . . . . . WA4RJT remarks, "I still have my KG6AKZ logs, so anyone who worked me on Guam can obtain confirmation via my new Florida QTH." See the list to follow . . . . . Ex-KC6UZ urges all amateurs and QSL bureaus to discontinue forwarding QSLs for KC6 stations to his former Truk or present Stateside QTH. Amateurs working KC6 stations should request addresses at the time of QSOs, and those seeking QSLs for previous KC6 contacts might try sending cards via the Marianas Radio Club, Guam, M.I., or via the Director of Communications, Trust Territory Government, Saipan, M.I. Carl adds, "During my time in the T.T. I sent out about 2500 QSLs but the general run of KC6s was quite delinquent in QSLing. Some didn't even have cards printed. On my departure my successor had enough problems without acquiring my extra-curricular duties as QSL bureau manager." . . . . . W2GHK of Hammarlund tells WGDXC that VK9MD QSLs followed shipment of VK9DR pasteboards in December, and that cards for VK9s MV and XI, also on Christmas isle, can be mailed to Hammarlund DXpedition, GPO Box 7388, New York 1, N.Y., without s.a.s.e.

EUROPE — SVØWAA's policy is QSL for QSL, according to W1s BDI and NJM . . . . . "I am QSL manager for the SP9 area, Krakow," communicates SP9ADU. "I offer to help obtain any QSLs needed from Poland. Enclose IRC for direct reply. Our main SP bureau has a new address: PZK, P.O. Box 320, Warsaw 1. By the way, the ZA2 who says 'QSL via SP8HH' must be a pirate, for there is no SP8HH."

SOUTH AMERICA — "I am QSL manager for CP1DJ," confirms K9PNV. "Cards go out as soon as pertinent logs are received, direct for s.a.s.e., otherwise via bureaus." . . . . There are some 100 W/Ks in all call areas who still owe QSLs to VP4WD (G3TA) for his 1959 Tobago sojourn. Jack writes W2ICO, "I've QSLd 100 per cent but perhaps not all reached destination. I'll be pleased to forward repeat QSLs to stations shown in my log who have not yet received theirs." G3TA, who also operated VP5TA for a spell in the late '50s, may sign a VP7 call later this year . . . . . Roving DL1KV clarifies, "HK3AH is listed to Luis G. Clavijo, its first op, but as second operator I made all c.w. and s.s.b. HK3AH QSOs from 1960 to November, 1962. Luis became active again in September, 1963, but uses an Apache on straight a.m. My own HK3AH activity closed December 15th. If anyone still needs a QSL from HK3AH for c.w. or s.s.b. work during the period mentioned he should contact me with full QSO particulars. S.a.e. with IRC will bring direct reply, and others will be answered via bureaus." Otfried may soon sign an XE call, and Luis may inaugurate single-sideband HK3AH operation shortly . . . . . WA2WUV may be of assistance where HC8FN QSLs are concerned.

HEREABOUTS — WB2CDB/VO1 comments, "QSLs for Argentia area stations may be sent to Argentia Amateur Radio Club, Box 12, Navy 103, FPO, New York, N.Y., 09597. Some actives up here are Ws 3SSL 4EHQ 5CPD 5YSA, Ks 2EEA 3KLC 3SWC 4DJC 5YAA 7GVM 9HXT, WAs 4MFS 4NNS 5IEG 8KKD 9JPX and myself, all mostly on 20." . . . . . An African assignment interfered with W3ZQ's completion of QSL chores for FS7MB and PJ5MC work in late '63. Mac tallied about 2500 and 1000 QSOs there, respectively. This via W1WPO of the ARRL DXCC Desk . . . . . Ex-HI8AKU (YV5AKU) has his D.R. logs and will answer direct if s.a.e. and IRCs are supplied . . . . . "Worked three consecutive 7-Mc. DX stations the other night who said 'QSL via W2CTN,'" reports K5JVF. "Even Jack himself appears on 40 c.w. these days." . . . . . WGDXC has it that VP2AP will be back from England by April. Meanwhile, W5NOP has VP2AP logs to October 2, 1963, and will respond to QSLs bearing GMT accompanied by s.a.s.e. . . . . "QSLers of the Month" status is hereby accorded CO2BB, CP5EZ, DL4IA, FY7YK, G3KBE, HI8MMN, HSF, JAs 1BWA 1CFD ØGP, KZ5HK, LUs 2WL 6WH, PY5KE, VKs 2AXR 4WO 5JE, WA6SPL/mm, XE1ZE and ZL2GH, plus QSL managers Ws 2CTN 2HMJ/4 and 4TAJ, all nominated for prompt pasteboard production by W9SKR, Ks 8RXD ØJPL, WAs 6USU 8AJZ 9GEB 9GRC 9ICQ, WBs 2BEV 2FMK and 6CGP. Any swift QSLers *you'd* like to see commended here? . . . . . Help! K4RJN seeks aid toward glomming QSLs from LU1ZO and VKØDM, WA2HLH wants a QTH for ex-EL4s A and YL, WA6VAT desires data on BV1USG and KG1FU, WA9GEB likewise re VP6LX, WB6AKZ needs the word on one FP8HM, WN5GZX yearns for KZ5DGN's address, and G3HCV and SP9ADU thirst for MP4QBB QSL clews . . . . . K7PIG and WA6VAT offer clerical services to overseas DX ops in bona-fide need of QSL managerial assistance . . . . . Now let's get specific, bearing in mind that the following catalog is necessarily neither "official," complete nor accurate:

CN8FQ (to W4UFQ)
CP1DJ (via K9PNV)
ex-EP2AM, A. Monsees, W4EXM/3, 3301 81st Av., Washington 28, D. C.
ET3GC, G. Crawford (K2PWS), USA ACS, APO 843, New York, N. Y.
FG7XT (via K5AWR)
G3SFD, J. Van Lear (VE7IR), c/o Camusa Gueguen, Ave. Bannour, Moulinville, Sfax, Tunisia
GM3IGW/a (to G3IGW)
HC8LS, L. Troya, Correo Central, Quito, Ecuador
ex-HI8AKU (to YV5AKU)
HK3AH, c/o O. Luhrs (DL1KV), Aptdo. Aereo 4282, Bogota, Colombia (see preceding text)
K4JLD/6O1 (via WA4FXE)
KC4USK (via W2CTN)
ex-KC6UZ-KH6UZ-KX6UZ, C. Kunz, 4730 East Av., Washington, D. C., 20028
ex-KG6AKZ, J. Price, WA4RJT, 2269 NE 174th St., North Miami Beach, Fla., 33160
KJ6BZ (see preceding text)
KL7ZF, J. Putnam, Box 95, Seward, Alaska
LX1RA, A. Rieffer, 49 rue de la Montagne, Bettembourg, Luxembourg
M1M, A. Brogdon (DJØHZ, K3KMO), 318 USASA Bn., APO 66, New York, N. Y.
M1VU (to DL1VU)
MP4TAS (to G3KDE)
OA4FM (via W2CTN)
OH1AH (via SRAL)
OK3CDP (via WA2YBR)
PYs 2DBU 7AMX 7ANN 7BX 7PO 7QAI 8DI (via LABRE)
SL8AY (via SM6CUK)
SMs 6CPI 7CPI (via WA9AEA)
ex-SV6AA-TA3AA-KP4AIO (to W4VOF)
SVØWAA, USAS, JUSMAG, APO 223, New York, N. Y.
SVØWF, c/o 17 Gallias St., Rhodes, Greece
TI2PT, c/o P.O. Box 284, Picayune, Miss.
TT8AJ (via WØLYQ)
VEs 2AQV/K6 3CPR/K6, 6819 Hinds Av., Suite 27, North Hollywood, Calif.

ex-VE3BGV/SU, W. McLauchlan, VE3BGV, P.O. Box 341, Almonte, Ontario, Canada
VE3FKU/SU (see preceding text)
VE8CO, B. Bonser (G3KXN), Fed. Elec. Corp., Winnipeg Airport, Winnipeg, Manitoba, Canada
VK9GL (via W1ETF)
VP1TA, Box 488, Belize, Br. Honduras
ex-VP4WD-VP5TA (to G3TA)
VP8FII/mm (via G3OLN, or to G3RFH via RSGB)
VP8HO, R. Biggs, Box 142, Port Stanley, Falkland Islands
VP9FE (via RSB)
VQ1GDW, Box 84, Zanzibar, Zanzibar
VQ1IZ, Box 1283, Zanzibar, Zanzibar
VR6TC (via W4TAJ)
ex-VS1BB-VK9BB (to VE8CO)
VS1LV (via K8VDV)
VS4HI, B. Shirlow, GPO Kuching, Sarawak, Malaysia
W8KHB/KJ6 (to W8KHB)
WA6DFZ/KJ6, APO 105, Box 130, San Francisco, Calif.
WA6KMW/KM6 (via KM6CE)
ex-WA6QVR/KJ6, T. Tabor, WA6QVR/4, 4990 Columbia Pike, Arlington, Va., 22204
WB2CDB/VO1, C. Abernethy, Argentia ARC, Box 12, Navy 103, FPO, New York, N. Y.
XE1DDM (via LMRE)
YK1AA (via K4RJN)
YV5AKU, J. Jaar, P.O. Box 5163, Caracas, Venezuela
ZL3VB (via ZL2GX)
ZS9Z (via SARL)
3A2AE (via RSGB)
5H3HZ (via RSGB)
5R8AI, J. Gautier, Box 168, Tananarive, Madagascar
6O1KH, K. Homfeldt, P.O. Box 397, Mogadishu, Somalia
6W8AE, Box 3028, Dakar, Senegal
9G1HO (via GARS)
9L1HX, c/o Police Hq., Freetown, Sierra Leone

The preceding recommendations come through the good offices of **Ws** 1BDI 1SWX/1 1TS 1WPO 1WY 1YYM 2BTQ/KH6 2ICO 5KNE 7DJU 8YGR 9AKV 9SKR, **Ks** 1RHZ 5JVF 6SXX/4 9AVQ 9OZM 9YVV 0JPL, **WAs** 2HLH 2YFE 2YBR 6VAT 9ICQ 0BMW. **WB2s** BEV FMK, **WN5GZX**, **VE3BGV**, DARC's *DX-MB* (DLs 3RK 9PF), DX Club of Puerto Rico *DXer* (KP4RK), Far East Auxiliary Radio League *News* (KA2s CM LL), Florida DX Club *DX Report* (K4IIF), International Short Wave League *Monitor* (12 Gladwell Rd., London N. 8, England), Kanawha (W. Va.) Radio Club *Splatter* (K8WMQ), Long Island DX Association *DX Bulletin* (W2MES), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa., N. Y.), North Eastern DX Association *DX Bulletin* (W1BPW, K1NOL), Northern California DX Club *DXer* (WA6TGY), VERON's *DXpress* (PA0s FX LOU VDV WWP) and West Gulf DX Club *DX Bulletin* (W5IGJ). Any tips in *your* log to help the boys along?

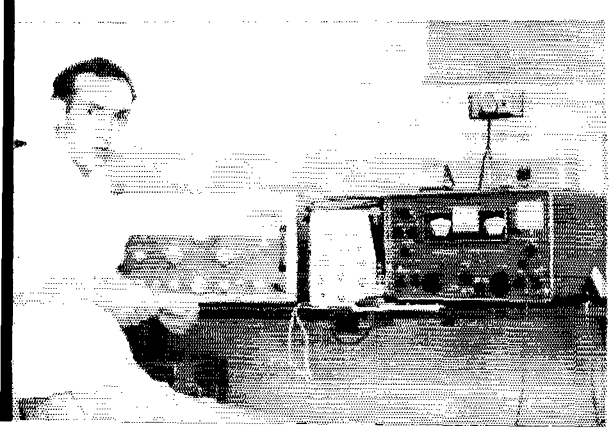
Whence:

ASIA — "EP2DM is on 14,080 or 21,250 kc. almost daily," asserts WB2FMK. "He's looking for W/K QSOs but 14-Mc. conditions to the U.S.A. have been poor since August. Javad's DX-35 soon will have a new v.f.o. EP2DM's most regular hours are *1100-1300 GMT*, mainly on 15 meters." . . . . Via ARRL Assistant Communications Manager W1YYM, more from BV1USA: "Our MARS station, of which I am the custodian, and the amateur station, *of which I am activities manager*, work very closely together. Without MARS there would be no BV1USA. A typhoon inundated our equipment last November and we had to start over from scratch." . . . . VU2s AO BB BG BZ GO GV KEZ NG NS RH RT SE and SO, Bangalore ARC members, help keep hq. station VU2TT airworthy. Secretary VU2GH writes, "The number of hams in our country is so small that we have many problems getting proper components. BARC is concentrating on popularizing our hobby, and we publish *South India Radio Amateur Newsreel*, a quarterly magazine." . . . . Syrian notes provided by W7QYA, K4RJN and WA2YBR: YK1AA works for the Damascus TV outlet, records sound for cinema companies and takes care of ground communications for the Syrian army when not carrying pile-ups on 20 phone. Rasheed was licensed back in '43 and is primarily responsible for keeping the game alive in YK-land. YK1AA, aided by K4RJN and friends, is modifying his station for greater DX coverage. Rasheed writes W7QYA who visited him recently, "I'm on the air every week end at 0500-1200 and 1400-1700 GMT using a.m. or d.s.b. on 14,172, 14,204, 14,218, 14,300 or 14,320 kc. By order of the government YKs do not operate c.w. but this restriction is temporary." . . . . Asian angles via the clubs route: XW8s AF AL AU and AV make lots of local Laos sideband QRM. . . . A kaput s.s.b. generator gave HZ2AMS a c.w. workout on 20 in late '63. . . . Political imbalances thwart Cambodian DXpeditionary overtures by Ws 4BPD 9WNV and others. . . . VS9OC is a 7010-kc. sleeper at 2200 GMT but you'll need a sturdy signal to crack the Continental curtain. . . . VS1LS may employ a 45-watter on 80 through 15 meters next month on his trip to the Andamans. . . . Single-sidebanders UH8s AY BA BO, UI8AG, UJ8KAA and UO5PK populate 14,302 kc., Sundays at 0800 GMT. . . . Turkey's TC3ZA (W3ZA) pops up on 14,085-kc. c.w., week ends. . . . KAs 2DP (K7NQT), 2LD (W3MTU), 2KS (W6CZB) and 8CG (WA5MTU) are recent FEARL membership recruits or renewals. . . . After more AP2 AP5 and YA doings W4BPD may swing back to VQ8 regions or head for Pacific outposts.

5T5s AD and AB, left and right, trade hamgab among 30-kw broadcast gear in Nouakchott. 5T5AD keeps skeds with XYL F2YR back home and soon will have a 50-X available to regale his 20-meter friends. (Photo via W4NJF)

AFRICA — "FR7ZD expects to be more active on 15 meters," reports W1WY. "Guy will be happy to make skeds with those still in need of Reunion island." Check 21,050 kc. week ends from 1600 to 1700 GMT . . . . VE7IR (G3SFD) is working in 3V8-7X2 areas with hopes of early DX action. "I'm ordering an HW-22 for future use and will modify it for 7-Mc. work. I'm a 6-and-2 man at home but I'll use slow-speed c.w. if I can come up with a rig. No more USAF and MARS personnel and equipment around here. There will be 200-ft. towers at sites where I'll be working." . . . . "You can hear me on 15 meters almost daily around 1600-1700 GMT," ET3GC (K2PWS) tells W1YYM. "Never much of a DX hound but it seems real strange being on this side of the fence. I worked twenty U.S. sixes one recent evening. The guys back home are very considerate in their operating. They usually wait till I'm finished with a QSO before calling, even if it means no contact until a future opening." . . . . "ZE4JS favors 20 c.w. with 100 watts to an 813," notes W3HNK. "George receives with a British-type 2-B." . . . . W3ZQ had to leave his KWM-2 behind when he made a three-week 7G1 visit in late '63. Flight baggage limitations . . . . Club periodicals add Africa items: VQ9HB intends a Chagos and/or Rodriguez jaunt this month with sideband emanations on 14,115 and 21,100 kc., listening on about 14,255 and 21,405-21,450 kc. C.w. hounds should watch 14,025 and 21,025 kc. Harv may hit 10 meters also, and will try to exploit 0200-0500 GMT long-path 14-Mc. openings. ZL1AAS is mentioned in connection with February Rodriguez DXpectations, too. . . . Be alert for probable Rio de Oro, Annobon, Ifni, etc., developments by EA2s CA and CQ (PY2s PA and PE) this month. K4TWF may be there, as

(*Continued on page 154*)



VS9ADV (G3NCP) has produced his share of W/K/VE QSOs from 4W1 MP4M VS9O and VS9K regions. Don's Aden layout feeds a 14-AVS rotary.

QST for

Correspondence From Members-

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

John F. Kennedy

¶ The NZART wishes to express their deep concern and sincere sympathy with their fellow amateurs of ARRL in the great loss to the world at large and to the U. S. A. in particular brought about by the assassination of President John F. Kennedy. — *R. T. Woodfield, ZL2VN, President, New Zealand Association of Radio Transmitters.*

To the family of John Fitzgerald Kennedy, we extend our sincere condolences. To our nation and our government, we pledge our continued support.

Members of East Bay Section ARRL

[*QST* wishes to acknowledge with sincere appreciation receipt of many similar expressions from individuals, clubs and national societies, particularly the following:

Radio Club Argentino
Liga dos Amadores Brazilieros de Radio Emissao
Radio Club de Chile
Reseau des Emetteurs Francais
Deutscher Amateur Radio Club
Radio Society of Great Britain
Club de Radioaficionados de Guatemala
Radio Club D'Haiti
Irish Radio Transmitters Society
Radio Club Uruguayo — EDITOR]

QSL ART

¶ I would like to thank Ted Wilds, KZ5SW/W4GYD, for the article "The Art of QSLing" in October 1963 *QST*. It helped me very much since I am a newcomer to amateur radio. — *Steven Hamilton, WNØGZX, Lenox, Iowa*

QSL NEEDED

¶ I find it harder to procure a QSL from a new state than to actually work the new state. A QSL is not likely to send one to the poorhouse, and us newcomers to the wonderful avocation of amateur radio can sure use those verifications for WAS. Will you please mention this problem again before the situation grows to awesome proportions. If the present situation persists, I will have DXCC before WAS! — *Allan Tarbell, K1UJB, Windsor, Conn.*

QSL AVAILABLE

¶ As my log testifies, Utah is a rather hard one for a lot of the other hams around the world. I have kept records over the years whenever a station says "You are my 1st Utah contact." Of my modest 101 DX countries, 32 have said I was their first Utah. This gave me the idea: Why not try to make my WAS with each state confirmed as "You were my first Utah contact?" Well, so far I have confirmed 41 states, but need N.Dak., Mont., Wyo., Vt., N.H., S.Car., W.Va., and what may be my Waterloo — Utah. Anyhow I'd be most happy to arrange a sked with anyone in above states who hasn't worked Utah (or for that matter anyone anywhere who wants a Utah QSO) and I QSL 100%. — *Herb Wright, W7POU, Salt Lake City, Utah*

BAILEY'S THEOREM

¶ I enjoyed reading Mr. Harris' review of the natural laws which govern the blood pressure of every amateur (Harris's Theorem, *QST*, Dec., 1963).

Recently, a new theorem was proposed by one of my friends.

Bailey's Theorem:

A group of N people working together will have, at maximum, a total effective Intelligence Quotient of

$$(IQ)_{eff} = \frac{1}{\frac{1}{(IQ)_1} + \frac{1}{(IQ)_2} + \ldots + \frac{1}{(IQ)_n}}$$

Since this result is intuitively clear, the proof will be omitted here. This discovery has opened a new field and work is now proceeding on corollaries. — *Richard E. Bakula, W4RXS/4, Gainesville, Florida*

THE ABOMINABLE "WE"

¶ I just concluded my 17th consecutive phone contact in which the other operator used the rhetorical "we"!"

Will you please write a strong article clearly pointing out how normal, natural and pleasant it would be if the self-modest individuals would *properly* use the word "I" instead of this abominable "we?"

In the event it is not within your province to write this recommended article, I shall either take a full-page advertisement in *QST* on the subject or drop out of ham radio after being in it for 35 years! — *R. H. Ebenreiter, W9LXC, Sheboygan, Wisc.*

PRACTICE MAKES PERFECT

¶ I wish to thank the League for its additional code practice each evening preceeding the 0100 GMT bulletins. I have been trying to get my speed up for some time now and could not find enough good code to copy, hi hi. This will certainly provide an excellent opportunity for me to improve my copy. — *Bob Schindler, VE3FIS, Scarborough, Ontario, Canada*

¶ Today at 8:15 A.M. EST I was in QSO wid WB2KUN (Art). Sez I to myself, "This cnap has bn coached by sum OT" But when I asked him "how cum?" he replied "I learned by listening to W1AW." — *George Rogers Sr., W1LVY, New Bedford, Mass.*

NET SERVICE

¶ Amateur radio exists because of the service it renders. One of the main services performed by amateur radio is the handling of traffic, mainly through nets. However, there are many hams who do not tune carefully before they transmit to be sure they aren't disrupting a net in operation. A particularly strong station on a new frequency can

(Continued on page 138)

Operating News

F. E. HANDY, W1BDI, *Communications Mgr.*
GEORGE HART, W1NJM, Natl. Emerg. Coordinator
ROBERT L. WHITE, W1WPO, DXCC Awards
LILLIAN M. SALTER, W1ZJE, Administrative Aide
ELLEN WHITE, W1YYM, Ass't. Comm. Mgr.

Joint NNJ Public Service Corps Type Drill a Success. Some months *before* the October announcement of the new Amateur Radio Public Service Corps K2ZFI (SEC) and W2QNL (RM) NNJ, with an assist from SCM W2CVW, completed a very successful Simulated Emergency Test of joint public service significance. The test emphasized the principle that AREC and NTS nets in any part of the nation may be alerted successfully for joint disaster operations. They can be manned as fully as possible to meet at 3-, 6- or 12-hour intervals (speeded up) instead of their normal 24 hours. In the ARPSC plan one member of each AREC or RACES group is normally to be assigned to maintain radio or other contact with the daily NTS-section net. This principle of the AREC nets with local coverage working into already organized greater-coverage connecting nets was tested in NNJ. Quoting the report of this first test "AREC and NTS worked together *well*! We had over 50% AREC-EC participation. NJN covered 3695 kc. all morning on the 25th. We had *complete exercise results* by NJN net time at 2300Z. We hope to run four drills a year. This will be on an NNJ section-wide basis and will continue to build up the ARPSC idea."

160-Meter Use Increasing. Les Sterling, W7GBL (Mont.), puts a fine signal into Connecticut. His news and views on use of 160 can be especially helpful to the many newcomers to this band: "WCC Chatham, KPH San Francisco, and WNU New Orleans, all work nighttimes near 2040 kc. Their signals are excellent indicators of band conditions. Under good winter night conditions we suggest that those calling CQ also check the *opposite high power segment* for possible DX replies. *Area nets and local QSOs* should take place more in the band centers where locals override interference; this will facilitate DX success at the band ends. Listen *under* such stations as WØRIII and VE4RO. They make many QSOs on both coasts. You may find other coastal stations behind their signals just waiting to call them. Keep DX contacts short . . . code speeds modest. Use QSZ procedures as needed when signals aren't strong."

MONITOR PREFERABLY WITH GEAR THAT *DIRECTLY SAMPLES* YOUR ON-THE-AIR SIGNAL

We can save on-the-air time perhaps by identifying these 160-band portions by numerals. You can refer to the band segments as (1) 1800–1825 kc., (2) 1875–1900 kc., (3) 1900–1925 kc., (4) 1975–2000 kc. In calling, for example, a "CQ 3" or SEG 3 after your CQ can indicate that you are looking for replies in that frequency range. When no indicator is given this usually means one is tuning his own frequency segment. Operators limited to low power in one frequency range can, after contact is made, ask others to listen for them in a different segment where permitted to use higher power. Such a request as PSE LSN SEG 3 can accomplish this. Nets having skip troubles are missing a bet if the Net Manager doesn't get certain members on with some home-built rigs using a designated alternative 160-meter net frequency these winter months!

Are You Sharp on Frequency Measuring? It's a fact that the more closely and accurately we amateurs can measure our frequency the wider our bands, in effect. FCC determines our compliance with FCC rules by monitoring the signal effects of our stations. If we can measure with extreme precision, we do not have to work so far inside the band to be sure we are not inviting FCC citations. Whether it's to see that sidebands are properly confined in assigned segments, or if the modes used in certain bands are authorized for a given operator, FCC first determines the matter of *frequency*. Our regs (par. 12.135) state that amateur licensees shall provide for measure-

ment of frequency, shall establish procedure for *making* such measurement regularly, and that this must be independent of the means used to control the transmitter.

This background is by way of leading up to our announcement of the first ARRL Frequency measuring test to be held for 1964. On the night of *February 13* we schedule the runs and give the approximate frequencies to look for from W1AW. All active amateurs are invited to try to pick up the W1AW signals and submit measurements. For those with 100-kc. crystals and multivibrators, LMs, BC-221s or frequency counters, here is a chance to check the precision with which you can measure under practical on-the-air operating conditions. All who participate will have their results compared with the official measurements five to six weeks after the run, when the arithmetical work has been completed. If the parts per million accuracy is good enough, you are then eligible for appointment by your SCM in the frequency-measuring Official Observer category. For this you have to be willing to dig in and use the demonstrated skill helping other amateurs, by sending the ARRL cooperative notice forms. Check details, please, in the full FMT announcement which appears elsewhere in these columns.

CD Staff Note. It gives us pleasure to announce that Pete Chamalian, K2UTV, has joined our CD staff. As ORS and OBS he's well known to all the CD gang. He expects to keep in touch with netters in NYS 2RN and EAN from W1AW as there's opportunity. His specialty will be staff work that backs up our National Emergency Coordinator and assists in development of the organized patterns for both the NTS and AREC divisions of the Amateur Radio Public Service Corps.

Pointers for Basic Operating. Editor Burgess, VE3EBI, in *Grey Bruce Net News* stresses some points of good sending. These are equally valid for both old and new hams. Since correct habits and objectives are especially easy to acquire and important in the early part of one's amateur operating, we direct our remarks to the newcomers especially. (Everything is easier if you *start right*!) Here's what VE3EBI has to offer: (1) proper spacing is essential; (2) use of a hand key is imperative until good code may be mastered with use; and (3) modest speeds are dictated by good judgment in most amateur work.

"The first and worst practice is sending faster than your hand can send. Some hams try to go like mad, but their dot spacing, dash length, proper character spacing and word spacing go all to pieces. Tapes on some of these fellows repeated back cannot be interpreted even after trying some five times at regular speed and half speed. The obvious need is that the individual *slow down;* strive for perfection and to attain it observe care in forming (and spacing) each character.

"Next I must mention the operator with the automatic key, one that also makes dashes. For three or four words these may give forth beautiful Morse, then it goes all nuts, more like teletype. Such an operator may back up and try again. He fluffs the *same* word, this time adding a lot of dots at the end for effect. Now these fellows know right away they are making mistakes. Don't use an automatic key if you can't handle it perfectly. Back to the oscillator and buzzer and don't show your very serious limitations as an operator until you have fully mastered the monster.

"Finally we run across the operator who goes like mad . . . faster than the fellow at the other end of the circuit. *The sign of a good operator* is to adjust his sending speed to never exceed that which he can take solid. A stock "comeback" in my early years was 'QRM knocked you out that time; got report but that was all.' So 'Old Speedy' has to waste time and repeat all the previous transmission again. This *is* a waste of time. Take one's cue from the sender and adjust speed accordingly!"

FREQUENCY MEASURING TEST FEBRUARY 14

ARRL invites every amateur to try his hand at frequency measuring when W1AW transmits signals for this purpose starting at 0230 GMT, Feb. 14. *CAUTION:* Note that since the date is given in Greenwich Mean Time, the early run of the frequency measuring test actually falls on the evening previous to the date given. *Example:* In converting, 0230 GMT Feb. 14 becomes 2130 EST Feb. 13. 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 3502, 7043 and 14,038 kc. About 4½ minutes will be allowed for measuring each frequency, with long dashes for measurement starting about 0236. 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 0530 GMT, February 14, W1AW will transmit a second series of signals for the Frequency Measuring Test. Approximate frequencies will be 3510, 7062 and 14,074 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 over-all *average* accuracy, as compared with readings made by a professional lab.

A.R.R.L. ACTIVITIES CALENDAR

(Dates shown are per GMT)

Feb. 1–16: Novice Roundup
Feb. 6: CP Qualifying Run — W6OWP
Feb. 8–9: DX Competition (phone)
Feb. 14: Frequency Measuring Test
Feb. 15: CP Qualifying Run — W1AW
Feb. 22–23: DX Competition (c.w.)
Mar. 6: CP Qualifying Run — W6OWP
Mar. 14–15: DX Competition (phone)
Mar. 17: CP Qualifying Run — W1AW
Mar. 28–29: DX Competition (c.w.)
June 13–14: V.H.F. QSO Party
June 27–28: Field Day

OTHER ACTIVITIES

The following lists date, name, sponsor, and page reference of *QST* issue in which more details appear.

Feb. 8–10: NYC-LI QSO Party, South Shore Amateur Wireless Assn. (p. 110 this issue).
Feb. 15–16: Vermont QSO Party, Central Vermont ARC (p. 116, this issue).
Feb. 29–Mar. 1: The French Contest, REF (p. 88, last month).

Identifying Station Properly. Our regulations require both stations to give complete identification in call-ups and radio contacts. FCC's Sec. 12.82 fully spells out the requirements necessary to assist government monitoring. The FCC rules, as established, do take practical break-in operation into account. Wherever a station has *break-in* with back-and-forth transmissions (not over three minutes) it is required that the calls be sent but *once every ten minutes* . . . then additionally at the very beginning and end-of-work.

Some pointers may help stations keep clear of FCC citations such as are given for *not* identifying properly or as frequently as required by the FCC (12.82) regulation.

1) To *show* that you are *using break-in*, start each such transmission with "BK" (or use the word *break* in voice transmission). This tells monitoring personnel why no dual identification by calls is given at that point.

2) In back-and-forth exchanges shorter than three minutes be careful *not* to terminate with VA (end of work) or other ending signals that create a formal end of transmission or of correspondence (*such as would call for identification* of station). If one pauses after sending AR (end of message), B (more to follow), "QSL" or "HW," *not* using any end-of-correspondence prosign, then back-and-forth exchanges of less than 3-minute duration are invited.

3) When a transmission *runs more than 3 minutes* remember to add *both call identifications* as required by FCC.

4) Regardless of back-and-forth exchanges, identifications are required at least as often as at 10-minute intervals in such correspondence.

For new amateurs there may be a temptation to leave off the W-K- or other prefix and/or the numeral in one's call. Using just the suffix letters for a "familiar" identification is all right for conversational purposes *between identifications*. But such informality does not take the place of full proper identification. FCC often cites amateurs for any such incompleteness when in a necessary context requiring full call identification. Perhaps an example of how to use calls at the beginning and termination of correspondence may be helpful. FCC requirements are met in the following: ". . . VA W6FNE DE W1BDI," or ". . . CL WØRRN DE K1GGG."

Novice Roundup Time. The annual "NR" runs from 6 P.M. Feb. 1 to 9 P.M. Feb. 16, local time. This activity is entirely to help the Novice in testing his station coverage and operating ability. Any operator, Novice or otherwise, is invited to keep a list of his Novice QSOs and their section locations for the period of the Roundup. Novices can work each other and also the Old Timers who may likewise call CQ NR. For the most part, OTs work near, but outside, the Novice segments to give them contacts. The Roundup is an activity in which one can put in just a little time each day and end up with a sizeable list. You can use page 6 of this issue of *QST* for a check-off list of the Sections, as contacted. All scores are welcomed for the *QST* account; only Novices are eligible for certificates. Novices who go in for the Roundup invariably work many new states on the road to WAS. For others, the Roundup is a chance to welcome and meet some of our newer amateurs. It is reported a fine fraternal change of pace from everyday operations for those who have been in the amateur ranks a long time. Readers will please see the detailed announcement of the Roundup in January *QST* . . . and don't miss the results you can rack up working in the NR.

ARRL's 30th DX Competition. One of the big operating events of each year looked forward to by the DX gang is the ARRL DX contest. The rules appeared in January *QST*, so we'll not dwell on them. Promotional invitations to national societies and to some rare DX spots were mailed as early as last fall and should bear fruit. Many overseas operators will be looking for new states in the contest to advance their WAS and WAVE standings; we have even written specially to our Canadian brothers to urge that stations in the provinces be in the fray to help provide rare ones for the DX. There are completely separate phone and c.w. contest sections. Please observe the timetable printed with the announcement most carefully. Avoid bad signals, a.c. notes, off-frequency calls, etc., since these things as noted by FCC or Observers can be disqualifying. We're hopeful that new workers for DXCC will find the going fruitful and that conditions favor everybody with some excellent operating. Best luck and DX.

ARPSC Activated in Los Angeles Disaster. As this form goes to press in December we have one bit of news about amateur work in the disaster which was caused by the bursting of a reservoir in the Los Angeles area. It comes in the form of a radiogram from Director Meyers, W6MLZ: "Los Angeles Section Amateur Radio Public Service Corps activated. K6BPC of the Southern California VHF Radio Club is operating. In use are 3606 kc. c.w. and 3885 kc. a.m. or s.s.b. as liaison. Portable and mobile stations have been located in the Los Angeles schools of the area for handling aid, as well as succor and inquiry messages." *F. E. H.*

AMATEUR RADIO PUBLIC SERVICE CORPS

One of the things we have continually to fight in amateur radio public service work is lack of interest (often called "apathy") on the part of the amateur body. This is something that has been with us for so long that we are quite accustomed to it; in fact, we expect it. It extends not only to the ordinary amateur, but also to our leadership functions. In many areas, there are new amateurs very much interested in being a part of our public service program who are stymied because of lack of leadership. How can an amateur, for example, participate in the local AREC program when there is no EC? How can a budding traffic man take part in a traffic net if there is no beginner's net, or no net at all, in his section?

Interest in leadership is a very important part of the over-all interest factor in public service. This cannot be accomplished at the headquarters level; there must be amateurs at local levels who are willing to devote some of their spare time to organizational leadership activities — amateurs who are not only willing but *capable* of extending the kind of leadership we need to make our ARPSC something of which we can all be proud. We need mature-minded, thinking, dedicated amateurs to step forward and take the responsibility for seeing that the things that need to be done *are* done, and properly. There is no dearth of enthusiastic, impulsive beginners who would love to take the ball and run with it, but most of them need and frankly request guidance, a helping hand, a push from those with the experience and the know-how. If they don't get it, they soon wander off into other amateur radio pursuits and are lost to us who so badly need them.

Each amateur, upon reading this, will automatically ask himself if he is qualified to lead, and, human nature being what it is, most of them will conclude that they are. If this bit of introspection is followed by a move to assume such a role, whether or not one is qualified will soon become apparent. Nevertheless, perhaps we should examine some of the qualifications herewith for the consideration of each of you, both as to your own qualifications and those of any person who might be under consideration.

Some of our elected officials have an unfortunate habit of selecting "best-liked" types for leadership roles requiring ideas and ability. Sometimes they have them, often they do not. Or, an official may make an appointment on the basis of his own personal likes and dislikes instead of after an over-all and impartial study of the candidate's qualifications. Actually the quiet, retiring type, who would not think of considering himself a candidate for the job, as often as not makes a better leader than the loud, pushy type who has a lot of "aggressiveness" and "drive." The former will feel flattered and accept gladly if called upon to do so; the latter will want to be coaxed, and will give the impression that he is doing you a favor by accepting.

While personality, financial status, location and social status, may all be things to consider, they should be minor considerations. A big business executive who drives a Cadillac, smokes expensive cigars, has a roomful of commercial equipment and talks big should not, for those reasons alone, be allowed to impress to the extent of leadership appointment. Conversely, neither should consideration of another amateur be neglected because he works behind the counter at a local radio store, drives a rickety car, can't afford cigars and uses low-powered equipment he built himself. You will say these things are fairly obvious — and still a great many groups select leaders *solely* on the basis of popularity, influence and volubility rather than seeking out and concentrating on qualities of enthusiasm and ability for the particular job to be done. Does the candidate merely want the prestige of the position, or is he anxious to do the job?

These are a few of the things that have to be considered, where more than one candidate is available. In all too many cases, the SCM or the SEC, as the case may be, has to "beat the bushes" for a qualified candidate, and usually takes whomever he can get. Most amateurs qualified to lead already have such roles in other fields and are reluctant to take on any additional load. Generally speaking, you can't go very far wrong by accepting a refusal to serve, because a "drafted" candidate usually is an indifferent one. But if you dig deeply enough into the inherent qualifications of those who are available, you can usually come up with one who will do better than a passable job. — *WINJM.*

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Pictures always decorate pages of print and make them more readable. In preparing this month's copy, we had seven photographic contributions under consideration, but only one turned out to be usable. We appreciate your trouble in sending in pictures, and this is in no sense a criticism of you for doing so, but we thought you might like to know some of the reasons why we cannot or will not use many of those received. It could save some trouble and postage for you.

Picture No. 1 was a snapshot of a prominent traffic man at work, a very good subject, with some excellent caption material, but the snap was slightly over-exposed and not contrasty enough.

Pictures No. 2 were polaroid prints of a display station at a hobby show. The prints weren't very good and the subject rather common. An excellent print or better subject might have altered the decision.

Picture No. 3 was about the same — a somewhat washed-out print of a fair station.

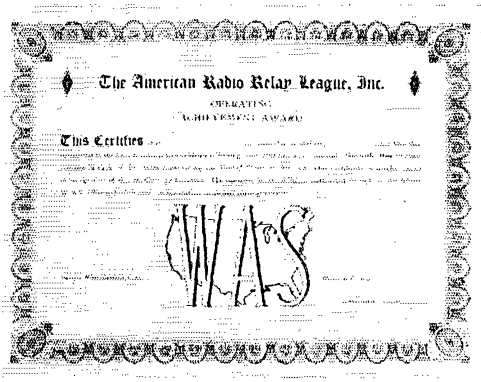
Picture No. 4 was an excellent print of a c.d. director, two boy scouts and a "radio operator," whose call was given. This one had too little emphasis on hams or amateur radio to be suitable.

Picture No. 5 was also an excellent print, but again contained too little amateur radio emphasis. Only one of four people in the picture was an amateur and the emphasis was on an entirely different, although related, activity.

Picture No. 6 was a good-enough snapshot but contained a group of far too many people too far from the camera to be recognizable without some fancy blowing-up.

The important thing to remember is that what we want most of all are pictures of amateurs or amateur radio *in action.* Secondarily, pictures in which amateurs are at least the principle subjects. Group pictures are occasionally useful, depending on who is in it and what the group represents. Pictures of individuals, at their rigs if possible, are good if the individual has some claim to fame. Pictures of equipment without amateur personnel or pictures of display stations of various kinds are usually given very low priority. In any case, the print should be sharp and contrasty (but not excessively so) for best reproduction; given these qualifications, the size of the print doesn't matter very much.

Okay? Okay, now let's have some pictures for these pages.



Have you worked and confirmed contact with all 50 states? The ARRL WAS award certifies this achievement and is available to any amateur submitting confirmations for two-way contacts with all 50. Submit QSLs alphabetically by state, enclose sufficient return postage and address your application to the ARRL, 225 Main Street, Newington, Connecticut 06111.

NATIONAL TRAFFIC SYSTEM

We are getting some really excellent NTS bulletins lately. Whether or not these are for the purpose of keeping the boys together in the face of murderous operating conditions we don't know. Going down the list briefly, there is *Traffic Lines*, a four-pager in small print (photographically reduced, we suspect) containing a wealth of information and comments regarding all traffic nets in the 2RN area. It is edited by 2RN Manager WA2GQZ.

W3UE hasn't issued any 3RN Bulletins recently, but he has overprinted our region net certificates with "Special Award and Recognition" for certain 3RN members who are outstanding.

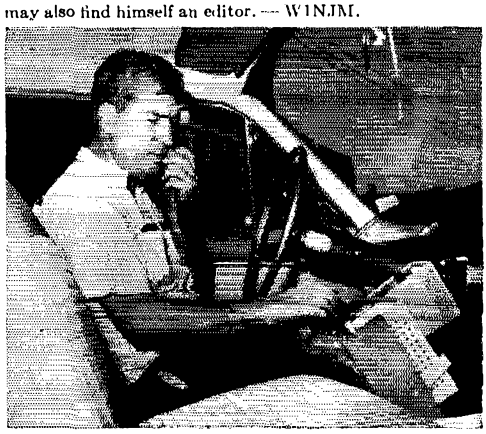
W4SIJ puts out an excellent *4RN Newsletter* on occasion; the latest one was in September, and included over five pages of real down-to-earth traffic talk. W4ZJY has been putting out an RN5 bulletin every month, about four legal pages long, with a wealth of statistics and philosophy. WB6BBO gets out a one-page "poop sheet" for her gang each month. W8CHT, 8RN manager, gets out a short (two- or three-page) 8RN bulletin just about every month. W9QLW puts out a monthly one-page newsletter for 9RN. WØBYV got out an occasional news bulletin while he was TEN manager. WØFEO also put out an occasional TWN bulletin before he had to give up the managership. We have just received an EAN bulletin which is really a knockout, two pages of data and chatter by Manager W2EZB, then two more pages of discussion of practical net operation problems by NCS K1WJD.

Then there is W9DYG's *CAN KAN*, one of the best in the circuit, and recently the new PAN manager, K4AKP 6, has come forth with some fine bulls reminiscent of some we saw not so long ago in the same hand but issued in the name of another NTS net.

Haven't seen any TCC bulletins recently, but this isn't too surprising. Those TCC directors are so busy chasing around after stations to perform the many TCC functions, then getting them to report, there isn't much time left for writing bulletins.

Everything considered, the number of NTS bulletins being produced at region and area level is little short of astounding. A good job of net managing can be done without it, and our net managers who do *not* put out bulletins are doing just this. It is an extra-curricular effort, a little added enthusiasm, plus a pinch of ingenuity. Writing a bulletin is a lot of work, and getting it reproduced in some form or other and mailing it out is both additional work and an expense. The work is free, a labor of love. The latter is paid for in various ways, usually not by ARRL, which nevertheless has limited funds for such purposes.

Yes, those who manage our NTS nets do it because they *want* to, and getting out a net bulletin is something they do on their own because it helps the *esprit de corps* of the net. A recent letter from one of our newer net managers points out that our letter of indoctrination only hints at some of the requirements that later become obvious. An NTS net manager must at once be not only the "boss," but also a work horse, a glutton for punishment and work, a bookkeeper, executive, employment agency, public relations officer, father confessor, friend, policeman, minute man, diplomat and arbiter. To this we must add one more attribute — he may also find himself an editor. — W1NJM.



November reports:

Net	Sessions	Traffic	Rate	Average	Representation (%)
EAN	30	1397	.833	47.5	99.4
CAN	30	1252	.934	41.7	100.0
PAN	30	1039	.726	34.6	100.0
1RN	56	407	.274	7.3	72.7
2RN	60	458	.178	7.6	97.6
3AN	60	409	.314	6.8	96.1
4RN	58	659	.361	11.3	95.3
RN5	60	958	.599	16.0	96.3
RN6	60	656	.305	18.0	88.2
RN7	58	376	.259	6.5	64.4
8RN	60	371	.251	6.2	90.0
9RN	55	495	.391	9.0	78.6
TEN	58	512	.393	8.8	57.3
ECN	28	114	.189	4.1	79.8[1]
TWN	30	240	.379	8.0	60.0[1]
Sections[2]	1377	8770		6.4	
TCC Eastern	120[3]	418			
TCC Central	90[3]	890			
TCC Pacific	96[3]	788			
Summary	2100	20209	CAN	8.6	CAN/PAN
Record	2025	24014	.931	12.6	100.0

[1] Representation based on one session or less per day. Others are based on two sessions or more per day.

[2] Section nets reporting (49). SCN (S.C.); TPTN, GN, 7-11, QFN (Fla.); Fla. Phone & W. Fla. Phone; RISPN (R.I.); NCN & NCSN (N.C.); BUN (Utah); CN (Conn.); SCS, SCN, SCVSN (Calif.); NTTN (Texas); KSSN & EPA (Pa.); WSBN & WIN (Wis.); GBN & OFN (Ont.); BN (Ohio); Poi (Hawaii); QMN (2 Mich.); E. Tenn. Phone, Tenn. SSB, TPN & TN (Tenn.); MDD (Md.-Del.-D.C.); VSN, VSSB, VFN (Va.); NJN, NJP, NJ6-2, NJNN (N.J.); AENT, AENP Eve, AENO, AENM, AENJ, AENB, AEND, AENH (Ala.); MSPN Eve, MSPN Noon & MSN (Minn.).

[3] TCC functions reported, not counted as net sessions.

Despite pretty poor traffic-handling conditions, we broke two November records. A record number of sessions was reported, and Central Area Net upped the all-time November "rate" from .931 to .934. If we keep going at this rate for the next couple years, while wintertime conditions continue to improve, the new records piled up should be terrific.

Practically every net manager complains about or at least mentions the havoc raised in normal net operation by long evening skip, so we won't make any reference to their individual comments herewith. EAN Manager W2EZB comments favorably about the appearance of new reps from the regions on EAN. W9CXY is helping W9DYG on CAN so Fred can take things a little easier. Traffic was down on PAN, probably girding for the big push in December. W1BVR is having problems getting representation from Vermont and N.H. WA2GQZ (Gramps!) announces the reactivation of the Second Regional Traffic Clinic, a training program for 2RN being managed by WA2VLK. W5CEZ has been awarded a special RN5 certificate for his past and continued efforts; RN5 is showing improvement in the all-important representation department. WB6BBO says that Nevada stations in RN6 are treated like "rare and precious jewels." K7JHA would like to see VE/RN7 net control stations get their reports in more consistently. W8CHT says the rumors that 8RN is falling apart are grossly exaggerated; considering everything, 8RN is doing well. W9QLW is gradually filling out the 9RN roster as he gets into the swing of managership. WØLGG, who has been acting manager since WØBYV's resignation, now takes over TEN officially; she hopes for better representation from Manitoba and North Dakota.

Here's K3NSN, one of 23 amateurs who operated mobile, portable and fixed in Philadelphia's "Victory Over Polio" campaign on Nov. 2. The city was broken into four sections, each with its own net control. Mobiles operated from supply centers, moving supplies from four drug companies to distribution centers throughout the city. It was quite an operation.

Transcontinental Corps. W3EML is trying hard, in coordination with W7DZX, to get the J-D function (Pacific to Eastern Area) working by signing up stations who can work during the daylight hours. Erratic, changeable conditions make this very difficult. W7DZX and W4ZJY are getting together on extra TCC skeds to take care of the expected Christmas rush. November reports:

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	120	67.5	1326	418
Central	90	93.3	1509	890
Pacific	96	73.3	1576	788
Summary	306	76.7	4411	2096

The TCC roster: Eastern Area (W3EML, Director) — *W1s* EMG NJM, *W2s* MTA GVH, *WA2s* VLK BLV KQG, *K3s* FHR MVO, W3EML, K4POA, *W4s* DLA DVT, *W8s* CHT QFO ELW. Central Area (W4ZJY, Director) — W4ZJY, WA4AVM, *W5s* PPE QMJ, *K9s* DIIN ZLA, *W9s* AKV CXY DYG JOZ VAY, K*Ø*FPC, W*Ø*s DBR SCA. Pacific Area (W7DZX, Director) — K4AKP/6, *K6s* DYX GID, *W6s* EOT HC, *WA6s* BRG ROF, WB6BBO, W7DZX, K*Ø*s EDH EDK.

DIARY OF THE AREC

Mad dog! Mad dog! On Oct 5, 1963, WA4PUX was contacted by the Huntsville, Ala., city police requesting amateur assistance in a search for a rabid dog reported to be at large in the city. Alabama Emergency Net "R," under the management of W4ERX, was activated on 50.55 Mc. Seven mobiles reported in and joined the search. After a two-hour search, not even a slightly irked dog was found, but the emergency need existed and the AENR boys filled it. — *W4NML, SEC Alabama.*

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On Oct. 14, K5WHB/8 was mobiling on U.S. Route 2 near Sault Ste. Marie, Mich., when he came upon an automobile accident on a very lonely part of the road, 20 miles from the nearest telephone. K5WHB/8 made contact with K8VXC in Iron River, Mich. and K9IBII in Waukesha, Wis. K8VXC notified the sheriff's office in Crystal Falls, which went through police communications channels to the state police in St. Ignace. K8ZSM also heard the contact and contacted authorities in Sault Ste. Marie. W8OQH at Cedarville, near St. Ignace, also was "reading the mail," and he, too, contacted state police. Within 42 minutes from the time K5WHB/8 made his first call, the ambulance had driven the 27 miles from Sault Ste. Marie to the accident scene and was on its way back to the hospital with the victims — thanks entirely to some alert amateurs. — *W8OQH.*

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From Ft. William, Ont., we hear that *VE3s* AYZ EEN ECU and AVS, all mobile, were active in a search and rescue operation involving a lost hunter in that area on Nov. 10. VE3ANP also assisted in the communications. Their radio communications were instrumental in locating the missing nimrod. — *VE3NG, SCM Ontario.*

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On Sept. 4, EC WA5ABU, of Washington County in Southern Texas, offered the assistance of his AREC group to provide communications for the Soil Conservation Service in Brenham, Texas, which was conducting a radiological test to check readiness in case of atomic attack. Two trucks were sent out, one to the east and one to the west. The latter was equipped with a 2-meter transceiver and a small 5-element beam, while the former was without radio equipment. A specially-installed base station received reports from the radio-equipped truck and relayed it to the headquarters in the county courtroom, where calculations based on the data received could begin at once. Calculations based on data from the other truck had to await its return, with consequent loss of much time. Communications were perfect at all times during the test. Five amateurs participated. — *WA5ABU, EC Washington County, Texas.*

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During the Delaware County (Pa.) Fireman's Assn. annual training school on Sept. 7-8, amateurs of the AREC and the Mobile Sixers were used to coordinate various sites of the school throughout the county and to keep the instructors informed on what was going on over the entire system. The system enabled the director of the school to keep in touch with his various assistants. Both fixed and mobile units were used. Seven AREC members of the Delaware County group participated under the leadership of Assistant EC K3RRV and W3UKG, president of the Mobile Sixers. — *W3FLP, EC Delaware County, Pa.*

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Our October SEC reports (39) fell one short of the 1962 record of forty, but the number of AREC members (18,856) represented is up almost exactly 2000. No new sections were heard from leaving the total in this department at 54 for 1963. A direct proportion based on October reports as a means of estimating our total AREC membership would give us a figure of 35,269. A big crowd, but not a high enough percentage of over 250,000 amateurs.

October reports: E. Mass., Del., Va., E. Bay, Alberta, So. Texas, Ohio, Mich., Ark., Tenn., Minn., Maine, Wash., Okla., Ore., Ala., No. Texas, No. Dak., Nevada, N.C., Ind., N.N.J., Utah, W. Pa., S.C.V., Ariz., Kans., Mo., So. Dak., NYC-LI, N.M., B.C., Iowa, E. Pa., R.I., Ga., Los A., Ont., E. Fla.

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for November Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W3CUL	361	3983	3656	297	8297
K*Ø*ONK	167	3023	2099	122	5411
K6BP1	73	2522	2170	201	4966
W6YDK	1127	1052	1039	13	3231
W9IDA	14	1210	1158	6	2388
W*Ø*LGG	137	1027	895	51	2110
W9JOZ	30	929	914	2	1875
W1PEX	10	624	568	36	1268
W3VR	46	601	579	8	1234
K9KZB	17	591	578	13	1199
WA9AKE	19	571	562	4	1156
W3IVS	19	543	543	6	1111
W7BA	2	557	540	11	1111
W6RSY	35	404	287	131	857
WA9CCP	24	414	211	196	845
W6JNK	28	408	187	221	844
W*Ø*BTR	17	407	401	5	830
W8UPH	12	396	332	62	802
W7DZX	13	355	323	4	695
W3EML	52	342	219	4	847
K3DKH	9	310	302	8	629
W4ZJY	17	350	235	4	606
WA4BMC	151	234	189	31	605
W5CEZ	9	320	272	3	604
WA*Ø*ARA	57	269	237	32	595
W*Ø*SCA	13	291	290	1	595
W4SGH	542	25	21	4	592
K3BHU	11	289	274	14	588
K4AKP/6	14	281	249	32	576
K7CTP	42	269	159	95	565
W9PHR/5	33	382	238	12	565
K4EHY	77	266	190	26	559
K7WD	33	257	246	5	541
W5DTA	7	262	218	51	538
W2EW	53	240	49	189	531
WA2GPT	12	269	231	18	530
W2MTA	22	251	222	24	519
W1TXL	91	218	180	16	505
Late Reports:					
W6WPF (Oct.)	33	588	557	31	1209
W6GYH (Oct.)	157	268	264	2	691
WB6BBO (Oct.)	56	388	234	24	602
K4AKP/6 (Oct.)	29	262	210	52	553
K*Ø*IHA (Oct.)	6	263	238	25	532

More-Than-One-Operator Stations

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W6IAB	643	3830	3515	321	8309
KR6NO	63	3177	3134	43	6417
KR6GF	1551	1182	1127	34	3894
KR6CP	2991	176	175	1	3343
KR6DI	741	975	963	12	2691
KR*Ø*MH	1287	52	25	27	1391
KR6MB	1091	59	22	37	1209

BPL for 100 or more *originations-plus-deliveries*

K3GJD 230	K8TFE 135	WB2ALF 104	
W9NZZ 202	WA6RUS 130	K2SPG 104	
W7APS 183	W8DAE 129	WA2CCF 100	
K3QOO 180	K8GOU 126	Late Reports:	
K6CIZ 165	WA*Ø*BYO 118	WA4ECY (Oct.)	125
K4PXY 151	WA8DGE 115	WA4KBU (Oct.)	125
WA4KBU 150	W4RHA 112	WA2TQT (Oct.)	109
K9IMR 137	K8CIP 112	WA8DZP (Oct.)	107

BPL medallions (see Aug. 1954 *QST*, p. 64) have been awarded to the following amateurs since last month's listing: K1WKJ, WA2KQG, K4CDZ, WA6KWV, VE7BHH, VE7BJV.

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 more or 100 or more originations plus deliveries for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

ELECTION NOTICE

To all ARRL members residing in the Sections listed below.)

You are hereby notified that an election for Section Communications Manager is about to be held in your respective Sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are *required on each* petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been a licensed amateur for at least two years and similarly a full member of the League for at least one continuous year immediately prior to his nomination.

Petitions must be received at ARRL on or before 4:30 P.M. on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, and station call of the candidate should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, *with no time to return invalid petitions for additions*, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

The following nominating form is suggested. (Signers will please add city and street addresses to facilitate checking membership.)

Communications Manager, ARRL [place and date]
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the . . . . . Division, hereby nominate . . . . . ARRL Section of the . . . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names of all eligible candidates.

You are urged to take the initiative and file nominating petitions *immediately. This is your opportunity to put the* man of your choice in office.

— *F. E. Handy, Communications Manager*

Section	*Closing Date*	*SCM*	*Present Term Ends*
West Indies	Feb. 10, 1964	William Werner	Aug. 10, 1963
San Joaquin Valley	Feb. 10, 1964	Ralph Saroyan	Apr. 10, 1964
Alaska	Feb. 10, 1964	Kenneth E. Koestler	Apr. 10, 1964
Tennessee	Feb. 10, 1964	David C. Gozgio	Apr. 15, 1964
Arizona	Feb. 10, 1964	Kenneth P. Cole	Apr. 15, 1964
Louisiana	Mar. 10, 1964	Thomas J. Morgavi	May 31, 1964
Maritime	Apr. 10, 1964	D. E. Weeks	June 11, 1964
Quebec	Apr. 10, 1964	C. W. Skarstedt	June 11, 1964
Eastern Massachusetts	Apr. 10, 1964	Frank L. Baker Jr.	June 15, 1964
Ontario	Apr. 10, 1964	Richard W. Roberts	June 15, 1964
South Carolina	Apr. 10, 1964	Lee F. Worthington	June 25, 1964

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

Hawaii	Lee R. Wical, KH6BZF	Nov. 11, 1963
Eastern Florida	Guernsey Curran, W4GJT	Nov. 11, 1963
Wisconsin	Kenneth A. Ebneter, K9GSC	Dec. 10, 1963
Western Florida	Frank M. Butler, Jr., W4RKH	Dec. 15, 1963
East Bay	Richard Wilson, K6LRN	Jan. 10, 1964
Eastern New York	George W. Tracy, W2EFU	Feb. 10, 1964

In the Saskatchewan Section of the Canadian Division, Mr. Mel Mills, VE5QC, and Mr. Jack Robinson, VE5BL, were nominated. Mr. Mills received 59 votes and Mr. Robinson received 34 votes. Mr. Mills' term of office began Dec. 17, 1963.

Briefs

The New Mexico award winner for the September V.H.F. QSO Party should be K5KJW with a score of 28. In addition, add the score of W5IXS to the N. Mex. tabulation with 22-11-1-AB. The Michigan winner was W8LCJ, with 1937-149-13-AB. The total score of the Oshtemo RC (multi-op. K8TIW) should read 3258.

In the December Field Day report, the Haleyville ARC belongs in 4A, not 7A as inadvertently reported.

In Class C, the score shown with K6OJD/6 belongs to K6ODJ/6.

1963 A.R.R.L. SWEEPSTAKES

High-Claimed Scores

Following are the high-claimed scores for the 1963 ARRL Sweepstakes Contest held in November. Included are only those *claimed* c.w. scores over 150,000 points, and those *claimed* phone scores over 100,000 points *received* by copy deadline. *QST will carry the full official Sweepstakes* Results as soon as checking is completed. Figures below show the score *claimed*, number of QSOs, and the number of different sections worked.

C.W.

W9IOP	264,828-	1441-	74
W5WZQ	253,173-	1389-	74
W4KFC	238,893-	1317-	73
K6ASL	235,968-	1277-	74
WA4NGO	235,875-	1286-	74
K4LPW	234,210-	1276-	74
K4GSU	219,948-	1198-	74
K4TEA	203,500-	1101-	74
K6VVA	200,725-	1092-	74
K5RHZ	199,800-	1110-	72
W4DQS	198,353-	1076-	74
K2DGT	197,210-	1066-	74
WØASO	196,226-	1130-	71
W3MVB	194,253-	887-	73
W8NBK	189,252-	1037-	73
W6UTV	186,480-	1008-	74
W3CGS	186,388-	1008-	74
WA5CBL	185,760-	829-	72
W9RQM	185,370-	1004-	74
K5OCX	184,860-	1043-	72
WB2APG	184,781-	1013-	73
W3BES	183,890-	1015-	71
W2OIB	182,683-	1001-	73
K2GUN	182,435-	857-	71
K3JQU	182,226-	1020-	73
WA6GFY	178,056-	1252-	72
W5DWT	171,110-	969-	71
W3MFW	171,000-	950-	72
KØSLD	170,273-	963-	73
W9ZAB	170,200-	920-	74
WA2WBH	170,135-	960-	71
K2EIU/5	165,510-	922-	72
K4CFD	162,057-	944-	71
W8OYL	161,695-	886-	73
W6SBB	161,100-	901-	72
KØDHH	157,590-	949-	68
W3ALB	156,960-	872-	72
W9RCJ	156,325-	845-	74
W3TMZ	156,100-	892-	70
W3MWC	155,960-	863-	73
WØJPH	152,295-	862-	71
KØBHM	152,075-	885-	70
W8LQA	151,851-	859-	71
W3GHM	151,710-	850-	72
WØWYJ	151,585-	854-	71
W4FRO/5	150,867-	826-	74

PHONE

K5MDX	223,332-	1006-	71
W7BSW	169,608-	764-	74
W3ZKH	150,660-	701-	72
W5KC	148,800-	712-	70
K5ALU	125,770-	600-	71
K6CYG	125,132-	607-	69
KØSCM	118,218-	591-	68
K9BGL	116,382-	574-	68
W1BU	115,730-	832-	71
KØMIC	115,220-	823-	70
KØMMS	112,761-	561-	67
W4JLW	111,754-	763-	71
W9AQW	111,492-	559-	68
K9VKH	109,296-	506-	72
W1FRR	104,040-	725-	72
KØUWZ	103,113-	513-	67
K4WJT	102,720-	535-	64
WA5ALB	101,175-	476-	71
K9PNV	100,800-	480-	70
K3KLQ *	100,912-	518-	65

* Multiple-operator station

DXCC Notes

Announcement is hereby made of the addition to the ARRL Countries List of the *International Telecommunications Union Headquarters at Geneva*. This listing will appear on our list as 4U1. . . . ITU Geneva. Acceptance of the ITU Headquarters as a separate entity on our Countries list is based on "distinctively separate administration" (Point 1 of our criteria; see July 1963, *QST*).

Confirmations for contacts with the ITU Headquarters at Geneva may be submitted for DXCC credit starting April 1, 1964. Confirmations received for this listing before April 1, 1964 will be returned without credit. Those credits that have been given for contacts with the ITU Headquarters at Geneva toward the Switzerland listing will be automatically transferred upon submission of a confirmation for a Switzerland contact. This, however, may not be done before April 1, 1964.

DX CENTURY CLUB AWARDS

Honor Roll

The DXCC Honor Roll consists of the top ten numerical totals in the DXCC. Position in the Honor Roll is determined by the first number shown. The first number represents the participant's total countries less any credit given for deleted countries. The second number shown represents the total DXCC credits given, including deleted countries. Positions in cases of ties are determined by date of receipt. All totals shown represent submissions received from November 1 through November 30, 1963.

W1FH....306/332
W2AGW...306/330
W6CUO...306/331
4X4DK...306/324
W8BRA...306/329
W3GHD...306/330
KV4AA...306/330
CX2CO...306/327
W1GKK...306/331
W2TQC...306/325
W9RRI...306/331
W7GUV...306/329
W8JIN...306/331
W8UAS...306/327
W4DQH...306/330
W4GD....306/327
PY2CK...306/329
W9NDA...305/329
W7PHO...305/323
W8KIA...305/329
W8BF....305/326
W8DMD...305/327

W8MPW...305/323
W2LPE...305/326
W9YEV...304/328
W1ME....304/327
K2GFQ...304/325
W5ADZ...304/326
W9HUZ...304/324
W9LNM...304/327
K3UPG...304/328
W4QCW...304/321
W2JT....304/323
W8KML...304/325
W1BIH...304/328
W5MMK...304/325
W2BXA...304/328
W3LMA...304/326
W0DU....304/326
W0QVZ...304/325
W8JBI...304/323
W3KT....303/327
W2HMJ...303/323
W7GBW...303/327

W5ASG...303/327
G4CP....303/327
W6YY....303/323
W8LKH...303/323
W6GPB...303/324
W6FBG...303/328
CE3AG...303/327
W8EWS...303/327
W1AIW...303/326
W1JYH...303/326
W2DEC...303/319
HB9J....303/327
W4TM....303/325
W1CLX...303/326
DL3LL...303/319
G3FKM...303/320
G2PL....303/326
W6AM....302/327
W3JNN...302/326
W5ABY...302/319
W5KC....302/325
W2BOK...302/319

W2ZX....302/321
DJ1BZ...302/320
K2DCA...302/319
VE7ZM...302/326
W3JTC...302/325
W2LV....302/321
W8BKP...301/323
LU6DJX..301/324
W2WZ....301/324
W3ECR...301/318
OE1ER...301/323
W0ELA...301/324
W5CKY...301/320
W2SUC...301/318
K6ENX...300/317
W5AFX...300/325
W4AIT...300/323
W9AMU...300/317
W8DAW...300/323
W7ENW...300/324
W6GYV...300/318
W0BFB...300/319

W0QDF...299/312
W4ML....299/319
W2FXN...299/313
K4LNM...299/313
G3YF....299/321
W0SYK...299/317
W2OKM...299/317
W2ZGB...299/315
W4LYV...299/319
G3AAM...298/322
W1ZW....298/315
K2BZT...298/315
K6EVR...298/315
W7AC....298/322
G8KS....298/316
W4VPD...298/315
W2QHH...298/319
W2GUM...298/320
W4GXB...297/318
W1HZ....297/315
W2UVE...297/315
W0NTA...297/317

Radiotelephone

W3RIS....306/331
CX2CO...306/327
W9RRI...306/329
PY2CK...306/329
W7PHO...305/323

4X4DK....305/323
W8GZ.....305/328
W8BF.....305/326
W1FH.....303/324

VQ4ERR...303/325
W8KML....303/324
W6YY.....302/322
PY4TK....302/319
W4DQH....302/323

W2ZX.....302/321
W3JNN....300/321
W0AIW....299/320
W8PQQ....298/315

W2BXA....298/320
W2JT.....297/311
W6AM.....296/320
W4DCW....296/309
W9JJF....296/313

New Members

From November 1 through November 30, 1963, DXCC Certificates and Endorsements based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the amateurs listed below.

F8KJ.....148
LA8LG....144
DL5HI....129
DJ2ZX....126
F8IH.....126
W2ANX....124
VE4MP....123
W1DPJ....122

K7BVZ....119
SM3BNV...118
W6UMI....115
I1HL.....115
JA1FHK...112
W7VRO....110
W8RCM....110
DL1NS....110

W3YUW....109
W4TFL/1..107
WA5CBE...107
W0EEE....107
WA6QGW...106
WB2CKS...105
W6GMQ....105

W8ARH....105
K3KHK....104
W6LDA....103
OH2BAC...103
WA2HZO...102
K5UBL....102
5B4RF....102

K1JKS....101
WA2QHQ...101
KX6BC....101
OA4FT....101
ZL2AQV...101
W1BPY....100
W1PLJ....100
WB2FMK...100

W2LQP....100
WA2RUB...100
K3BTT....100
W3NCW....100
WA6MAR...100
KH6BIH...100
W9JGV....100
G3KAB....100

Radiotelephone

G4CP.....232
K2CNX....199
W1FQA....166
HC2JT....129

LA8LG....129
W4PRP....120
ZL1AQE...119

DL5HI....115
ON4UN....111
GW3NWV...110

WA6LCK...107
W2ZTV....105
VE7HJ....105

W4NKO....101
KR6OF....101
SP5HS....101

WA2QNW...100
W4AVY....100
CR6DU....100

Endorsements

W8IRH....314
W4AAU....311
W9MLY....311
WA2IZS...310
W3NKM....310
W4ECI....310
W5LGG....310
W2CR.....307
W5IGJ....306
G3DO.....304
W4DHZ....302
W2SSC....301
W2AEB....300
K2FC.....300
W5PM.....300
W9FYU....300
DL3RK....300
W4BJ.....294
VE2NV....294
G6XL.....291
W4CKB....290
W4LRN....290
W1CKA....284
VE2YU....284

W2CWK....280
W2RGV....280
K4RJN....280
W6KG.....280
K9CJK....280
W9WFS....280
W2KIR....274
G3HDA....274
W7DLR....273
W9LTR....273
W1RAN....270
KZ5WZ....270
WA2ELS...264
K4TEA....260
W6PB1....260
W2AZS....256
W3AFM....253
K4BVQ....253
W0NFA....253
W3PN.....251
VE2YA....251
W9UIG....250
W0AUB....250
W4FNQ....240

KP4AQQ...240
KP4RK....240
W0AIH....239
WA6TGY...235
K4ZKZ....231
W4HYL....230
W4QVJ....230
W6ISQ....230
W0CPM....230
W2MJ.....228
K8MTI....228
W1YMG....222
W4EJN....221
W8ETU....221
W0GUV....221
W9WHY....220
DL1IA....220
ZS6ATA...218
W1QV.....217
ZS2AT....212
W2ZY.....211
K6OHJ....211
W3FSS....210

W5VA.....210
W8EVZ....210
K8WOT....210
EA1GZ....208
W1BPW....202
JA6AK....201
JA2DN....201
W2ODZ....200
W5PIO....200
W6AAO....199
K1ANV....193
W1ALK....190
ZS5KU....190
WA4DCP...185
WA6GLD...183
W0FLK....183
G8JM.....183
WA4CXR...181
W8TPS....181
W8LUZ....180
K1IMP....174
W1SIK....173
ZE3JO....173

W3AHX....172
G8KU.....172
OZ4H.....171
WA2JBV...170
K2YMO....170
W9RDI....170
I1ZQ.....170
K1HVV....169
W3PVZ....167
W4PRP....166
W8MPW....163
I1ZPB....163
W8CJN....160
K9BHM....160
K8ZBY....154
WA2FQG...150
WA6GFE...150
W7MH.....150
W9YYS....150
I1CWN....150
SM6RS....148
WA2OMR...145
W6OMR....144

W3BSC....142
EP3RO....141
K8RDE....140
K0UKN....140
W8LZV....134
SM7BWZ...132
W1YYM....130
VE6AAV...130
KL7DTB/6.128
ON4UN....124
K1UDD....120
K3BNS....120
K1DOP....120
K4RZK....120
K8PHD....120
W9IGW....120
K0MLM....120
W0TDR....120
W3URE....112
W4KN.....111
K1NIY....110
K4ADU....110
W9NNC....110
VE3AES...110

Radiotelephone

TI2HP....314
I1AMU....313
W9JJF....310
G3FKM....303
G8KS.....303
K4AIM....300
W3NKM....295
G3DO.....295
W1LLF....293
W8JIN....293
W1BAN....290

W4SKO....281
W2BQM....271
W2TP.....271
WA2IZS...270
W2RGV....270
K9ECE....270
W0SYK....270
W8NGO....263
W0MLY....262
W4PAA....260
W1GKK....245

W7DLR....235
W9LTR....235
W0NFA....234
DL3RK....232
K4HYL....230
WA2ELS...224
YV5AXQ...222
W2SUC....220
K0TJW....207
G3HDA....203
XE1SN....200

W2DEC....199
K3TOQ....180
W6USG....173
VE3BKL...171
W8QNW....170
W8GUZ....168
SM5VS....164
W0GUV....160
VE3BTI...159
W2NQP....155

K1ANV....152
WA2HOK...150
K2KGS....150
I1ZPB....149
K1UDP....146
WA6TGY...144
I1SCA....144
W8EVZ....137
K6AYO....136
K0UKN....133
W2GKZ....132

W2LEC....131
WA2WDV...131
F2KC.....129
I1CWN....128
W7PRY....121
W2FXA....120
DL2OX....119
SM6RS....116
I1HL.....113
W2PDB....110
W9RDI....110

NATIONAL CALLING AND EMERGENCY FREQUENCIES (kc.)

3550	3875	7100	7250
14,050	14,225	21,050	21,400
28,100	29,640	50,550	145,350

During periods of communications emergency these channels will be monitored for emergency traffic. At other times, these frequencies can be used as general calling frequencies to expedite general traffic movement between amateur stations. Emergency traffic has precedence. After contact has been made the frequency should be *vacated immediately* to accommodate other callers.

The following are the National Calling and Emergency Frequencies for Canada: *c.w.* — 3535, 7050, 14,060; *phone* — 3765, 14,160, 28,250 kc.

SUGGESTED OPERATING FREQUENCIES

RTTY 3620, 7040, 14,090, 21,090 kc.
WIDE-BAND F.M. 52.525 146.94 Mc.

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, NST −7, PDST −7, PST −8, Hawaii −10, Central Alaska −10.

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 Feb. 15 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on 1805, 3555, 7080, 14,100, 21,075, 28,080, 50,700 and 145,800 kc. The next qualifying run from W6OWP only will be transmitted Feb. 6 at 0500 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, 0230 GMT Feb. 15 becomes 2130 EST Feb. 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.

Daily tape-sent code-practice transmissions are available on an expanded basis this season. These start at 0030 and 0230 GMT and are sent simultaneously on all c.w.-listed W1AW frequencies, with about 10 minutes practice given at each speed: 5, 7½, 10 and 13 w.p.m. on Sun. Mon. Wed. Fri. (GMT date) from 0230-0320 — 15, 20, 25, 30, 35 w.p.m. on Tues. Thurs. Sat. (days in GMT) from 0230-0320— 10, 13 and 15 w.p.m. daily from 0030-0100 GMT.

To make the practice more beneficial the order of words in each line of the text is sometimes sent reversed. The 0230-0320 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* and to allow checking strict accuracy of your copy on certain tapes, note the GMT dates and texts to be sent in the 0230-0320 GMT practice on those dates:

Date	Subject of Practice Text from Dec. *QST*
Feb. 3:	*It Seems to Us* . . . , p. 9
Feb. 11:	*Antennas and Feeders*, p. 33
Feb. 20:	*Signal Checking* . . . , p. 62

Date	Subject of Practice Text from *Understanding Amateur Radio*, First Edition
Feb. 26:	Power, p. 16
Feb. 28:	The Nature of Resistance, p. 17

W1AW SCHEDULES

(February, 1964)

Operating Visiting Hours

Monday through Friday: 3 P.M.–3 A.M. EST.
Saturday: 7 P.M.–2.30 A.M. EST.
Sunday: 3 P.M.–10.30 P.M. EST.

The ARRL Maxim Memorial Station welcomes visitors. The station address is 225 Main St., Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent on request. The station will be closed February 22, Washington's Birthday.

Operating Frequencies

C.w.: 1805 3555 7080 14,100 21,075 28,080 50,700 145,800.
Voice: 1820 3945 7255 14,280 21,330 29,000 50,700 145,800.

Frequencies may vary slightly from round figures given; they are to assist in finding the W1AW signal, not for exact calibrating purposes.

Official Bulletins

Bulletins containing latest information on matters of general amateur interest are transmitted on the above frequencies according to the following schedule in GMT:
C.w.: Mon. through Sat., 0100; Tues. through Sun., 0500.
Voice: Mon. through Sat., 0200; Tues. through Sun., 0430.

Caution: Note that in the U.S. and Canada bulletin hours usually fall on the evening of the previous day by local time.

W1AW CONTACT SCHEDULE

Would you like to work W1AW? W1AW welcomes calls from *any* amateur station in accordance with the following schedule:

GMT	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0120–0200[1]	.....	.....	7080	3555	7080[2]	3555[2]	7080
0210–0230[1]	.....	.....	3945	50.7 Mc.	145.8 Mc.	3945	3945
0330–0430	.....	.....	3555	3945	7080	1820	3555
0440–0500[1]	.....	.....	3945	14,280	3945	14,280	3945
0520–0600[1]	.....	.....	3555[2]	7255*	3555	7080[2]	3945
0600–0700	.....	.....	14,280	14,100	3555	14,100	.....
0700–0800	.....	.....	7255*	3945	7080	3945	7255*
2000–2100	.....	.....	14,280	21 28 Mc.[3]	14,100	.....	.....
2100–2200	.....	14,280	21/28 Mc.[3]	14,100	21 28 Mc.[3]	21,330	.....
2200–2300	.....	14,100	14,280	21,075[2]	14,280	14,100	.....
2330–2400	.....	7255*	.....	7080	.....	7255*	.....

[1] General-contact period on stated frequency begins immediately following transmission of Official Bulletin which begins at 0200 and 0430 on phone and at 0100 and 0500 on c.w. Starting time is approximate.
[2] W1AW will first listen for Novices before checking the rest of the band for other contacts.
[3] Operation will be conducted on either 21,075, 21,330, 28,080 or 29,000 kc.
* Operation may be on s.s.b. as announced at the beginning of the period.
Station Staff: W1QIS, W1WPR, K1MET.

HOME TOWN QSL BUREAU

DO YOU HAVE any idea how many QSL cards are filed each year into the circular file by the Post Office? National and International QSL bureaus have long ago justified their existence and have become indispensable in the exchange of cards which are so necessary for awards, contest and general courtesy.

WHAT IS BADLY needed now, and we have it, is a QSL bureau on the home front . . . one in every community having more than two hams . . . to further the exchange of the hundreds of misaddressed, poorly addressed, or not addressed cards which are currently delivered to the dead letter round file.

WHILE WE HAVE sympathy for the intended recipient of a QSL card who must do without it through no fault of his own, we have none for the operator who thinks a call sign, first name, city and state constitute a complete address.

IT IS EASY to set up a Home Town QSL Bureau. Rent a post office box and offer to help the postmaster and his staff who handle undeliverable QSL cards. It may sound improper to hand mail around, but the postal clerks feel it is an extension of their obligation to do whatever is necessary to get the mail delivered. What better help is available than a reliable ham club's assistance?

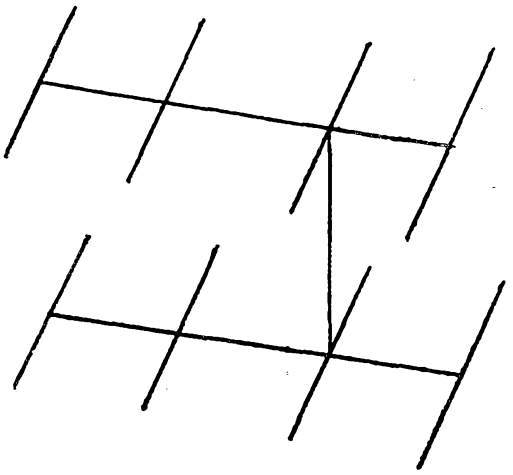
THE BOX TENDER digs up the correct address (sometimes in another state), writes it on the card, and returns it to the mails for proper delivery. There is no extra postage charge.

THE WARREN A.R.A. post office box has been the repository for several years of undeliverable QSL cards. These cards ordinarily would not get through to the addressee.

IF YOU BELIEVE this service is unnecessary, ask your postmaster to get an estimate on the number of QSL's not delivered in an average year.

Dick Ellers, K8JLK
Warren, Ohio
Guest Editor

STACKED BEAMS



Dipole driven elements assure a perfect match, assuring full power radiation. Half-wave phasing line is furnished ready for attachment to beams. Everything is furnished, ready for easy assembly (except coaxial cable feedline) and no special tools are required.

☐ Set of two stacked beams, 24 elements in all, for 2 meters.....**$39.95**

☐ Set of two stacked beams, 8 elements in all, for 6 meters.....**$42.95**

☐ Set of two stacked beams, 8 elements in all, for 10 meters.....**$44.95**

BEAMS

Rugged Yagi design, ful half-wave, Gamma-matched

2 Meter, 12 Element	**$24.95**
6 Meter, 4 Element	**25.95**
10 Meter, 4 El., #R10	**40.95**
15 Meter, 3 El., #R15	**49.95**
20 Meter, 3 El., Deluxe	**59.95**
15-20 Two-Bander	**49.95**
10-15-20 Tribander	**59.95**

NOTE: Specify frequency; otherwise band center

GOTHAM VERTICALS DELIVER THE CONTACTS

PROVEN! PROVEN! BY THESE EXCERPTS FROM UNSOLICITED TESTIMONIALS:

CASE HISTORY #71

"I am very delighted with the first V80 and want another for a different location." A. C., California.

CASE HISTORY #159

"I ordered a Gotham V40 Vertical Antenna and found it so successful that several others are wanting them, too. Will you please send me four more." W. A., Alaska.

CASE HISTORY #248

"I just wanted to let you know how pleased I am with my Gotham V80 antenna. I have worked a W.A.S. of 46/43, a WAC of 3/3, and DXCC of 14/12 in about 12 months." G. W., Maryland.

CASE HISTORY #111

"The V160 did a beautiful job on a VE1 for me. Also, I forgot to take it down during the hurricane of last week. It is just as straight as it was when I bought it." D. S., New Jersey.

CASE HISTORY #613

"I have never been happier with any antenna than I have been with the V80. I have worked all bands with it and have had tremendous success — i.e., DL4s, ZS3, etc., all solid copy." R. D. S., Penna.

CASE HISTORY #483

"My V80 is working wonders. I am able to maintain a 1:1 SWR all across the 40 meter band. After many years on 10, 15, and 20, the XYL and I are getting great kicks out of some of the lower bands." J. A., New Mexico.

CASE HISTORY #146

"I have had very good luck with mine (my V80) feeding it with a Johnson Adventurer; works fine on all bands." B. I., Nebraska.

CASE HISTORY #555

"Being an owner of your V80 vertical I would like to let you know of the excellent results I am getting with it, both working the DX and the local stations on the lower bands. It certainly is an excellent antenna system." F. H. Jr., New York.

CASE HISTORY #84

"A few months ago I purchased your V40 vertical and have achieved outstanding results on the air." K. G. B., North Carolina.

FREE CATALOG

AN ANTENNA THAT
SURVIVES THE COMPETITIVE STRUGGLE CONTINUES TO BE ADVERTISED.

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THE GOTHAM VERTICAL ANTENNA IS THE BEST ALL-BAND ANTENNA

- Absolutely no guying needed.
- Radials not required.
- Only a few square inches of space needed.
- Four metal mounting straps furnished.
- Special B & W loading coil furnished.
- Every vertical is complete, ready for use.
- Mount it at any convenient height.
- No relays, traps, or gadgets used.
- Accepted design—in use for many years.
- Many thousands in use the world over.
- Simple assembly, quick installation.
- Non-corrosive aluminum used exclusively.
- Multi-band, V80 works 80, 40, 20, 15, 10, 6.
- Ideal for novices, but will handle a Kw.
- Will work with any receiver and xmitter.
- Overall height 23 feet.
- Uses one 52 ohm coax line.
- An effective modern antenna, with amazing performance. Your best bet for a lifetime antenna at an economical price.

73
GOTHAM

DO YOU KNOW

1. YOU WILL HAVE NO DIFFICULTY INSTALLING YOUR GOTHAM VERTICAL ANTENNA IN JUST A FEW MOMENTS, REGARDLESS OF YOUR PARTICULAR PROBLEM, SO ORDER WITH CONFIDENCE EVEN IF YOU HAVE RESTRICTED SPACE OR A DIFFICULT SITUATION.

2. LOADING COIL NOT REQUIRED ON 6, 10, 15 AND 20 METERS. FOR 40, 80, AND 160 METERS, LOADING COIL TAPS ARE CHANGED MANUALLY EXCEPT IF A WIDE-RANGE PI-NETWORK OUTPUT OR AN ANTENNA TUNER IS USED; IN THIS CASE BAND CHANGING CAN BE DONE FROM THE SHACK.

3. EVERY GOTHAM ANTENNA IS SOLD ON A TEN DAY TRIAL BASIS. IF YOU ARE NOT FULLY SATISFIED, YOU MAY RETURN THE ANTENNA PREPAID FOR FULL REFUND OF THE PURCHASE PRICE. THIS IS YOUR GUARANTEE OF FULL SATISFACTION.

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Airmail Order Today — We Ship Tomorrow

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1805 PURDY AVE., MIAMI BEACH, FLA.

Enclosed find check or money-order for:

☐ V40 VERTICAL ANTENNA FOR 40, 20, 15, 10 AND 6 METER BANDS..... $14.95

THE V40 IS ALSO MADE FOR CITIZENS BAND OPERATION, WITH SPECIAL INSTRUCTIONS. DESIGNATE CB-11 ANTENNA. PRICE SAME AS THE V40

☐ V80 VERTICAL ANTENNA FOR 80, 40, 20, 15, 10 AND 6 METER BANDS. MOST POPULAR OF THE VERTICALS. USED BY THOUSANDS OF NOVICES, TECHNICIANS, AND GENERAL LICENSE HAMS... $16.95

☐ V160 VERTICAL ANTENNA FOR 160, 80, 40, 20, 15, 10 AND 6 METER BANDS. SAME AS THE OTHER VERTICAL ANTENNAS, EXCEPT THAT A LARGER LOADING COIL PERMITS OPERATION ON THE 160 METER BAND ALSO..... $18.95

HOW TO ORDER. Send check or money order directly to Gotham. Immediate shipment by Railway Express, charges collect. Foreign orders accepted.

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Address.....

City.....Zone.....State.....

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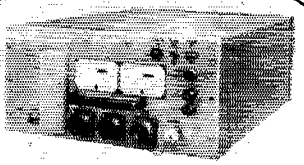
WORLD FAMOUS FOR COMMUNICATIONS

HQ-170A
AMATEUR



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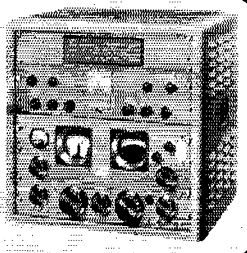

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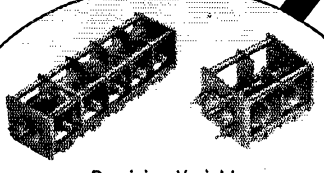

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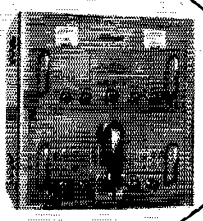
Air Capacitors
STANDARD & SPECIALS



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COMMERCIAL SSB

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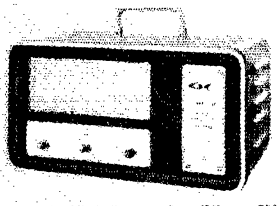
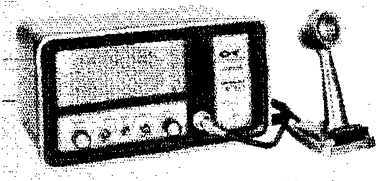
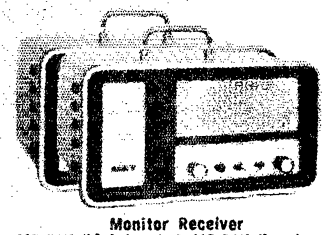
VHF Transmitter/Receiver
FM-50A (high band) & FM-50A (low band)



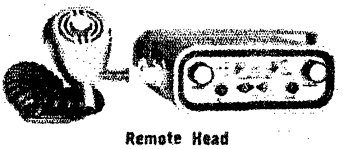
150 watt VHF Power Amplifier—FM-500



Telephone Remote Control—CU-10A



Monitor Receiver
MR-50X (high band) & MR-60X (low band)



Remote Head

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

EASTERN PENNSYLVANIA—SCM, Allen R. Breiner, W3ZRQ—SEC: W3DUI. RM: W3EML. PAM: K3CAH. V.H.F. PAMs: W3SAO, W3SGI. The E. Pa. C.W. Net had 429 QNI and handled 302 pieces of traffic. The Susquehanna Valley 6-Meter Net had 30 sessions handling 330 pieces of traffic. K3OMP has been appointed Asst. EC in Delaware County. K3SLY is going s.s.b. W3DGX made proper repairs to the sideband generator with a large hammer. K3BHU claims it's working fine now. K3ZDK is operating 2-meter mobile. K3ZLU and K3ZLV are new father-and-son hams. K3JXD recently acquired an XYL. K3JHT spent the Thanksgiving holidays in New York. K3RFH is vacationing in Ohio. W3BUR is working on Long Island and has been QNI/2 into the E. Pa Net. W3AHZ gave his tower a coat of paint. K3KTH finds traffic conditions nearly the same as last year. W3ELI and his AREC assisted in operation "Vaccine" in the Philadelphia Polio Drive. K3ODM, W3UAX, K3MJR, K3HNP, K3ATI, K3MIJ, W3CNN, K3EJG, K3VBX, W2LZA and W8FP/3 assisted in a parade in Bristol, Bucks County. New Gear Dept. K3ARR an eleven-element 6-meter beam; W3RKN an all-band vertical; W3RV a T-150A and a Drake 2-B; K3RSX a KWM-2 topped by a General Class license. There have been some appointment cancellations because of inactivity. Presently a few areas are open for Official Bulletin Station appointment. Let your desires be known. WB2AXW/3 worked VE3CAU from Philadelphia with a Sixer. AREC and ARPSC in many counties have recently progressed quite rapidly. There still are many counties dormant and inactive. Beginning with January all ECs will be expected to make monthly reports on progress. Where there is no Emergency Coordinator appointed and your interest is in emergency communications, you will be welcome to apply for an EC appointment. By the time this appears in print your SCM will have the section report completed and mimeographed. Anyone not on our regular mailing list can get a copy by sending me their address. Traffic: W3CUL 8297, W3VR 1234, W3IVS 1111, W3EML 647, K3BHU 588, K3MVO 491, K3MQE 141, W3FLP 89, W3RV 83, K3LTT 80, K3OMP 77, W3AXA 72, W3JKX 52, K3CAH 49, K3KTH 48, K3HNP 46, K3ZDK 46, K3YQJ 44, W3ELI 43, K3ARR 42, W3VAP 32, W3LXN 28, W3ZRQ 28, W3LC 26, K3TSO 26, K3JHT 25, K3JSN 16, K3EMA 12, W3OY 12, K3JHF 11, W3BFF 10, W3QDW 6, K3HTZ 5, W3ADE 4, W3DUI 4, W3PDJ 3, W3BUR 2, W3EEN 1, K3MTF 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Andrew H. Abraham, W3JZY—SEC: W3CVE. RMs: K3JYZ, W3TN (for the MDD Traffic Net which meets on 3649 kc. daily at 0000Z), W3ZNW (for the MDDS (slow) traffic net on 28.1 Mc. at 0130Z daily). PAM: W3EQK. The MEPN meets on 3820 kc. M.W.F. at 2300Z and Sat. and Sun. at 1800Z. W3CDQ has a new HQ-170 receiver. K3DNO says that examination and term papers at the U. of M. have cut into his operating time and he has missed all openings on the v.h.f. bands. W3ECP continues as our Vice-Director. W3EOV sends in a fine traffic report. W3EQK gave his 500-watt transmitter to the U.S. Veterans Hospital at Lock Raven Blvd. and Alameda. Charlie Kasmoff is giving an old HRO receiver and they are on the air with the call W3NM using a tribander. W3FUV is back on the air with an AFR-67 rig. W4EXM/3 is handling traffic. W3GCO is working on his s.s.b. rig. The National Capitol V.H.F. Society is now affiliated with ARRL. K3GJD operated W3GQF during the SS Contest. W3HQE has a Tri-Ex 70-ft. tower with a 20- and 40-meter beam. K3LLR finally got an s.w.r. meter and found that his antenna was very bad. W3MCG is pleased with the way his 20- and 40-meter beam's work. W3OHI is busy on the MARS nets. K3PEJ's school work prevents much operating. K3PRN and K3SOZ will be operating mobile with HE-45B transceivers. K3QDD has been working some DX in his free time. K3RGB maintains his OBS skeds on the 10-meter band. K3SGD reports the BAAREC of the Baltimore area provided communications for the Md. State Cross Country Meet at Hereford, Md. The Baltimore AREC meets each Sun. at 8 P.M. EST on 28.680 kc. K3SMT had trouble with his rig during the SS Contest. W3TN reports that traffic was down in November, but the QNIs were steady. Newcomers to the MDD are W3RMI and WA4EQW/3. K3OAE, K3RUQ and K3SXA QNIed while home for the Thanksgiving holidays. New ORSs are K3THF, K3URZ and K3LLV. K3URZ enjoyed working in his first SS Contest. W3WTO from Hagerstown, Md., is in Bladensburg, Md., temporarily and has a HW-10 Shawnee to work the band while there. K3YZI has moved to Owings Mills and has a tribander up 108 feet. K3ZRM reports that a new 6-meter net has been formed in the Washington, D.C. Area, operating on 51.660 Mc. This net is primarily a ragchewing net and meets each Sun. at 8 P.M. EST. Traffic: K3GJD 367, W3TN 236, K3QOO 225, K3SMT 114, K3QDD 56, W3HQE 55, W3OHI 48, W3QOW 44, W3PQ 39, W3ECP 31, W3ATQ 30, K3WBJ 29, W3EOV 28, W3AHQ 27, K3URZ 27, K3THF 26, K3GZK 6, W4EXM/3 6, W3MCG 4, K3LLR 3, W3CDQ 2, K3YZI 2, K3SGD 1.

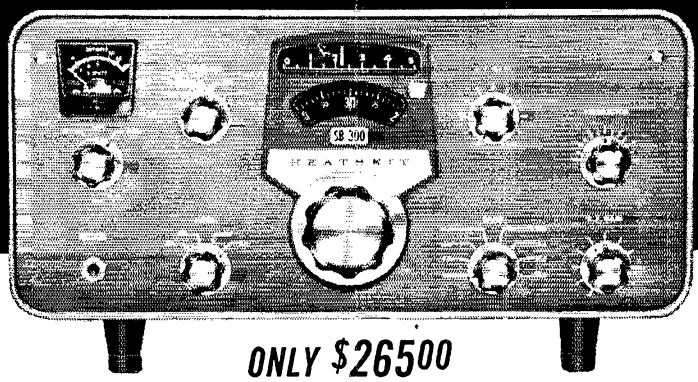
DELAWARE—SCM, M. F. Nelson, K3GKF—PAM: K3LEC. RM: W3EEB. DEPN meets Sat. on 3905 kc. at 1830 local time. DSMN meets Tue. on 50.4 Mc. at 2100 local time. Renewals: K3AXW as OO; K3AXW, K3PZL as ORSs. New calls in the state: K3ZVM and his boss gal K3FIF, from the Mountaineer State. The Delaware ARC, after a joint meeting with the U. of Del. ARA, visited the University computer center. The First State ARC had a lively session on amateur radio licensing *after hearing excerpts of Hoover's speech before the* Atlantic Convention. W3EEB, busy with RM chores, still gets into the CD Parties. W3HKS is back from his Mexico trip. K3OWS has finished up his WAC and WDEL awards. There must be close to 1000 WDEL certificates issued by now. Traffic: W3EEB 81, W3EKO 21, K3OWS 13, K3GKF 5, K3EWK 2.

SOUTHERN NEW JERSEY—SCM, Herbert C. Brooks, K2BG—SEC: K2ARY. PAM: W2ZI. RM: WA2VAT. The Gloucester County ARA elected W2YNR, pres.; K2JKA, vice-pres.; WA2KWM, rec. secy.; WA2IAZ, treas.; K2QGH, WA2KGD, W2CKX, W2LVW and K2PQD, directors. K2RXB, Margate, is doing FB handling traffic after a recent illness. N. J. Phone & Tfc. Net Nov. totals: QNI 620, sessions 30, traffic 201. DVRA's newly-elected officers are W2VU, pres.; K2TQI, vice-pres.; W2LZA, secy.; W2TAM, treas. K2SHE, Crosswicks, enjoyed a vacation in Texas. WA2AWD is building a transmitter for use at Oakcrest Regional High School. Two new calls in the Atlantic City area are WN2EBJ and WN2EBW. W2OSD, WA2GSO and K3JXC, SJRA members, are building receivers. SJRA's newly-elected officers will be announced next month. K2BZK is doing a fine job with the club's training class held in the Cherry Hill HS. Correcting last month's *mention of* WA2WWF, he was appointed OBS not OO. W2BLV and WA2EMB report band opening on 144 Mc. W2BLV makes monthly reports on aurora news and predictions in SJRA's *Harmonics*. Many AREC Form 7 reports are mailed to me in error. This section consists of the following counties: Burlington, Camden, Cumberland, Cape May, Atlantic, Salem, Gloucester and Mercer. The Levittown (N.J.) Radio Club has provided training in code and theory in that area. The Burlington County Radio Club meets the 2nd Mon. in Moorestown. Contact K2BG for information. Traffic: (Nov.) WA2BLV 203, W2RG 128, W2ZVW 78, W2MMD 77, K2RXB 69, W2ZI 28, K2JJC 5, WA2KAP 4, K2SHE 4. (Oct.) K2JJC 4.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2ICZ. RMs: W2RUF, W2EZB, W2FEB. PAM: W2PVI. NYS C.W. meets on 3670 kc. at 1900, ESS on 3590 kc. at 1800, NYSPTEN on 3925 kc. at 1800, NYS C.D. on 3610.5 and 3993 kc. (s.s.b.) at 0900 Sun. and 7102.5 kc. at 1930 Wed., TCPN 2nd call area on 3970 kc. at 1900, IPN on 3980 kc. at 1600, 2RN on 3690 kc. at 0045 and 2345 GMT. W2ETY/WB2LOX has been appointed OO. WA2THY renewed as OBS. New officers of the Northern Chautauqua ARC are K2JQT, pres.; K2GDF, vice-pres.; W2DFZ, secy.; K2TKD, treas.; K2SZF, W2DGV, WA2CTB, dir. Clara, W2RUF, has organized a state-wide c.w. net consisting of one c.w. sta-

(Continued on page 102)

DELUXE HEATHKIT® SSB RECEIVER SB-300



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• Professional styling & features at 60% savings! • Complete coverage of 80 through 10 meter amateur bands with all crystals furnished, plus provision for VHF converters • Prebuilt, calibrated linear master oscillator (LMO) • 25 KC per tuning knob revolution offers bandspread equal to 10 feet per megacycle • Built-in crystal calibrator • 2.1 KC crystal bandpass filter • Stability of 100 CPS after initial warmup • Wiring harness & two heavy-duty circuit boards for easy assembly

CHECK THESE SPECIFICATIONS!

Frequency range (megacycles): 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. **Intermediate frequency:** 3.395 megacycles. **Frequency stability:** 100 cps after warmup. **Visual dial accuracy:** Within 200 cps on all bands. **Electrical dial accuracy:** Within 400 cps on all bands. **Backlash:** No more than 50 cps. **Sensitivity:** Less than 1 microvolt for 15 db signal plus noise-to-noise ratio for SSB operation. **Modes of operation:** Switch selected: LSB, USB, CW, AM. **Selectivity: SSB:** 2.1 kc at 6 db down, 5.0 kc at 60 db down (crystal filter supplied). **AM:** 3.75 kc at 6 db down, 10 kc at 60 db down (crystal filter available as accessory). **CW:** 400 cps at 6 db down, 2.5 kc at 60 db down (crystal filter available as accessory). **Spurious response:** Image and IF rejection better than 50 db. Internal spurious signals below equivalent antenna input of 1 microvolt. **Audio response: SSB:** 350 to 2450 cps nominal at 6 db. **AM:** 200 to 3500 cps nominal at 6 db. **CW:** 800 to 1200 cps nominal at 6 db. **Antenna input impedance:** 50 ohms nominal. **Muting:** Open external ground at Mute socket. **Crystal calibrator:** 100 kc crystal, ±.005%. **Front panel controls:** Main tuning dial; function switch; mode switch; AGC switch; band switch; AF gain control; RF gain control; preselector; phone jack. **Rear apron connections:** Accessory power plug; HF antenna; VHF #1 antenna; VHF #2 antenna; mute; spare; anti-trip; 500 ohm; 8 ohm speaker; line cord socket; heterodyne oscillator output; LMO output; BFO output; VHF converter switch. **Tube complement:** (1) 6BZ6 RF amplifier; (1) 6AU6 Heterodyne mixer; (1) 6AB4 Heterodyne oscillator; (1) 6AU6 LM osc.; (1) 6AU6 LMO mixer; (2) 6BA6 IF amplifier; (1) 6AU6 Crystal calibrator; (1) 6HF8 1st audio, audio output; (1) 6AS11 Product detector, BFO, BFO, amplifier. **Power supply:** Transformer operated with silicon diode rectifiers. **Power requirements:** 120 volts AC, 50/60 cps, 50 watts. **Dimensions:** 14⅞" W x 6⅝" H x 13⅜" D.

The SB-300 SSB Receiver is the first in an exciting new series of Heathkit SSB amateur gear designed to bring you the finest in communications facilities at great savings. Its professional styling, quality and features offer performance never before found in kit equipment.

Features include a crystal-controlled front-end for same rate tuning on all bands; prebuilt, Linear Master Oscillator (LMO) for linear tuning with 1 kc dial calibrations; built-in crystal calibrator; hermetically-sealed 2.1 kc crystal bandpass filter; smooth, non-backlash vernier dial drive mechanism; optional AM & CW filters; high frequency I. F.; AGC control; provision for transceive operation with matching transmitter available soon.

Kit SB-300...17 lbs....no money dn., $25 mo.....**$265.00**
SBA-300-1 CW Crystal Filter (400 cps)...1 lb..... **$ 19.95**
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WATCH FOR ANNOUNCEMENT OF OTHER MODELS IN THIS DELUXE HEATHKIT HAM SERIES!

(*Continued from page 100*)

tion per county which will meet Mon. nights. So far 31 counties are represented and W2EFU, SCM of ENY, has promised full cooperation. Primary purpose is AREC-ARPSC and liaison with the NYS Civil Defense Command Net. Plans are for the net to meet in two sections. Local AREC organizations will be invited to establish liaison. This is our attempt to establish a completely amateur-owned and operated emergency network on a statewide basis. ECs will receive specific information shortly. W2NW, WA2RGR, W2ICZ, WA2PKS and W2-KYA received fine newspaper publicity for their part in relaying information from the World Lightning Class Championship held in Lima, Peru. The RAGS Phone Net is on 28.625 Mc. at 8 P.M. Mon. nights. K2KJZ is NCS. WN2DVE is now WB2DVE (General). WA2JGG has taken over as editor of *W2IWUX Calling*, which is the club paper of the Utica ARC. He replaces WA2QLH, who has done a fine job. *RARA Rag* editor would like to exchange with clubs in WNY. Contact WA2KND, 153 Mason Ave., Rochester 14626. Please note that much information for this column is gleaned from club bulletins. Lead time for announcements of hamfests and picnics, etc., is two months. As this is being written it is Dec. 5. All reports should be mailed. Traffic reports will not be accepted by telephone, however they can be relayed via W2RUF on the NYS CW Net. Traffic: W2OE 285, W2GVH 241, W2RUF 230, W2EZB 205, WA2HSB 167, W2FEB 63, W2HYM 50, K2AYQ 30, K2IMI 28, W2RQF 21, K2SSX 21, WB2FPG 17, K2OFV 16, K2KTK 12, K2RYH 9, K2HOH 8, WA2GLA 3, K2EQB 2, W2-QHQ 2.

WESTERN PENNSYLVANIA—SCM, Anthony J. Mroczka, W3UHN—SEC: W3LIV. RMs: W3KUN, K3-OOU and W3NUG. The WPA Traffic Net meets Mon. through Fri. at 2400 GMT on 3585 kc. The Keystone Slow Speed Net (KSSN) meets at 2330 GMT, Mon. through Fri. on 3585 kc. Congratulations to K3DKH on making the BPL again and earning his BPL Medallion. K3AXO is recuperating from eye surgery. K3CJH now has a Drake 2B. The Butler County AREC members are monitoring 28.7 Mc. New officers of the Steel City ARC (W3KWH) are W3SHT, pres.; W3OKU, vice-pres.; W3-ZDW, treas.; K3RKW, rec. secy.; W3GQJ, corr. secy. W3YDP and W3RYC have new TA-33 beams. The Foothills RC (W3LWW) is back on the air. W3NDG is on 6 meters with an HE-45B. K3UTR now is 45/38 for WAS. W3IWT is in the Marine Corps. The members of the Nittany ARC (K3HKK) are going full-out to build a club house at their mountain site location. W3OVM had charge of the December meeting of the ATA of W. Pa. K3BWI now is operating from Ohio with the call W8-EWP. New officers of the Greater Pittsburgh V.H.F. Society are W3BWU, pres.; K3JTH, net mgr.; W3EWV, treas.; K3QBI, secy.; K3BAK and W3OMY, trustees. The Cumberland Valley ARC (W3ACH) reports via *Valley QRM!*: K3EDI and K3EIN are attending Valparasio T.I. School; K3EDH is e.d. radio officer; the club participated in the Hobby Show sponsored by the Tri-Hi Y Club. W3TOC reports that at the November meeting of the Etna RC W3TVW showed a program of colored slides of all the club members at their home stations. In order to do this, Bert had to visit all the members at their homes. From all comments, this type of a program was well received. W3RI is operating an HT-37 and a Drake 2B. K3TFG is on 6 meters with s.s.b. New officers for ATA are K3RAD, pres.; K3SMB, vice-pres.; W3ZJZ, secy.; W3UL, treas.; K3GQA, W3-RSB, W3GSI, W3OJW, directors. Traffic: (Nov.) K3-DKH 629, K3NZB 201, W3KUN 91, W3MFB 88, K3OOU 57, K3PYS 51, K3PIE 48, W3LOS 28, W3OFO 26, K3-SDT 26, W3CHN 15, K3COT 11, K3TEZ 11, K3SMB 9, W3IYI 8, W3SMV 8, W3YA 3, K3UTR 2. (Oct.) K3SMB 8, K3UTR 2.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—Asst. SCM: Grace V. Ryden, W9GME. SEC: W9RYU. RM: W9USR. PAM: W9VWJ. EC of Cook County: W9-HPG. Section net: 1LN: 3515 kc. Mon. through Sat. at 1900 CST. The EC Net meets every Sun. at 1600 GMT on 3840 kc. W9AC, Bill Halligan, was honored at a testimonial dinner in recognition of his 50 years in electronics at the Knickerbocker Hotel in Chicago Dec. 9. Many notables, both in and out of electronics, attended. W9-HAS reports that the County Hunters Net meets daily on 7220 kc. all day long. New Generals heard were WA9-DYY, WA9GKC and WA9EXH. K9EIV received his WAS-c.w. certificate. K9KHN, W9ATU, WN9JBW, WA9DPV, K9GFN, K9ZRN, K9FNB, K9EID, K9IHM, WA9GKX, WA9DYY, W9MLT and WA9GKC participated in the recent St. Clair County Polio Drive campaign. K9OZM and W9GDI have new antenna systems. W9MXD has moved his QTH to Bartonville, Ill. This column's sympathy is extended to the family and friends of W9ALS, president of the Hamfesters Radio Club of Chicago. WA9EJA would like to correspond with amateurs interested in radio astronomy. W9OKI, W9CIB, K9VGT, WA9AJF, W9PNB, W9ZAB, W9NNE and W9-DDX were elected officers of the York Radio Club for the coming year. DLISR and F8OC are living and working in the Rockford area. W9HOA has a new teletype machine and is making good copy. WA9BLE's transmitter was damaged by a lightning stroke. W9WYB has a new tri-band antenna. K9EID has entered the music recording business. W9EEP has put up a new two-element full-size 40-meter beam. W9IKN (Elgin Radio Society) will start a new class to upgrade its members in amateur radio. K9LVB has installed a new TA-36 Mosley beam. The 9RN traffic count was 461. K9QMJ is recuperating at home after being hospitalized for surgery. New appointments include WA9CCP as OPS; WA9APT and WA9CCP as OBSs. W9EET suffered severe injuries when an electric drill shorted out while he was working on his tower. WA9AIH and XYL WA9AII have finished installing a new Easy Way tower and four-element Hy-Gain beam. W9QLZ soon will surprise the Starved Rock Radio Club members and get back on the air after a long absence. The North Central Phone Net reports a traffic count of 1083 and the ILN handled 51 messages during November. BPL recipients are W9IDA, K9KZB and WA9CCP. Traffic: (Nov.) W9IDA 2388, K9KZB 1199, WA9CCP 845, W9HAS 315, W9AKV 242, W9SMD 145, K9AXS 121, WA9AJF 108, W9JXV 81, W9KJ 75, WA9DKM 61, K9LRN 28, K9OZM 20, K9DRS 14, W9-PRN 14, K9GSD 13, K9RAS 13, W9GFF 12, W9QQG 11, WA9HSZ 5, K9EIV 4, WA9DXA 2, W9LNQ 2. (Oct.) K9LRN 40, W9EET 30, K9ISP 14, K9UCG/9 9.

INDIANA—SCM, Ernest L. Nichols, W9YYX—Asst. SCM: Donald Holt, W9FWH. SEC: K9WET. PAMs: K9CRS, K9KTL, K9GLL. RMs: W9TT, W9JOZ, K9-DHN. Net skeds (all times in GMT): IFN, 1330 daily and 2300 M-F on 3910 kc. ISN, 0030 daily on 3920 kc. (during winter months may be moved up to 2330 GMT). QIN, daily at 0000 and RFN, at 1200 Sun. on 3656 kc. Hats off to W9SNQ, who has resigned as SEC after more than 5 years of outstanding service. Our new SEC is an ex-marine, Ralph L. Piercy, K9WET, R.#3, Box 174, Logansport, Ind. Other new appointments: WA9FHF as EC of Tipton County; K9ARW as OO Class IV. The Greenwood ARC has received the call WA9JYL and has an f.m. rig on 52.525 Mc. Fishers High School ARC installed 6-meter gear on the school bus for the Band Day football game trip. W9LNC reports on the plans for organizing a Storm Warning Net including Vermillion, Warren, Parke, Fountain and Vigo Counties. QIN honor roll: K9VHY, WA9ECX, W9QLW, K9DHN, W9AUM and K9KTL. W9JOZ and W9NZZ made the BPL. *Amateur Radio exists because of the service it renders.* November net reports: ISN 791, IFN 265, QIN 136, Hoosier V.H.F. 87, RFN 11, 9RN 495. Indiana represented 95 per cent. Traffic: (Nov.) W9JOZ 1875, W9QLW 391, W9-NZZ 317, K9DHN 298, W9VAY 287, WA9ECX 229, W9-MM 228, K9IVG 211, K9RWQ 177, K9KTL 165, WA9-AUM 156, K9LZA 128, K9ZLB 97, K9CRS 75, W9TT 69, W9BUQ 61, W9YYX 50, W9RTH 40, W9FWH 39, K9-QXI 36, K9VHY 29, W9DGA 24, W9QYQ 24, W9CC 23, WA9BRD 22, WA9ELY 19, K9ILK 19, K9BSL 18, WA9-BFB 16, K9GEL 16, K9PVS 16, W9SNQ 15, W9BTZ 13, WA9BGI 12, WA9BWY 10, W9DOK 10, W9DZC 9, K9-MWC 9, K9ARW 7, K9FPA 7, W9UHQ 7, W9EJI 6, W9-ZZR 5, W9BDP 4, W9CLY 4, W9ENU 4, K9SUH 4, W9-AQW 3, WA9AEL 1, K9DHJ 1, K9WET 1. (Oct.) K9INF 257, K9IVG 212.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: W9BCC. RMs: WA9AKE and W9KQB. PAMs: K9IMR, W9NRP and W9NGT. Nets: WIN on 3535 kc. daily at 0045Z; WTN, on 3710 kc. Tue. through Sat. at 0130Z; BEN, on 3950 kc. daily at 2400Z; WSBN, on 3985 kc. daily at 2315Z; SWRN, on 50.4 Mc. Mon. through Fri. at 0300Z. Net certificates were sent to W9FNT and W8-ZUL for WSBN. New appointments: K9DBR and WA9-FNS as OESs. Renewed appointments: K9DTK as OPS. WIN is looking for Milwaukee and Madison outlets, among others. W9BSO has a new 50-ft. tower with a 15-meter beam. The Milwaukee AREC gave a demonstration of amateur radio for the boy scouts. K9WLE has a new SX-101A. W9CXY is assisting W9DYG as CAN mgr. while Fred takes a well-earned rest. WA9EOO has a new five-element 50-Mc. beam. W9ONI finished his new final and says it worked fb the first time. Wonder how he does it? W9RQM has his DX at 276. K9LJM received his General. WA9FMQ has his WAS award. K9ELF has a new NCX-3. With his Oct. BPL

(*Continued on page 104*)

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Kit HX-10....96 lbs.....$334.95

SPECIFICATIONS — Emission: SSB (upper or lower sideband), CW, AM and FSK. **Power input:** 180 watts PEP—SSB and CW, 75 watts AM. **Output impedance:** 50 to 75 ohms with not more than approximately 2:1 SWR. **Frequency range (MC):** 3.5 to 4.1; 6.9 to 7.5; 13.9 to 14.5; 20.9 to 21.5; 27.9 to 28.5; 28.5 to 29.1; 29.1 to 29.7. **Frequency stability:** within 100 cps, after warmup. **Carrier suppression:** 50 db below peak output. **Unwanted sideband suppression:** 55 db below peak output. **Keying characteristics:** Break-in CW provided by operating VOX from a keyed tone using grid-block keying. **Audio input:** High impedance microphone. **Audio frequency response:** 400 to 3000 cps at ± 3 db. **Power requirements:** OFF—4 watts; STANDBY—200 watts; KEY DOWN—400 watts at 117 volts, 50/60 cycles AC. **Cabinet size:** 19"W x 11¼" H x 16" D.

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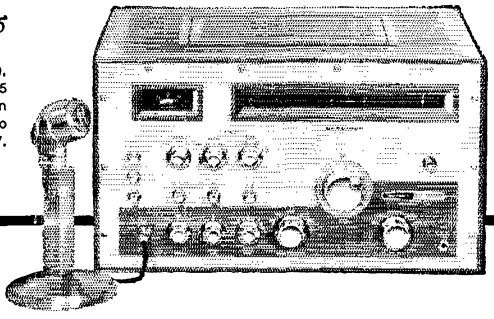

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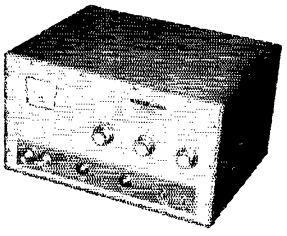

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AM-144

(*Continued from page 102*)

W9DYG completed 55 consecutive months of making BPL. Net reports received: WIN, 101 cleared in 13:38 by 233 check-ins; WSBN, 669 cleared in 29:24 by 1198 check-ins. BPL certificates for Nov. traffic went to K9IMR and WA9AKE. Traffic: WA9AKE 1156, W9SAA 470, K9-IMR 356, W9AOW 269, W9DYG 160, K9LGU 98, WA9-BWD 79, W9KQB 67, K9GSC 55, W9YT 38, W9NRP 35, W9MWQ 33, W9HPC 30, W9OTL 22, K9DBR 14, WA9-FOM 13, K9UUT 12, K9DJY 11, W9RQM 4, W9UEB 4.

DAKOTA DIVISION

NORTH DAKOTA—SCM, Harold A. Wengel, WØ-HVA—SEC: WØCAQ. PAM: KØTYY. WØDXC is active again after several years. WAØDAR is on the air with a 6-meter rig and is building a 6-meter mobile transmitter. KØQYD has a new Thunderbolt. KØBOT finally got an antenna up. KØDAR and KØCZR have moved up from Conditional to General. KØEWW has a new 15-meter beam. KØEOF has a 20-meter rhombic. KØQYD has DXCC. WØVCQ is building a monitor scope and a 160-meter 50-watt a.m. phone rig. The North Dakota 75-Meter Phone Net reports for Nov.: 25 sessions, 471 check-ins with a maximum of 26 and a minimum of 9; 39 pieces of formal traffic handled, 67 informal with 8 relays. Traffic: KØITP 160, KØGGI 31, WAØAAD 30, KØFRP 22, WØCAQ 8, WØCZL 2, WØ-IHM 2.

SOUTH DAKOTA—SCM, J. W. Sikorski, WØRRN.—SEC: WØSCT. KØGSY, RM, is asking for more traffic on the C.W. Net, which operates Tue., Thurs., and Fri. at 0100Z on 3645 kc. WØCUC reports a score of 142,848 in the SS. WAØCXJ and WAØCXK purchased a new TR-3. SFARC members installed an antenna on the hospital so CXK could operate while recovering from surgery. The Sioux Falls (South Dakota) ARC, Inc., announces it will sponsor a South Dakota QSO Party starting at 0001Z, Feb. 16 and ending at 0600Z, Feb. 17. Frequencies monitored: 3645 kc. and 3900 kc.; 7050 kc. and 7230 kc., 14,095-14, 100 kc. and 14,280 kc. (All are approximate.) Call "CQ SD" on c.w., and "CQ South Dakota" on phone. QSLs may be sent to Box 91, Sioux Falls, S. Dak. 57101. Traffic: (Nov.) WØZWL 450, WØ-SCT 250, KØGSY 178, WØDVB 119, KØVYY 40, KØ-BMQ 29, WØCUC 28, KØAIE 26, WØDIY 25, KØTXW 25, WAØCWX 17, KØZBJ 17, WAØARZ 10, KØBSW 8, KØJHJ 8, KØMHF 8, WØZLS 6, KØJGM 5, KØKOY 5, WØRWX 5, WØOFP 3, KØQYB 3, KØFQH 2, WØFUV 2. (Oct.) WØWUU 3.

MINNESOTA—SCM, Mrs. Helen Mejdrich, WØOPX—Asst. SCM: Emerson Mejdrich, WØRIQ. SEC: KØ-KKQ. RMs: KØZRD, KØIJU. PAMs: WØYHR, KØ-VPJ. MSSB PAM: WØHEN. Newly-elected officers of the Minneapolis Radio Club are WØGLU, pres.; WØ-CKI, vice-pres.; KØZOJ, secy.; WØQMD, treas. The RARC started classes Jan. 20 for Advanced Class license aspirants. Appointment issued: KØZZR as EC. Renewals: WAØCAH as EC. OO WØTIV reports 16 violations. Congrats to ORS/OPS WAØARA on attaining his first BPL. Steve holds NCS spots on MSN, MPN and TEN. OBS WAØDIE received WAS and needs an African QSL for WAC. V.H.F. OBS WAØCQG has a Heath Sixer and worked N.Y. on 5 watts input in a recent band opening. He is now 31/28 on 6 meters, using c.w., n.f.m., a.m. and s.s.b. He was assisted by WØBUO and WØIRO in forming a new organization, the Metropolitan Amateur Radio Council. Good luck! OPS WAØ-BYO has once more made the BPL. Congrats! Our best wishes go to ORS WØDQL who has moved to Miami where he is working with the Veterans Administration. MSN NCS KØBAD has worked H13PC on 80 meters using G6CJ CFM. WØOJG, KØERQ, KØLWK, KØVPJ, WØOPX and WØRIQ gathered at the new Aitkin QTH of WØOJG for a recent antenna-raising. Bill is now active on 75-meter phone. KØQLM is an electronics technician at the Montana AFB. He will be operating a portable station soon on 80- and 20-meter c.w. and looking for Minnesota contacts. Traffic: WAØ-ARA 595, KØIJU 287, WAØBYO 263, WAØDVH 250, WØOPX 93, KØBAD 88, KØZKK 87, WØUMX 81, WØ-HEN 80, KØADI 65, KØVPJ 64, KØQBI 62, WØKYG 55, KØZRD 55, KØZIW 50, WØYHR 43, WØRIQ 41, WAØCQG 36, KØFLT 32, KØMIA 31, WØCIV 29, KØ-SRK 29, KØSXQ 28, WAØDSH 27, WØMXC 24, KØ-LWK 22, KØFWC 21, KØIHD 21, WØALW 20, WAØ-CPW 20, WØFID 20, WAØFNS 20, WØKNR 20, KØ-DEF 19, KØFTB 18, KØJFJ 18, WAØFIK 17, WØKJZ 17, WØRQJ 17, WAØFCJ 16, WAØDXV 13, KØJYJ 13, WØLIG 11, KØIKU 9, WAØEDN 8, WØOSJ 8, WAØ-ASV 5, KØICJ 5, WAØBKA 4.

DELTA DIVISION

ARKANSAS—SCM, Curtis R. Williams, W5DTR—SEC: W9PHR/5. PAM: K5SGG. RM: K5TYW. New appointments: K5IKA, Stone and Izard County EC; W5LZU, Garland County EC; K5ALU, Crawford County EC; W5CAM, Jefferson County EC; WA5BBS as OPS. BPL: W9PHR/5. Section Net certificates have been issued to K5ARE, W5SZJ, W5LHN, W5FML and WA5-BIB for OZK and to W5WUM, K5WSS, W5NTV, W5-LHN, W5FML, WA5GPO, WA5EVU, WA5BBS and K5AXP for AEFN. Reporting into either OZK or AEFN 50 times will get you an SNC. Net reports for Nov.:

Net.	Freq.	Time	Days	Ses-sions	QTC	QNI	Ave.	Rate
OZK	3790	0100Z	Daily	30	107	271	3.6	.129
AEFN	3885	1200Z	M-Sat.	26	115	1063	4.0	—

W5YM has been active on both nets and has received two net certificates. Thanks to the U. of A. amateurs. The new Delta Division Director is Philip Spencer. He will need all your support. Arkansas amateurs should write him expressing their views on amateur radio matters. The Amateur Radio Public Service Corps now has over 150 members in Arkansas, but needs additional support. If you are not a member, join now. The Conway area has several new Novices. Traffic: (Nov.) W9-PHR/5 565, K5TYW 184, W5DTR 169, K5SGG 60, W5YM 32, WA5CSJ 23, WA5BBS 22, WA5BDM 9, WA5CAG 3, W5FML 3. (Oct.) W5YM 58, K5TCK 1.

LOUISIANA—SCM, Thomas J. Morgavi, W5FMO—The Lafayette ARRL Delta Division Convention held in November was a huge success with about 300 attending. Convention chairman W5WZR with his wit and poise did a fine job of direction. Ed Handy, W1BDI, and Lew McCoy, W1ICP, attended as representatives of ARRL; also in attendance was Director Teetsen, W5-MUG. Director-elect Spencer, W5LDH; Vice-Director-elect Cassens, Vice-Director Hicks, Tennessee SCM Goggio and yours truly, W5FMO. WA5GLC of Plaquemine, La., made off with the SR-150 while WA5EHU, snagged the 30L1. Rick incidentally passed the General Class examination at the FCC tests being conducted at the convention. W5AXU just finished a 4-1000 final and got it on the air. W5CEZ, Louisiana RM, has added a new 40-meter sked which is producing quite a bit of traffic. That 604 traffic count Carter has this month was no accident. K5FYI has been running a warrior with a T-60 at 600 watts a.m. with controlled-carrier without burning anything up yet. W5JGV has been working on his amateur TV system. The power supply has 15 tubes delivering 6 different regulated high voltages with an additional 85 tubes in another cabinet plus videcon camera, etc. Looks like all W5JFB does is galavant. In addition to visiting a lot of W1 friends, He visited W1AW. Now that the director election is over, I want to take this opportunity to thank the fellows who voted for me. About 1700 out of 2600 members in the Delta Division voted. A very good percentage. Traffic: W5CEZ 604, K5OKR 31, K5FYI 6.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—Congratulations to the Lafayette ARC on the fine convention. Was glad to see ARRL staff members W1ICP and W1BDI, also the new Delta Division Director, W5-LDH/W5LXX. Thanks to all the boys who are now checking in to the Miss. S.S.B. Traffic Net on 3990 kc. at 1800 CST. W5JDF, W5WZ and WA5CAC are doing a fine job with the Miss. CW Net. W5YD and W5YE are doing good jobs for the boys at Ole Miss. and Miss. State. K5-ZFM and WA5GWV are welcome additions to section nets. WA5CAC has developed into a fine c.w. operator. K5RUO says he worked 4 new countries. Sorry to lose W5JDG from Aberdeen. K5AFO is doing a good job as Magnolia Net mgr. WA5GEK, WA5GWV, K5VKV and K5AFO got more contacts than deer at their portable deer camp rig. WN5EHZ now is WA5EHZ in Meridian. Biloxi ARC is purchasing 12 transceivers for 10-meter mobile units. K5UII is now on s.s.b. Traffic: WA5CAC 117, W5JDF 105, W5WZ 46, K5AFO 18, K5IHQ 10, K5-RUO 7, K5MWR 5, WA5JEK 4, K5GAD 1.

TENNESSEE—SCM, David C. Goggio, W4OGG—SEC: K4JIG. RM: W4ZJY. PAMs: K4WWQ, W4RMJ, WA4AIS. Appointments: K4HRY as EC for Sumner Co., W4VRD as OO, W4WBK as ORS. Nets (Nov.):

Net	Freq.	Time	Days	Ses-sions	QTC	QNI	Aver-age
TN	3635	1900C	M-Sat.	26	90	165	6
TSSN	3980	1830C	M-Sat.	26	108	723	28
TPN	3980	0345C	Daily	30	158	934	31
ETPN	3980	0610E	M-Fri.	21	38	420	20

(*Continued on page 106*)

HEATHKIT "LUNCH-BOX"

6 & 2 METER TRANSCEIVERS

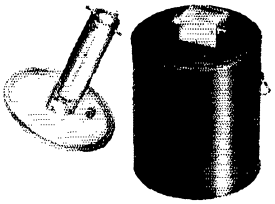
- ✶ CRYSTAL-CONTROLLED TRANSMITTERS—5-WATT INPUT
- ✶ TUNEABLE SUPERRE-GENERATIVE RECEIVERS WITH RF STAGE
- ✶ PROVEN POPULARITY

Affectionately called "Benton Harbor Lunch-Box," the Heathkit "Sixer" and "Twoer" transceivers are used by thousands of amateurs everywhere because of their neat, compact design, proven performance, and low cost.

VERSATILE Operate "fixed" with built-in 117 volt AC power supply or "mobile" with the Heathkit GP-11 vibrator DC power supply. Transfer from fixed mobile operation is easy and fast with the AC and DC plug-in power cables included.

HIGH QUALITY FEATURES Both 6 and 2 meter models feature crystal-controlled transmitters and tuneable superregenerative receivers with RF stage. The sensitive receivers pull in signal levels as low as 1 microvolt with ease and the 5-watt input transmitters are more than adequate for "local" net and emergency operations. A press-to-talk transmit/receive switch with "hold" position provides extra convenience. Complete with ceramic element microphone. Less crystal. Order yours today!

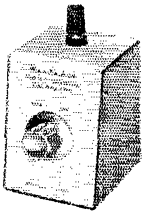
Kit HW-29A (6 meter) . . . 9 lbs. $44.95
Kit HW-30 (2 meter) . . . 9 lbs. $44.95
Kit GP-11: DC power supply for above, 6 lbs. $16.88



Heathkit "Cantenna" Transmitter Dummy Load

Simplifies servicing and testing! Handles up to 1 kilowatt at 50 ohm impedance. Less than 1.5 V.S.W.R. up to 300 mc. Coax connector for transmitter, phono jack for relative power measurement. Oil capacity 1 gallon (not included).

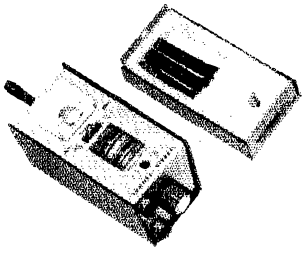
HN-31 . . . 3 lbs. $9.95



100 KC Crystal Calibrator

Every amateur needs this! Provides output every 100 kc from 100 kc to over 54 mc for "dead-on" receiver & VFO calibration. Requires only connection to antenna input terminals. Transistorized and battery powered for complete portability.

Kit HD-20 . . . 1 lb. $14.95



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(*Continued from page 104*)

Congratulations to the MARA on publicity received by the Mayor's proclamation of Amateur Radio Operators Week in Memphis. New officers for '64 are K5JOK, pres.; K4JXG, vice-pres.; W4OQG, secy.; WA4FGB; treas. New officers of the Delta Club: K4BSI, pres.; K4HPP, vice-pres.; W4ZDK, secy.; K4HSP, treas. K4JIG has been appointed hamfest chairman for Delta. See Election Notice, this issue of QST, for details on how to nominate an SCM candidate. Your SCM attended the Delta Division convention at Lafayette, La., and learned from the FCC inspector that some holders of the Conditional Class license were called up for reexamination and failed the code test. If you need to brush up, try the Tenn. C.W. Net listed above. Director-elect Philip Spencer, W5LDH, spoke against the incentive licensing proposal at the convention and was for taking 50 kc. additional for phone sub-bands on 75, 40 and 20 meters where presently used by foreign amateurs. Traffic: W4ZJV 606, W4PQP 302, W4OGG 192, W4MXF 127, WA4IHG 82, W4FX 79, W4KAT 55, WA4HRG 44, K4-ULT 43, K4JXG 40, K4WWQ 39, W4TZJ 34, W4WBK 30, W4CVG 28, K4UMW 24, WA4AWG 18, W4LU 18, W4VTS 17, K4CPC 16, K4JIG 16, W4PFP 16, WA4BUP 14, W4-HPN 13, W4RMJ 11, K4OUK 10, W4TYV 10, W4YAU 8, WA4GLS 7, W4OQG 6, K4LTA 5, WA4BNL 4, K4PZT 3, WA4BXH 2, WA4IUM 2, WA4LPH 2, K4RIN 2, W4SGT 2, K4EPS 1.

GREAT LAKES DIVISION

KENTUCKY—SCM, Mrs. Patricia C. Schafer, K4-QIO—SEC: W4TFK, PAMs: W4SZB, W4BEJ, W4USE. V.H.F. PAM: K4KJQ. RM: WA4LCH. RM (KNN): WA4APU. EMKPN: 21 sessions, 265 QNI, 67 QTC. KPN: 18 sessions, 314 QNI, 68 QTC. Oct. KYN: 30 sessions, 63 QNI, 156 QTC. Nov. KYN: 39 sessions, 278 QNI, 139 QTC. Oct. MKPN: 30 sessions, 509 QNI, 57 QTC. Nov. MKPN: 31 sessions, 551 QNI, 105 QTC. Ky. Emerg. 6-Meter Phone Net: 8 sessions, 91 QNI, 5 QTC. Louisville & Jefferson Co. Area Emergency Net Section I: 4 sessions, 70 QNI. Section II: 13 sessions, 140 QNI, 30 QTC. The Ky. Council of Amateur Radio Clubs had its organizational meeting Nov. 9 at a luncheon in Louisville with 14 delegates and alternates representing 7 clubs in Ky. Officers are W4MFI, chairman; W4JPV, vice-chairman; WA4IUW, secy.; W4TFK, treas. K4TRT has a new Valient II s.s.b. adaptor and an HQ-170A. K2JJW, New Jersey, is portable in Louisville. The Lexington amateurs are using the Utica 650, 6-meter transceiver. K4RGL was reelected president of the Henderson Amateur Radio Club. More than 50 amateurs and their XYLs attended the ARTS meeting in Louisville to hear W8UPB. WA4ELB is remodeling his station with a new antenna and s.s.b. transmitter. The Owensboro Amateur Radio Club elected K4-URX pres. The Louisville Area Emergency Net meets at 1900 EST Mon., Wed., Fri. on 50.7 Mc. W4CDA has set up a message service for the students at the Ky. School for Deaf in Danville. K4QZQ/9 is in Dayton, Ohio. W4UWR is building a final for s.s.b. Traffic: (Nov.) W4BYG 427, WA4LCH 191, W4BAZ 154, K4NHY 100, WA4AGH 83, WA4APU 59, W4BEJ 40, K4VDO 37, K4QIO 32, WA4CQG 24, K4NVO 21, W4BTA 22, W4USE 22, WA4GFN 21, K4HOE 17, K4SWL 15, W4SZB 14, W4YYI 14, WA4ELK 13, K4LOA 13, K4TQZ 12, W4QCD 10, K4ZIQ 6, W4BEW 5, WA4ENH 4, WA4GMA 4, W4-JUI 2. (Oct.) W4CDA 62, WA4CQG 14.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: W8LOX. RMs: W8EGI, K8QLL, W8FWQ, K8KMQ. PAMs: W8CQU, K8LQA. V.H.F. PAM: W8PT. Appointments: W8DCT and W8SLV as ECs; W8FZ as OES; K8PKU as OBS; W8FSZ, K8JED and K8PKU as OPSs; WA8DNZ, K8NJW, W8PBO, K8QKY, W8SCW, W8SJF and K8WQV as ORSs. New officers—Mason County RC: W8VHQ, pres.; WA8CID, vice-pres.; K8-JED, secy.; K8DIX, treas.; K8VXO, act. mgr. Macomb County (S.E. Mich.) C.D. Net: W8APL, RO; W8JXX, ARO; K8JVB, net mgr. Great Lakes Division Convention will be held in Detroit, Apr. 3-5, Statler Hotel; the Grand Rapids Hamfest, May 9, Pantlind Hotel. W8CAM holds code practice on 1804.5 kc. at 0000 M through F at 5 w.p.m. The Great Lakes Sidewinders meet on 50.106 Mc. at 1500 each Sun. The Saginaw V.H.F. Club now is called the Central Mich. V.H.F. Club, net frequency 145.5 Mc. The Huron Valley ARA Net meets Tue. at 0000 on 145.260 Mc. WA8GUO goes from Novice to General. K8EXE changed his HBR-14 to the HBR-11—fine for c.w., s.s.b. WA8BZZ got RTP1, with radar, and his XYL, WA8CDR, got General. K8-NJW built an 813 amplifier. W8DSW likes his SX-117. K8IUZ married WA8CHH, the daughter of K8TCA, and is working at Sparton under the college co-op plan. Our Louis, W8NOH/6, is out of the hospital after a heart bout and doing better. K8GOU and K8TFE made the BPL, along with K8CIP. K8LUY and W8DSW handled traffic from the Dearborn Veterans Hospital for Thanksgiving. W8IWF's DX for Nov.: DL1RK, OH2IZ, DM3-XYO, SM4UV, SM6WT, OZ2OD, KH6AR, VP6PJ, 9LINH and EL2AD. All OESs not reporting for the last 3 months, all OBS not making 3 bulletin transmissions per week and all OOs not turning in a minimum of 25 violations per month, will be cancelled. If you haven't time to handle the appointment, please advise. All ham radio must tighten up if we are to survive. Traffic: (Nov.) K8GOU 435, K8TFE 290, K8HLR 256, K8KMQ 238, K8NJW 225, K8QKY 151, WA8DNZ 149, K8CIP 147, K3DCB/8 123, W8BEZ 101, W8ELW 90, K8KNE 85, W8-QFO 82, K8LUY 60, WA8CPH 57, W8FWQ 55, K8BYX 53, VE3CYG/W8 50, K8PKU 49, K8QLL 49, W8FX 47, W8HKT 35, K8YAY 35, K8DCP 32, W8RTN 29, WA8-EMU 25, W8IUJ 21, W8GTL 14, W8IBB 13, W8ZJE 13, W8AUD 12, K8JED 12, W8DSE 11, K8WQV 10, W8EU 9, W8AHV 7, WA8ASV 7, W8TBP 7, W8ZLK 7, K8WWM 6, W8ZHB 6, K8GJD 4, K8VDA 4, W8EGI 3, W8MAI 3, W8IWF 2, WA8GCN 1. (Oct.) WA8DZP 180, K8LNE 170, K8YAY 61, WA8ASK 43, K8EXE 22, W8EU 20, K8PYW 16, W8AHV 8.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8HNP. RMs: W8BZX, W8DAE and K8LGB. PAMs: W8VZ, K8BAP and K8-UBK. Your SCM attended the North East Ohio V.H.F. Group banquet in Barberton along with 137 others, of which 91 were licensed amateurs. W8AZF, one of our Buckeye Net members, joined the Silent Keys. Warren ARA's *Q-Match* informs us that W8HDF told a very interesting story concerning Ohio State Patrol communications. W8AQW moved to Colorado, ex-W8DSH is now WA8JLI. WN8GGX is in the hospital. W8RQ received USA-CA 1000 award. K8BXT sent in this news: W8QGT, K8OZK and WN8FZU received Trumbull County (WTC) Awards. W8RXS joined the Silent Keys. K8NCV has a new tri-band beam. K8QDQ vacationed in Florida with his son W4JRY. The Seneca RC held its annual pot-luck dinner. 1964 officers for the Scioto Valley ARC are W8NTL, pres.; K8OUQ, vice-pres.; WA8-EFX, secy.-treas. Tiffin RC held a 12-meter transmitter hunt. Dayton ARA's *R-F Carrier* says one meeting was held in the U.S. Army Reserve Signal Bldg. and club members were shown how the Signal Unit operates. officers for 1964 were nominated, the dates for the 1964 Dayton Hamvention was announced as Apr. 24-25 and W8IIP spoke of meters, metering and modifications. Toledo's *Ham Shack Gossip* tells us that W8ARF, an old-timer, has joined the Silent Keys and K7OPI/8 moved to Toledo. The Six Meter Nomads' *The Amateur Extra* informs us K8SEV has a new Clague 99er. South East ARC's *Hamfax* says Lt. Mullaney, of the Shaker Heights Police, spoke on police communications and related subjects and the club toured the Cleveland Airport communications facilities. Parma RC's *P.R.C. Bulletin* tells us the color film, "Land of the White Alice" was shown. W8HXL joined the Silent Keys. K8DHX/VO1 was home on leave and the club elected '64 officers. Indian Hills RC's *Smoke Signals* informs us that Mr. Hover spoke to them on "Above the Arctic Circle" using color slides and 68 members attended the club spaghetti dinner. Dana Cartwright, W8UPB, was reelected as Director of the Great Lakes Division and Charles Miller, W8JSU, as Vice-Director. Ohio had 1049 Novice, 4934 Technician, 599 Conditional, 5495 General, 2032 Advanced and 117 Extra Class licensed amateurs. Massillon ARC's *MARC News* tells us that W8DCC spoke to them on Transistorization. V.H.F. High Banders' *The High Banders Log* informs us that WA8DON received his General Class license. The Babdock & Wilcox ARC saw the film, "John Glenn Story." Canton ARC toured the Akron-Canton Airport. K8RKY has a new Utica 650 transceiver. W8JEI, K8BLC and K8OGN are on 160 meters. K3BWI is now W8EWP. K3ION is now W8FBP. K2CVD is now W8FBT. Appointments made in November were W8ERD and WA8BXN as ORSs. W8VTP as EC and W8GIU as OO. W8DAE and W8UPH made BPL in November. The Ohio S.S.B. Net had 996 stations check in and they handled 465 messages. Traffic: (Nov.) W8UPH 802, W8DAE 359, K8LGA 253, W8BZX 225, K8DIU 163, K8UBK 113, K8BNL 111, W8ECB 101, WA8AJD 94, W8MGA 94, WA8CXY 92, W8QCU 80, K8-LGB 50, K8PBE 49, W8DQD 43, K8BAP 36, WA8AJZ 31, W8GRG 27, K8RXD 26, W8QZK 23, K8VWN 21, WA8EEW 18, W8ETO 16, K8QJU 15, W8AL 8, WA8AWV 8, W8DIH 8, W8LZE 8, W8IEP 6, K8DDR 4, K8RFU 4, K8YML 4, W8EWP 1. (Oct.) W8ILC 53, W8LT 26, W8-OUU 25, W8PZS 23, W8ALS 6, K8YML 3. (Sept.) W8-LZE 22.

(*Continued on page 108*)

VALIANT II—Outstanding flexibility and performance—band-switching 160 through 10 meters—delivers 275 watts input CW or SSB (with auxiliary SSB exciter or Viking SSB adapter) and 200 watts AM! Low level audio clipping—differentially temperature compensated VFO provides stability necessary for SSB operation! High efficiency pi-network tank circuit—final tank coil silver-plated. Provision for plug-in SSB operation with no internal modification.

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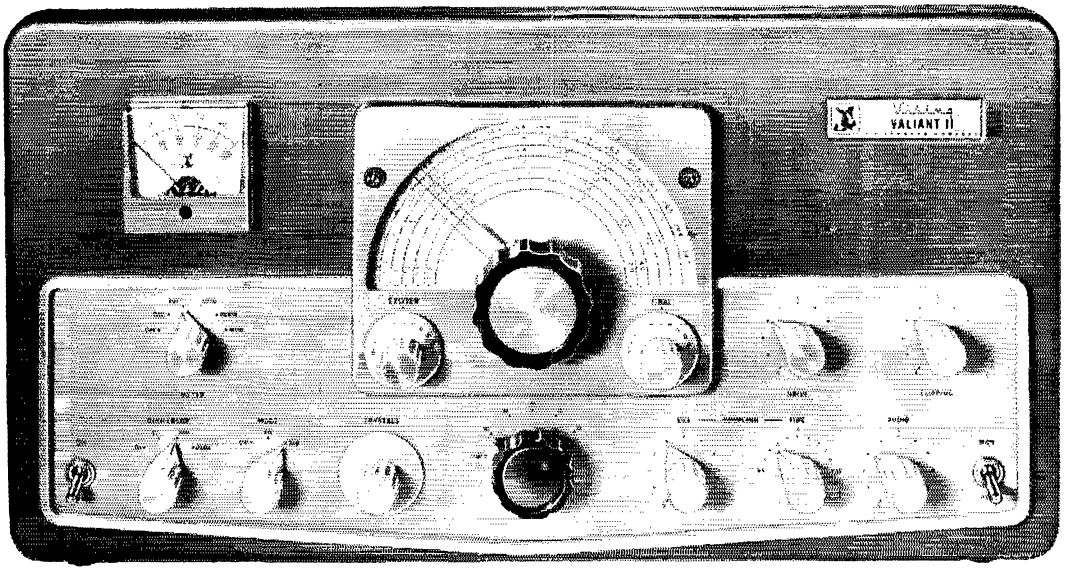

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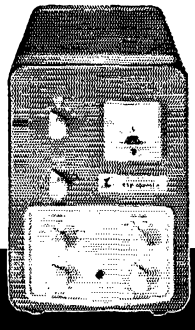

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HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SEC: W2KGC. RMs: W2PHX and K2QJL. PAM: W2IJG. Section nets: NYS on 3670 kc. nightly at 0000 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590 kc. nightly at 2300 GMT; Emergency Coordinators on 146.550 kc. Fri. at 0130 GMT. Appointments: K2MPK as OPS; WA2ZPD as OES; WB2FZC as ORS; WB2LEP as OBS. Endorsement: K2BGU as OES. WA2IBX has a new Thor and five elements on 6 meters while WA2NMH is on the same band with a new HE-45B. WB2HIX is a new station in Beacon. Welcome. WB2FVD is on 75 meters with a new HT-32A and a Drake 2B. Amateur TV was demonstrated by W2ZHI. K2IOW and WB2ICP at the Schenectady Club's Nov. meeting. WA2JAE and WA2VBW have received their 35-w.p.m. stickers from ARRL. G2DBL was a guest of Schenectady amateurs while visiting General Electric. W2EQS spoke to the New Rochelle Club on his experiences as a member of two DXpeditions off the Canadian coast. Several of the members visited our new building in Newington. The Harmonic Hill Club in Mt. Kisco held a successful auction. In Albany, Program Chairman WA2JWK presented an ARRL film, followed by a discussion of summer radio activities. W2AWF is chairman of the Albany Club Old Timers Nite. The Westchester Club is sponsoring a 2-meter transceiver construction program headed by W2AMK, K2EEM, WA2BSY, WB2ESS, WB2FEU and K1ONJ/2. Congratulations to WA2NRV on his recent marriage. K2UTV is the new assistant to NEC WINJM, at ARRL. We wish you the best of success, Pete. Traffic: WA2VYS 217, WA2UZK 206, W2EFU 147, WB2FZC 112, K2TXP 63, K2SJN 44, WB2HYB 35, W2THE 34, W2SZ 33, WA2HGB 31, WA2JWL 28, W2PKY 24, WB2FXB 15, WA2UBO 4, K2HNW 2.

NEW YORK CITY AND LONG ISLAND—Acting SCM, John S. Brandau, K2OVN—RM: W2WFL. V.H.F. PAM: W2EW. Section Nets: NLI, 3630 kc. at 0015Z nightly; NYCLIPN, 3908 kc. at 2230Z nightly; V.H.F. Net, Tue.-Wed.-Thurs. on 145.8 Mc. at 0100Z and Fri. through Mon. on 146.25 Mc. at 0000Z; Mike Farad on 7238 kc. at 1700Z. Tickets are available for the 1964 National ARRL Convention to be held in New York City. The Worlds Fair amateur radio station will be K2US and if you wish to operate the station see your HARC Club representative. K2SPG reports calling and working OZ4OF and HA6KVB on 80 meters. WB2AXW now is operating in Philadelphia. New officers of the Lake Success Radio Club (W2YKQ) are W2NBI, pres.; W2EXH, vice-pres.; K2PWG, secy.-treas. K2HSY is busy building a 417 converter and an 829 transmitter for 2 meters. W2IAG reports FB on 15-meter a.m. WB2DUD, EC Kings County, reports a TVI committee has been formed from members of the 6-Meter AREC Net. Contact WB2EMO or WB2FXN for help on TVI in Brooklyn. WA2EFN needs two more for DXCC. WB2AEX reports the MacArthur HSARC station, WA2WJY is on the air every afternoon looking for other high schools. W2DBQ reports meeting old AARS members from the '30s. WA2YNH has a 2-meter kilowatt under construction. WA2PMW received the Florida Cities Award and QRP 50 Award. BPL certificates were awarded to W2EW, WA2GPT, W2MTA and K2SPG for good work on the traffic nets. Why not sign into the traffic nets and make the BPL? New appointments: K2SJP and WB2HWB as OPSs; WA2JIS as OO; WA2UNH and WA2YNH as OBSs; WA2ZJF as OES; WA2YLL as ORS. WA2MMW has been appointed EC for Manhattan with WA2VKK assisting him. All AREC nets are looking for more operators. WA2QAO, Bronx EC, reports his nets are improved and wants more operators. Queens County AREC needs an EC. Requirements: Plenty of time for planning and training, some experience in emergency work and a flair for paper work. If interested, contact K2OVN. A new NYCLI Fone Net will meet Mon.-Wed.-Fri. at 2200Z and Tue.-Thurs.-Sat.-Sun. at 2100Z on 3932 kc. This net can only be effective if it has sufficient operators and strong NCS. Contact K2YMU or WA2QJU. WA2YLK has been appointed mgr. of 2RN Traffic Clinic. WA2OUM completed a 2E26 amplifier for use with his Twoer and reports a great improvement. WA2EXP is using 20- and 40-meter "Vees." WA2UYQ has plate-modulated his DX-60 and reports good results. WA2GPT is back on the traffic nets after a forced vacation because of transmitter trouble. WA2EXP, a member of NLI and the 2-Meter Traffic Net, is out of the hospital. Please send your station activity reports after the first or second of the month. Code practice on Fri. and Sat. at 2200 EST by W2YBU on 7,080 Mc. is another service of the Rockaway Amateur Radio Club. Code practice is conducted Sun. morning 9-10 on 28.6 Mc., compliments of the Radio Club of Brooklyn. Officers of the Five Towns RC are K2RPW, pres.; WA2PDI, vice-pres.; WA2YPJ, secy.; WA2SCO, treas. Their election will be celebrated with a spaghetti

(Continued on page 110)

dinner and radio auction. Once again the Five Towns RC handled traffic for servicemen for the holidays. The Erasmus Hall Radio Club elected Michael Salsberg, pres.; WB2DRE, vice-pres.; WB2BCO, secy.; WA2VOW, trustee. Traffic: (Nov.) W2EW 531, WA2GPT 530, W2MTA 519, WA2VLK 382, K2SPG 206, WA2LJS 183, WA2YNH 66, K2KYS 62, WA2SAZ 54, W2GKZ 18, WA2-QJU 48, WA2ZXR 42, WA2EXP 33, WA2UYQ 31, WA2-RMP 29, W2EC 20, W2DBQ 19, WA2EFN 18, WB2DUD 8, WA2PMW 8, W2PF 6, W2WAO 5, W2IAG 4, WA2-RAQ 4, WB2BKS 1, K2OVN 1. (Oct.) WA2GPT 196, WA2TQT 115.

NYC-LI QSO PARTY

February 8-10

The South Shore Amateur Wireless Assn. invites all amateurs to participate in the New York City-Long Island Section QSO Party by contacting as many NYC-LI stations as possible.

Rules: (1) *Contest Period:* 2300 GMT Feb. 8 to 0500 GMT Feb. 10. (2) *General Call:* On c.w. "CQ NL" or "DE NL." On Phone "CQ New York City-Long Island." (3) *Scoring:* Stations outside NYC-LI count two points for each NYC-LI station worked, and multiply by the number of counties worked (7 maximum). NYC-LI stations count two points for each station worked outside the section, one point for section contacts and multiply by the number of ARRL sections worked. Multiply final score by 1.25 if power 150 watts or less at all times. Phone and c.w. are considered the same contest. (4) *Exchange:* RS(T), ARRL section or county and name. (5) *Awards:* Certificates go to section winners, county winners, and Novice high scorer. At the discretion of the contest committee, 2nd and 3rd place certificates may be awarded. (6) *Frequencies:* 3560-70, 3900, 7080-90, 7250, 14080-90, 14250, 21050-60, 21350, 28010-20, 29000 kc., and 50.4 and 145.5 Mc. (7) *Entry:* Logs must be postmarked no later than Feb. 29, 1964. Send logs to the SSAWA c/o John G. Courtney, 22 Pine Street, Rockville Center, New York.

NORTHERN NEW JERSEY—SCM, Edward F. Erickson. W2CVW—Asst. SCM: Louis Amoroso, W2LQP. NNJ ARPSC Nets: (Nov.)

Name	*Freq.*	*Time*	*Days*	*QNI-QTC*	*Managers*
NJN	3695 kc.	2400Z	Daily	479-317	W2QNL-RM
NJ PHONE	3900 kc.	2300Z	Ex Sun.	620-201	K2SLG-PAM
NJ PHONE	3900 kc.	1400Z	Sn		
NJ 6-2	51.15 Mc.	0400Z	T, Th,	140-259	K2VNL-PAM
NJ 6-2	146.70 Mc.	0300Z	W, Sn		
16N	1810 kc.	0030Z	Tue.	new net	WA2QPX-RM
NJNN	3725 kc.*	0020Z	W, F	12-3	WA2SRK-RM

*WA2SRK will tune plus and minus 8 kc. from 3725 kc. AREC local net skeds are available from K2ZFI. SEC. K2OEI and K2YWG are organizing the Shore Area Amateur Radio Club to cover the greater Keyport area. W2DMJ and K2OEI both held a very busy session for the SET; W2DMJ 99 points, K2OEI 89 points. WA2-RIN reports a multitude of equipment failures, but evidently Albert has gained the knowledge from these experiences to qualify for a 2nd-class commercial ticket. K2SRA has returned from a 30-month stay overseas as DL5IV. WB2DDA has erected an 800-ft.-long wire and is building a transistorized keyer. Novices aspiring to become traffic-handlers are reminded of the NJNN listed above. WN2LJO and WN2LJJ have joined our ranks. K2UCY reports ham participation in the Oct. 22 state-wide c.d. drill. Many AREC and RACES groups worked together. WB2CVN reports the East Coast RTTY Net meets on 3620 kc. at 1900 EST. Charles sends Official Bulletins on that net. WA2CCF is going RTTY also. W2NIY reports a grand trip through the West with mobile and eyeball QSOs. K2LRF has four elements on 6 meters. Glad to hear that W2AOE is out of the hospital. Ranking N.J. leaders in QSARA's 4th N.J. QSO party: WA2WBH, K2BMI/2, W2TSL, WA2CBB/2, W2-CVW. Asst. EC WA2ZRP has a new 15-meter beam. Teaneck Radio Club officers: WN2FYB, pres.: WB2-COZ, vice-pres.; EC WB2BCS and W2MPT got some nice newspaper publicity for their AREC work. They are building their own emergency equipment! QSARA resumes its code classes. Contact WB2BCS at 741-5568 (Red Bank). OBS WA2KIY sends code practice on 21,132 kc. Fri. Sat. and Sun. at 9 P.M. local time. W2OYG has a new SX-115. WN2KSG has been experimenting with antennas. WB2ALF is building a keyer. WA2ZOW is on 6 meters with 5 watts. WB2DEP was active in the SS. K2UKQ operated from the hospital with the help of W2ANG. Glad that Kay did not have to stay there very long. WA2GQZ and family are proud of the new granddaughter. W2QNL will continue as examining Route Manager for N.N.J. and plans a manual on traffic procedure. Traffic: (Nov.) WB2ALF 303, K2VNL 294, K2UCY 212, WA2WAJ 166, WA2KVQ 158, WA2CCF 141, W2QNL 109, WA2MYB 95, WB2DEP 86, WA2TEK 84, WB2FCT 69, WA2SRK 67, W2CVW 53, W2EWZ 52, WA2GQZ 43, W2TFM 29, K2SLG 21, K2ZFI 18, K2VNK 16, W2PEV 15, W2BVE 14, W2LQP 14, WA2ZRP 13, W2-DRV 10, WA2ZKT 10, WB2COZ 9, W2FNX 9, K2EQP 7, WB2BCS 4, K2MFX 4, K2VVL 3, K2AGJ 2. (Oct), WA2-GQZ 102, W2QNL 101, WA2UOO 100, K2OEI 14, WA2-APY 5.

MIDWEST DIVISION

IOWA—SCM, Dennis Burke, WØNTB—SEC: KØ-VBM. PAMs: KØBBL, WØLSF. A new OBS is KØUPQ. Welcome, Charles. KØHBD and WØBIP are Silent Keys. WOOLM is recovering from a coronary. WØKJN recovered from one several months ago. The Panora boys entertained your SCM recently. WØNWX, our Midwest Division Director, visited the Ames Club just before he left for Newington. I am sure he had some tidings to bear to headquarters. WØLGG is happy with TEN and WØUSL has resuscitated the 75-Meter Interstate S.S.B. He asks a pertinent question, "Of what use are you if you don't do something?" Look at his report below. There has been a good response to my plea for c.w. operators but more can be used. Don't be bashful. Nets for Nov.: 160 Meter, QNI 902, QTC 36, sessions 30. 75-Meter Net, QNI 883, QTC 121, sessions 26. Interstate Sideband Net, QNI 1459, QTC 614, sessions 30. Hamilton County, QNI 230, QTC 29, sessions 29. Jasper County, (late for Oct.), QNI 191, QTC 10. Traffic: (Nov.) WØLGG 2110, WØBDR 830, WØSCA 595, WØ-NTB 135, WØUSL 83, KØBBL 31, WØDUA 25, WØJPJ 24, WØBTX 23, KØTDO 16, KØBRE 13, WØYDV 11, WØHTP 8, KØJSK 8, WØFMZ 7, WØREM 5, WØQVZ 4, KØJYZ 3. (Oct.) KØJMA 14, WØDUA 8.

KANSAS—SCM, C. Leland Cheney, WØALA—SEC: KØBXF. PAMs: KØEFL, WØBOR. RMs: WØQGG, WØPFG. V.H.F. PAMs: WØHAJ, KØVHP. Nov. net reports:

Net	*Freq.*	*Time*	*Days*	*Sessions*	*QTC*	*QNI*	*Ave.*
KPN	3920	1245Z	M-W-F	16	85	318	19.9
"	"	1400Z	Sun.				
QKS	3610	0030Z	T-T-S-Su				
NCSs: WØIFR, WOORB, KØYTA, KØEFL							
HBN	7280	1800Z	Daily	18	559	703	

A section meeting is planned this month in the northeast part of the state. Details will be forthcoming on the traffic nets. Scores are mounting toward TOP awards to be awarded to the top workers in each appointment classification this year. Is your station represented in the activity of the section? If not, why not get started toward one of the awards. Send a report of your activity each month to your SCM. You may find yourself a winner. BPL certificates are available to traffic operators who maintain the required amount of traffic. Traffic: KØYTA 124, WØBYV 113, KØBXF 70, WØTWJ 43, WAØEDD 41, KØGH 38, WØIFR 36, WØALA 33, KØ-LHF 25, KØEFL 13, WØBMW 11, KØVET 8, WAØBRK 7, WØFDJ 2, WAØDZI 1.

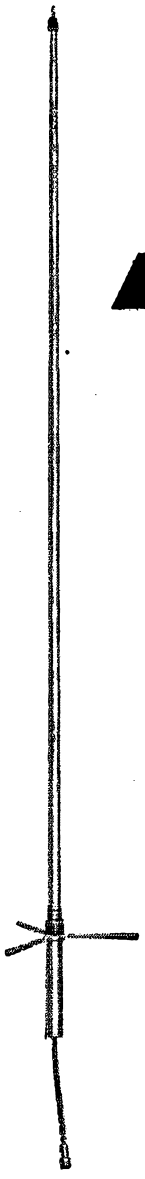
MISSOURI—SCM, Alfred E. Schwaneke, WØTPK—SEC: WØBUL. RMs: KØONK, WØOUD. PAMs: WØ-BUL, WØBVL, WØOMM, KØONK. ORS appointments were renewed for WØKIK and WØOUD; OES for KØ-JWN. The Greene Co. ARS has started radio theory classes, KØHUU directing and WØNHO teaching. WØ-ZWN received the St. Louis Amateur of the Year Award. New officers of the St. Louis ARC (KØLIR) are KØ-TOV, pres.; WØBGO, vice-pres.; KØAEM, secy.; KØ-HUO, treas. WAØCWV, KØFPC and WØKCG resigned as OBSs. WØALA, SCM Kansas, visited with KØONK and read the Wouff Hong ceremony conducted at the Midwest Convention. WØBUL reports that conventions have forgotten the emergency and traffic ham. WAØDYK received his Gen. Class license. KØFPC got Extra Class! WØOUD and WØDE (OM) operate from two positions and report into two nets simultaneously. A new station in Joplin is WA5GNV, awaiting a zero call. WAØFLL stacked 2 five-element beams at 40 ft. for 6 meters. Note the new days for the MOSSB Net. The Mo. Slo-speed Net (MSN) is conducted to train new hams in traffic work. Any Novices or others wishing to learn traffic work are invited to join. Drop a line to the SCM or the net manager. Net reports for Nov.

(*Continued on page 112*)

C-P COMMUNICATION ANTENNA SYSTEMS

—mean CERTIFIED PERFORMANCE!

BASE STATION STATIONMASTER ADVANCED DESIGN ANTENNA (4X-Omnidirectional Gain)
U.S. PATENT NO. 3,031,668



Cat. No. 200-509 Frequency Range 130-174 MC*

Cat. No. 200-509 Stationmaster Collinear Gain Antenna is designed to meet the ever increasing need for high antenna gain in minimum space and at lowest cost. This antenna, consisting of a number of collinear radiating elements fed inphase and encapsulated in a continuous weatherproof fiberglass housing, meets the above requirements. Low overall weight eliminates the need for extensive erection equipment required by previous antennas offering equal power gain. The input fitting on these antennas is a standard Type N male connector mounted at the end of an 18" flexible terminal extension. Designed for maximum strength with minimum cross-section, Cat. No. 200-509 is capable of withstanding winds in excess of 100 MPH.

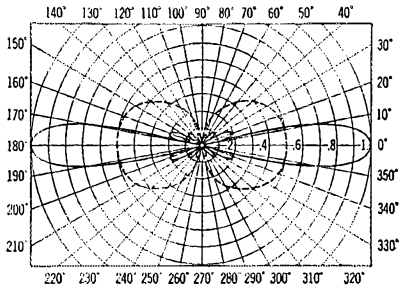
*Exact frequency must be specified

Electrical Specifications:

Nominal input impedance	50 ohms
VSWR	1.5:1
Bandwidth	±0.3%
Maximum power input	500 watts
Internal feedline	RG-8A/U
Flexible terminal extension	18" of RG-8A/U
Termination	Type N male with Neoprene housing
Omnidirectional gain	144-174 Mc 5.8 db 130-144 Mc 5.5 db
Vertical beam width (½ power points)	18°
Lightning protection	Direct ground

Mechanical Specifications:

Radiating element material	Copper
Element housing material	Fiberglass
Element housing tip diameter	⅝"
Element housing butt diameter	1⅞"
Element housing length	19'
Ground plane element length	18"
Support pipe	2⅜" dia. hot-galvanized steel, 22" available for mounting
Rated wind velocity	100 MPH
Lateral thrust at rated wind	45 lbs.
Bending moment 6" below ground plane at rated wind	450 ft. lbs.
Weight	30 lbs.



Vertical field strength pattern of Cat. No. 200-509 Stationmaster Antenna. A dipole pattern is shown for reference.

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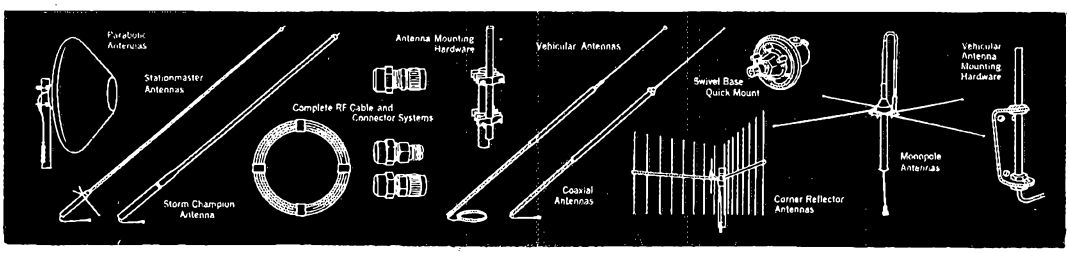

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MON	3580	0100Z	Tu-Sun.	26	147	118	WØOUD
MSN	3715	2200Z	M-F	**30**	22	12	KØONK
		1300Z	Sat.				
SMN	3580	2200Z	Sun.	4	20	12	WØOUD
MEN	3885	2400Z	M-W-F	13	283	77	WØBUL
MoSSB	3963	2400Z	M-Sat.	10	—	158	WØOMM
PON	3810	2100Z	M-F	19	180	589	KØBWE

Traffic: (Nov.) KØONK 5411, KØTGU 258, KØFPC 232, WØMKJ 174, WØWYJ 78, WØOUD 63, KØMMR 57, KØBWE 55, KØVNB 47, WAØCWV 38, WØTPK 31, KØTCB 26, WØBVL 24, WØAIM 18, WØBUL 16, KØLQH 15, WØDEO 11, WAØDJG 8, WØKIK 7, KØWOP 6, WØOVV 5, WØRTW 5, KØJPL 2, KØVIQ 1, KØVYP 1. (Oct.) KØIHA 532, KØVIQ 8.

NEBRASKA—SCM, Frank Allen, WØGGP—SEC: KØTSU. Net reports for Nov.: Nebraska Storm Net, KØJXN reports, QNI 746, QTC 40. Nebraska Emergency Phone Net, WØEGQ NC, QNI 820, QTC 92. Western Nebraska Phone Net, WØNIK NC, QNI 564, QTC 39. 100 per cent check-ins: WAØAES, KØAIE, WØFJZ. Nebraska Morning Phone Net, NCs WAØCEZ, WØFNH, WAØCFB, WØEGQ. WØSCT, WAØBRH, QNI 482, QTC 64, 29 sessions. A steady increase in 2 meter ragchew activity is reported in the Hastings area. Six meters has folded for the year. The Pine Ridge ARC at Chadron has acquired equipment for a club station and has requested the call of WØFLO, who joined Silent Keys in October. More OOs are needed in Nebraska. If you can qualify, contact your SCM now. Traffic: WØNYU 76, KØIJW 75, WØFIG 69, WØLOD 67, WAØBIE 43, WAØBID 41, KØRRL 36, WØEGQ 31, KØCEZ 23, KØMMS 23, WØZHV 21, KØKJP 18, WØNIK 16, WAØCFB 15, WAØAES 12, WØBKW 12, WØFBY 12, WØMAO 11, WØCCD 10, KØJFN 10. WØGGP 9, W4LEE-Ø 8, WØOVV 8, WAØCDQ 6, KØCGM 6, WØBOQ 5, KØZEO 5, WAØBYK 3, WØPQP 2, WØWUV 2, KØYZP 2, WAØDFS 1.

NEW ENGLAND DIVISION

MAINE—SCM, Arthur J. Brymer, W1AHM—SEC: K1DYG. PAM: K1ADY. RM: K1MZB. Traffic Nets: Phone Seagull Net, 3940 kc. 1700-1800 daily except Sun. Pinetree Net, 3596 kc. 1900 daily through Fri. First Regional Net, 3605 kc. 1815-1930 daily. Maine State C.D. Net meets Sun. at 1100 EST on 3993 kc. and Wed. at 1900 on 3530 kc., with W1BYK as NCS. The AREC Net meets Sun. at 0900 EST on 3940 kc., K1DYG as NCS. The amateur station at the Naval station, Winter Harbor, Me. K1NAN, had a bit of bad luck in a wind storm in Oct. but now has a better antenna system and is back in business. W1WJK is on duty with the armed forces. K1CLF conducts RTTY nets on the MARS Net weekly. K1PWG is NCS of the Barnyard net once a week. W1EPN and K1PWG handled emergency traffic during the fatal plane crash in Oct. W1FNX is in Florida for the winter. W1EPN is putting up a new antenna for 40-meter c.w. W1DPU has a new NCX-3. W1OHU has a new Heath S.S.B. transceiver on 75 for mobile and a.c. power. W1TUA has a new three-element beam for 20 meters. W1WM is active on 2 meters and is building a new receiver for 2 meters. W1PC'D has the new Collins S/Line. WN1ASF is a new ham in the Portland area. W1AVO, WA1AVP, WA1AVQ, WA1AVR, W1SXA and K1WHO are new Generals in Maine; K1AES, K1-JWT and K1UCQ are new Conditionals; K1WJI is a new Tech, and WN1AUX, WN1AVA and WN1AVH are new Novices. Traffic: (Nov.) K1BFX 149, K1MDM 52, K1GSF 10, W1AHM 8, K1VEQ 6, K1LHE 4. (Oct.) K1-MDM 33.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker Jr., W1ALP—W1AOG, our SEC, received reports from ECs K1MOO, K1ICJ, W1FON, K1PNB, K1QAM. K1RPA is a new OO. W1ASG is in Hawaii. W1EFW presented the ARRL charter to the TIMAC Club. W1ALP was present. Sorry we have three Silent Keys: Ted McElroy, exW1JYN, W1JGW, W1LNE. T-9 Club met at W1MNK's QTH. K1IPA is on several bands with a home-made rig. W1BGW worked VS9HAA. WN1AUZ is in the service in Germany. The Central N.E. Net had 25 sessions, 525 QNIs, 4 traffic. W1EAE and K1SCJ were hospitalized. KN1FKQ is on 80-meter c.w. W2NSD spoke at a joint meeting of the Middlesex and Waltham Clubs. K1s OME and QVT operated in the SS from W1BCH, club station. W1KBN sponsors Worked All Mass. Counties. Division A officers: W1LFA, pres.; K1CJF, Vice-pres.; WA2RYJ, secy.-treas. Division B officers: K1MBO, pres.; W1BJV, vice-pres. W1HGT received the RNARS of England certificate "Mercury" #1. K1ESG is active in traffic nets. K1BUF is back in our 80-meter EMN. EM2MN held 21 sessions, 170 QNIs, 81 traffic. W1NF says DX on 80-meter c.w. is good. K1-ZZX is on 2. W1JYH is moving to Westwood. WØPAN

(Continued on page 114)

AOC*

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ACF-2 Two-crystal filter circuit using low impedance link input and 2K resistive output load. Unwanted sideband rejection greater than 30 db. Mounting space 1½". **$9.95**

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ACF-6 Six-crystal filter circuit using nominal 600 ohm input and output. Unwanted sideband rejection greater than 55 db. Mounting space 3". **$27.95**

MATCHING OSCILLATOR CRYSTALS for the ACF filter series. Recommended for use in OS-4 oscillator.
CY-6-9LO **$4.40**
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OS-4 Crystal Oscillator **$6.95**

SE-6F Mounting Case
Special AOC case for mounting filter plates. Contains case hardware and input-output terminals. **$5.50**

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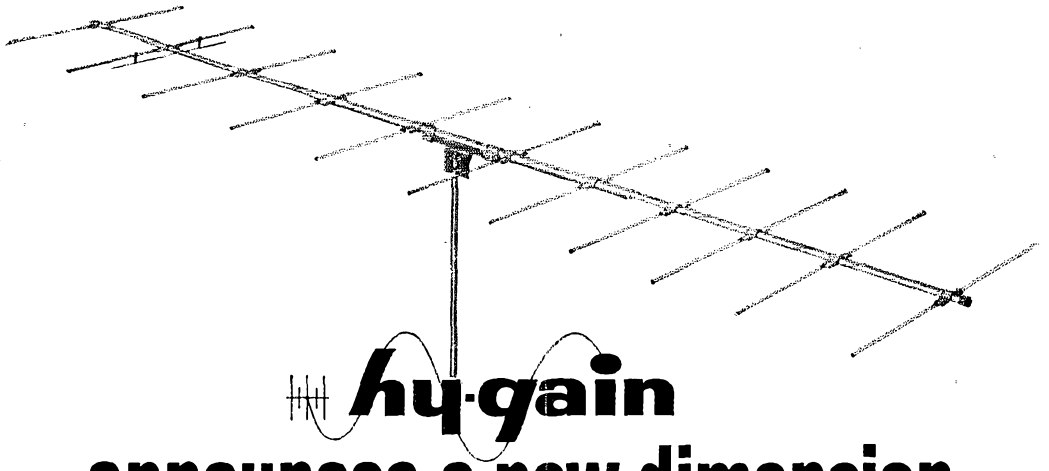
18 NORTH LEE • OKLAHOMA CITY, OKLA.

has been transferred to New London, Conn. W1AKY recently received the "Vasa Star" from Swedish Consul in Braintree. W1DDC is on 21-Mc. c.w. Chelmsford ARA officers: K1YSE, pres.; K1VKT, vice-pres.; K1TEE, secy.-treas. The Framingham and Middlesex Clubs held auctions. W1GKX, of National Co., spoke at the Wellesley ARS. W1PEX made BPL again. K1KPD was home on vacation. W1BB held the Annual Netfest of the Winthrop gang at his QTH. W1QVK is Army MARS State Director for Mass. The 6-Meter Crossband Net had 21 sessions, 488 QNIs, 50 traffic. K1BGK and K1HZU, Newburyport EC, are going to work together, making use of the net. W1HIL is very busy. K1RHZ worked Hawaii on 15-meter c.w. for WAS. K1ONW says Tufts, W1KN, will be on 6 meters. Appointments endorsed: W1QXX Arlington, W1BB Winthrop, W1DDC Ayer, K1-MOO Foxboro, W1JPJ No. Attleboro, K1IMP Milton as ECs; W1BB, W1FZJ, K1IMP as OOs; W1HIV as OES; W1KBN as OBS; K1BUF as ORS. Dot, K1BUF, is on our 80-meter c.w. net and Mary, W1LES, is in our 2 meter net. K1NGJ is on 2 and 75. On 6 meters: WA1s ATA, ABU, K1s VPJ, EZX. K1HDH and K1VPJ have new beams. K1GYM gets on 75-meter s.s.b. K1CMS and XYL K1ILA are going to Florida and will be mobile. The QRA had Wayne and Virginia Green speak on "Incentive Licenses." W1EYZ and W1OKB both acquired XYLs. North Shore RA held a meeting. W1JPJ says that c.d. is at a stand still. K1PNB, our Eastern Mass. Novice Net RM, says they had 40 QNIs, 9 traffic. Another "Radio Day" at Northeastern. W1KBN, was held and arranged by K1KED, K1SAY and others. Heard on 75: K5OZU/1 at Otis AFB, W1TIV, K1s HZU, MPD. On 2: W1s AJA, FR, K1s ZMN and QNQ. K1-YYM-W4ADU is going back to Kwajalein (KX6) for 3 months. W1TUF is ex-KL7ECF. K1PNB reports on the setting up of the RACES Radio Net station in Townsend in the CD control center. The station, staffed by Townsend Amateur Radio Society operators and at present using the call K1PNB/1, includes a Valiant transmitter with Johnson matchbox feeding a 300-OHM line to an all-band Windom antenna. The receiver is a National NC-190. A heathkit transistor Mohican is available for portable standby. The Eastern Mass. Novice Net was started on 3733 kc. Mon., Wed. and Fri. nights from 6:30 to 7 P.M. EST. The Townsend AREC has the Punkin Hollow Net on 50.52 Mc. and invites all the boys in the area to join them Tue. at 8 P.M. EST. Traffic: (Nov.) W1PEX 1268, W1EMG 303, W1LES 243, K1ESG 116, K1PNB 91, W1OFK 58, W1DOM 51, K1GKA 51, K1GYM 37, W1AOG 36, W1BJE 34, K1ZQU 28, K1CMS 25, K1VOK 24, W1AUQ 19, K1BGK 15, K1LCQ 15, K1-VGM 12, K1BUF 8, W1FON 8, K1QOJ 8, K1YYM 7, W1-HGT 6. (Oct.) K1GKA 76, K1WJD 34, K1BUF 28, K1BGK 13.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—SEC: W1BYH/K1APR. C.W. RM: K1-IJV. PAM: K1RYT. It is with the deepest regret that we report the passing of W1AGM. Our sincere sympathy to his family. The West. Mass. C.W. Net (WMN 3560 kc. 7 P.M.) still is going full blast with the following in attendance during the month (stations in order of activity): K1ZBN, W1BVR, K1IJV, K1SSH, K1ZVJ, K1YST, K1VPN, W1AML, K1LBB, K1NWF, K1YMS, W1MNG, W1DWA, W1AJX, W1UEY and W1QFT. Traffic handled: 198 at a rate of .337 messages per minute (better than IRN this month)! Our sincere congrats to our C.W. RM K1-IJV! After all these years, W1JYH is leaving our section. His new address is 60 Warwick Drive, Westwood, Mass. Darned sorry to lose you, Rog. Holy Name High School ARC (Worcester) has elected the following officers: K1FST, pres.; K1WPO, vice-pres.; K1VPN, trustee; (secy. and treas. not yet hams). W1DWA still is award hunting. W1JGW is active working the SS *Hope*. The following are active on 6 in the Pittsfield area: W1PFD, K1PYX and K1TYF. K1VPS, K1CPG and K1DDB are active in MARS. The Berkshire gang is working DX on all bands but 1.8 and 28 Mc. W1HDM and W1OSK are joining the Army very soon. W1MIW is out of the Naval Service and is active on 10. K1IJU is leading the pack in the HCRA Contest. Traffic: W1BVR 101, K1IJV 82, K1SSH 65, K1LBB 29, K1JQT 19, W1DWA 11, K1ZVJ 11, K1VPN 1.

NEW HAMPSHIRE—SCM, Albert F. Haworth, W1YHI—SEC: W1TNO. Endorsements: W1AIJ as OPS and ORS. We regret to announce the resignation of our RM, K1BCS. Press was forced to submit his resignation because of the pressure of business and a thank-you is extended for his fine assistance. All c.w. men are asked to look for the NHN CW which will be reactivated shortly. Also, remember that GSPN is active and needs outlets for traffic. K1HFW was NFS for the Merrimack Valley Net in Nov. K1DWK is doing an FB job with this net. Congratulations to W1JR on his 40 years of hamming. It is with regret that the death of W1AGM is reported. K1PDU, attending college in W6-land is looking for contacts in the Manchester area. All clubs should advise your SCM of their new officers. W1SWX continues to add to his DX contacts on 80 meters. Can

(*Continued on page 116*)



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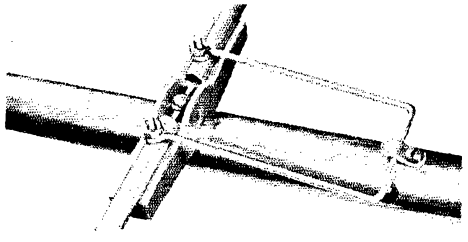

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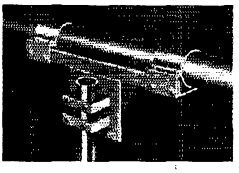
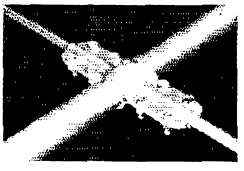
Boom to Mast Bracket



Element to Boom Bracket



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anyone supply your SCM with the information in connection with the GSPN award presented for working members of the net? Traffic: (Nov). W1EVN 14, K1IIK 9, K1BGI 6, W1ET 4, (Oct.) W1AIJ 5, W1TFS 3, W1ET 2, W1SWX 1. (Sept.) W1AGM 11. (Aug.) K3YQJ/1 22. W1CUE 13, W1EVN 10, K1IIK 9, W1AGM 4, W1AIJ 3. (July) W1CUE 16, K1NBN 12, W1AGM 9, W1AIJ 2, K1IIK 1. (June) W1CUE 45, K1IIK 3, W1TFS 2.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: W1YNE. RM: W1BTV. PAM: W1TXL. Endorsements: K1JGF and W1FEQ as ECs. RISPN report: 30 sessions, 612 QNI, 115 traffic. The Roger Williams V.H.F. Society recently elected K1KAZ, pres.; K1ZEM, vice-pres.; K1EQE, secy.-treas. The club has completed a 220-Mc. station and is looking for skeds on this frequency. Election of officers of the R.I. YLs was held with the following being elected: K1DCW, 1754 Main St., West Warwick, R.I., pres.; K1VXZ, vice-pres.; K1QJE, 6 Spring St., West Warwick, R.I., secy.; K1DWH, treas. The club has an R.I. YL certificate which will be awarded to anyone who contacts 10 R.I. YLs or XYLs. Requests for the certificate should be sent to the secretary. The W1AQ Club of Rumford has completed renovations to the building and invites all hams in the area to drop in and see it on any Fri. evening. W1YNE, while recuperating from the mumps, worked G6UF, PA0PAN, CN8CB, HP1IE and HC5CN. WN1s AVL, AVM and AVZ received their Novice Class tickets. WA1AGZ received his Tech. Class ticket. Traffic: W1TXL 505. K1TPK 135. W1RTV 74. K1NJT 24. K1VYC 20. K1RRK 13. K1YEV 10. W1YNE 7.

VERMONT—SCM, E. Reginald Murray, K1MPN—The Green Mt. Net meets on 3855 kc. at 2230Z daily; the Vt. Fone Net on 3855 kc. at 1400Z Sun., the Vt. C.W. Net on 3520 kc. at 0000Z daily; the Vt. S.S.B. on 3950 kc. Congratulations to K1FXP on passing the Conditional and K1ZKW on passing the General Class exams. K1AUE has been appointed OO. K1CEG's boy Ed broke his leg. Don't forget the Vt. QSO Party Feb. 15-16. Let's have a good group active again (some of us felt like a rare DX station the way they piled up around us last year). The BARC is holding code and theory classes again. For Nov. the Green Mt. Net checked in 554 stations and the Vt. Fone Net had 108. The Central Vermont Amateur Radio Club had an old-timers night meeting which was very reminiscent. Traffic: W1WFZ 55, K1BQB 50, K1LLJ 17, W1RNA 15, K1RMG 12, W1KJG 9, K1MPN 9, K1IJJ 3.

VERMONT QSO PARTY

February 15-17, 1964

All amateurs are invited to participate in the Vermont QSO Party, sponsored by the Central Vermont Amateur Radio Club, K1YMZ. Vermonters are urged to work as many out-of-state stations as possible so that those interested can earn credit toward WAS, WANE and W-VT awards.

Rules: 1) Time, the 28-hour period from 2300 GMT Feb. 15 to 0300 GMT Feb. 17. 2) No power restrictions, all bands can be used and contact credit with the same station on different bands will be given. 3) Vermont stations score 1 point per contact and multiply by the number of ARRL sections and foreign countries worked. Outside stations score 3 points per Vermont station and multiply by the number of Vermont counties worked. 4) Certificates will be awarded to the highest scoring station in each ARRL section, plus a trophy to the highest scoring station outside Vermont. A trophy will also be awarded to the top Vermont scorer, with 2nd, 3rd and 4th place station receiving a gold-trimmed certificate. A special award to multioperator groups. 5) Suggested frequencies: 3520 3855 7050 7250 14,100 14,250 21,000 21,300 28,100 28,600 50.250 50.360 144-144.5 and 145.8. 6) Vermont stations send number of QSO, report and county. Others send QSO number, report and section. 7) General call to be used "CQ VT" on c.w. and "Calling any Vermont station" on phone. 8) Logs should be postmarked no later than March 31 and sent to the CVARC, c/o Ann L. Chandler W1OAK, RFD #2, Barre, Vermont. 9) the W-VT (Worked Vermont) certificate will be awarded to stations working 13 out of 14 Vt. counties, provided the station has not previously been issued the award. Party logs showing required data will be accepted in lieu of QSLs. Vermont stations are urged to be active and QSL promptly.

(Continued on page 118)

NATIONAL CELEBRATES its Fiftieth Anniversary in 1964 . . . and the continuity of our company philosophy over the years is rather remarkable, in view of the many changes in personnel over half a century of building ham gear. But even the youngest, newest employee almost immediately absorbs a feeling of identification with the grand old receivers . . . and it takes no time at all to develop a sense of personal responsibility to maintain our hard-earned reputation for workmanship and performance.

IF THE TRUTH BE KNOWN, it's hard *not* to feel this way . . . we're constantly amazed at the number of old timers at every hamfest and convention who come up to the National booth just to tell us how much they enjoyed their first National receiver 30 or more years ago. Every day at least one letter arrives telling us about one of our venerable products which is still in active service, or a warranty card is returned with a comment that the new owner of an NCX-3, for example, is glad to see that we put the same care into its manufacture as we did his first SW-3. Just the other day our Service Manager showed us an ancient SW-5, circa 1929, which had come in for a routine "physical" — after being used as the main station receiver by an Alaskan ham for almost 35 years.

A SHORT TIME AGO we spent a day going through some of the more than 5000 photographs that comprise our photo "morgue." We haven't had so much fun since the cat got across the B+. Pictures of an SW-3 handsomely posed on an antimacassar (you look it up — I had to) and illuminated by a particularly ugly fringed lamp . . . breadboard amateur stations that the XYL must have been afraid to dust for fear of violent electrocution . . . girls in boyish bobs testing NC-101X's . . . elegant amateur stations that were the bee's knees in 1930 . . . early experimental television receivers . . . HRO Senior receiving installations that conjure up tantalizing visions of the *really* rare DX before WWII . . . early mobile installations where the rig is almost as funny looking as the automobile . . . the well known "war" pictures of row upon row of HROs in military receiving stations . . . the German and Japanese military carbon copies of the HRO (down to the NC Diamond on the IF transformers) . . . photos of the Thrillbox, the SRR, the FB-7 and FBX-A, the NHU, the AGS, each of the long line of HROs all the way up to the '60, the NC-100 and '101X, the Kilowatt and NTX-30 transmitters, the military and post-war gear from the "R" series up to our latest solid state synthesized equipment.

WE ENJOYED these old photographs so much that we thought you might like an opportunity to see them. So we've picked out the best to make up an Anniversary Photo Album which is free for the asking. Just drop your name and address or a QSL card to Department G, National Radio Company, and we'll send you one with our compliments, as soon as they come off the press.

WE'VE pretty much confined this month's page to classic National equipment, but it's appropriate to comment that our Fiftieth Anniversary coincides with the introduction this year of new National amateur products which will be startlingly advanced in concept and performance. It'll be some months before we can let out the details, but it's safe to promise that you can be certain of the workmanship and value you expect from National.

—MIKE FERBER, W1GKX

National Radio Company, Inc.

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NORTHWESTERN DIVISION

IDAHO—SCM, Raymond V. Evans, K7HLR—K7OAB, EC for Minidoka County, also has been appointed communications officer for that county. W7EMT's signal has improved since putting up a 60-ft. vertical. We will have more section news when the hams of the section get it in to us. Traffic: W7EMT 49, K7OAB 11, W7GGV 8.

MONTANA—SCM, Walter R. Marten, W7KUH—Asst. SCM/L.F. PAM: Dr. Marvin F. Hash, W7YHS. SEC: K7AEZ. V.H.F. PAM: W7TYN. RM: W7FIS. OOs: K7OGF, W7IDK, W7LBK, W7FIS, K7VMJ. Endorsements: W7OIO as EC. The Montana Sideband Net had 571 check-ins during Nov. K7OGF departed for school at Redwood City, Calif. W7EGN is experimenting with phase modulation for v.h.f. W7EWR would like to contact QRP club members in this state. K7UPH is working on an antenna change-over system. K7PWY and K7IOJ are trying to organize the Montana PON Net. K7YXU is a new Conditional in Bozeman. W7QHO visited in Bozeman. W7LBK handled 72 MARS messages. W7IUN is building a grounded-grid linear for s.s.b. K7ELW is working on a homebrew all-band receiver. K7MOW received the highest score and certificate in Mont. district PON (Post Office Net contest). K7PGN assisted in the hunt for a little girl who was lost at Hardin and for road block duty. K7MYH is building an s.s.b. exciter on an ARC-5 chassis. K7JAT has organized another c.w. class. W7SMY installed his homemade rig (mobile) in his new car. W7LBK and K7JBH hold regular weekly contacts on RTTY with W7YZQ and K7JUO on MARS Net. K7PGN, W7SMY and W7LBK are taking an extension course from the Army Signal Corps School on radio and television. W7OIO is recuperating from a recent illness. The Butte-Anaconda 2-meter frequency is 145.350. W7CJN has built a new 6-meter transmitter. W7OIO has built a new 6- and 2-meter rig. Butte amateurs would like a state frequency for 2 meters and 420 Mc. WØUOW is starting theory classes in Billings. K7DGR moved back to Billings. A future ham, Craig Owen Davis, weighed in at 6 pounds. His mother—K7AET; his grandfather—W7YHS. W7FGZ won the Big Sky Radio Club transmitter hunt. K7PKV came in second, 31 miles and 2 hours later! Traffic: K7EWZ 197, W7LBK 11, K7UPH 9, K7OGF 8, K7PWY 8, K7PGN 5, K7JAT 3, W7FIS 2, K7ELW 1, W7EWR 1, K7JBH 1, K7MOW 1, K7MYH 1, W7QGJ 1.

OREGON—SCM, Everett H. France, W7AJN—SEC: W7WKP. RM: W7ZFH. Appointments: W7KTG as OO Classes I-II-III; K7SJQ as OES. Endorsements: W7DEM as EC; K7IWD as OO Classes. III-IV, W7ZEH OSN mgr., reports net sessions 21, attendance 127, traffic 51. BRAT awards went to W7ZFH and K7IWD. K7EZP reports the Portland Area AREC Net on 146.47 Mc. now has 70 members and November check-ins totaled 282. At the November meeting of the Portland Area, Multnomah County AREC, Mr. McCann of the FCC Office in Portland, gave a timely talk on the subjects that are under discussion by amateurs at the present. K7SJQ is experimenting on 3300 Mc. and made a 30-ft. contact for 2½ hours. Other rigs are used by K5IXF/7 and K7AUZ. W4UHY and K6RSF are new hams in Grants Pass. W7DEM and K7PMB are working with "slot" antennas on 2 meters. K7PMB and W7KTG hold weekly skeds on 2 meters. K7JRA now is mobile s.s.b. on 75 meters using an HW-12 Heathkit. Traffic: (Nov.) K7IWD 541, W7ZFH 69, W7DEM 11, K7SHC 11, W7KTG 2. (Oct.) K7JRA 84, K7CNZ 12.

WASHINGTON—SCM, Robert B. Thurston, W7BGY—Asst. SCM/SEC: Everett E. Young, W7HMQ. RM: W7AIB. PAM: W7LFA. The starting times of the various nets in the section have been changed to conform with skip now being experienced. Your SCM would appreciate being informed of the different times on nets. The Lake Washington Club has in its possession the visitors trophy, having beaten the Tacoma Club. It formerly was held by the Chehalis Club. W7ICD is back in the Pacific northwest after 8 years in W6-Land. W7NPN may go to New York soon. W7CHI is putting the veterans hospital rig on s.s.b. W7EMP has the new tower up. K7KEG has a new Swan s.s.b. rig. Letters of thanks were received by the Walla Walla Amateur Radio Club for its assistance in the Halloween Patrol. New calls heard in the Spokane area are K1EHY/7, WA4DSK/7, K7ZLU and K7WTT. There are now 34 licensees associated with the Fairchild MARS program. K7YRC has a new 80-meter Heath s.s.b. transceiver. A new traffic net, the Noon Time Net, has been started on 3970 kc. Officers are W7LEC, mgr.; K7TCY, secy.-treas.; W7LEC, K7CTP and W7PWA, dir. The starting time is 1130 local time Mon. through Sat. In November the members handled 222 QTC during 26 sessions and had 629 QNIs. The SCM and SEC visited the Aberdeen Hoquiam Club. re-

(Continued on page 120)

SBE AGAIN!
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....SB1-LA LINEAR AMPLIFIER

Exceptional... in its compactness... in its high power... in its modest price... new 1000 watt P.E.P. four-band amplifier (80-40-20-15). **Small**... a size match for **SB-33 transceiver** and a companion unit **to make up a pair without equal** as a multi-band mobile combination. But SB1-LA will also work with any SSB transceiver... can boost its output to a full KW in fixed or mobile service.

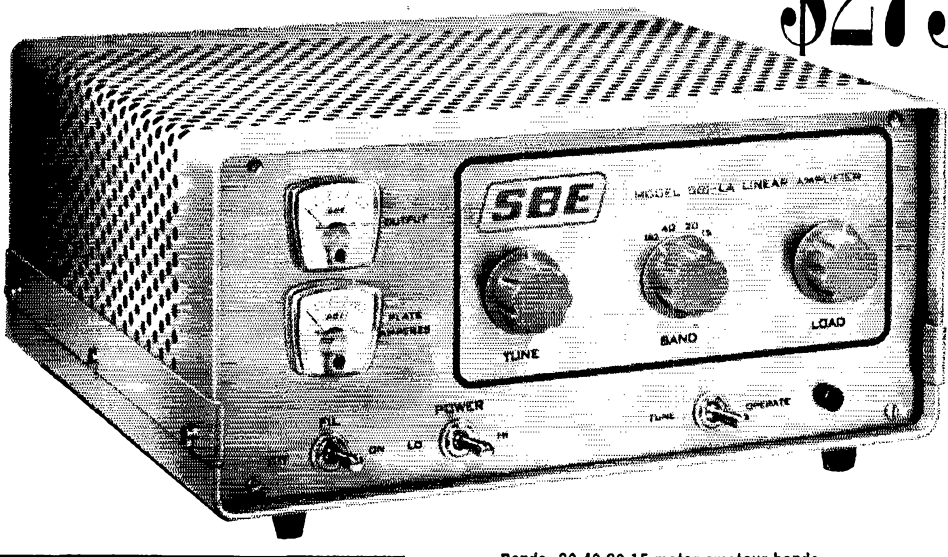
This new linear incorporates every desirable modern feature. Stable, with passive grid input, it offers a 50 ohm resistive load for SSB exciters. Operation is Class AB-1 for low distortion. Output is conventional pi network.

SB1-LA applies the desirable technique of low plate voltage (only 800 volts) and high plate current. This lower plate voltage is far easier on capacitors—diode rectifiers—transformers—insures safer operation under environmental extremes.

All-solid-state, 117V AC heavy-duty power supply is **built in.** (No rectifier tubes).

Tubes used are 6JE6's—six of them, parallel connected. These are standard, low cost types, available anywhere. (See specifications below for other features.)

$279.50



Please send full information on SB1-LA Linear and SB-33 Transceiver.

NAME

NUMBER STREET

CITY ZONE STATE

SBE SIDEBAND ENGINEERS

317 Roebling Rd. So. San Francisco, Calif.

An operation of Webster Manufacturing

Bands: 80-40-20-15 meter amateur bands.
Power rating: 1000 watts P.E.P. input. (750 watts 15 meters).

Drive requirements: Approx. 75 watts for full rated output.
Input impedance: 50 ohms resistive.
Output impedance: (antenna) 50 ohms, unbal. VSWR 1.5 or less.
Power supply: Built-in all solid-state, 117V AC.
Primary power requirements: 115V AC @ 12A max. at peak output. (DC) **Standby:** 12.6V (nom) @ 7.5A. **Peak:** 12.6V @ 110A.
Tubes: Six, type 6JE6. (parallel connected).
Control circuits: Antenna switching relays (2) built in. Rear terminals for transceiver relay control.
Size-Weight: 5½"H, 11¾"W, 11¾"D. Weight 35 lbs. approx.

cently. W7YDS is planning a new 55-ft. tower at his new QTH. W7OEB joined Navy MARS. K7QOM is building a TO keyer. K7VNX is a new Conditional in the Kenniwick area. W7BTB reports that he and W7AMC have reverted to archery to place skyhooks in place. W7UUO received his Navy MARS call. W7AIB reports that the long skip is causing extreme difficulties on the WSN skeds. The NSN had 30 sessions with 228 QNIs and 59 QTCs in November. W7SLB fired off his mobile. It still works but his engine caught fire during the blast off. W7SFR, the XYL of W7ECX, joined the ranks of Silent Keys. K7SRI is looking for an electronic computer to do his home work. K7JBE has the 6-meter beam up 50 feet in a fir tree. The VARC of Puyallup is planning its annual code and theory classes for the 1964 high school adult educational program. K7CTP is active on five nets and a director on two of them. W7VI picked up a 32-V2. W7OEX made a vacation trip to the Southland. Traffic: W7BA 1111, W7DZX 695, K7CTP 565, W7APS 212, W7OEB 109, W7BTB 39, W7AIB 38, W7AMC 38, K7FEA 32, K1RFX/7 29, K7JRE 19, K7PIG 8, K7SRI 8, W7EVW 5, W7IEU 2.

PACIFIC DIVISION

HAWAII—SCM, Lee R. Wical, KH6BZF—I would like to thank the membership for my appointment as SCM and hope to support the members needs and ideas for the coming two years. Kudos to KH6ARL on filling in for KH6DVG's unexpired term. We've lost KH6EOG, KH6DVD and KH6EGL to the mainland for new assignments. KH6EWD is our new RM, filling KH6DVD's shoes. KH6EOF is our new ORS. Sun. at 6900 local time join the 147.0 net. KH6GG reports that the new Emergency ARC is inviting new members to join. Contact KH6CUP or KH6AFM for more details. KH6EJN ex-W8FOB, moved to Hilo. Look for Ed's big s.s.b. signal on 75. KH6AFM's code class is rolling. KH6VE is in a new QTH. The Poi Net meets Mon. through Sat. at 1900 on 3750 kc. HARC's prexy, Phil Hodap, enlightened members on "electrons in electronic organs." KH6AOL and many others showed up for the "Tsunami Wave" alerts two Saturdays in a row. KH6NAA and KH6ATS are looking for more NCSs for the 50th State Phone Net nightly except Sun. on 3850 kc. at 2000 sharp. Appointees are reminded to forward certificates for endorsement to keep them active. Contact me at once. See page 6 QST for address. KH6ATS has been elected a life member of the Flying Hams Club. To date he's the only "lighter-than-air member." Do you have your QSL envelope with your latest address filed with KH6DQ? KH6AR still skeds W6-land regularly. Traffic: KH6EOF 25, KH6EWD 25, KH6BZF 3.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: W7JU. The Las Vegas Radio Amateur Club with its headquarters at the Thunderbird Hotel has bid for the 1964 Pacific Division ARRL Convention. W7JU has had a regular schedule on 2 meters with W6NLZ and W6YVO at 0800 PST Sun. for a long time. Anyone else interested? W8EAD, ex-W7YNO, is in SV-Land. W7KJV is hearing wedding bells instead of c.w. K7NCD has an SR-150. W7VIU is a grandpa for the eleventh time. K7SFN is a new ORS in the Reno area. K7OLQ had a busy holiday season helping Santa Claus with the mail. Southern Nevada has about 25 active stations on 2 and 6 meters. W7PRM has his electronic organ kit pieces all in one piece now and it sounds very good. W7PBV has his ham shack nearing completion. Traffic: K7SFN 54, W7VIU 46, W7JU 10, W7PBV 6.

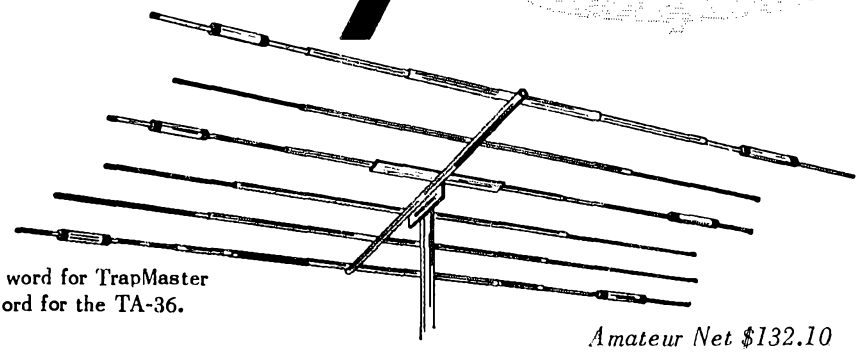
SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM: Edward T. Turner, W6NVO. SEC: WA6HVN. RM: K6KCB. V.H.F. PAM: WA6RRH. Santa Clara Valley Section Two Meter Net reports 16 sessions, 103 check-ins, and a traffic total of 25. Section nets for the Santa Clara Valley Section include:
Northern California Net (NCN) 3635 kc. 0300Z Daily
Santa Clara Valley Section Net
(SCVSN) 146.7 Mc. 0400Z Tue.-Sat.
NCN is a combined section net and includes other sections of Northern Calif. Both nets are member nets of the National Traffic System. Why not check into either one and handle a little traffic? W6RSY was on vacation the latter part of the month and still made BPL. W6JXK is waiting for a BPL Medallion for BPLs made on c.w. and RTTY. K6DYX reports that the RTTY net is active three nights per week and handling traffic. Smitty also is active on 220 and 144 Mc. with fax equipment but so far has only worked W6SHK. W6DEF gave a talk and demonstration on amateur radio to Troop 151, BSA, in Menlo Park. WB6HIX, a member of the troop, went mobile during the talk and Hal contacted him from a portable station. Hal also sports a new HT-37 and an SX-110 which he hopes to have on soon. W6PLS reports that the RACES station at Half Moon Bay is in the process of installation. Gene worked a nice stack of DX on 15 and 20 including 9G5AB. W6RFF has

(Continued on page 122)

Mosley

MODEL TA-36

for 10-15-20 meters

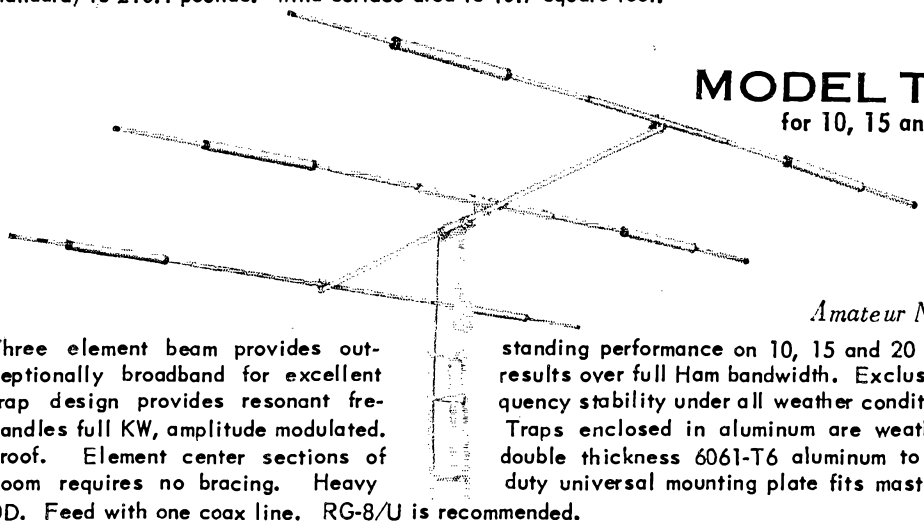


Incomparable is the word for TrapMaster and terrific is the word for the TA-36.

Amateur Net $132.10

The new clean-line TA-36 . . . the three band beam that will give your signal that DX punch!

This wide spaced, six element configuration employs 4 operating elements on 10 meters, 3 operating elements on 15 meters and 3 operating elements on 20 meters.
Automatic bandswitching is accomplished by means of exclusive design high impedance, parallel resonant "Trap Circuits". Built for operation at maximum legal amateur power.
Traps are weather and dirt proof offering frequency stability under all weather conditions. Just one coaxial feed line is needed. 52 ohm, RG-8/U is recommended.
Antenna comes complete with illustrated instruction booklet and color coded elements for ease of assembly.
SPECIFICATIONS and PERFORMANCE DATA: Forward gain on 10 meters is 9 db., on 15 meters is 8.5 db. and on 20 meters is 8 db. Front-to-back is 20 db. or better on all three bands. SWR is 1.5/1 or better at resonance. Transmission line - 52 ohm coaxial. Maximum element length is 29 feet. Boom length is 24 feet. Turning radius is 19' 3". Assembled weight is 69 pounds. Wind load (EIA Standard) is 210.1 pounds. Wind surface area is 10.7 square feet.



MODEL TA-33

for 10, 15 and 20 meters.

Amateur Net $104.75

Three element beam provides outstanding performance on 10, 15 and 20 meters. Exceptionally broadband for excellent results over full Ham bandwidth. Exclusive MOSLEY trap design provides resonant frequency stability under all weather conditions. Easily handles full KW, amplitude modulated. Traps enclosed in aluminum are weather and dirt proof. Element center sections of double thickness 6061-T6 aluminum to reduce sag. Boom requires no bracing. Heavy duty universal mounting plate fits masts up to 1½" OD. Feed with one coax line. RG-8/U is recommended.

SPECIFICATIONS and DATA: Fwd. gain up to 8 db. Front-to-back is 25 db. SWR is 1.1/1 or less, at resonant frequencies. Maximum element length is 28 feet. Boom length is 14 feet. Turning radius is 15.5 feet. Assembled weight is 40 pounds. Wind surface area is 5.7 square feet. Wind load is 114 pounds. Shipping weight is 53 pounds.

MOSLEY Electronics Inc., 4610 N. Lindbergh Blvd., Bridgeton, Mo., 63044.

finished his new final and works NCN. W6AUC is busy on phone. W6OII is active on APTN. W6YHM visited John Reinartz and reports that John is back in Aptos recovering from an operation. W6MXO, in Pacifica, is ready with emergency power now installed. The Santa Clara County Amateur Radio Association held its annual Christmas Party on Nov. 30 which featured a talk by W6CYL, former CO of the Marine detachment at Guantanomo Bay, Cuba. The Palo Alto Amateur Radio Association December meeting featured a special prize drawing. The South County Amateur Radio Society held its Annual Christmas Potluck Dec. 16. The Salinas Red Cross Radio Club is ready to go at the Red Cross Headquarters and is planning better coordination with the SEC. WA6HVN. Traffic: W6RSY 857, W6JXK 844, K6GZ 185, W6AIT 123, K6DYX 110, W6ZRJ 72, W6DEF 52, W6PLS 50, W6RFF 34, W6AUC 21, K6MTX 17, W6YBV 14, W6OII 10, K6EQE 5, K6VQK 4.

SAN FRANCISCO—SCM, C. Arthur Messineo, W6UDL/K6CWP—SEC: W6KZF. K6NCG has acquired a new UHF-Microwave receiver tuning 1000 to 6250 Mc. and would like to contact anyone operating in those bands. Jerry, an active OES, is now in the service. RTTY DXer W6MTJ is putting up a new beam and doing some remodeling to the shack. The CCRC has elected W6CTH pres.; W6NOV, vice-pres.; W6GGC, secy.; WA6MIE, treas. The results of the highly successful "Operation Goblin" on Halloween resulted in the permanent installation of 2-meter antenna at the Novato Police Station for use in any further emergency communications. The City of Concord had 12 mobiles and a base station, all on 75-meter phone, with the same type of operation. These are just two of the many reports worthy of bringing PICON to the attention of the public and the newer and older hams. All clubs: Send your name and secretary's name and address to Jack Slater, W6WF, 2456 Johnson Place, Santa Rosa, Calif. and get on the Northern Calif. Chapter of the QCWA mailing list. The Annual QCWA Banquet will be held Feb. 15, 1964, at the International Inn, south of the S.F. Airport. W6KZF says, "Use the back of the last sheet of your log book to list phone numbers you may need in a hurry, Red Cross, Police, Fire, etc., and other hams that have been instructed in the use of your rig. The time saved in hunting them down may be vital." W6YKS is doing FB work on both v.h.f. and u.h.f. in Fortuna. K6ALI is doing notable work as an OO. New officers for H.A.M.S. are W6LVG, pres.; K6QKY, vice-pres.; W6JWF, secy.; W6GHI, treas. The club also has new antennas for 20, 40 and 80 with excellent results being reported. There is an opening for PAM and RM in this section. Volunteers will be given every consideration. Once again, please make an effort to get your reports in immediately after the first of the month. Some are coming in too late to make the column. All news will be welcome. It is important and is needed to keep this column informative and up-to-date. The San Francisco Award, a certificate given by the San Francisco Radio Club, will be given for contacts with amateurs in San Francisco. A late traffic report worthy of note—W6CXO 411. Traffic: W6PZE 19, W6UDL 11, W6MTJ 2, K6RCR 2.

SACRAMENTO VALLEY—SCM, George R. Hudson, W6BTY—Asst. SCM/SEC: A. F. Buzdas, K6IKV, K6HHD, reports the Camellia Capital Chirps Club is making plans for its 6th Annual All California Hamfest (YL) Sacramento, Mansion House Inn, Mar. 7. K6HHD's Official Bulletin sked: Mon. 8 P.M. 143.46 Mc. RTTY; refiled to MARS: Tue. 7.30 P.M. 147.12 Mc. Sacto C.D. Net: Sat. 10 A.M. 3965 kc. W6AF got in six weeks fishing in the Klamath River Area. W6ZJW says band conditions are improving his area. K6HEZ can be found on MTN at 1900 on 3854 kc. SJV Net: 1830, 3915 kc. Skete SB Net: 2000 kc.. WA6MMO prexy. At a recent meeting of the Yolo Amateur Radio Club K6IKV spoke on Organization of AREC Nets. The YARC has 100 per cent AREC membership and officers are WA6MMO pres.; WA6NAU, vice-pres.; WB6BEK, treas.; WN6GGH, sgt. at arms. WA6YKR is 2-meter NCS. W6VNC. WN6GGH, WB6BEK and WA6MMO are getting their Link 2210 ready for 2-meter f.m. using a 150-W repeater. OO K6HEZ's skeds are MTN 1990, 3854 kc., SJV 1800, 3915; Sketo SBN 1930, 3910 kc. K1CAU/6 can be found on NCN at 1830 on 3905 kc; WA5HFB at 1730 Thurs. on 14.330 kc. W6WLI is doing an FB job on RTTY with Official Bulletins. The McClellan Amateur Radio Soc. (MARS) elected W6FSZ pres.; WA6ORZ, vice-pres.; W6TFH, secy.; W6QYJ, treas. W6ZUZ says the Nevada County Amateur Radio Club (Grass Valley) has a new call, WB6IJW. The Sacramento Amateur Radio Club is conducting code and theory classes at club headquarters, Red Cross Bldg., under WA6KFN. W6LSW, Eldorado County EC, a member of the ECARC, prepared and filed an AREC Emergency Plan which should be a model for all groups. Your SEC and his XYL surprised K6HEZ at Milford and found

(Continued on page 124)

Clegg's VENUS 6 TRANSCEIVER

A COMPLETE SSB STATION FOR 6 METERS

The Clegg Venus is a high quality, compact, attractively styled SSB receiver and tran mitter that puts you on 50 mc single sideband without all the fuss, bother and expense associated with adapting low frequency SSB exciters, crystal controlled converters, relays, linear amplifiers, etc.

Employing all the latest circuit techniques, the Venus, in one small package, provides a combination of advanced operating features and conveniences heretofore unavailable in rigs at any price. Some of the outstanding features of the VENUS include a nuvistorized high sensitivity, low-noise front end; crystal lattice filter in both receive and transmit positions; ± 1.5kc receiver offset tuning; broad band circuits throughout providing maximum simplicity and ease of tune-up; and a separate front panel control for smooth injection of carrier for excellent quality AM and adjustable CW output.

ELECTRICAL SPECIFICATIONS

TRANSMIT: *Frequency Range:* 49,975 to 50,475 KC, standard (other ranges available on special order). *Power Ratings:* 85 watts PEP input — all modes (AM, SSB, and CW.) *SSB Performance:* (9 MC lattice filter). Unwanted sideband down more than 50 db at 1000 cycles. Carrier suppression greater than 56 db. Distortion products down more than 30 db at full ratings. *Frequency Stability;* Less than 500 cycle warmup drift after first five minutes. Less than 100 cycles/hour drift after warmup.

RECEIVE: *Frequency Range:* Same as TRANSMIT. *Frequency Stability;* Same as TRANSMIT. *Sensitivity:* .25 μV for 6 db S/N on AM. .1 μV for 6 db S/N on SSB. *Selectivity:* 2.7 KC at 6 db, less than 6 KC at 50 db. *Spurious Responses:* Images and IF leak through down more than 60 db. *Overload Characteristics:* Less than 5% cross modulation results from any two signals separated by more than 20 KC if stronger signal is less than 2 MV across 50 ohm input. *AVC Characteristics:* Less than 10 db change in AF output for input change from 1μV to 400 μV (52 db). Fast attack, panel selectable release times of .15 or 1.2 seconds. *AF Power Output to Speaker:* More than 2 watts at 3.2 ohms. *Physical:* 15" wide x 7" high x 10½" deep. Weight approximately 22 lbs.

Interested in HF? See the Squires-Sanders SS-1R at your nearest distributor.

VENUS 6 TRANSCEIVER — Amateur Net Price..... $495.00

115 V. A.C. 60 CPS Power Supply — Amateur Net Price..... $110.00

See your Distributor or write for information.

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TELEPHONE 627-6800

Roger has organized a 2-meter emergency net. K6UQH is building a 2400-ft. tower. K6LSK reports on s.s.b. activity in Tehama County. K6TWE is getting out on 220 Mc. with a TRC-8. K6YNV/YJL reports the RAMS Net meets at 10 A.M. every Sat. on 3965 kc. Newly-elected officers of the Golden Empire Amateur Radio Society are WA6FWM, pres.; W9WNL/6, vice-pres.; WB6DLW, secy.-treas. K6BYS has built an 80-through 10-meter trap-vertical for WA6WJZ. The Glen county gang is contemplating going from 6 to 10 meters. K6UHD donated a duplicating machine to the club. WB6DLW purchased a QTH in the sky at Forest Ranch. W6LYQ has his 160-meter vertical backup. W6DSX is designing load coils to put his Tri-Bander on 40. WA6YVW needs a QSL from Bolivia to complete his "WASA" WA6SES is busy with the soldering iron and side-cutters home-brewing an s.s.b. rig. Traffic: K1CAU/6 63, K6HEZ 46, WA6MMO 2.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—WA6TZN is attending Cal Poly in San Luis Obispo, and is majoring in electronics. WA6DAU has moved to Merced and is NCN mgr. New officers of the Fresno Amateur Radio Club are W6QJM, pres.; K6ACO, vice-pres.; W6JGY, secy. W6WPV had eye surgery and is on the mend. "Al," from KC4USH, was a recent visitor in Fresno, and has been transferred to a missile base on the West Coast. The Six Meter C.D. Net checks in on 50.25 Mc. every Mon. at 8 P.M. and has had as many as 30 check-ins. WA6DRH is net control for the C.D. net. The MTN Net for Nov. reports: 30 sessions, 111 messages, 1524 check-ins, 181 contacts, 6 QST, and 62 relays. K6UBJ and W6HLI both have new NCX-3 transceivers. W6QON is being heard on s.s.b., 75 meters with a tri-band Swan. W6ZYR is thinking about s.s.b. K6TYN is attending FSC. W6NJQ was a recent visitor in Fresno. W6PBL has an SX-99 receiver, and is studying for his General Class license. WA6JMZ, WB6GJG and W6HKV are heard on 10-meter s.s.b. W6HKV is thinking of chasing DX and it putting up a TA-33 beam. WB6BYE and WA6RPW have their General Class licenses. WB6ETK is a new Technician in Atwater. W6QFR has a tunnel Dipper. W6PPO is mobiling with a Galaxie transceiver. W6PSQ is heard on 40-meter s.s.b. with a Swan tri-band transceiver. K6LKJ has moved down to Los Angeles. Traffic: (Nov.) W6ADB 239, WA6ESH 138, WA6VPN 12. (Oct.) WA6VPN 12.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, K4QFV/W4YZH—Asst. SCM: Robert B. Corns, W4FDV. SEC: W4MFK. RMs: WA4FJM, K4CDZ, WA4ANH. PAM: K4ODX. V.H.F. PAM: K4MHS. The U.N.C. AR Club sends a brief note to say the following officers were elected for the year: WA4BRS, pres.; K1EJK, vice-pres.; K4YYK, secy. The club, in cooperation with the campus Air Force ROTC, will conduct classes in code and theory for those interested in obtaining an amateur license. WA4BBY says a new 6-meter net has been organized in the Rockingham County area; it has 28 members and meets Sun. evenings. WA4EIS reports AREC progress in his area. W4VSJ says Herford County AREC is holding weekly drills on 6 meters with good attendance. WA4JCS and WA4QJA are building 6-meter transceivers. K4EWD is working on an AREC c.w. net for his area. With all the AREC area net activity building up, there is a great potential for our section net traffic to increase, if the ECs will stress the traffic angle and send a representative to the section nets with their accumulated outgoing traffic. They will be welcomed, I'm sure. The section EOs held a very successful dinner meeting in Salisbury recently. Net traffic: NCN 228, CCEN 120, NCSN 112, THEN 51. Traffic: WA4PDS 318, W4LWZ 224, K4YYJ 102, W4BAW 100, WA4ANH 84, K4BUJ 84, W4EVN 76, W4EJP 64, K4CDZ 50, WA4FJM 47, W4EJQ 31, WA4EIS 30, K4QFV 24, WA4LKL 22, K4QDO 16, WA4JCS 9, W4VSJ 6, W4MKT 2.

SOUTH CAROLINA—SCM, Lee F. Worthington, K4HDX—SEC: W4BCZ. RM: K4LND. S.S.B. PAM: K4JOQ. Nets: C.W., 0000Z and 0300Z, 3795 kc.; A.M., 0000Z, 3930 kc.; S.S.B., 0000Z, 3915 kc. WA4LPV, der Abelkop, still is stirring things up on the C.W. Net and in personal encounters wherever he goes. He is a regular ball of fire who is putting a new home-grown rig on the air soon designed by W4NTO, der Nitsch. NTO still is the most active Official Observer in the state with 96 infraction notices mailed during November. Keep up the fine work, Fritz! On Nov. 6 W4FFH was elected as net mgr. of the AREC Net. John will do a fine job with the net, just as he does with all his undertakings. W4UEV is to be commended for his fine work in the state in explaining and enlightening many concerning the need for ARRL's incentive licensing program. Traffic: K4LND 154, K4OCU 49, W4PED 45, WA4LPV 33, WA4LPX 12, W4NTO 6.

(*Continued on page 126*)

There Is Nothing Tougher Than Mobile Service...Except Our New Model 600E!

Model 600E
$23.40
Amateur Net

MOBILE SERVICE is the most demanding form of voice communications you use. Power and size limitations are extreme, putting an unusual premium on efficiency. The environment is tough, putting an accent on reliability. In the final analysis you will benefit fully from your mobile equipment only by paying strict attention to every detail of installation and operation.

Mobile service performance starts with the microphone—the first active element in the system—and there's no better way to start than with the new E-V Model 600E dynamic microphone. It is a little more costly than many microphones you can buy that "just work", and rightly so. For the E-V 600E is a lifetime investment in top-notch performance.

Look closely. The dynamic element of the 600E is the direct descendant of a long line of military microphones built to perform faithfully under battle conditions. This element was chosen for high intelligibility and its ability to withstand any environmental conditions. The proved ruggedness of the E-V Acoustalloy® diaphragm easily withstands ear-shattering sound pressures with no change in characteristics. But there is more to the 600E than ruggedness. Its sound quality has no equal. Here's why.

The frequency response of the 600E is ideally suited to SSB and critical AM transmission. You get highest intelligibility with any ALC circuit or frequency-shaping network in common use. That's been proved with on-the-air tests with every commercial SSB mobile transmitter and transceiver on the market today. Further, the high output level of the 600E will fully modulate even the "Scotch" input circuits sometimes found in mobile rigs. The 600E is available in 150-ohm or Hi-Z models.

Now pick up the 600E. It is shaped for comfort, with an easy-acting switch that gives you positive control, even when you are wearing heavy gloves. The case is molded of Cycolac®, a space-age plastic that absorbs a fantastic amount of abuse. The 600E never feels hot or cold to the touch, regardless of the climate. The shielded coiled cord has passed flexing tests that far exceed normal life, while the switch has test-cycled on and off over a half-million times without a sign of failure. Even so, both cord and switch are designed for easy field service, if necessary.

The E-V 600E is built to outlast every other piece of mobile equipment you may use, while outperforming every other microphone on the market. It will probably be transferred from rig to rig as the one most useful communications tool you own. Actually, the 600E, like all E-V microphones, is guaranteed forever against defects in workmanship or materials. It must perform as stated, or your money back.

The one best way to find out what the E-V 600E can contribute to your mobile installation is to try it. We guarantee you have nothing to lose. Ask your Electro-Voice distributor to help you put the new E-V 600E dynamic mircophone to work in your rig, today!

ELECTRO-VOICE, INC.
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Electro-Voice®
SETTING NEW STANDARDS IN SOUND

VIRGINIA—SCM, Robert L. Follmar, W4QDY—Asst. SCM/SEC: H. J. Hopkins, W4SHJ. RMs: K4MXF, W4ZAU, W4SHJ, W4QDY. The VSBN and VFN continue to improve operating as NTS nets and congrats are in order to W4JMA and WA4FCS for jobs well done. The new net policies are meeting with the approval of the majority of the net members and it is certainly streamlining the net operation. We urgently request former participants in both the a.m. and s.s.b. nets to give this new plan a try. The VFN, with WA4FCS as mgr., operates on 3835 kc. at 0000 GMT (1900 EST) daily and the VSBN, under the guidance of W4JMA, holds forth on 3935 kc. with two sessions: 2300 GMT (1800 EST) and 2300 GMT (2200 EST) daily. Don't forget about our c.w. nets: The VSN, under W4ZAU, meets at 2300 GMT (1830 EST) Mon. through Fri. and the VN, under K4MXF, meets at 0000 GMT (1900 EST) daily. VSN is slow speed and VN high speed c.w. W4DLA is the LARC pres. W4CVO is in Florida for the winter. W4BYZ is back on the air with a new HR-37 and an SX-117. The VSN mgr. suggests 160 meters as an emergency VN and VSN frequency. Any comments? WA4GWD is back on the nets after a short absence. W4JXD reports a tragedy—The owner came for his KWM-2! Ye ole SCM is trying to revive *The Virginia Ham* and get it on a regular basis again. K4PXY made a trip to Florida. WA4KBU is working on a new kw. final. One of the new requirements of Virginia ECs is making an on-the-air report (once a month) to the SEC, utilizing the 80/75-meter band. Traffic: (Nov.) W4DLA 422, WA4FCS 292, W4RHA 252, K4PXY 251, W4DVT 211, WA4KBU 209, W4JMA 110, WA4RSV 110, WA4EUL 109, W4MXU 85, W4SHJ 83, K4KNP 82, W4LK 80, K4FSS 76, WA4GWD 59, K4ITV 55, K4SDS 41, W4ZAU 32, WA4BVE 26, W4BGP 24, W4LRN 20, W4KX 19, W4TE 17, W4NLC 14, K4BAV 9, WA4JRY 6, W4MK 6, W4QDY 5, K4SGQ 4, W4BYZ 3, W4WBC 2, K4YZT 2, W4OWV 1. (Oct.) WA4KBU 175, W4JMA 43, K4KNP 34, WA4RSV 14.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8SSA. RM: K8HID. PAM: K8EPI. West Virginia stations may be found on 3570, 3890, 3903, 3095 nightly. W8IRN, Kanawha County EC, has announced W8HZA, K8CSG, K8WMQ, W8ZHN, K8BIT and W8WQE as Asst. ECs. The Emergency Net meets on 50.25 Mc. at 9 P.M. Wed. W8KSJ has a new home-brew transceiver operating on 2 meters. W8HZA has moved up to Class I Observer. WA8FIC now is net mgr. for the WVPON C.W. Net. New Novices of the Oak Hill area are WN8LET and WN8KGU. WA8DGE made the BPL with activity in the WVN and 8RN Nets. New officers of the West Virginia State Radio Convention are W8JM, pres.; K8HID, vice-pres.; W8DUV, secy.; W8SSA, treas. The Annual State Convention will be held at Jackson's Mill. K8MQB, W8UHK and W8VMP will select West Virginia's Outstanding Amateur for 1964. The Tri-State ARC at Huntington received good publicity, page 90, Dec. '63 *QST*. As of December, the Roanoke Division was 7th in the Building Fund program with 62.5 per cent. Have you or your club contributed? Traffic: (Nov.) WA8DGE 199, WA8FIC 80, WA8CPY 44, W8DUV 32, K8EPI 24, W8JM 15, K8CFT 12. (Oct.) WA8CPY 115.

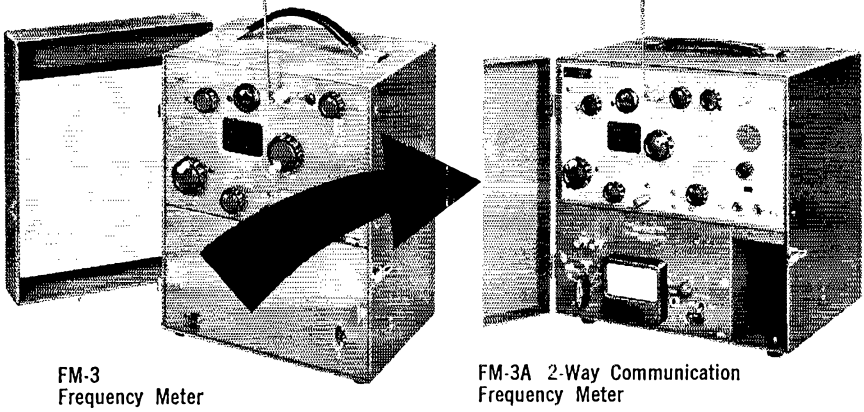
ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Donald Ray Crumpton, KØTTB—Looks like the Mile High Highbanders are about the most active group in Colorado. Ever hear of looking for a needle in a haystack? Well, these fellows were on a new deal called Operation Mad Dog. This is where you turn loose a dog in the city with only a description of the pooch and then go hunt him down. Try it sometime. These guys also are using ultraviolet light to beam out signals on voice, and it works. The club also has a very nice communications trailer that is the envy of other clubs. We need a lot more club activity in ham radio. WØSIN, Colorado SEC, reports that the only EC reporting for November was KØYZW. Traffic reports also are slow. Net reports: Columbine Net 160; HNN 185, WX Net 96. Traffic: WØHXB 368, KØZSQ 278, KØDCW 146, WØSIN 103, WØANA 11, KØQGO 9.

UTAH—SCM, Thomas H. Miller, W7QWH—Asst. SCM: John H. Sampson, W7OCX. SEC: K7BLR. W7LQE has been appointed ORS and his XYL, W7VTJ, has an OPS appointment. W7VTJ is on phone regularly. W7POU worked in the VE/W, VK/ZL and SS Contests. Herb reports that he worked 71 sections in the SS. His power went off during the VK/ZL Contest just when the skip was right. W7EHX is attending California U. at Berkeley. K7VRT is active on 75-meter s.s.b. and 20-meter c.w. and s.s.b. He also has been checking on on several nets in the area and scored over 18k in the SS. UARC officers for 1964 are W7YDW, pres.; K7TEO, vice-pres.; K7SVN, exec. vice-pres.; K7JTO, secy.-treas.; W7VEO and W7NMK, program chairmen. *Microvolt* editors: W7CYG and K7HFV. The SCM would like to have reports of activities from clubs and individuals to

(*Continued on page 128*)

YOUR GERTSCH FM-3 FREQUENCY METER CONVERTED TO MEET FCC REQUIREMENTS



FM-3
Frequency Meter

FM-3A 2-Way Communication
Frequency Meter

— factory conversion provides direct reading of all allocated channels in the 150-170 mc band

All Gertsch Model FM-3 frequency meters can now be factory-converted to measure and generate *all* assigned channels in both 150-170 mc, and 450-510 mc bands.... with ±.00025%(2.5ppm) accuracy. Instrument features a single 1-mc crystal which is easily standardized against WWV.

Converted units can also be operated as standard FM-3 instruments through 20 to 1,000 mc, at .001% accuracy.

Conversion includes: an all transistorized converter module, a new front panel and carrying case, and a built-in amplifier (with speaker). Also, a front-panel jack allows input of external audio signals, such as those from a Gertsch Model DM-3 deviation meter. Space for a DM-3 is provided in the case.

Compact size — only 13½" W x 11½" D x 13¾" high.

New Gertsch frequency meters are also available in both battery operated and AC power supply units. New meters incorporate same features as converted instruments.

Send for literature on FM-3A series.

Gertsch

GERTSCH PRODUCTS, Inc.

3211 South La Cienega Boulevard, Los Angeles 16, California/UPton 0-2761 - VErmont 9-2201

fill this column. Traffic: W7OCX 81, K7VRT 31, W7LQE 23, W7VTJ 15, W7QWH 2.

NEW MEXICO—SCM, Carl W. Franz, W5ZHN—SEC: K5QIN. V.H.F. PAM: W5FPB. 10-Meter PAM: W5WZK. The NMBC meets at 0700 MST Mon. through Sat.; NMEPN Sun. at 0730 MST, both on 3838 kc. The Albuquerque Amateur Radio Caravan Club on 29.6 Mc. at 1900 MST. We welcome WN5IPW to the amateur fraternity. She soon will be on the air on 80 and 40. She won her 15-w.p.m. certificate five weeks after starting to learn the code. The New Mexico Eye Bank, sponsored by the Lions Club, is looking for operators in all N.M. Towns to service this important work. Those interested in participating in this humane service, please get in touch with W5ZHN. A C.W. Net is being planned on 10 meters for both young and old who may or may not wish to get their code speed up again. See W5WZK. New Mexico shortly again will be represented on NTS by W5ZHN, K2OSX/5 and W5CRF. If others are interested, please get in touch with your SCM, K5ZCA, K5HMN, K5MGR, W5NSN and WA5CWS are on with RTTY gear. The Albuquerque free message service became internationally known in November through the ACF publication *Horizon*. K5WZA won her 30-w.p.m. certificate and K5WQP won his 25-w.p.m. award. Traffic: W5UBW 45, W5UAR 24.

WYOMING—SCM, Lial D. Branson, W7AMU—The Pony Express Net meets Sun. at 0830 MST on 3920 kc. The YO Net is a c.w. net on Mon., Wed., and Fri. at 1830 MST on 3610 kc. The TWN Net is a daily net at 2000 MST on 3570 kc. W7CQL visited his XYL's folks at Evanston, Wyo. K7CSW is sporting new China Clippers. W7AMU still is on the sick list. K7EWV, XYL, is a new ham in Big Horn Mountains out of Ten Sleep, was in Casper and bought a new light plant. W7AHO has a contract in Cody for a large new building. K7ITH had a bad case of flu. W7PVN's new house is just about finished. W7FLO is all set for winter and ham radio. K7OWL, "Where you at?" K7SLM, a new ham, has a new inverted "V" antenna and is using a new receiver. All Wyoming hams extend sympathy to W7NNX in the loss of his XYL. Traffic: W7AMU 57, W7HEB 43, W7-BHH 22, W7ITM 22, K7QJW 8, K8TAQ 8, W7DW 6, K7JED 6, W7AEC 5, K7IAY 4, W7HHW 3.

SOUTHEASTERN DIVISION

ALABAMA—SCM, William S. Cratts, K4KJD—SEC: W4NML. RM: W4USM. PAMs: K4BTO, K4TNS, K4-WHW. Nov. reports:

Net	*Freq.*	*Time GMT*	*Days*	*Sessions*	*Ave.*	*Tfc.*	*Ave. QNI*
AENB	3575	0100	Daily	31	3.5	7	
AEND	3725	2200	Mon.-Sat.	19	1	5.8	
AENM	3965	0030	Daily	30	3.1	38.5	
AENO	50.55	0115	M.W.F.	13	2.38	28%	
AENP	3955	1230	Mon.-Sat.	27	3	17	
AENP	3955	0000	Daily	35	2.7	25.3	
AENT	3970	2230	Daily	31	1.58	13.354	

Winner of the AENT Contest is K4WWP. The Novice Net needs crystals for 3725 kc. Send spares to WA4AVM, net mgr. Macon Co. is very active with drills. The Huntsville AREC collected money for the Muscular Dystrophy Drive. WA4OGQ is new on 6 meters in Huntsville. W4DS also is active on 6 meters. K4WOQ has a new 6-meter vertical. WA4AVM received an A-1 Operator certificate. Form 1 reports are away down this month. I want to urge all of you, even if you hold no appointment, to send one each month. If you do not have Form 1 cards, please send me a request for some. Traffic: (Nov.) WA4EXA 267, K4WOP 107, K4AOZ 105, K4WHW 70, K4KJD 60, K4NUW 53, K4GXS 46, K4BSK 32, K4DJR 16, W4NML 16, WA4EXB 14, K4PBY 12, K4WWP 12, K4BTO 9, K4FZQ 8, W4WGI 8, W4DS 6, W4YRM 5, W4KCQ 4, K4RIL 3, W4CIU 2, K4UMD 2, WA4BDW 1. (Oct.) WA4EXB 186, WA4LGF 6, W4EOH 5, K4WSS 3, K4WWP 3.

EASTERN FLORIDA—SCM, Guernsey Curran, W4-GJI—SEC: W4IYT. First a word from G. E. Cushing, W4QVJ: "As of Jan. 1, 1964 the section and division is under new Directorship, Vice-Directorship and SCM. Let us put our maximum effort toward worthy projects for our division and section. We should up-grade our operating efficiency as well as technical knowledge. In this last report as SCM I want to thank all who helped me so very much." . . . Your SCM W4GJI: Some plain talk seems in order. Eastern Florida is already the best; our AREC and public service record is proof. One must allow that s.s.b., RTTY and c.w. now carry the load. In s.s.b. we consider any station 200 cycles off frequency is having cockpit trouble. The RTTY and c.w. operators insist on spot frequency consistency. The traffic hounds

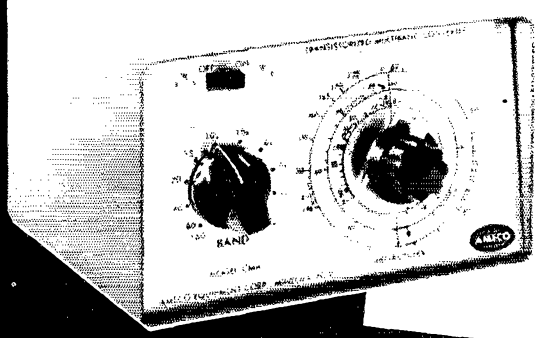
(Continued on page 130)

AMECO *Leader in Compact, Quality Ham Gear*

Amazing but True...

ALL BANDS.. 2 THRU 160 METERS IN ONE CONVERTER

- TRANSISTORIZED
- CRYSTAL CONTROLLED



The NEW AMECO Model CMA

Model CMA covers all frequencies from 1.7 to 54 Mc. and 108 to 174 Mc. The output can be fed to a standard broadcast set or any communications receiver. The CMA has better than 1 microvolt sensitivity. It can be operated from an internal battery or from the 12 volt car battery. Model CMA has an RF stage, tuned by a panel dial for best image and spurious rejection. Up to 10 crystals can be selected by the band-switch. Size — 3¾" x 6" x 6¾". For more detailed information, write for special "Converter Information Sheet".

Model CMA, wired and tested, less crystals $64.95

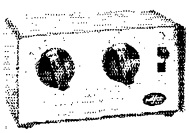
Crystals each 3.50

NUVISTOR CONVERTERS FOR 50, 144 AND 220 MC. HIGH GAIN, LOW NOISE

Model CN

Has 3 Nuvistors (2 RF stages & mixer) and 6J6 osc. Available in any IF output and do NOT become obsolete as their IF is easily changed to match any receiver. Average gain — 45 db. Noise figure — 2.5 db. at 50 Mc., 3.0 db. at 144 Mc., 4.0 db. at 220 Mc. Power required 100-150V. at 30 ma., 6.3V. at .84A. See PS-1 Power Supply. Model CN-50W, CN-144W or CN-220W wired, (specify IF.) **$49.95.** Model CN-50K, CN-144K or CN-220K in kit form. (specify IF.) **$34.95**

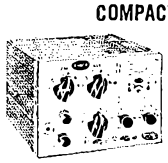
ALL BAND NUVISTOR PREAMP 6 THRU 160 METERS



MODEL PCL $24.95

2 Nuvistors in cascode give noise figures of 1.5 to 3.4 db. depending on band. Weak signal performance, image and spurious rejection on all receivers are greatly improved. PCL's overall gain in excess of 20 db. Panel contains bandswitch, tuning capacitor and 3 position switch which puts unit into "OFF," "Standby" or "ON," and transfers antenna directly to receiver or through Preamp. Power required — 120 V. at 7 ma. and 6.3 V. at .27 A. — can be taken from receiver or Ameco PS-1 supply. Size: 3"x5"x3".

COMPACT 6 THRU 80 METER TRANSMITTER



Model TX-86

Handles 90 watts phone and CW on 6 thru 80 meters. Final 6146 operates straight thru on all bands. Size — only 5" x 7" 7 7" — ideal mobile or fixed. Can take crystal or VFO. **Model TX-86 Kit $89.95 — Wired Model TX-86W. $119.95. Model PS-3 Wired $44.95. Model W612A Mobile Supply wired $54.95.**

CB-6

CB-6K — 6 meter kit, 6ES8-rf Amp., 6U8-mix./osc. $19.95
CB 6W — wired & tested ... $27.50
CB-2K — 2 meter kit, 6ES8 1st rf amp., 6U8 — 2nd. rf amp/mix. 6J6 osc. $23.95
CB-2W — wired and tested. ... $33.95
Model PS-1 — Matching Power Supply — plugs directly into CB-6, CE-2 and CN units. **PS-1K — Kit ... $10 50**
PS-1W — Wired $11.50

EASY TO UNDERSTAND AMECO BOOKS

Amateur Radio Theory Course **$3.95**
Amateur License Guide ..... **.50**
Radio Operators' Lic. Guide, EL 1-2 ..... **.75**
EL 3 ..... **1.75** EL 4 ..... **1.25**
Amateur Log Book ..... **.50**
Radio Electronics Made Simple **1.95**

CODE PRACTICE MATERIAL

Ameco has the most complete line of code records, code practice oscillators and keys. Code courses range from start to 18 W.P.M. and are on 33, 45, or 78 r.p.m. records. Model CPS oscillator has a 4" speaker and can be converted to a CW monitor.

Write for details on code courses and other ham gear. Dept. Q2 **Ameco equipment at all leading ham distributors.**

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Affiliated with American Electronics Co. and Ameco Publishing Corp.

in the h.f.-a.m. nets are screaming about incentive licensing, yet they cannot keep a signal within 5 kc. of an NCS. Before we bother about traffic, let's get the know-how back into radio. As SCM I shall give the EF h.f.-a.m. net managers due notice to establish good procedure. Action will have to be taken about nets that do not operate within 1 kc. tolerance of Net Control by March 1. This is *amateur* radio—1964. Our Side-banders Emergency Net is statewide for civil defense and shall operate under the guidance and SOP of its elected Net Manager, as does the FAST Net. The other nets shall continue to function in accordance with the AREC plan as published by the SEC-EF in collaboration with SEC-WF titled *Manual of Operations*. We are looking forward to your earnest support. Address all traffic and activity reports to W4GJI. Traffic: (Nov.) WA4BMC 605, W4SGH 592, K4EHY 559, WA4IJH 293, W4TRS 225, K4BY 214, WA4JYB 144, K4ILB 105, WA4IXI 105, W8-LDU|4 75, W4EHW 73, W4VWL 70, K4FQP 54, W4AKB 48, W4YPX 45, W4EAT 37, W4GUJ 35, WA4FGE 34, K4-LCF 23, WA4ESS 16, K4DAX 10, K4MTP 7, W4FP 2. (Oct.) W8LDU/4 300, WA4LHK 198, WA4KSC 147, W4-IAD 143, K4NVD 41.

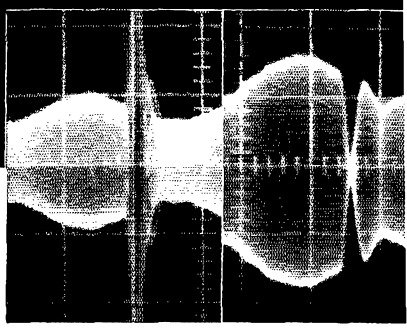
WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4MLE. PAM: W4WEB. V.H.F. PAM: W4ZGS. RM: W4BVE. Pensacola: K4QAC has joined Silent Keys; he was an active member of the V.H.F. Club and AF MARS. K4SMB runs high power now with an HA-10 linear. The PARC enjoyed an FB supper dance with about 40 present. W4AXP is running a code class for a group of Boy Scouts. K4YYE joined the 10-meter mobiles. W4UCY had to get another 815 for his final; the first one lasted only 10 years! Ft. Walton/Eglin AFB: W4COD, Defuniak, and W4SMM, Santa Rosa, are regular check-ins on the 2-meter emergency net. W4MTD is the new Okaloosa County EC. W4KWX is building 220-Mc. gear. W4UXW has more time for hamming now that he is married! W4ZGS completed rework of the GRC-30 for 145.2 Mc. WA4OGB has a new 6&2 beam and turnstile vertical for 2 meter. K5UUN is a new OO. W4SRX made a good score in the SS. Wewahitchka: W4CCA has 100 watts on 6-meter s.s.b. Panama City: W4YLY aided in relaying a message from a stranded motorist. WA4FIJ was active in the SS. SCM W4RKH and SEC W4MLE were guests at the PCARC installation banquet. WA4s MFC, MMT and MMU were transferred overseas. A new club was formed at Tyndall AFB. Officers are K4HNB, pres.; W4FOX, vice-pres.; WA4OKX, secy.-treas. Traffic: (Nov.) K4VFY 208, WA4IMC 59, K4SMB 45, WA4FIJ 17, W4ZGS 3. (Oct.) WA4ECY 294.

GEORGIA—SCM, James A. Giglio, W4LG—SEC: W4YE. PAMs: W4FYH, K4PKK, W4RZL. RM: W4-DDY. The Coosa Valley Emergency Net meets each Sun. at 1330 EST. GSN meets Mon. through Sun. on 3595 kc. at 1900 EST and 2200 EST. GCEN meets on 3995 kc. at 1800 EST Tue. and Thurs., 0800 EST Sun. The 4RDN operates on 7115 kc. at 10 EST daily. The Georgia Cracker Mobile Net meets each Sun. on 3995 kc. at 1330 EST. The Sowega Amateur Radio Club merits congratulations on an FB new club bulletin. K8PWE is editor. WA4IQV has his TCS on 3995 kc. using a vertical. K4UJS is building a 30-watt portable Field Day emergency rig for c.w. Newly-elected S.E. Director W4-HYW is heard regularly on GSN. The Columbus Hamfest is planned for March as usual. WA4GPA, K4AIP and WA4PSA have been appointed by Kennehoochie Radio Club President W4KTS to construct a monitoring and transmitting station for use in communication with Oscar III to be placed in orbit in the spring of 1964. WA4PSA had rig trouble at the worst possible time—right in the middle of the Sweepstakes—but not before receiving RCC and CPIS awards. W4BZ is the newly-elected president of the Southeastern DX Club, and W4LG wields the new gavel of the Atlanta Old Timers Wireless Club. 1964 officers of the Atlanta Radio Club are W4HEG, pres.; K4MDC, vice-pres.; K4SUD, secy.; K4YFU, treas.; K4YGK, act. mgr.; WA4MZI, editor. The Atlanta Hamfest will be held the first week end in June at Lenox Square Traffic: (Nov.) K4MCL 114, K4-UJS 43, K4FRM 40, W4HYW 39, K4YRL 20, K4FLR 7, K4BAI 4, WA4PSA 3. (Oct.) W4HYW 25.

SOUTHWESTERN DIVISION

LOS ANGELES—SCM, John A. McKowen, W6FNE —In response to the many inquiries regarding the missing SCM report in the Nov. issue of *QST* I offer my apologies. A business trip to the East Coast was unexpectedly advanced three days and caught me with the report still incomplete. However, I found out that a lot of people *do* read the column. A 6-meter band opening to the North Pole provided Santa Claus, with an opportunity again this year to speak to many harmonics in the L.A. basin. K6MDD has performed this miracle for five years now and it is a real treat for the kiddies.

(*Continued on page 132*)



Impulse Noise In—
Readable Signals Out...

The SS-1S Pre-IF Noise Silencer[1] makes possible *solid copy* of barely detectable signals (S2 or less) in the presence of overwhelming (S9 or greater) impulse noise caused by ignition, neon signs, switches, power leaks and similar high peak, short duration disturbances. The truly spectacular performance of this accessory results in part from the exceptional overload and cross modulation characteristics of the unique SS-1R Receiver design[2] as well as from two most important design concepts: a) broad band noise detection (*full receiver front end bandwidth*), and b) gating the receiver (quietly and rapidly with low insertion loss) *before the noise pulse has been lengthened by receiver selectivity.* The oscillograms at right show the net effect of this silencing.

The SS-1R offers other extremely attractive performance characteristics: frequency precision and stability exceeding that of most frequency meters; digital frequency display requiring no mental arithmetic; autocalibration of all amateur bands with WWV; easy and exact sideband tuning (10 kc. per revolution with manual control) plus push button motor tuning fast traverse — to mention just a few. SS-1R is *The New Standard of Performance.* Now available at your favorite dealer.

[1]"A Pre-IF Noise Silencer", W. K. Squires, W2PUL, QST, Oct. 1963. [2]"A New Approach to Front End Design", ibid., Sept. 1963

SPECIFICATION PROFILE

- **Frequency Coverage:** 80 through 10 M (eight 500 kc. segments). Fixed tuned WWV at 10.0 and 15.0 MC; 5.0-5.5 MC auxiliary (WWV 5.0 MC). Two general coverage 500 kc segments
- **Selectivity:** 5 kc./2.5 kc./0.35 kc.
- **Stability:** Less than 500 cps warmup drift (typically in less than 5 min.); less than 100 cps thereafter including low to high line variation
- **Sensitivity:** ½ μv, or better, for 10 db S/N on 10 M with 5 kc. bandwidth
- **I.F. and Image Rejection:** Greater than 60 db
- **Cross Modulation:** Example: Receiving a **10** μv signal with 2.5 kc. selectivity, an unwanted **0.1 volt** signal 20 kc. away produces negligible cross modulation
- **Internal Spurious:** None at stated sensitivity
- **AGC:** Attack — 1 ms., **Slow** release — 1.0 sec., **Fast** release — 0.1 sec.
- **ANL:** I.F. type; operates on AM, SSB, and CW
- **Size:** 7¾" H x 16¼" W x 13" D, 25 lb.

For other Squires-Sanders products, see Clegg Laboratories advertisement, page 123

Squires Sanders, Inc.

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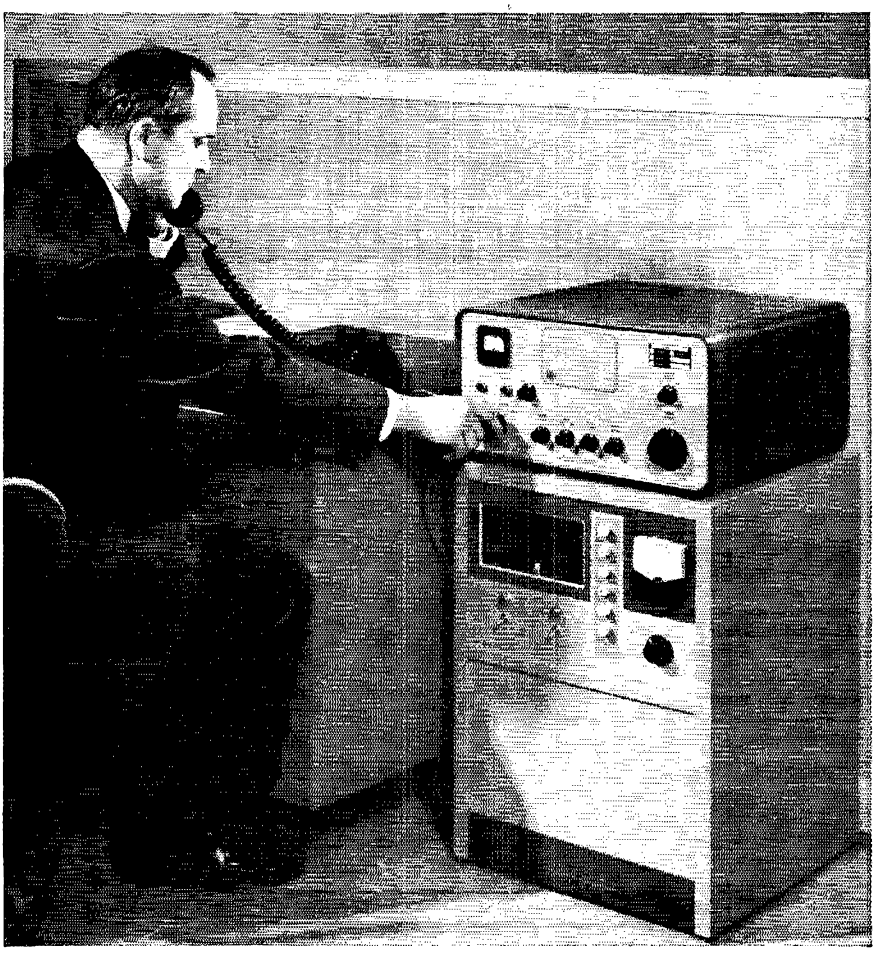
Our sincere sympathy to WA6OUK, whose OM passed *on unexpectedly recently*. The Southwestern Division Convention provided many interesting events. Shortly after WA6ZID won the QLF Contest there, he dislocated his left knee. For you c.w. operators—at the High-speed C.W. Contest four people took 50 w.p.m. *with a stick!* We are happy to learn that W6USY is out of the hospital. WA6USU has improved his 6-meter antenna installation and is one of the liasons from SOCAL SIX to SCN. This is still one of the weak links in the section NTS nets. Anyone of you traflickers who can operate 6-meter phone and 80-meter c.w. and would like to help plug this hole, please contact WA6TWS on 50.40 Mc. at 1900 any night. Members of the SO Cal. V.H.F. Club provided a spook patrol for the City of Paramount on Halloween night. Twelve mobiles patrolled the city on 2, 6 and 10 meters. Our SEC is busy getting operational on RTTY. The Desert RATS recently operated atop the Palm Springs Aerial Tramway and accepted traffic from the travelers there. Many favorable comments were received. W6VOZ has a new kw. final operating in QRM alley (14,204). MTN is beginning to find skip conditions a headache. W6SRE is starting to get ready for Oscar III with a new converter in front of the NC-303. Don Wallace reports that as far as he knows, W6AAM has worked every country that is on the air, both phone and c.w. WA6USQ is fighting a noise level that makes copy on SCN real rough. W6OZ still is running code practice sessions. The Marina RC now is giving certificates for c.w. qualifications on these transmissions. For further details on the frequency and time contact the Marina Radio Club. The San Fernando Valley RC has appointed W6UEI as hamfest chairman for 1964. WA6RMT Field Day chairman and K6UMV is the new awards manager. Traffic: (Oct.) W6WPF 1209, W6GYH 691, WB6BBO 601, K4AKP/6 553, W6QAE 360, K6MDD 357, K6VVN 252, K6HIT 249, WA6RTF 226, WA6OUK 183, WA6ZID 169, WA6TWS 122, WA6USU 105, WA6GAG 90, W6BHG 78, K6YCX 71, WB6GXI 61, W6FB 55, WB6BBH 54, W6ZJB 52, W6FNE 51, WA6TIM 39, WB6GZY 38, W6NAA 37, WA6MNM 35, WB6FKD 33, WB6EUU 27, K6PZM 20, W6VOZ 18, K6SIX 15, WA6CXB 14, W6USY 8, WA6KAW 7, K6QGX 7, WA6DJB 6, WB6FAX 5, W6NKR 5, K2PHF/6 4, WA6CKR 4, W6SRE 4, W6AM 2, W6VUZ 1. (Sept.) K6PZM 96, WB6EUU 83, WA6KAW 18, WB6GZY 15, K6UMV 8.

SAN DIEGO—SCM, Don Stansifer, W6LRU—New officers of the Orange County Club for 1964 are W6WRJ, pres.; K6KTX, vice-pres.; WA6KRU, treas.; WA6YWN, secy.; K6LJA, TVI; WA6TSU, pub. rel.; K6COE and W6DEY, board members. The December meeting featured a nice party for members and their families. WA6ROF got a new side-band exciter for his 5100B. W6DGM, in Newport Beach, is now an ORS, and busy handling traffic for that area on c.w. WA6BRG and K4AKP/6 won Section Net certificates. W6LAB now is in the new station, and adding 2 and 6 meters to coverage from Camp Pendleton. A "well done" to the many AREC members in San Diego who helped with the Eye Ball Bank in cooperation with the County Medical Association. The December San Diego DX Club meeting was held at the home of W6EPZ. The Palomar Radio Club, in the North San Diego County area, is very active, publishes a monthly newsletter, and is open for members living in that area. W6DLN, in El Centro, continues to put Imperial County on the DX bands. All OO, OES, ORS, OPS and OBS appointees are reminded to keep your SCM posted each month on your activities prior to the 7th. This is one of the requirements for continuing to hold a valid certificate. Club secretaries also are reminded to keep the SCM informed about club news and elections. If you want the SCM to visit your club, *drop him a line.* Traffic: W6IAB 8309, K6BPI 4966, W6YDK 3231, K4AKP/6 576, W6EOT 371, WA6RUS 130, WA6BRG 122, WA6RCF 96, K6IME 66, W6DGM 58, WA6BDW 26, K6GJM 25.

SANTA BARBARA—SCM, William C. Shelton, K6AAK—SEC: WA6OKN. RM: W7WST/6. I wish to apologize for not reporting *last* month but was in the hospital for an eye operation which restored sight in the left after over 30 years of darkness in the eye. I wish to express my appreciation for the numerous cards, messages and visits that I received while on the sick list. The Point Mugu Amateur Emergency net has been formed to provide emergency communications in the *event of need.* This net will provide a much-needed service for the many military bases in this section. The net will utilize 145.2-Mc. a.m./f.m. and will meet at 1900 PST Mon.-Wed.-Fri. K6CST will be net control. It will tie to the 3895-3930 SSB and 3600 SCN for the long-haul traffic. Both fixed, portable and mobile units will be included. The SEC will appoint ECs at a meeting scheduled for the latter part of Feb. 1964. The meeting will be section-wide and all clubs, etc., will be contacted. Traffic: W7WST/6 274, K6AAK 3.

(Continued on page 134)

SSB COMMUNICATIONS



A COMPLETE 1KW FIXED CHANNEL STATION!

Shown above is the R F Communications Model SB-6F, 125 Watt SSB Transceiver driving the Model RF-101, 1KW Linear Amplifier. The system provides 6 crystal controlled channels over the frequency range of 1.6 to 16Mc for Government, commercial and military applications. Power **output** is a full 1KW, p.e.p., using two 3-400 Z triodes in grounded grid. Kilowatt antenna coupler available.

Contact us for details

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Overseas Distributor Inquiries Invited

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. SEC: K5AEX. PAM: W5BOO. RM: W5LR. The Brownfield ARC held its Annual Free Swapfest Nov. 9-10. As usual it was a fine meeting with 613 attending, an increase of about 40% over last year. The highlight of the meeting was the get-together Sat. night with more than 150 in attendance. The main topic of conversation was the Incentive Licensing Plan as submitted by the League to the FCC. K6RX and W5NW were the principal speakers. Most of the hams present were against the plan as submitted but no better plan was suggested. One suggestion made was that if the amateurs would devote more time to making amateur radio a public service, as was intended first, and as a hobby second, there would be no necessity for any change in our regulations. W5DTA is the new net mgr. for the NTX CW Traffic net. Willie is a devoted c.w. traffic man and needs your cooperation in his new job. K5ANS/5 is to be congratulated on a job well done as net mgr. for the NTX Net. WA5EEM and W5WYU, father and son, have a new Swan transceiver. WA5EEM got WAS in three months from his new QTH in Lubbock. The Red River ARC handled the annual March of Dimes Drive in Wichita Falls Jan. 19. W5NT is in the hospital in Richardson, Tex., with a heart condition. We hope you have a speedy recovery, Chuck. K5AEX is back on the job after a three-month session in the hospital with a back ailment. Traffic: W5DTA 538, W5AFI 127, W5LR 17, W5FIR 10, WA5EEM 6.

OKLAHOMA—SCM, Bill F. Lund, K5KTW—Asst. SCM: Cecil Andrews, W5MFX. SEC: K5DLP. It seems that the spirit of ham radio and Christmas hit Tulsa at the same time. W5FWZ has offered the Tulsa hams a meeting place that is well maintained with a kw. transmitter and a log-burning fireplace. It seems like skip affected the nets as the check-ins were light in December. W5NT is recovering from a heart attack suffered in Dallas. Ray, our Vice-Director, has his Drake TR-3 fixed up mobile and ready to travel. W5OHH and W5MWT have a new Galaxy 300. W5IYU went deer-hunting and came home with a bob-cat. The Tulsa Mobile Club and the Electron Benders have consolidated under the name of The Electron Bender, Inc., and elected K5ZGV, pres.; K5GMP, vice-pres.; K5JFJ, secy.; W5GZD and K5ZCJ, corr. secy. The Tulsa Downtown Radio Club elected WA5BZG, pres.; W5KW, vice-pres.; K5HT, secy.; W5ZBI, treas. W5ZBI is active again after a long lay-off. W5EUL has been trying for years to make BPL and because of my typing I messed him up and made out the BPL to W5EUI. Hank, if you will forgive me I will try to correct this. K5TEY and W5PPE forgot to send in their reports this month. Traffic: K5IBZ 253, K5DLP 41, K5KTW 38, W5MFX 28, K5OCX 27, K5ZCJ 16; W5PML 15, W5GMJ 9, K5JOA 8, K5MTC 7, W5PNG 6, W5EUL 5, K5CBA 2.

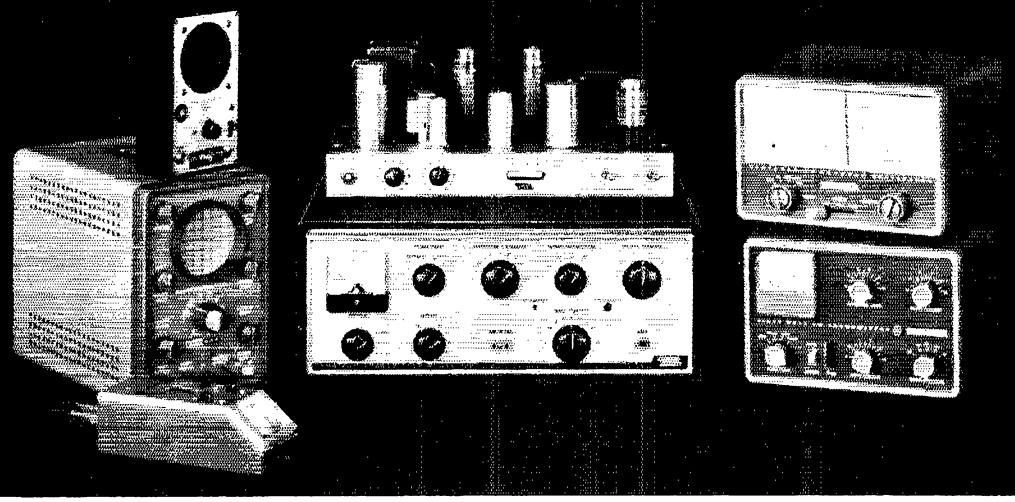
CANADIAN DIVISION

MARITIME—SCM, D.E. Weeks, VE1WB—Asst. SCM: A. E. W. Street, VE1EK. Our Canadian Director, Noel Eaton, VE3CJ, recently made an official visit to the section. Noel met with clubs in Saint John, Fredericton, Moncton, Charlottetown, Halifax, Sydney, St. John's, Truro, Middleton and Yarmouth. Sincere thanks to the many club officials and individuals whose cooperation and effort did so much to make the visit a success. The CBN (Cape Breton Net) meets on 3730 kc. Sun. at 1330 AST. Does your club or group receive the *News Letter* from the Canadian Director? If not, a note to Noel Eaton or this office will suffice. The Loyalist City Club reports that classes have been started for prospective amateurs. Also, a record player has been purchased for VE1NF, who has lost his sight. The SKN (Seaboard Key Net) is progressing favorably but help still is needed. Time and frequency? 1300 GMT (0900 AST) Sun. on 3660 kc. ARRL Operating Aid 11 is available for the asking directly from Headquarters or this office. New calls on 50 Mc. from the Halifax area include VE1AFG and VE1OU. Traffic: VE1DB 6, VE1OM 4.

ONTARIO—SCM, Richard W. Roberts, VE3NG—More than one hundred s.s.s.b. hams sat down to the excellent dinner held recently in Toronto. Host was VE3GH, proxy for the Ont. S.S.B. Assn. West Side ARC had Noel Eaton VE3CF, Canadian Director, as guest for an FB meeting in early Dec. VE3MN is a Silent Key. Hats off to VE3AHU for the true ham spirit in getting VE3CJJ, a blind ham, back on the air. Welcome back, Gordie. The Ottawa gang had a fine auction.; VE3ATU is back in Canada. VE3ABU was a guest speaker at Ottawa. We welcome back VE3AWE, reappointed ORS. VE3EBI whacks out an excellent bulletin for the Grey Bruce boys. Welcome to VE3-EGA, the new EC for Ft. William. The Scarboro Club elected VE3BXM, pres.; VE3CUJ, vice-pres.; VE3-

(Continued on page 136)

Build the best ham shack in town with EICO



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Eico 720 90-Watt CW Transmitter 'clean' 90W, CW, 65W, AM/ Phone with EXT plate modulation. 80 through 10 meters. Kit **$89.95;** wired **$129.95.**

Eico 723 60-Watt CW Transmitter 'clean' 60W, CW, 50W, AM/ phone with EXT plate modulation. 80 through 10 meters. Kit **$59.95;** wired **$89.95.**

Eico 722 Variable Frequency Oscillator (self powered). Approaches crystal stability. 80 through 10 meters. Kit **$44.95;** wired **$59.95.**

Eico 706 Transistor Code Practice Oscillator Select variable tones, flashing light or both together. Phone jack for private use. Clean, loud signals. Kit **$8.95;** wired **$12.95.**

Eico 730 High-Level Universal Modulator-Driver Delivers 50W undistorted audio for phone operation. Can plate-modulate Xmitters with RF inputs up to 100 W. Unique over-modulation indicator. Kit **$59.95;** wired **$89.95.** E-5 Cover; **$4.50.**

Eico 710 Grid-Dip Meter Continuous coverage 400 kc to 250 mc. 500 μa meter. Includes complete set of coils for full band coverage. Kit **$29.95;** wired **$49.95.**

Eico 430 General Purpose 3" Scope Compact, portable, lightweight. Flat-face CRT; sharp, bright trace. Flat from 2 cps to 500 kc, 25 mv/cm sens. (vert.); 2 cps to 300 kc, .25 v RMS/cm sens. (horiz.). Easy, direct connections to CRT vertical plates. Kit **$65.95;** wired **$99.95.**

QS-2

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Add 5% in the West

EZC, secy.; VE3MB, treas. The SCM was guest speaker at the York North ARC, which now meets in Aurora. VE3CLK is pres. The Hamilton ARC held its usual successful Ladies' Night at the Yacht Club. The Toronto Two-Meter Net is running full steam ahead with VE3-DRF at the helm. VE3FEI is now s.s.b. VE3CWB is now a portable W6. The London Two Net is well attended. VE3CHQ is back on the air. VE3CAB is on 2 with 30 watts home-brew. The Kingston ARC elected VE3AHU, pres.; VE3AKV, vice-pres.; VE3CVD, secy.-treas. VE3TT is a new ORS appointee in Scarboro. VE3DU is active on 160 meters. The ECN still is looking for new members on its c.w. net, every night on 3535 kc.; Slow-speed c.w. Thanks to all who sent Marge, VE3DZA, and myself Christmas cards and greetings. Happy New Year and DX to all. *Traffic:* (Nov.) VE3-CYR 164, VE3BZB 104, VE3AWE 93, VE3BUR 90, VE3-NG 81, VE3DPO 68, VE3CFR 62, VE3DRF 52, VE3GT 49, VE3FGV 40, VE3ETM 38, VE3AKQ 31, VE3DU 29, VE3RG 19, VE3BLZ 16, VE3CFI 14, VE3AUU 9, VE3-IA 6, VE3VD 5. (Oct.) VE3AWE 49.

QUEBEC—SCM, C. W. Skarstedt, VE2DR—Asst. SCM: Michel St. Hilaire, VE2BEZ. This month you will notice a new Asst. SCM appointment. Please give Mike your full support. A very prosperous 1964 to you all. VE2NN is the spark plug of the new 2-meter net on 145.096 Mc. using surplus taxi equipment which is now appearing on the market. VE2NI, VE2SI, VE2YG and VE2ALZ are others taking part. Anyone acquiring such equipment should contact anyone of the above. The McGill University Club station, VE2UN, joins the University Net on 14,140 kc. with VE4UM as NCS, Wed. and Fri. at 1830Z. All university stations are welcome to drop in on this net. VE2AQV/K6 is looking for VE2s on 14,140 and 14,262 kc. at 1700Z. Our Canadian DX king, VE2WW, is having difficulties with his 40-meter beam; now U-shaped. VE2AUU, VE2AKK, VE2OC and others assisted with communications and search operations after the ill-fated aircraft accident Nov. 29. We still require active ECs for outlying districts. The saddest news was the sudden death of VE2VR. Our new Asst. SCM reports: Les amateurs du Quebec, ont perdu un ami très connu, et bien aimé dans notre milieu, Michel Normandin, VE2VR, est décédé subitement a l'âge de 50 ans, le 12 Novembre dernier. Michel était reconnu tant du coté sportif, que du coté amateur. Sa présence sera beaucoup manquée, sur 20 et 80 mètres. Nos plus sincères sympathies a la famille éprouvée. *Traffic:* VE2-DR 95, VE2ALH 73, VE2IN 34, VE2BEZ 27, VE2BG 21, VE2BMS 20, VE2BRT 8.

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FS, PAM: VE6PV, RM: VE6AEN, ECs: VE6FK, VE6SS, VE6ABS, VE6AJV, VE6AEJ, VE6PZ, OPSs: VE6CA, VE6PV, VE6HM, VE6SS, VE6BA, OOs: VE6-HM, VE6NX, VE6PL, OBSs: VE6HM, VE6AKV, ORS: VE6BR, OESs: VE6DB, VE6HO, VE6AKV, VE6JJ, is moving his QTH from Barons to Lethbridge. VE8-CW reports from the North, that the Polar Net meets Mon., Wed., Fri. on 3760 kc. at 0300Z. Our SEC reports that some of the ECs are not sending their monthly reports. What is the matter, fellows? We would like all reports in by the end of each month so that we can get them into Headquarters on time. VE6AFJ got his net started recently and it will be on every Tue. at 1900 MST on 3750 kc. Hope to hear from all you fellows in '64. Let's make Alberta a little more attractive. *Traffic:* (Nov.) VE6HM 211, VE4VX 54, VE4SW 12, VE8CW 11, VE8MF 10, VE8JH 9, VE8PK 9, VE6CA 6, VE6SS 5, VE8RG 5, VE6AFJ 4, VE6ABS 3, VE6ADS 2, VE6WN 1. (Oct.) VE6UD 20.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB —VE7IR spent four weeks touring Europe and is off for Morocco. Chilliwack Club's new officers are VE7BEN, pres.; VE7EX, vice-pres.; VE7BLA, secy. The club members paid a visit to the Mount Baker Club in Bellingham. VE7BCV has made Class "A." VE7BDR inserted 700 watts into the front end of his receiver, r.f. no receiver. New ECs are VE7WP, Williams Lake and VE7QQ, Terrace. The B.C. AREC is moving ahead with your help. VE7BBB still is DXing; she worked SB8DK and LU8AER and is working for YLRLs. VE7-BDG reports nine new countries on 80 meters. The Nanaimo Club has 6-meter mobiles VE7BHD, VE7BBQ, VE7ACE, VE7DH and VE7AQB. Code and theory classes are coming fine and students hope to try for their tickets early in 1964. 1964 officers of the British Columbia Amateur Radio Assn. are VE7ALE, pres.; VE7BHH, vice-pres.; VE7YG, secy.-treas. The BCARA has, through the B.C. Government, obtained picture QSL cards. Obtain yours through your club. Plan now for the Quarter Century Wireless Assn. big week-end in Vancouver July 11, 1964. All amateurs and their syls and YLs are invited. See VE7BHH. Call letter license plates for 1964 has increased to forty-seven new applications. The Totem Club is preparing a list showing

(Continued on page 138)

calls and frequencies used by the mobiles bearing amateur call plates. The Victoria Short Wave Club elected VE7AAF, pres.; VE7DY, secy. VE7JF is home again and wishes to say thanks to all for the kind words. Traffic: VE7BDV 71, VE7KZ 25, VE7AC 16, VE7BHW 14, VE7AKE 7.

MANITOBA—SCM, M. S. Watson, VE4JY—At the annual meeting of the ARLM held in November the following officers were elected for 1964: VE4MP, pres.; VE4CZ, vice-pres.; VE4SK, secy.; VE3AQN/4, treas.; VE4GA, VE4TT, and VE4ZX, chairmen of various committees. A training program was sponsored for the new year. Preparations are in hand for the summer hamfest to be held at the Riviera on Pembina Highway where there is ample parking and numerous motels. The WARA and ARLM are in charge, the date to be announced. The new officers of WARA are WØKLP/4, pres.; VE4MW, vice-pres.; VE4RE, secy.; VE4CS, treas.; VE4BF, business mgr. Upon receipt of your application for car license plates from the Motor Vehicle Branch (by those who have paid the fee for call letter plates) you must send the completed application direct to MAARC, Box 352, Winnipeg 1, Man., along with the regular fee payable to the Provincial Treasurer. Congratulations to VE4EF on his election as vice-pres. of the Manitoba Farmers Union. Traffic: VE4UM 17, VE4QD 16, VE4XA 8, VE4EG 7, VE4JA 7, VE4JY 7, VE4AN 4, VE4LQ 4, VE4SD 3, VE4SE 3, VE4QJ 1.

SASKATCHEWAN—SCM, Jack Robinson, VE5BL—New officers of the Moose Jaw Amateur Radio Club are VE5KZ, pres.; VE5IL, vice-pres.; VE5GA, secy.-treas. VE5JV still is in the hospital at Regina. VE5SY is busy looking for DX. VE5JK has an indoor 2-meter beam in two sections. VE5GG has the shack set up in a spare room of the new house with the approval of the new XYL. The Regina Club held a very successful social evening Nov. 22. This is my last report as SCM and I wish to thank all who helped in sending in news items and also to those holding appointments for the good work done. Your new SCM for the next two years is Mel Mills, VE5QC. Traffic: VE5HP 89, VE5LM 28, VE5HQ 11, VE5JU 3, VE5HX 2.

Correspondence

(Continued from page 85)

completely destroy a net's effectiveness, and I have observed this happening time and again. If you want to ragchew, go right ahead, but leave the nets alone, because they're providing a service which is a part of the foundation of amateur radio itself. — *Terry Wilkinson, K7SWF, Lebanon, Ore.*

MORE ON V.H.F.-U.H.F. TRAFFIC NETS

¶ It's amazing how few amateurs appreciate the worth of our v.h.f. bands for work over distances up to 100 miles.

During v.h.f. contests it's not uncommon for me to copy the better New Hampshire and Massachusetts stations on 50 Mc. almost around the clock, and every morning many stations along the Atlantic seaboard northeast from here are heard with good readability. Yet with the sunspot cycle fast approaching rock-bottom we find 75-meter traffic handlers pulling their hair out to cover similar distances. Why not let 50 Mc. and higher bands take some of this load?

There is already plenty of activity in most heavily-populated areas to support v.h.f. traffic handling, and occupancy is growing all the time.

I've operated portable in all the call areas of the east coast, and I know that there is enough activity almost everywhere to support efficient traffic nets. In many instances it seems that there are v.h.f. men where there are no low-band traffic operators. By arranging schedules on spot frequencies outside of the most heavily used parts of the band you may be able to set up a good system for working with each other, and with the low-band people who are having their traffic headaches these days.

The undersigned will be glad to correspond

(Continued on page 140)

INTRODUCING THE NEW SWAN-TCU

TRANSMITTER CONTROL UNIT

COMPANION FOR YOUR SW-240

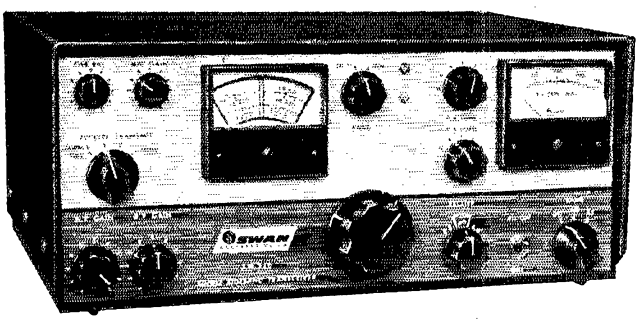
EXTERNAL VFO—PROVIDES FOR SEPARATE TRANSMIT-RECEIVE FREQUENCY CONTROL.

- Complete coverage of 20, 40, 75, and 80 meters.
- 100 kc Calibrator. • 15 mc Reception of WWV
- VOX. Voice Controlled Operation,- including Anti-trip.
- Built-in Speaker. • Phone Jack.
- Plugs into ALL SW-240 Transceivers. (Installation Kit included.)
- Operates directly from Transceiver supply. No additional power supply is required. Those who now own an SW-240 and AC supply need to buy only the Swan-TCU.
- The New SW-117B AC supply may be installed inside the TCU cabinet if desired, thus making a complete home station in two matching units.
- SW-240 Transceiver may still be used in mobile operation by simply disconnecting the TCU, and inserting a jumper plug.

complete with connectors and installation kit for use with all SW-240s.

$115

THE FABULOUS SW-240 TRANSCEIVER



240 watts PEP input. High frequency crystal lattice filter. Precision tuning mechanism. Exceptional frequency stability. Receiver sensitivity better than one microvolt.
Automatic gain control.
Break-in CW operation.
14,000-14,350 kc
7,000- 7,300 kc
3,650- 4,000 kc*
*Kit for full 80 meter coverage available.

$320

SWAN ACCESSORIES

MOBILE MOUNTING KIT
Locking type, including speaker switch, with front-mounted mike jack. **$19.50**

SIDEBAND SELECTOR KIT
Provides both opposite sideband and AM receive position. **$18**

SW-117AC Power Supply With Matching Cabinet.
With 5x7 speaker and phone jack. **$95**

SW-12DC Power Supply for mobile operation.
Has pre-wired cables and installation hardware. **$115**

NOW A NEW SWAN AC POWER SUPPLY—THE SW-117B
Designed to fit inside the Swan TCU cabinet or may be used separately to power the SW-240.
Includes top and bottom covers and rubber feet. **$75**

SWAN
ELECTRONICS CORP.
Oceanside, California

with anyone interested in organizing v.h.f. traffic nets. — *Lori Barfield, K1RSR/1, Gene Barfield, W4TVH/3, Leonardtown, Md.*

¶ I noted with interest the letter (p. 95, Dec. '63) regarding a microwave link to handle traffic and some of the advantages to be gained from such a project.

There are some very real obstacles to such a utopia. While 40 stations might stretch from coast to coast, it would require several times that number to get any kind of thorough coverage of the continent. Micro-wave equipment is not cheap. It would require 24-hour-per-day operation to be really effective, and the electric bill alone would be the joy of the local power companies. Such a project would almost have to be the work of a large radio club in each area, which might be more difficult in the more sparsely populated areas such as here in the middle west.

I have worked with 2000-Mc. equipment now for the past 6 years on the Kansas Turnpike where we use it for v.h.f. control and telephone purposes. Ours is not a heavily loaded system, only 4 multiplex frequencies, but I have been fascinated from the start at the possibilities which this technique presents. Unfortunately, we amateurs have dropped the ball in this vast area of the spectrum, and there are only a relative few of us with even a scant knowledge of the possibilities or the techniques involved.

As was mentioned in *QST*, the first stage is to place into operation small links which can be expanded later. Across metropolitan areas, counties, or between several large cities is the logical place to begin. But if it is really to be effective, let's get some engineering on the thing and a few standards adopted at the very beginning so we don't find ourselves with equipment so unreliable or so unadaptable as to be more of a detriment than a credit!

I haven't meant to sound discouraging. This thing has vast possibilities. Let's not approach it with half-developed techniques. The ARRL can provide much of the leadership in disseminating ideas for equipment techniques and background material. This microwave field is rapidly expanding. Amateurs need to be in on it. Let's get moving! — *Carl Fisher, W0HHK, Carbondale, Kansas.*

THE NEW BREED?

¶ Kudos to you on your article "The New Breed" in December *QST*! It is about time you put the kit-builders in their place, and put the hobby back on a technical footing.

I am presently designing a W2PUL front end for my thesis project here at Ryerson Institute of Technology and I discover more things I don't know with each problem I encounter. By the time the beast is finished, my horizons will have been considerably broadened.

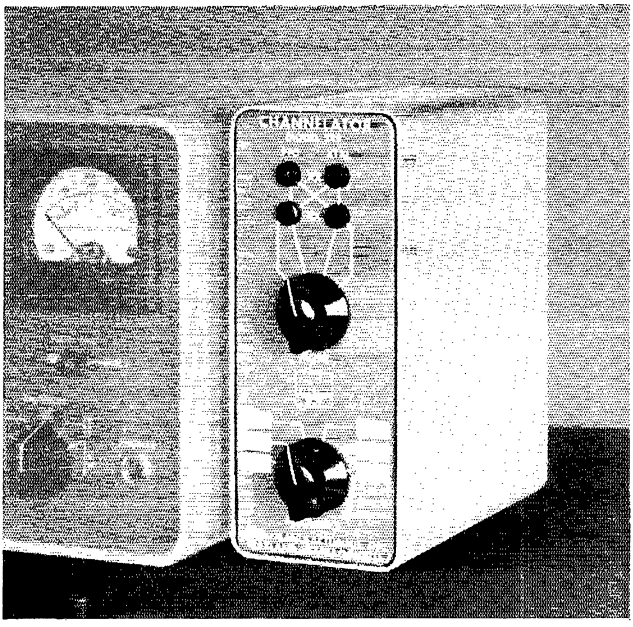
Let's have more of those "ideas" articles. — *Mike Goldstein, VE1ADH/VE3, Toronto, Canada*

I felt a little nettled by the mild bawling out that B.G., bless his heart, gave in his Technical Topic, "The New Breed." I am writing this for your readers, to take the sting out of B.G.'s words for others who may have been trapped by the articles.

It appears that other amateurs were interested in W2PUL's articles on a beam deflection mixer, and noise silencer; I was. Having written several technical articles and received inquiries from readers, I felt it perfectly logical to request further information from W2PUL. I was slightly bitter to receive a form letter from his sales manager and

(*Continued on page 142*)

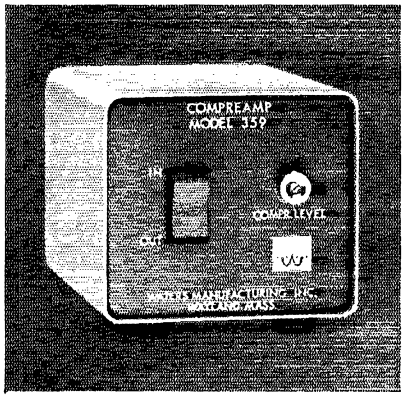
WATERS RADIO COMMUNICATIONS EQUIPMENT



CHANNELATOR™ Crystal Frequency Control

The CHANNELATOR resolves KWM2/2A transceiver tuning problems. Instantaneous switching to any of six pre-selected, exact crystal frequencies; covers complete PTO range. A built-in heterodyne frequency meter and "pullable" crystals permit exact frequency adjustment for NET or ROUND TABLE operations. You can operate normal PTO or "split channel." The Channelator installs in minutes — all cables and plugs are furnished, only cable to solder — no drilling; operates from any fixed or mobile KWM2/2A power supply. Model 349. **Price: $79.95** Crystals, any frequency, USB or LSB: **$6.00** each

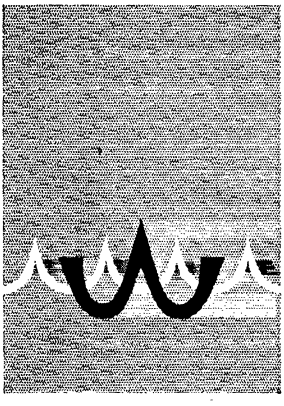
EVT™ Electronic Vernier Tuning gives you 20-to-1 tuning ratio reduction on your KWM2/2A. A stable, solid-state varactor tuning device, EVT attaches to your PTO *without* wiring changes. Precise, slow-rate tuning makes small frequency changes easy, especially when "mobiling" in traffic. Tuning range is ±500 cycles from any PTO setting. Zener regulator maintains well-known Collins stability. EVT may be used with *any* power supply. Model 354 (mounts coaxially with "ON-OFF-NB-CAL" switch) **Price: $23.95** Model 355 (mounts above "Band Selector" switch) **Price: $21.95**



COMPREAMP™ Preamplifier/Limiter

Increases speech power output of a transmitter up to four times, limits over-modulation. Self-contained, battery powered, transistorized — it fits all types of transmitters without wiring changes. In-out switch, compression level adjustment.

Price: $27.95, less battery



WATERS MANUFACTURING, INC., WAYLAND, MASSACHUSETTS

Other Waters Products: Coaxial Switches – Dummy Load/Wattmeter – "Little Dipper™" (Transistorized Dip Oscillator)

an advertisement for a new type of receiver in a return mail.

I think B.G. is basically correct in his expressed thoughts of the New Breed. On the other hand, I certainly would not knowingly bother an author of an article which had commercial implications since any further information I might want would probably be of a proprietary nature.

Perhaps my resentment of B.G.'s choice of articles to set forth his valid thoughts is that the W2PUL articles were not written by a "bona 'Fida'" individual with whom I could correspond on a technical level regarding his techniques. Perhaps there is some way that *QST* can warn the readers of such a situation. — *Henry Elwell, W2JKH, Westwood, New Jersey*

Kilowatt Amplifiers

(Continued from page 17)

you can get 750 watts out of it in Class C. For the 144-Mc. amplifier, 200 watts out with 700 in is about the safe maximum for a.m. linear service. These are optimum figures; you may get less, but you can't get more and be *linear*.

For higher plate efficiencies go to s.s.b., c.w. or plate-modulated a.m. In any of these modes these amplifiers will give you the biggest legal signal around, if that's what you want. Or they'll throttle down nicely to 300 watts input or less, merely by lowering the plate voltage. They'll work efficiently at much lower inputs if the screen voltage is dropped appropriately. Chances are that you'll still have a signal that will stand out in most neighborhoods, on either 6 or 2.

QST

Ya Fer It or Agin It?

(Continued from page 45)

. . . ahhh . . . I just changed my mind! You can count me in too! *I'm against Incentive Licensing* — now! You convinced me. They can't do that to us! Build a transmitter . . . chhheeee!"

"Hey, friend."

"I've been listening to the wrong fellas, Charlie. How could anybody be for that Incentive stuff after what you've been telling me?"

"Well now don't be too hasty, friend. Ya know there's lots more to this Incentive stuff than ya hear on the high . . . ahhhh . . . than you read up and study . . . yeeeaaahh. Like this business about how them fellas back there is gonna fix up the bands . . ."

"Charlie, I only just heard it on the . . ."

"Sorry, friend, I just made up my head. I'm fer Incentive Licensing now! Yessir, friend . . . *I'm fer it.*"

"Charlie, you're outa resonance. Two minutes ago you told me you were against it, and you convinced me I should be against it too. And now you say you're *for* it!"

"Why sure I'm fer it. Ya see, friend, after I studied up all the facts . . ."

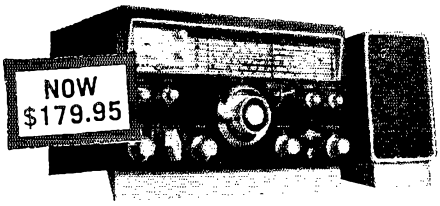
"But Charlie, those fellas back there are going to make you take all those tests and code exams

(Continued on page 144)

WRL Makes Quantity Purchase Of New National Receivers

$20,000 Savings Offered By World Radio Laboratories

Council Bluffs, Ia. (HAM)—Leo I. Meyerson, WØGFQ, President of WRL quotes:"I have just purchased a stock of New National Receivers, at a hot price. This savings will be passed on to our customers." Leo also stressed, "We shall give top trade-in allowances despite the bargain prices on these receivers. For the past 28 years WRL



SAVE $100.00 *NC-270*

A SAVINGS OF OVER 35% on the regular price of $279.95 on the famous NC-270,...a double conversion receiver, 6 to 80 meter ham band coverage and other features, including: selectable sideband; five selectivity positions—600 cy. /5Kc.; both product and diode detectors; high order stability for SSB/AM/CW reception; 1 uv. sensitivity for 10DB SN ratio; built-in 100 Kc. calibrator, ANL; "S" meter; etc. Size 8⅝" x 15⅝" x 9". Approx. 28 LB. less speaker.

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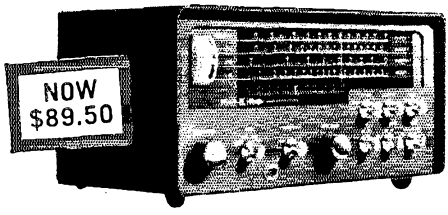
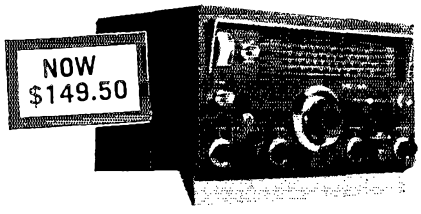


SAVE $30.45 *NC-105*

A SAVINGS OF OVER 25% on the regular price of $119.95 on the NC-105, and offering continuous coverage over 550KC to 30 Mc. Includes: "S" meter; noise limiter; "Q" multiplier; built-in speaker; special hi-fi tuner output jack, etc. Size: 7⅝" x 13½" x 8⅝". Approx. 25 LB.

ORDER # XM229 ($5.00 monthly on Charg-A-Plan) cash $89.50



SAVE $50.45 *NC-155*

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again . . . wouldn't be surprised if they raised it to 40 w.p.m. — maybe 45 — and make you show a college degree just to get in the door of the license place —"

"Now see here, friend. A while back I got me a Extrie Class ticket just for fun — to see if I could do it. But it never got me nothin' — up to now."

"But Charlie, that master's degree in electrical engineering . . . and 50-w.p.m. code . . . with a pencil . . ."

"Naw, friend. I studied up this Incentive stuff and the way I see it, all you boys and the CBers is gonna be stuck on them other bands. But my Extrie Class Incentive License is gonna get me my favorite old ten-meter band . . . all to myself!"

"Charlie, watch your language — them's fightin' . . ."

"Easy now, friend. You're un-neutralized. Ya been zeroed in on all the guessin'-gossip on the high end too long. Time you thunk it up fer yourself . . . errr . . . be open-headed! Study up the facts . . . then make up your own . . . ahhh . . . well, like somebody says . . . hmmm . . . yeeaahh. But ya know, friend . . . I just can't hardly wait 'till them fellas back there gimme my Extrie Class Incentive License . . . yeah. Me . . . and good old ten . . . and all that DX — mine, all mine! Friend, *I'm fer it!*" QST

Gus In Bhutan

(*Continued from page 48*)

it's always up and up and around and around. I never saw a stretch of even 200 feet that was straight!

There are daily landslides that block the road for hours, even days. Between 5000 and 12,000 workers, mostly women, work the year around to keep the road passable.

The people are the most friendly I have met anywhere in the world. There seems to be nothing they do not immediately give me. They keep the palace power plant operating several hours more than usual each day for me. They even got a few crates of Cokes by air from Calcutta, and cigarettes and fresh fruit and vegetables, also by air. I love the country and the people, and have no complaints at all.

For my stay here I want to extend my thanks to His Majesty the King of Bhutan; Chhawna, AC5PN; Saja, AC5SQ; His Excellency the Prime Minister; and for many favors given me, the Bhutan Trade Advisor in Calcutta. For the entire DXpedition I sincerely thank my XYL, Peggy; Ack, W4ECI; K8RTW, Ed; Chuck Carney of Collins Radio (W9GDJ), and many others who have made it possible. As for the equipment — do you think *yours* would still be working if it had been submerged in Indian Ocean salt water for ten days? If it took a ten-day trip on top of an African bus where almost every tube was shaken from its socket? If it was fed line voltages ranging from 160 to 265? Well, mine is still working *almost* like the day I got it!

There is much more I'd like to write about Bhutan, but it would take a book to do a good job, so I will save it for my book, later, which will cover the entire trip — all fifty countries, every country a story within itself. I'll be writing more later. QST

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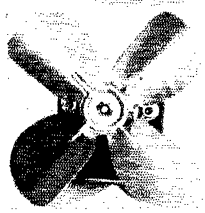

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Model 4111/RV
Amateur Net **$1.95**

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Wired, tested, calibrated, ready for use.
Mod. 4/104 for driving one 807 or 6146 final in AM or CW under Class "C" conditions.
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Mod. 4/104, 4/102 or 4/103 less tubes and xtal, each **$29.95**

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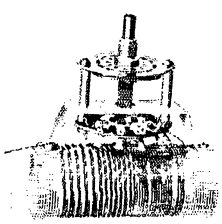
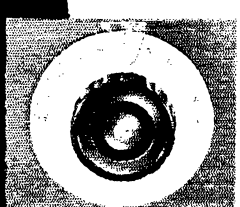


Units have 6 posit. tap switch mounted on ceramic coil form. Mod. 4/111 designed for use with two 807's or 6146's (in parallel). Freq. Range 3.5 to 29.7 mc.
Mod. 4/112 is designed for use with single 807 or 6146. Handles up to 60 w. Range: 3.5 to 29.7 mc.
Mod. 4/111 or 4/112, **each $4.95**



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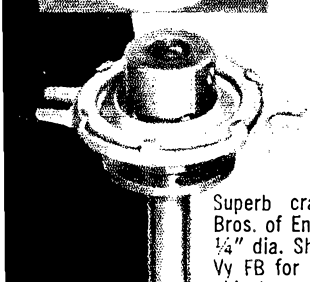

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The World Above 50 Mc.

(Continued from page 80)

K3PFE tells that he and K3IHT are planning to each build an A4, (facsimile) transmitter and converter for 220 Mc. in the near future. From Red Bank, New Jersey WA2VYN tells us that conditions on 144 Mc. were unusual to say the least during the month of November, with the band opening and closing nightly almost before you knew it. Jane heard two New Hampshire stations and one W4.

WA9DKM sez: "Lemme at 'em! Exceptional skip or something with a K3 and W4?HK on 220.015 Mcs. being heard." Keep a-call-in' and a-watchin', Lowell, you'll catch 'em yet.

Portland, Oregon, seldom heard from recently, is this month, represented by K7SJQ, who reports that he is working on a 220-Mc. 15-watt transmitter; and also working on a rig for 3300 Mc. Ron sez the rig worked fine for two and a half hours for a 30-foot contact but then the power supply quit. When on the air again they'll try for some outside DX on 3300 Mc. Another station building for those "way-up-thar" frequencies is Bob, WB6DMB, now building for 2300 Mc.

TV is beginning to be very much "the thing" among many of the v.h.f. hams. At Metairie, Louisiana W5JGV sez: "Have been working on the ham TV system. Have built the main power supply that will run the whole thing. It has 15 tubes and delivers 6 different regulated and super-filtered voltages for the system. It will run an 87-tube system that will be housed in a 40" rack cabinet, with the vidicon camera in a separate case on 50-foot control cables. Most of the parts have already been obtained but a few parts for the sync and timing generators have to be made or bought yet. The vidicon deflection yoke has been hand made and seems to be a success. It cost about $3.75 for parts and took about three days to construct." He goes on to give further details concerning this TV rig and sounds real "gone" on it. If you're interested in more information, drop a note to W5JGV at Metairie.

More TV news, but this from W8WNX at Detroit, Michigan and the band is 432 Mc. Larry sez he is now on 432 using a 4X150A cavity tripler to a 4CS250B final cavity at 300 watts, and a 32-element collinear at 70 feet. He is also on TV using a vidicon camera and at present the receiver is an ASB-5 with 2 6AN4 preamps with a 417A converter under construction. Regulars on 432 at that location are W8RLT (Livonia) and W8JLQ (Toledo). WA8DOM at Dayton, Ohio sez that his 432-Mc. corner reflectors are ready to go except for driven elements. Transceivers are ready except for final frequency adjustment. Fred sez he's been spending too much time on the low frequencies (6 and 2) to get the 432 gear completed. According to W4AWS in Orlando, Florida the known stations on 432 in central and south Florida are W4GJO, WA4BYR, K4IXC, WA4GHK and possibly W4VTJ. They are reporting no difficulties in point-to-point contacts around the area and DX covered is around 100 miles.

Think the following letter from Al Margot, W6FZA will be of interest to all v.h.f.ers and will certainly show some of what is being done on 432 Mc. on the west coast. "I finished the 432 s.s.b. exciter (50 watt in, 20 watts out, a 5894 in AB_2) in September, and revived and modernized the old 406B. Have worked W6NLZ, 150 miles south over the Tehachapi mountains, and have heard W6UID about the same distance right behind Mt. Wilson (he's tough on two meters). Nightly skeds with K6HCP in San Jose, about 200 miles over the coast

(Continued on page 148)

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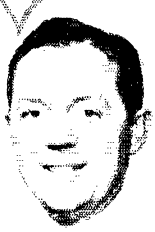
Bob Henry
WØARA
Butler, Mo.



Ted Henry
W6UOU
Los Angeles, Calif.

Walt Henry
W6NRV
Anaheim, Calif.

COLLINS

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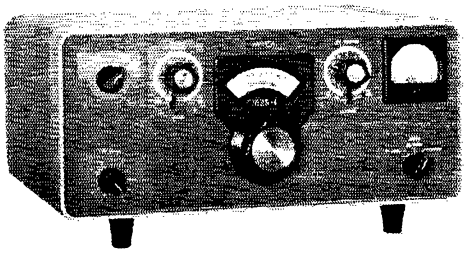

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range have provided an interesting project. We have made contact about half the time, and have had enough signal for s.s.b. a couple of times. Summing up, 432 Mc. seems to be providing signal levels similar to two meters, considering the low powers involved." [The feats being performed by K6HCP, W6UID and K6JC all using the s.s.b. approach, are making a number of the a.m. stations sit up and take notice. Stability is no problem with modern techniques. However, there are still those who say "it won't work" as the s.s.b. boys talk right over their heads. (Been listening to any of the a.m./s.s.b. feuds on the low frequencies lately, Al?)

"I have completed my 4CX300 final for 432 with considerable enjoyment and am now waiting for authorization to use it. It took several days to tune but now provides a power gain of about 13 db. using fairly crude techniques. The 5894 s.s.b. exciter easily drives it to 1 kw. input and about 45% over-all efficiency in AB_1. XYL K6ZEH used 432 s.s.b. from this QTH in QSO with W6TZJ for a first. 432 has been up and down out here for years, but I believe the s.s.b./c.w. kw. approach is breathing new life into the activity. When the stations are completed, I'm sure that 200–300 miles over the hills will be nightly as it is on two meters."

Very, very nice letter, Al. Be sure to let us know how things progress.

50 Mc. DX

Harold, VP7CX, sends us some good news from San Salvador. "50-Mc. DX prospects for 1964 are shaping up and look pretty good at the present time. Several people in the island south of here have shown interest and will probably be on by next summer. Watch in the c.w. band for HI8RO, HI8MMN, HI8XAG, VP6AQ, VP2SY, VP5BB, VP2AR and Trinidad. Most of these people will have rigs on six by next summer if we can scrape up some converters and transmitters to send to some of them. Parts are hard to come by down here and duty is very high on equipment. I worked stations on December 3, 14 and 22 into the 4th area with 1s, 2s, 3s and 8s being worked on the evening of the 14th. I'll be on s.s.b. this summer one way or another. Have a mixer in the planning stages and planned antenna improvements should pick up another 7 db. for me. I'll get those 7s one way or another! Totals for 1963 so far are 40 states, VE1-2-3-4, FP8, HI8, KP4, FG7. Was heard several times in VP9 but didn't hear them. Haven't received cards from Colorado, Arkansas and VE2 as yet." Certainly sounds as though Hal is working on the DX stations for us and will get them on the air (by hook or crook) by next summer. Hope that some of you fellows with spare parts, converters, transmitters, etc., lying around will ship them to Hal.

50 Mc.

A quick assessment of the value of v.h.f. sideband and the extent of activity currently on this mode in the Northeast can be made by monitoring a session of the East Coast VHF Sideband Association on 50 Mc. Each Sunday at 11 A.M., WA2CVF, Brooklyn, N. Y., calls all members of this widespread organization. Following completion of the member roster for each numerical-alphabetical call group, Sam stands by for calls from other interested operators.

Everyone has a chance to be heard, member or not, and the net provides a fine opportunity for circulation of news and the exchange of signal reports over a wide area. A typical session will find 40 to 50 stations participating, in an area stretching from

(*Continued on page 150*)

New Hampshire to Virginia. Good tropospheric propagation may extend the range in all directions. A record is kept of all stations reporting in, and of all others recently heard on 50-Mc. s.s.b. The latest list, with names, addresses and calls, may be had by writing Abe Cutler, WA2ONB, Secretary, 45 Birchall Drive, Haddonfield, New Jersey.

In addition to the on-the-air activity, the association sponsors dinners several times each year. Anyone interested in v.h.f. sideband is welcome at these get-togethers, as well as in the Sunday morning net operation. Watch for WA2CVF on 50.115 Mc. His snappy procedure will make clear to newcomers the "modus operandi" of the ECVHFSSBA.

WA2GJT reports that he has not been very active during November but major activity at the present is getting set up at his new QTH which is 19 floors *up* in midtown Manhattan (with 13 floors above him). Jim will be using a double stacked TV conical for the present and hopes to be completely set up by the first of the year. In the Bronx WA2PSL sez that ground wave was pretty good during November with stations in 1-land being worked almost every day. Louis heard a very weak VE1 on the 15th but because of local QRM was unable to copy. Conflicting report received from WA2TQT who said groundwave was poor, general conditions below average, but one opening observed during which 4s, 5s, 9s, 0s and one 6 were heard. In 3-land K3HIT (Pennsylvania) and W3GCO (Maryland) are both building s.s.b. gear for 50 Mc. K3KPA sez that ground wave was very good during November and K3VPI worked into Florida, Georgia, North and South Carolina and Texas during the month.

WA4BMC at Lake Worth, Florida observed band openings on November 11 and 12 into Pennsylvania, Missouri and Kentucky. Bertha had her first RTTY contact on November 27 with W4VTJ. "Very successful!" sez she. In Kentucky WA4CQG sez ground wave was good on a couple of days during the month, but only one skip session was observed. That on the 29th when W4ETI was the only station heard. WA4JCS at Oxford, North Carolina and WA4BBY at Durham, North Carolina seem to agree as to openings on 50 Mc. during November. Openings occurred on November 11, 12 and 13 into Texas, Louisiana, Florida, Massachusetts, Vermont and New Brunswick, Canada. Pennsylvania and New York were also heard by Walt in Oxford.

At Knoxville, Tennessee K4KYL and K4PZT both report openings on November 3 to Texas, on November 11 and 12 to Texas and Florida, November 13 and 14 to Florida and the Bahamas. Jim, K4KYL sez he is making slow progress on 432 gear. Doc, K4PZT sez he is still working on 150-watt six meter rig and TV station. W4HHK at Collierville, Tennessee reports double hop to the west coast on December 15. Paul worked WA6HXW and heard W6NLZ on 50-Mc. c.w. He put his beacon on 50.05 Mc. at 2037 until 2225 CST headed due west. W5JGV in Metairie, Louisiana sez six has been open for a few days and afternoons lately with east coast stations and southwestern stations being heard in Metairie.

Interesting reports received from 6-land recently include that of K6RCR at Santa Rosa who worked WB5BGE on November 10 and also worked K7OCG in Phoenix. He heard K7UVD and K7SWK in Oregon on November 18. George reports that 50 Mc. has been open to Montana daily for short periods, and that WA4HAT, WA4HAS and W0DYB were heard at his QTH on November 19. K6VXI reports that 50 Mc. was open from San Francisco to Great Falls, Montana and Phoenix, Arizona on October 26.

(Continued on page 152)

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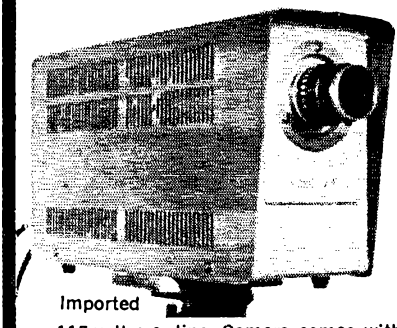
VALUES OF THE MONTH



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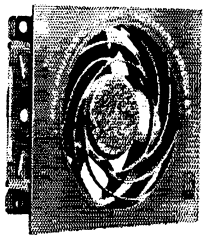
Standard scan, compatible with domestic receivers, uses horizontal frequency of 15,750 cps and vertical frequency of 60 cps (synchronized by power line). Check with EIA test patterns demonstrates high resolution and linearity. Modulated RF output at 25 mv is enough to feed any number of TV sets; direct video output is 1 volt p-p. Output is matched to RG59/U cable (not included). Draws negligible power (approximately 18 watts) from standard 115-volt a.c. line. Camera comes with 25mm F:1.9 lens, but the C-mount lens base accepts all common 16mm motion-picture lenses, such as wide-angle, telescopic, zoom and others.

The HV-13A closed-circuit TV camera has many uses in the home, in industry and in the laboratory. It can be used for keeping an eye on the baby in another room or on the lawn, for remotely observing hazardous operations or experiments, and for providing service to sports fans at race tracks or arenas. It can be combined with a microscope to present highly magnified views to numbers of people in educational TV or other applications.

MODEL HV-13A CLOSED-CIRCUIT TV CAMERA.....**$399.95**



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W6YKS sez that although he has had no contacts on six he has *heard* K6LEW, K6IBY, W7QDJ/6, W6FZA and K7AAD. John reports that WA6GHL, WA6EXM and WA6UHR are now on 50 Mc. n.b.f.m. The boys in that area are centering their activity to 50.250 so they will know who is on the band.

At Tujunga, California WB6BOW sez that six has been pretty dead since July. "Only two openings here since then that I know of. On November 8 Washington, Oregon, Ohio and Oklahoma were getting into southern California but I missed that one. (That's life — I guess.) November 10 at noon W5CNT at El Paso was in here solid for a half hour and a number in this area worked him. Also heard Superior, Arizona but no contact."

K7ICW reports that E_s activity increased slightly over that of last year but noted that most stations didn't even realize that the band had been open. High power a.m. or s.s.b. helped attract the attention to this from this end, but only one c.w. station was worked. E_s on November 3, 8, 10, 19 and 24th into Las Vegas. On November 18 WA8EGA in Michigan worked WAØYKU in Kansas and W5WYZ in Texas during the only "skip session" heard during the month.

At Kalamazoo W8CVQ reports that Sporadic E to Florida was heard on November 2 and into the Gulf states on November 11. Walt sez ground-wave signals are falling off as winter approaches. Mike Baker, K8WVZ observed openings into Texas on November 11, into Florida on the 13th, and on the 23rd RTTY was heard during standard ground wave conditions. From the heading of his beam Mike presumed this RTTY signal to have originated near Toledo, Ohio.

Several of the Illinois boys sent in reports of openings on 50 Mc. K9TYH observed one on November 9 for a twenty-minute period into 5-land; WA9FVD noted an opening on November 21 into Texas, Iowa and other southwesterly states. WA9AEN observed openings on November 11 into Florida, Texas and Louisiana; on November 13 into Florida and Texas. At Cicero WA9FIH reports openings on November 12, 13, 14 and 25 into Texas, Florida, Louisiana. Jim also mentions the opening of December 1 into Colorado when he heard a number of stations from that area. Wisconsin comes through for us via K9FPM in Beloit. Ron sez that six meters was good during November with a short-lived band opening into Florida on the 2nd. Ground wave overall is better than last year at this time with most of the ground-wave activity being to the south.

WØDRE reports that although he has not been on the air very much he did have a contact with K7ZKN on December 1 with only signal reports exchanged. At Ames, Iowa WØPFP noted openings on November 2, 12, 17 and 30 with 3s, 5s, 8s and 9s being heard or worked. Skip was observed quite frequently during the month by WAØFLL. On the 3rd and 29th Bob worked into 4-land and on November 3, 5, 11, 18, 20, 25 and 29 he heard a number of other skip stations in 3, 4, 5, 7, and 8-lands. At Columbia, Missouri WØHHG reports very good ground wave to Kansas City, Rolla and St. Louis on November 8, 9 and 10; and also reports a band opening to Texas on the 12th. Final skip report received was from WAØCHD who observed skip into Arizona on November 10, into Florida and Cuba on the 11th and into Florida on the 25th.

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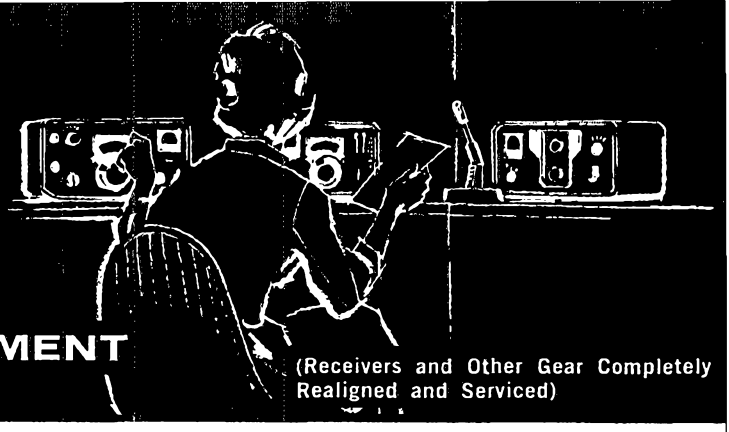

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SX111	169	HQ145X	179	OP-1 SCOPE	149
SX100	199	HQ150	149	T60	34
SX115	379	HQ180C	329	R100	69
SX117	299	SP600	299	R100A	79
HA10 LF TUNER	20	HX50	299	T150	87
SX110	99	HX500	399	B&W 5100	147
SX140	74	HRO-60	239	LA400C	147
SX96	129	NC300	179	P&H 6-150	199
S85	79	NC183D	177	PALCO 65 XMTR	77
SX99	89	NC125	79	PMR7	79
SX62A	229	NC109	99	AMECO 86W	77
SX43	87	NC155	139	AC SUPPLY	27
S76	79	NC270	159	ZENITH 1000D	129

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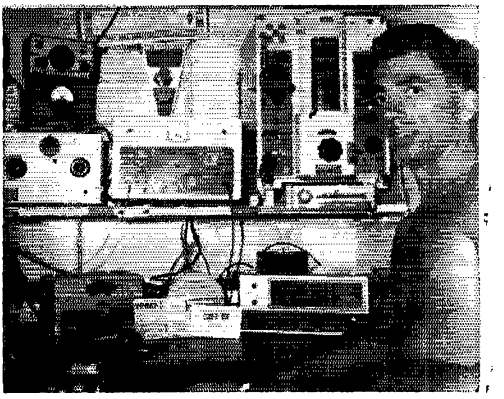
How's DX?

(*Continued from page 84*)

well. . . . G3PBD (ex-VQ1-3-4-5PBD) commences a two-year Nyasaland engagement, s.s.b. favored. . . . Ray of ZS2MI knocks off on Marion isle next month and doubts that his replacement will do much hamming. Better quick click, OMs. . . . TU2AU and/or 9G1EX anticipated Upper Volta (XT2) output around this time, and 5N2RSB may be homing in from Dahomey (TY2) as you read this. . . . ZS9A's 50 watts and dipole should be workable for the rest of the year, 14,080 kc. . . . FR7ZD is about due to forward HB9TL's sideband loaner rig to FB8ZZ.

OCEANIA — "VR6TC is still active Mondays around 0500 GMT," hints WA6VAT. "Tom has a fine signal on 14,167 kc. and usually tunes 70 kc. lower." . . . . . K1KSH/VK9, now VK9GL, opened his Papua DX career with a VK2NS QSO in November. His 50-watter makes plenty of c.w. noise on 20 through 160 meters thanks to a multiband dipole 170 feet high. Sparks writes ARRL Assistant Secretary W1ECH, "My usual spot is near 14,019 kc. but I run 160-meter DX tests with Ws 1BB and 6ML at 0930-1030 GMT on 1801 or 1859 kc. This may be my last Pacific stop unless I manage a quick side trip or two." . . . . . Oceaniagrams courtesy the clubs press: G3HCL may be radio-active from Malaysia next month, multiband and multimode. . . . Christmas isle tidbits: VK9DR replaces his 14,060-kc. 12-watter with a 100-watt job, VK9MD hits 14,125-kc. sideband now and then, VK9MV's 40-watt c.w. signals appear at 1300-1500 GMT almost daily on 14,062 or 14,103 kc. with a.m. gear in prospect, VK9XI, a club deal, favors 14,100-kc. phone and c.w. at 1300-1500 GMT. Withdrawal of loaned Hammarlund gear may curtail future action by VK9s MD and XI. . . . Chatham islanders ZL3s VB and VH/3 hit 20 and 40 occasionally, the former trying 14,050 kc. at 0300-0700 GMT. ZL2GX may soon supply ZL3VB with a sideband sender. . . . Midway is no problem thanks to the kw. and 120-ft.-high rotary of KM6BI, 21,425 kc. KM6CE helps out on 21,434 kc. around 2200 GMT. . . . VK4JQ of Willis isle sometimes sends on 14,148, tuning around 14,190 kc., week ends, 1330 GMT or so.



VP8HF/mm (G3RFH), active aboard HMS *Protector* on far-south survey missions, hopes to land some of this gear and drop his "mm" tag for a few weeks of 7-Mc. DXing from the South Sandwich Islands next month. Chow line forms 10 kc. up.

EUROPE — In 1962 Scandinavian Activity Contest results we find Ws 2JAE 1JYH, K1RTB, Ws 4KXV 4SNU and 7PQE the leading Stateside c.w. scorers in that order, VEs 1AE 2AFC and 3BWY pacing Canada, SM5BFE, OH1TN, LA8PF and OZ4FF recorded homefront c.w. highs. Ks 8PUU 9ECE and W7BTH submitted the only North American phone totals in that scoring order, while OH5SM, LA8WF, SM5OV, OX3AI and OZ3KE miked to Scandinavian victory . . . . . SP9ADU describes Poland's amateur license categories, omitting v.h.f.-u.h.f. specs, as Class IV, 3.5- and 7-Mc. c.w. only with 15 watts maximum input; Class III, all-band c.w. and voice at 60 watts; Class II, 250 watts; and Class I, 750 watts. SPs number about 1000 and they're trying to retrieve 160-meter privileges. The SP DX Club, of which SP9ADU is a member, has more than fifty 100-country members. SP7HX can supply data on an interesting certification sponsored by SPDXC . . . . . G3s IGW and JML operated GM3IGW/a in January 160-meter doings. "Our Wigtownshire site is magnificent, giving a clear take-off to the west," declares G3IGW . . . . . Top Radio Club of Pargas, Finland, publicly exhibited OH1AH in November. OH1s ND QY

(*Continued on page 166*)

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WH XK YA YF YG YH YS and YT aided the demonstration atop Finnby hill. . . . . SVØWAA has a Viking II, 75A-3, vertical and long-wire perking on 7, 14 and 21 Mc. "I'll try 28 Mc., too, when openings come along, but 80-meter operation is not permitted in Greece." . . . . . HB9TL expects to generate lively Liechtenstein liaison this month. . . . . SVØs WWD WF WG and WQ all represent Rhodes on 20 sideband, the latter sampling c.w. on alternate days.

SOUTH AMERICA — VP8HF/mm (G3RFH) expects to continue activity aboard survey ship HMS *Protector* at least through next month, possibly through May. Ken believes he is the first VP8 licensed for marine operation. . . . . OA4s A and O will be active on March 15th-19th with regular a.m. and s.s.b. on 7, 14 and 21 Mc. in celebration of World Understanding Week, an activity sponsored by Rotary Club El Rimac of Lima. . . . . Southern scoop via club and group: WA2WUV of LIDXA arranged shipment of ample wireless apparatus to HC8FN where a TR-3 hooked to Virgil's old HC8CA beam should make plenty of Galapagos noise. Neighbor HC8LS does booming biz on 20 c.w. . . . Weary of hunting South Shetlands VP8s? Try CE9AQ, 14,055 kc. at 0200-0300 GMT. . . . W9EVI and associates threaten CEØXA San Felix DXcitement by April.

HEREABOUTS — "There are about twenty active Argentia ARC members and all use 20 meters," testifies WB2CDB/VO1. "About the only time we stray from 14 Mc. is to join the Newfoundland traffic net for local relays. K5YAA/VO1 worked 53 countries in his first six days on the air here. By the way, awards hunters should be interested in the AARC Codfish Certificate. High winds play havoc with our skywires. We lost the club's yagi, and our quad is up for the third time." . . . . . Codfish are in the news, it seems. K5JVF says it's rough to crash New England's Codfish Curtain for DX on 40 and 80. . . . . WA6VAT and others salute W3ZQ for outstanding DXpeditionary performances as FS7MB and PJ5MC in late '63. Encore, OM! . . . . . W4EXM/3 is back on from D. C. after his EP2AM venture, and neighbor ex-KC6UZ expects to sign a new three call shortly. . . . . spelling OM W1WPO, a confirmed Boiled Owl, causes XYL W1YYM to wonder if she's therefore a Boiled Owless. Bob still tries to top Ellen's back-to-back QSOs with FB8s XX and ZZ . . . . . VEs 2AQV and 3CPR share a 14-Mc. rotary, 240 exciter and kw. linear in North Hollywood. . . . . K2YFE, embarking on a Texas stint as an Army medical looie, says VE5LG can fill you in on the Saskatoon Award . . . . . Ws 1RTW and 2EQC are interested in undertaking or joining DXpeditionary endeavors this season . . . . . Florida DX Club members can be heard swapping secrets on 3817-kc. sideband around 1500 on Sundays . . . . . Back in the late '30s one of Jeevesie's personal operating heroes, a W3 contest champ, forever became a bum in our estimation when we heard him take the filter off his c.w. final to crack a 14-Mc. Liechtenstein pile-up. The guy apparently has another hobby now, thank goodness, but NCDXC's *DXer* reports reappearance of this foul technique. Hardly worth it, really. QST

Happenings of the Month

(Continued from page 66)

range program to strengthen and preserve the Amateur Radio Service. Firm guidance and leadership by the Commission at this time is essential.

The Commission is respectfully requested to (1) immediately reactivate the Advanced Class license, and (2) issue a notice of proposed rule making proposing to adopt the League's proposals and inviting comments upon any of the other proposals and suggestions which the Commission believes should not be denied by simple orders.

Respectfully submitted,
THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED
By
ROBERT M. BOOTH JR.
Its General Counsel

1735 DeSales Street, N.W.
Washington 36, D.C.

December 26, 1963

(Continued on page 158)

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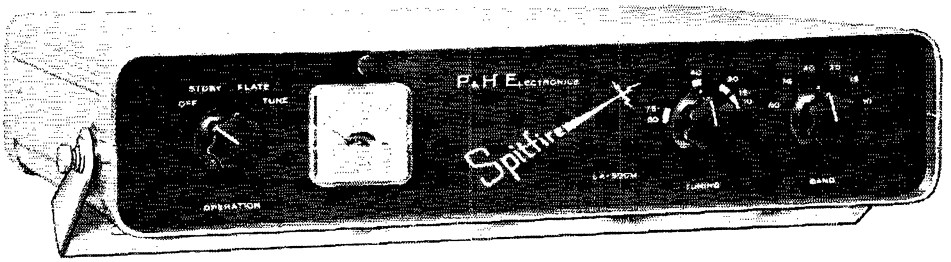

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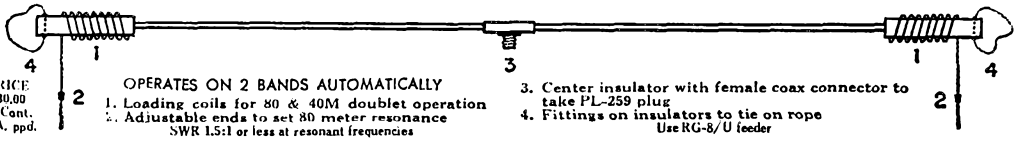

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As the skip shortened up on 20 one morning and the VK5 I was QSO QSB'd out, a W8 called me. My contact with him was so long that it could have qualified me for the RCC! But it brought me something much more tangible: from this W8 I learned of the big money many hams are earning in commercial and public-safety 2-way radio maintenance. He told me how several years ago he had sent in a coupon from a Lampkin ad in QST—and received a free copy of "HOW TO MAKE MONEY IN MOBILE-RADIO MAINTENANCE". It started him on the road to a high extra income.

So after signing him out in the log, I found and mailed the coupon from a Lampkin ad. Now I, also, am in high-paying mobile-radio maintenance.

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MINUTES OF EXECUTIVE COMMITTEE MEETING

No. 296

December 7, 1963

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the Headquarters office of the League in Newington, Connecticut at 9:30 A.M., December 7, 1963. Present: President Herbert Hoover, Jr., in the chair; First Vice President W. M. Groves; Directors Charles G. Compton, Robert W. Denniston, Noel B. Eaton and Morton B. Kahn; General Manager John Huntoon; Vice President F. E. Handy; and Treasurer David H. Houghton. Also present were General Counsel R. M. Booth, Jr., Hudson Division Vice Director Harry M. Dannals, and Delta Division Director-Elect Philip P. Spencer.

On motion of Mr. Eaton, unanimously VOTED that the next meeting of the Committee be held in Miami, Florida, January 18–19, 1964, to provide appropriate opportunity for discussion of the formation of a Region II IARU division with member-society representatives expected to be present there.

The Committee heard reports from the General Counsel on the progress of reciprocal operating privileges, and the status of amateur license application filing fees. The Committee heard a further report by the General Counsel on developments in the matter of the restricted grant of the General Class license to Charles Seaman, K3IOP. On motion of Mr. Denniston, unanimously VOTED that the Committee fully approves of the several actions taken by the General Counsel as this matter has developed, and instructs him to continue to participate as fully in the case as necessary to protect amateur interests.

The Committee then heard reports from the Communications Manager concerning the status of the agreement with the American Red Cross, and from the General Manager concerning a program of providing equipment for needy overseas amateurs, and on the results of the recent Space Radio Communications Conference at Geneva.

The Committee was in recess for luncheon from 12:30 P.M. until 2:05 P.M.

There ensued an extended discussion on plans for the formation of a Region II division of the International Amateur Radio Union. On motion of Mr. Eaton, unanimously VOTED that the officers of the League are requested to undertake the necessary actions to provide full League cooperation in the formation of such a division, including any desirable liaison with the officers of the Region 1 division.

On motion of Mr. Groves affiliation was unanimously GRANTED to the following societies:

Baltimore Polytechnic Institute Amateur Radio Club (H.S.)	Baltimore, Md.
The Denison Junior High School Amateur Radio Club	Winter Haven, Fla.
Lakewood Radio Club	Lakewood, Calif.
Lapeer County Amateur Radio	Lapeer, Michigan
Louisville Gas & Electric Company Amateur Radio Club	Louisville, Ky.
The Low Country Amateur Radio Club, Inc.	North Charleston, S. C.
National Capitol VHF Society, Inc.	Montgomery Co., Md.
The Vienna Wireless Society	Vienna, Virginia
West Oak Lane Radio Club	Philadelphia, Pa.
Forx Amateur Radio Club	Grand Forks, N. Dakota
The Wichita Tec-Ni-Chat Club	Wichita, Kansas

On motion of Mr. Compton, unanimously VOTED to grant approval to the holding of a Southwestern Division Convention in Palm Springs, California, September 11–13, 1964.

On motion of Mr. Compton, unanimously VOTED that Assistant General Manager Richard L. Baldwin is authorized to sign checks on behalf of the General Manager.

At this point the Committee engaged in an extended discussion and appraisal of the League's program for improvement of the amateur service with particular reference to the incentive licensing proposal, and found no area in which formal action was required at this time.

There being no further business, the meeting adjourned at 7:10 P.M.

JOHN HUNTOON, *Secretary*

E-T-A-O-N-I-S

(Continued from page 60)

Only the hard core of seriously interested fellows are left. But the quality of the meeting is much higher now. They have questions inspired by their own reading. One has modified an old receiver and gets code practice on it. An ambitious one is working on a DCS-500. When I bring my bug in with an extra weight on it to slow it down to 7½ w.p.m., they all must needs try it. I criticize the efforts mercilessly, letting them learn that no one can *send* code faster than he can *receive*. I tell them that if I hear them on the air with a maladjusted bug I will personally wring their necks.

One by one, the envelopes come in from the FCC and the recipients go off to get their Novice tickets. The overlearning pays off, and none of them fail the code.

December.

Santa Claus's white beard and wrinkled brow are not due to age, I am sure. They are due to the importuning of young hams with large, well developed bumps of impecuniosity, who pester him for transmitters and receivers — in that order, too, such is the folly of youth. I, too, am nearly driven grey in the week after Christmas, and my junk box is raided for bits and pieces Santa did not send, but which are vital for setting up a station. Ye gods, even my straight key disappears for a few days, and I have to give the borrower his first QSO with the bug at 7½, which he can only just read.

Next Year.

The payoff. Four hams look to me with gratitude for many hours spent teaching the necessary fundamentals of the art. All of them use the air in a clean,

disciplined fashion. (That is the finest form of it — self-discipline). More than one parent tells me it has done his boy the world of good. One lad comes up and gives me a tube that retails for hundreds of dollars, with a casual remark that he got it from a Nike base near Chicago (I hope they remembered to plug another one in). All occasionally wave QSLs under my nose. At odd intervals, they go on for the advanced licenses, and have to let me know when they drop the "N."

One of the lads who dropped out accosts me in the street. "Will I be running classes this year?"

"If you will collect a group of five or more people" I promise, "and arrange a meeting place, I will teach you the theory, and I am sure I can find someone to teach you the code." QST

Kuria Muria

(*Continued from page 67*)

European S.S.B. Net on 3.798 will be surprised to know that on our last night, November 23, they were 5 and 9 at VS9H, but they were working Ws and not listening on their own frequencies. With 600 watts of s.s.b. to a dipole only one station was worked on 80-meter s.s.b. That was DL1IN, a very good DXer indeed!

We made a total of 5256 contacts, 94 on 80 meters, 507 on 40, 3593 on 20, 1050 on 15, and 12 on 10. The total number of countries worked came to 131.

The equipment worked very well with two exceptions. A generator shorted a primary turn and kept us off the air for thirty minutes. The 328-3 blew up a bias capacitor and we were off the air for about forty minutes in the midst of two very big pile-ups. We had one bad sandstorm on our last night and one terrific rainstorm. This was useful as we completely replenished our water supply from a waterfall. About a half hour later there was no trace of water: it was all dried again.

As a matter of interest, on c.w. a straight key at about 20 w.p.m. brought no replies, but an electronic key at about 30-40 w.p.m. brought immediate response from several stations at once.

Station "A", operated by Ross, VS9HRK, and myself as VS9HAA operated mostly s.s.b. We used the beam and trap dipole, and used c.w. when s.s.b. was not on. Station "B", using the verticals, was operated mostly on c.w. by Gus, also VS9HAA, and Ken, VQ4IN/VS9H.

Unfortunately, on Sunday at about nine o'clock I saw a boat on the horizon. It proved to be the *Seiyun*, so we struck camp in a hurry.

The radio equipment was packed and on the beach as the ship approached — and then the fun began! A large sea was running and the ship's boat stayed off shore in water between four and nine feet deep! At least one box was lost in the sea and most of the others were completely soaked! The boxes containing the two Collins stations were carried out on four shoulders. I am five feet, eight inches in height; and was in front of one case when it was carried out. The water completely covered my head and halfway up the box. When it fell off our shoulders into the boat, I came up swimming!

Finally all the gear was aboard and we started on the trip home. Everybody exhausted but happy after a good expedition.

Our sincere thanks to those who helped make the trip successful: to Squadron Leader Silvester and his party who gave us great practical assistance; to the World Wide Propagation Study Association; to Shell Oil Company Ltd., who supplied petrol for the generators; to Mosley Electronics who solved a complicated problem in relation to trap antennas; and to the many others who did so much to help.

Now if someone can find another new country, let us know: we may work you from there *next* year! QST

Now *There's* a Receiver!

(Continued from page 61)

"Might be able to get a *little* on it from a Novice or a Techn . . . ah . . . s.w.l. . . . heh heh . . . couldn't allow my own mother much on a boat anchor like that . . . heh heh . . . Receivers are like wine, you know; there are good years and there are bad years — and that was a *bad* year for that model . . . Word gets around on 'em. Can't hardly give these things away . . ."

"But . . ."

"Now, you're a six-meter man and you need something *hot* . . . well, now, you just take a look at this little beauty over here! Now *there's* a *receiver* for ya!" QST

February 1939

. . . *QST* and the amateur world were still recoiling from the accidental electrocution of *QST*'s Managing Editor Ross Hull. The February editorial (called "gruesome" by its author) told of several recent deaths and injuries by accidental shock.

. . . The first of a series of safety articles appeared in this issue. Written by C. B. DeSoto, it told how to apply artificial respiration.

. . . Technical articles discussed checking crystal frequencies, BCI, factors influencing *Q* of r.f. coils in ham-band receivers, scanning and synchronizing c.r. tubes for TV reception, and phone break-in with suppressed carrier.

. . . Construction articles described an economical six-band transmitter, how to modernize a 56-Mc. receiver, a W1TS single-signal receiver, and the "Q-Beam" antenna.

. . . Nontech stories lauded amateur aid in the rescue of XFB8AB and the crew of the trawler *L'il Bourbon* from St. Paul Island in the Indian Ocean; of the brand-new call-letter license tags for automobiles in Michigan; and welcomed Freeman Gosden (Amos of "Amos'n'Andy") to the ham fraternity as W6QUT.

. . . Operating highlights in *QST* for February 1939 were Navy Day results and the approaching 11th annual ARRL DX Competition. QST

Strays

W1QJ writes that he has successfully used a "loop" antenna for 40 meters *inside his shack*. The antenna is about fourteen feet of wire wound around a wooden cross, three feet wide.

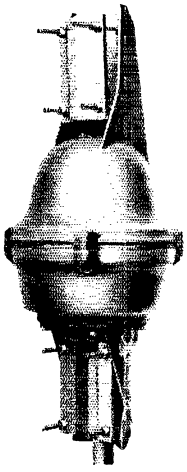
Detroit, Michigan: "Does an excellent job of swinging a 20-40 combination and stacked Finco 6-2 beam."

San Diego, California: "I am well pleased with the rotor to date, holds and turns stacked 40M and up beams in 50 mph winds with no difficulty."

Los Angeles, California: "I have personally installed 3 other HAM-M Rotors in the past 3 years (all of them OK) so I feel that I'm buying the best."

Houston, Texas: "Wonderful! Was using the AR-22 (the CDE TV automatic) and it did a fine job for 4 years, but put up a larger beam and needed more power."

Anchorage, Alaska: "Due to below-zero weather, it took quite a while to get up but the last couple of weeks it has proved perfect. Wish I had one years ago."



Alamo, California: "Works very well and purchased on recommendation of my friend who has been using one for 4 years and likes it quite well."

Swarthmore, Pa.: "Am very pleased with the results. More than meets my expectations."

Pluckemin, New Jersey: "The HAM-M rotates and two TR-15's tilt the 6-foot parabola for 432 and 1296 mc."

Chicago, Illinois: "It really does the job."

New York, N. Y.: "This is a perfect rotor. Can't see where you can improve it."

(a sampling of mash notes received by our HAM-M)

At $119.50 amateur net, the HAM-M is the greatest rotor value around! For technical information, contact Bill Ashby K2TKN. Your local CDE Radiart Distributor has the HAM-M in stock.

CDE CORNELL-DUBILIER

CORNELL-DUBILIER ELECTRONICS, DIV. OF FEDERAL PACIFIC ELECTRIC CO., 118 E. JONES ST, FUQUAY SPRINGS, N. C.

CDE makes a complete line of the world's finest rotors: Ham, heavy-duty automatic, heavy-duty manual, standard-duty automatic, standard-duty manual... and the industry's only wireless remote control rotor system!

LABORATORY TEST EQUIPMENT Measurements 80 Sig. Gen. **$295.00**; Dymec (H-P) DY-2501 Electronic Counter **$350.00**; FR-4/U Freq. Meter **$495.00**; Tektronix 511A Scope **$225.00**; Tektronix 514AD Scope (less cabinet) **$275.00**; G.R. 1001A Sig. Gen. **$350.00**; DuMont 304H Scope **$125.00**; G.R. 720A Freq. Meter **$125.00**; H-P High Speed Scaler 520A **$295.00**; BC-221 w/modulation & A-C Pwr. Sup. (RA-133) **$85.00**; TS-174/U w/modulation & RA-133 A-C Pwr. Sup. **$125.00**; Elec. Meas. Co. Strobo-Tachometer 351A **$95.00**; G.R. Strobolux 648A **$165.00**; AN/PRM-1A RFI Test Set (Stoddard NM-20B) **$950.00**; AN/UPM-10 Radar Test Set **$775.00**; OS-8C/U Scope **$145.00**; H-P Microwave Test Set 623B **$750.00**; R-388/URR Receiver **$495.00**; R-274C/URR (JX-26) Receiver **$450.00**; TS-47A/PR Test Osc. **$65.00**; R-361C/GR Receiver **$125.00**; AN/PRC-14 Transceivers **$45.00**; RCA Broadcast Microphone 77DX **$125.00**; G.R. Var. Inductance Decade 1490-B **$165.00**; H-P Pulse Gen. 212AR **$265.00**; G.R. Unit Osc. 1211A **$165.00**; Amer. Paulin SMB-5 Micro Surveying Barograph **$475.00**; Abrams Inst. Co. 1950 Stereoscope **$75.00**; G.R. 724B Precision Wavemeter **$95.00**; Polyphase Inst. Co. TA-3A Transistor Analyzer **$145.00**; H-P Calibrated Attenuator 380A **$160.00**; Write for additional listings. High quality test equipment bought, sold, traded.

ELECTRONICRAFT, INC.

BOX 13 BINGHAMTON, N. Y.

Faster CW—Better readability

10-day money back guarantee. Budget payments

$69.50

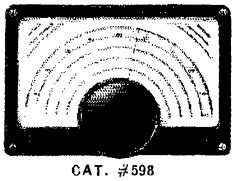
$16.95

AUTRONIC KEYER is fully transistorized, automatically eliminates erratic sending. Built-in speaker for practice or monitoring. Separate weight, speed controls. Phone jack. Any position, fixed or mobile. 7x5x2". Finest buy for reliability, performance. **AUTRONIC KEY** will not walk. Fully adjustable. No contact bounce. Usable with any keyer.

Send card or QSL for info

ELECTROPHYSICS CORP. SINCE 1929

3017 West Coast Highway, Newport Beach, Calif.



CAT. #598

Full Vision Dial—Epicyclic, ball bearing drive, smooth in operation, free from backlash or binding. Reduction ratio 10 to 1. Measures 6" by 4⅝" with 3/64" lip. A separate scale with 5 blank lines is provided for logging principal amateur wave-bands. Easy to mount with small cut-out. **Price $8.00 Postpaid.**

EDDYSTONE

By

Stratton & Co., Ltd. (Eddystone) Birmingham, Eng.
MANUFACTURER OF THE FAMOUS #898
GEARED SLOW MOTION DRIVE

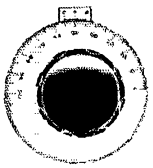
OTHER COMPONENTS:

*Communications Type Loudspeaker in steel case.	$15.00
*Diecast Boxes for effective radio frequency screening.	$ 4.00
*Receiver Mounting Blocks.	$ 3.00 pr.

All Prices Postpaid

Detailed Catalogue available from:

BRITISH RADIO ELECTRONICS, LTD.
1742 Wisconsin Avenue, N.W.
WASHINGTON 7, D. C.



CAT. #843

Vernier Slow Motion Dial—Anodized satin finished hard aluminum dial, 1" diameter. The driving head, of an improved ball-bearing epicyclic type totally enclosed, gives a reduction ratio of 10 to 1. **Price $6.00 Postpaid.**

Silent Keys

IT IS with deep regret that we record the passing of these amateurs.

W1AGM, Henry A. Tadgell, East Derry, N. H.
W1APY, Casimir Parolski, Wakefield, Mass.
W1DAV, Frank A. Nowell, East Hartford, Conn.
W1IO, Robert B. Pendleton, Danvers, Mass.
W1JGW, William L. MacKeen, Holliston, Mass.
W1LNE, Harrison F. Gardner, Hull, Mass.
W1LVJ, Harlan M. Bryant, Bangor, Me.
W1RQR, Clifford H. Robinson, Phippsburg, Me.
ex-W2AIX, Thias G. Schumacher, Schenetady, N. Y.
W2DAK/W2BZG, Morton E. Task, Middletown, N. Y.
WA2GEN, Addison L. Marvin, Sr., Stewart Manor, N. Y.
WA2GNI, Frederick C. Easton, Somerville, N. J.
W2MRY, Charles J. Gillen, Mastic Beach, N. Y.
W2SDY, James T. Sherman, Newburgh, N. Y.
WA2VSS, Henry C. Hubbard, Salem, N. Y.
W3CIB/W3DJ, Raymond P. Glemser, Neshaminy, Pa.
WN4QCG, James L. Clark, Columbus, Ga.
K4QDY, Walter F. Deneen, Jr., Johnson City, Tenn.
W4RNQ, Julian S. Hatcher, Falls Church, Va.
ex-W5BG, John H. Robinson, Jr., Dallas, Tex.
W5HSX, Clark W. Nolte, Houston, Tex.
W5JW, Lloyd C. Hoffmann, New Orleans, La.
K5PFO, Jerry N. Naylor, Wichita Falls, Tex.
W5TJ, Thomas P. Robertson, Mansfield, Tex.
W6BWK, William T. Shaw, Bethel Island, Calif.
WB6ECU, Carl A. Deaton, Fontana, Calif.
K6GRM, William K. Cline, Venice, Calif.
W6KAA, Thomas M. Stevens, Sacramento, Calif.
W6PCA, R. Opal Jones, Esparto, Calif.
W7SFR, Lorraine E. Stuart, Centralia, Wash.
K7VIB, William J. Edwards, Las Vegas, Nev.
W7VLX, Elmer E. Matheson, Pasco, Wash.
K7ZAK, Dorothy S. Edwards, Las Vegas, Nev.
W8AZF, Harry L. Harter, Akron, Ohio
W8BZC, Gordon F. Keeler, Hartville, Ohio
W8IG, Frank J. Riley, Cleveland, Ohio
K9GTY, Stanley J. Kramarczyk, Niles, Ill.
WØBIP, Dwight C. Pierson, Elliot, Iowa
WØFON, Fred H. Kloepper, Lawrence, Kans.
KØFQK, Donald W. Carlson, Centerville, S. Dak.
KØGIA, Rolla A. Hall, Wichita, Kans.
KØHBD, David R. Arends, Parkersburg, Iowa
WØWAP, William H. McClement, Clinton, Mo.

Strays

Want information on a certain radio or TV set? Supreme Publications, 1760 Balsam Road, Highland Park, Illinois, can supply schematics and specs on practically any radio or TV, even those of manufacturers no longer in business.

—•••—

An irate citizen of Detroit complained to FCC about interference by a ham to his TV, hi-fi, garage-door opener, and other equipment. He *strongly* suggested more stringent legislation to control amateurs. When the Detroit FCC Bureau tried to check back with the complainant however, he was either out of town on business or vacation. When finally they found him, he had trouble recalling his complaint, but admitted that his woes had disappeared after he bought a new TV set.

—•••—

A Maryland Air Force base recently asked FCC to find the source of interference to their air-ground channels. An FCC check found that it came from the second harmonic of a local ham's c.w. rig. The interference quickly ceased, for the licensee was a member of the force of the complaining base.

HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all of part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a box number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) beow.

(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 noncommercial 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. 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 plainly 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 issue nor more than one ad in one issue.

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.

S.R.R.C. Hamfest: June 7, 1964. Write for details after April 1, 1964. Starved Rock Radio Club, W9MKS/W9OLZ, RFD #1, Box 171, Oglesby, Illinois.

BIG D Hamboree, August 15, 1964. Make your plans now. Write Dallas Amateur Radio Club, Box 30532, Dallas, Texas 75230.

QCWA—Amateurs licensed 25 or more years are eligible for membership in Quarter Century Wireless Association. See page 63 November 1963 QST. Write Executive Secretary W2ZM for information.

WANTED: Early wireless gear, books, magazines, catalogs before 1922. Send description and prices. W6GH, 1010 Monte Dr., Santa Barbara, Calif.

MOTOROLA used FM communications equipment bought and sold. W5BCQ, Ralph Hicks, Box 6097, Tulsa, Okla.

WE buy all types of tubes for cash, especially Eimas, subject to our test. Maritime International Co., 199 Front St., Hempstead, N.Y.

TOROIDS: Uncased 88 Mhy, like new, Dollar each. Five/$4.00. P. P. DaPaul, 309 South Ashton, Millbrae, Calif.

SOUTHERN California: Transmitter and receivers repaired, aligned. Bandwidth, frequency, harmonics measured. Used ham gear bought, sold, traded. Robinson Electronics, 922 W. Chapman, Orange, Calif. Tel. KEllogg 8-0500.

CASH For your gear! We buy, trade and sell. We stock Hammarlund, Hallicrafters, National, Johnson, RME, Hy-Gain, Mosley and many other lines of ham gear. Ask for equipment list. H & H Electronic Supply Inc., 506-510 Kishwaukee St., Rockford, Ill.

WANTED: Military or Industrial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y.

WANT 1925 and earlier ham and broadcast gear for personal collection. W4AA, Wayne Nelson, Concord, N.C.

MICHIGAN Hams! 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. Tel NOrmandy 8-8262.

HAM TV Equipment bought, sold, traded. Al Denson, W1BYX, Rockville, Conn.

TOROID RTTY Kit: Mark-Space discriminator and bandpass filters. Includes 4-88 Mry and 1-44 Mhy uncased like new condx. toroids: information sheet, mounting hardware and six mylar capacitors. $5.00 ppd. Toroids: specify 88 or 44, less capactrs, $1.00 each. 5/$4.00, ppd. KCM Products, Box 88, Milwaukee 13, Wis.

ACT Now!! Barry pays cash for tubes (unused) and equipment. Barry Electronics, 512 Broadway, NYC 12. Call 212-WAlker-5-7000.

VALIANT, Drake 2-A, $450. Excellent, K8VYY.

JOHNSON Valiant factory-wired, excellent condx with Johnson Matchbox, $250. F.o.b. Caldwell, Dr. Patrick, Box 103, Caldwell, Idaho.

WE Buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., 199 Front St., Hempstead, L.I., N.Y.

WANTED Handbooks, literature, manuals, everything concerning ham radio. Zapateria, Lopez 13, Mexico City.

QSLS? SWLS? Personalized made-to-order one-day fast service!! Largest variety samples 20¢. DeLuxe samples 35¢ (refunded). Sakkers, W8DED, Box 218, Holland, Mich. (Religious QSL samples 25¢).

C. FRITZ QSLS. Bringing hams greater returns over a quarter-century! Samples 25¢ deductible. Box 1648, Scottsdale, Ariz. (formerly Joliet, Ill).

QSLS. Drawn by our own artist in three colors on lustre coat stock twenty exclusive designs 100 for $3.85 (ten designs) or 200 for $6.90 (twenty designs). Satisfaction guaranteed five working days. Constantine Press, Bladensburg, Maryland.

QSL SWL cards that are different. Quality card stock. Samples 10¢. Home Print, 2416 Elmo, Hamilton, Ohio.

QLS Specialists. Distinctive Samples 15¢. DRJ Studios, 2114 N. Lavergne Ave., Chicago 39, Ill. 60639.

QSLS: samples 25¢ (refundable). Schuch, W6CMN, Wildcat Press, 6707 Beck Ave., North Hollywood, Calif.

QSLS "Brownie" W3CII, 3111 Lehigh, Allentown, Penna. Catalog with samples, 25¢.

QSLS-SMS. Samples 10¢. Malgo Press, Box 375 M.O., Toledo 1, Ohio 14107.

PICTURE QSL Cards of your shack, etc. Made from your photograph. 1000, $14.50. Also unusual non-picture designs. Samples 20¢. Raum's, 4154 Fifth St., Philadelphia, Pa., 19140.

DELUXE QLS. Petty, W2HAZ, Box 27, Trenton, N.J. Samples, 10¢.

QSLS Special. 100 50 Star U.S. Flags on glossy cards, $3.70. Ppd. Other samples 10¢ or 25¢ refunded. Dick, W8VXK, Rt. 4, Gladwin, Mich.

QSLS-SWLS. 100 2-color glossy, $3.00; QSO file cards, $1.00 per 100. Samples, 10¢. Rusprint, Box 7575, Kansas City 16, Mo. 64116.

QSLS-SWLS-WPE. Finest. Since 1946. Largest assortment. Priced right. Send 10¢ for samples to: Glenn Print, 1430 Bonsal St., Baltimore 24, Md.

QSLS. Distinctive samples dime. Volpress, Box 133, Farmingdale, N.Y.

CREATIVE QSL Cards. Free, new catalog and samples. Personal attention given. Wilkens Creative Printing, P.O. Box 1064-1, Atascadero, Calif.

ZIP Code rubber stamp, call, name, address, with ink pad, $1.00. K4ISA, E. Perry, Box 8080, Allandale, Fla.

QSLS, SWLS, WPE. Samples 10¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix 17, Ariz.

QSLS, SWLs, XYL-OMs (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing; eye-catching, comic, sedate, fantabulous. DX-attracting, prototypal, snazy, unparagoned cards (Wow!). Rogers, KOAAB, 961 Arcade St., St. Paul 6, Minn.

SUPERIOR QSLs, samples 10¢. Ham Specialties, Box 73, Hobbs, New Mexico (formerly Bellaire, Texas).

QSLS 300 for $4.35. Samples 10¢. W9SKR, "George" Vesely, Rte. #1, 100 Wilson Road, Ingleside, Ill. 60041

QSLS. Samples 25¢. Rubber stamps; name, call and address $1.55. Harry Sims, 3227 Missouri Ave., St. Louis 18, Mo. 63118

QSLS 3-color glossy, 100, $4.50. Rutgers Vari-Typing Service. Free samples Thomas St., Riegle Ridge, Milford, N.J.

QSLS. Kromekote 2 & 3 colors, attractive, distinctive, different. Free ball point pen with order. Sample 15¢. Agents for Call-D-Cal decals. K2VOB Press, 62 Midland Blvd., Maplewood, N.J.

QSLS $2.50 per 100. Free samples and catalog. Garth, Jutland, N.J.

QSLS, All kinds, free samples. W7IIZ Press, Box 183, Springfield, Ore.

AT Last! Something new in QSL cards! All original designs. Send 10¢ for samples to Yarsco, Box 307, Yorktown Heights 1, N.Y.

PHOTOSTAMPS of your station with gummed back for your QSLS. 100 $1.50. Samples 10. Morgan, W8NLW, 443 Euclid, Akron, Ohio.

DON'T Buy QSLS until you see my free samples. Bolles, W5OWC, Box 9363, Austin, Texas.

RUBBER Stamps $1.00. Call and address. Clint's Radio, W2UDO, 32 Cumberland Ave., Verona, N.J.

QSLS. Samples 20¢. QSL Press, Box 281, Oak Park, Illinois 60303.

1½" Call QSLS (2 sides printed) 100, $3.15. Sample free. Garieny, 2624 Kroemer, Ft. Wayne, Ind.

QSLS From the "Hobby Horse" printer. Glossy, red and green. $2.00 per 100 postpaid. Free sample. Hobby Print Shop, Umatilla, Fla.

OUTSTANDING QSLS, New low prices, Professional, Samples 10¢. Brigham, North Billerica, Mass.

SUPERIOR QSLS, Samples 10¢. Ham Specialties, Box 73, Hobbs, New Mexico (formerly Bellaire, Texas).

ENVELOPES Printed with your call, name, address, Zip Code. Save time, writing! #6¾ or #10. $1.95 first 100; 95¢ each additional 100. 5-day service. Envo-King, Box 152, M.O., Springfield, Mass. 01101.

QSL, CB, SWL letters and cards. $2.00 and $3.00 per 100. Sample 10¢. Martin, 828A Schuylkill Ave., Reading, Penna.

QSLS, $2.50/100. Exciting 1964 catalog, 10¢. Longbrook, Box 393-W, Quakertown, N.J.

QSLS, New designs, Dime, Filmcrafters, Box 304, Martins Ferry, Ohio.

BULLETIN Boards for QSL cards. Now tack your cards on cork tack boards. These boards are trimmed in aluminum and come in all sizes and colors. Cork samples are 25¢. Robert Williamson, K2UWM, 123-37th St., Union City, N.J.

NOW! 1000 gummed name and address labels with call, $1.00; self-inking pocket name and address rubber stamp with call, $1.00. Ross's, Box 7, Grandville, Michigan.

QSLS, High quality regular or raised printing free samples. Frier, 21 Harvard, Schenectady, 12304.

QSLS. Stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

QSLS. Large selection including photos, rainbows, cuts, etc. Fast service. Samples 25¢. Includes beautiful 4-inch call letters for your shack. Ray, K7HLR, Box 1176, Twin Falls, Idaho.

QSLS-SWLS. Gorgeous rainbows, etc. Very reasonable. Samples 10¢. Refundable. Joe Harms, WA4FJE, 905 Fernald, Edgewater, Fla.

QSLS Samples free. Blanton's, Box 7064, Akron, Ohio 44306.

QSLS. Fair prices. Samples 25¢, refundable. W9PMT, Bob Witte, 1225 Wall, Ft. Wayne, Ind.

Q-STAMPS reproduce any photo, postage-stamp size! 50 large or 100 small, $1.50 per gummed backed, perforated sheet. Send photo (returned unharmed) and $1.50 check or money-order. State size desired. Samples free! Q-Stamps, Box 149, Dept. 1-A, Gary, Indiana 46401.

ATTRACTIVE QSLS. Guaranteed largest variety of individual samples (25¢ deductible). Paul Levin, K2MTT, 1460 Carroll St., Brooklyn, N.Y. 11213.

QUALITY QSLS. New designs monthly. Samples 10¢, 25¢, 50¢. Savory Press, 172 Roosevelt, Weymouth, Mass.

CANADIANS: For sale, National NC-303 receiver, $350. Heathkit Marauder SSB transmitter, $450.00. Both units are indistinguishable from new. Philip Greenberg, VE2AUT, 4920 Lacombe Ave., Montreal, Quebec. Tel: 738-2667.

CANADIANS! Sell: Viking II, VFO crystals, $220.00; SX-42 $140; AR77A, $50.00; PMR6A rec, 12 volt, power supply, Viking mobile 12 volt supply VFO, Astatic 10M5 mike, Dow-Key relay, Master whip, 75M coil, complete, $248.00. NC-270, used six months, perf. condx. VE3DQP, Box 2411, Postal Stn "D", Ottawa, Ont., Canada.

CANADIANS: Selling Viking Valiant, $400.00; National NC-183 receiver, matching speaker, $200.00. All in gud condx. Stark, VE7RS, Box 177, Chilliwack, B.C., Canada.

BARGAIN: Chokes, transformers, meters. Send SASE for free listing. W2TB, Chas. Gardiner, 39-20-220th, Bayside, L.I., N.Y.

WANTED For cash: Collins 314B-4 console and MM-1 mike. WØDVZ, Box 475, Ottumwa, Iowa.

INTERESTED In two-meter linear amplifiers, transmitters, receivers, etc. If the price is reasonable to members of St. Mary's Radio Club, or as tax exempt donation to Missions, K8WLB, St. Joseph's Mercy Hospital, Centerville, Iowa.

304TL tubes wanted. Also other xmttg and special purpose tubes. We will buy military or commercial transmitters and receivers with designations ARC, GRC, URR, 51 and MN. Air Ground Electronics Co., 64 Grand Pl., Kearny, N.J.

BOOST Reception: 3.5—30 Megacycle SK-20 Preselector kit, $18.98; boost modulation, AAA-1 clipper-filter kit, $10.99, reduce noise NJ-7 noisejector, IF, wired $4.49. Postpaid! Literature free. Holstrom Associates, Box 8640-T, Sacramento 22, Calif.

WANTED: For personal collection: QSTs March, April, May and August 1916; ARRL Handbook Edition 1, W1CUT, 18 Mohawk Dr., Unionville, Conn.

HAM Discount House. Write us for lowest prices on Ham Equipment. Factory sealed cartons. Specify equipment wanted. H D H Sales Co., 170 Lockwood Ave., Stamford, Conn.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, P.O. Box 155, Barrington, Ill.

HALLICRAFTERS SR-150 amateur band. Fixed/mobile transceiver and its accessories for $695.95. Contact Michael Reed, 1021 Garrison St., Fremont, Ohio. Tel: 332-3453.

COLLINS 75A3 with product detector, $300; Collins 32V2, $200. Must sell. John P. Tiedeck, WA2SDE, Indian Run Farm, Woodstown, N.J.

ATTENTION! Mobileers Heavy-duty Leece-Neville 6 volt 100 amp. system, $50; 12 volt amp. system, $50; 12 volt 6 amp. system, $60; 12 volt 100 amp. system, $100. Built-in silicon rectifier alternators 12 volt 60 amps. $100; 12 volt 100 amps. $125.00. Guaranteed no ex-police car units. Herbert A. Zimmerman, Jr., K2PAT, 1907 Coney Island Ave., Brooklyn 30, N.Y. Tel DEwey 6-7388.

MUST Dispose: 82 copies Proceedings of the IRE, 3 volumes complete, 1926 to 1952. Real bargain for lot. Write for list Mrs. Miriam Y. Knapp, W1ZIM, 191 Beechwood Rd., West Hartford 7, Conn. Tel: 521-2055.

WE Have some excellent bargains in new and used antennas, transmitters and receivers. Write for list. Hornet Antenna Products Co., Box 808, Duncan, Okla.

WANTED: Parts, sets, as is GRC-9, BC-610, GRC-27, Autodyne, 236 Park Avenue, Bethpage, L.I., N.Y.

WANTED: Tubes, all types, write or phone W2ONV, Bill Salerno, 243 Harrison Avenue, Garfield, N.J. Tel: GArfield 4/1-2020.

CASH promptly paid for your ham gear. Trigger, 7361 North, River Forest, Ill. PR 1-8616.

TUBES Wanted. All types, highest prices paid. Write or phone Lou-Tronics, Inc., 131 Lawrence St., Brooklyn 1, N.Y. Tel. UL 5-2615.

$1.00 will change all your old xtals to new freq. where you want them, safe etching method, complete, no gimmicks, air-mailed. Ham-Kits, dummy loads, Cranford, N.J.

WANTED: All types of aircraft or ground ratios. 17L, 618F or S 388, 390, GRC, PRC, 51J, RVX. Especially any item made by Collins Radio, ham or commercial. Also large type tubes and test equipment in general. For fast cash action contact Ted Dames, W2KUW, 308 Hickory, Arlington, N.J.

WANTED: 5 or 6 element Telrex 20 m beam, W2UGM, 66 Columbus, Closter, N.J. 201 PO 2-1884.

TUBES, Diodes, transistors wanted. High cash prices paid. Astral Electronics, Box 636, Elizabeth, N.J. Tel: 354-3141

ELECTRONIC Bargains. Discounts from net, free brochure. Franklin Electronics, Box 51b, Brentwood, N.Y. 11717.

P & H Linear, 800 P.E.P., $160.00. Will consider swap. K3UOT, 5558 Florida, Bethel Park, Penna. 833-2838.

WANT QSTs prior to 1927 and early ham and broadcast equipment, including parts and tubes. W4EDW, Sanders, 3596 Canadian Way, Tucker, Ga.

EQUIPMENT Constructed, kits assembled, communication receivers and service equipment serviced. 40 years of electronic experience. Wally Cox, 1826 N. Talbot, Indianapolis 2, Ind.

COLLINS Owners! Work A.M. Wired kit, $5.00. No soldering, holes, chassis removal! Switch In-Out! (State Model)! KWM-2 independent receive control, $15.00. It's a honey! Kit Kraft, B-763, Harlan, Ky.

SSB Rig for sale; HT-32 xmtr; NC-300 rcvr; accessories. Like new. Make offers to Goldenson, Sunny Ridge Road, Harrison, N.Y.

QST In binders, 1931 to present. $3.50 per year for the entire run. Only 50¢ more than the cost of binders alone. F.o.b. Morton's, 11114 Cedar Lane, Beltsville, Md.

SELL: Microwave and UHF devices; parametric amplifiers, converters, SWR indicators, modulators, couplers. WØYAU, 333 W. 10th St., Claremont, Calif.

75S-1 Rcvr. $299; National FRR-24 dual diversity receivers and converters, etc. $495; HT-32 SSB xmtr, $289; FRR-21 low freq. rcvr, $175; 74A2A, 3.1 filter, $276; SP-600JX17, $425; R-390/URR, 500 kc. 32 mc., $675; C-E 10B SSB xmtr, $119; 200 V, $625; URA8A, $195; 51J-3, $675; Boehme Aut. keyer, $125.00; Wheatstone perforator $175. Alltronics-Howard Co., P.O. Box 19, Boston, Mass. 02101 (RI 2-0048.)

FOR Sale: Complete instructions including 28 page booklet and 26" x 36" schematic for converting the ART/12 transmitter to AM and SSB. $2.50 satisfaction guaranteed. Sam Appleton K5MKI, 501 N. Maxwell St., Tulia, Texas.

SUPER Specials from the "Kid from Texas": Hallicratters, in mint condx, HT-37, $279.00; B&W 5100 with 51SB, $199.00; Valiant $149.00; SW-240, $249.00; Drake 1-A, $139.00. Send for complete list of equipment available. BC-610, $129.00; 75A-1, $175.00; new 4-400A's in seaed cartons, $25.00; new 4-100A's, $65.00, used, $35.00. Complete line of new and used amateur equipment at money-saving prices. New Swan SW-240 with Ad-Com power supply, $369.00. Wide selection of homebrew linear amplifiers at low prices. Swan SW-175, $179.00; SW-140, SR-150 and matching AC power supply, $579.00; Bryan, W5KFT, Edwards Electronics, 4124-34th St., Lubbock, Texas. Tel. SW 5-2595.

SELL: HQ-110A, very good condition, $210.00. Thomas Wulling, K9APS.

HEATH Twoer, BW 11, halo, 2 xtals. In mint shape. $50.00. E. Eggert, K2IVJ, Apt. 2G, 230 Mt. Vernon Pl., Newark 6, N.J.

CHRISTIAN Ham Fellowship now being formed (Undenominational) non-profit missionary and fellowship organization. Details free. Write Harry Wieskamp, WA8CFH, 96 E. 21st St., Holland, Michigan.

SELL: 30 foot televue galvanized crank-up tiltover tower with eave bracket, also 2-element 20-meter Telrex Minibeam, Model 20MDC, both $95 F.o.b. Mamaroneck, N.Y. W2NQR, 8 Wagon Wheel Road.

SELL: NC-183D receiver, factory revitalized, $200; 6 and 2 meter bandswitching xmtr w/mod., 200 watts RF input, $150; Tri-Band quad for 20-15-10 meters, $40. K8WYU, 377 Franklin Ct., Worthington, Ohio.

50 Watt, 40-meter transmitter, 7167 xtal, self-contained power supply, $20; BC-453 LF rcvr with 20-meter converter, power supply, $20. E. Taggart, Nashville, Indiana.

FOR Sale: Heath HP-20, HX-20, HR-20, HP-10, AK-6, AK-7, all for $350.00. Also HQ-129X for $85. All equipment in excint condx. K1CBT, George Gibson, 44 Kenilworth St., Pittsfield, Mass.

FOR Sale: Swan SW-240; Heathkit AC power supply, Model HP-20; and Hallicrafters speaker, Model R-46B. Price $280. Bob Heydenreich, WA6IFA, 4482½ 51st St., San Diego 15, Calif.

SALE: 75A3, 2 filters, product detector, spkr, xtal calibrator, $300. TG10 keyer with Army lesson. Takes one to five, $20. WA9KJA, Birkhead, Apt. 1-424 W. Prairie, Decatur, Ill.

COMANCHE and Cheyenne with Heath 12 volt transistorized power supply. First $100 takes all. In gud operating condx. John Tryniski, 613 South 1st, Fulton, N.Y.

SELL: RTTY Model 19 complete, $200; HT-31, $100; Gonset G-66B, $119.50; G-77A, $149.50 with 3-way power supplies converted to press and RTTY. Heath Pawnee 2-meter, $160.00. K9MLD, Eschmann, 1315 No. Main, Racine, Wis.

NC-300 with speaker and xtal calibrator, immaculate condx crackle finish, $185.00. John Kane, 1518 Longfellow Drive, Cherry Hill, N.J.

SAVE On all makes of new and used ham equipment. Write or phone Bob Grimes, 89 Aspen Road, Swampscott, Mass. 617-598-2530 for the gear u want at the price u want to pay.

CHEYENNE-Comanche xmtr and rcvr with mobile and fixed transistorized power supplies; $165.00. F.o.b. Coralville, Iowa. Dr. J. A. Coover, Jr., 719 11th Ave.

SELL: Following items in mint condx; R-390A at $800; KWS-1 with RTTY at $750.00; Model 14 typing reperforator at $115.00; Telrex Triband beam (needs some work on it) at $30. Want: GR R/278B. W1LWV, 99 Water, Millinocket, Maine.

SALE: RME VHF-126 low-noise tunable converter, used vy little, in like-new condx and appearance; Model 19 teletype-less table (non-military); EE101 ringer generator, 1000/20 cycle tone. Reasonable offers accepted. Will consider cash plus trade. R. Kaval, WA4ISR, 504 Eagle Dr., Winchester, Va.

APACHE Transmitter with SB-10, $250.00; Mohawk rcvr, $210.00; all recently aligned, and in excint condx. Will ship. WB6ALQ, Dr. Jack McMullin, 5184 Carlingford Ave., Riverside, Calif. Tel. 684-4381.

SACRIFICE Telrex R-100 antenna rotator with desk control and synchro indicators, $35.00. W2HCP, W. P. Munro, Martinsville, N.J.

COMPLETE New Collins S/Line, #OS-1, 32S-3, 75S-3, 62S-1, 312 B-4, 516F-2, SM-1 dynamic as a unit only for $2900.00. Cash. F.o.b. Woodbridge, Conn. WICFE.

Station: A-1, Apache, SB-10, SX-100, RME DB-23, 40-10 trap vert., mike, key—all cables, relays, plugs, spare finals, tubes. Spkr, the goodies. SASE. WA8ARZ, Mike Eisenstot, 453 Fransisca Ave., Youngstown 4, Ohio.

EIMAC 4X150A, new, $8; Eimac 4X250B, $15; Eimac SK600 socket, $6.00; RCA 7034 (4X250B), $5.00. Amperex 6360, $3.50. All tubes guaranteed. Bob Heil, K9EID, 402 Bodder, Marissa, Ill.

HAPPY Hams Club. Are you happy with Ham Radio as it is? Do you think more operating restrictions and license requirements are unnecessary? Be Happy with us! Send 25¢ (coin) for handsome inscrolled 8" x 10" Club Membership Certificate suitable for framing. It's a Wow! Brigman, W4IEN, Box 257, Norcross, Georgia 30071.

FOR Sale: Used, 1 RCA closed circuit television, HAV-1 camera, HVA-1 control unit, complete with tubes and connecting cable. 1 used Century 6" 150 mm F2.8 telescoping lens. 1 new 1790 Vidicon tube, some spare parts, manual, $300. Complete or will trade for an HX-10 Heath. Dale E. Brockett, W7HQS, 659 Ave. C, Boulder City, Nevada.

SELL: Heathkit HO-10, $50; HM-10A, $30. Both: $75.00. Will trade for TT-4 printer. G. D. Boone, WA5CON, 912 Magnolia, Hubbard, Texas 76648.

WANTED: Crankup tower Tri-Ex HZN HRZN HS 71" 88' E-Z Way RBX70. Send condx and asking price in your first letter. KP4BCL, WB-28 Urb Los Angeles, San Juan.

WANTED: Power transformer 115V prim. 3000-2500-0-2500-3000 V. secondary, 350 Ma at least. Please quote dimension and price. Gherardi, 306 Roseville Ave., Newark, N.J.

FOR Sale: Factory-wired Valiant with SB-10, like new condx, 275 w. SSB, CW, 220 W. AM, $230.00. Complete 6 meter 7 W. mobile stn (Lafayette transceiver) $45.00. WB2DYR, 115 Sheffield Ave., Englewood, N.J.

FOR Sale: KWM-2 with installed Waters Q-multiplier, complete with Collins AC pwr. supply. Looks same as new, $800; Central Electronics 110-V, like new, 25 hours use, $450.00. Genuine Mims rotor and control in A-1 condx: $65.00. M. B. Patterson, 5508 Montrose Dr., Dallas, Texas.

COLLINS S/Line, 75S-3, 32S-1, 516F-2 power supply, original cartons, $895.00; Pawnee, including mobile halo, mounts, $175.00; HA-1 keyer, Vibrokey, $60.00; SWR Bridge, $10.00; Signal Generator, $20.00; Capacitor checker, $15.00; D-104 mike, G stand, $20.00. All like new condx. Marvin Cook, 1629 Burnett St., Brooklyn 29, N.Y. ES 6-7373.

SELL Bound volumes of QST-CQ, Radio-TV News, Radio Electronics for 1950 through 1957. WØPVR, 306 4th St., South, Moorhead, Minn.

SELL: RME 4350, $150, DB-23, $30, Hart 75 xmtr, $40, Eico 720, $55, Eico 730 $35, Gen. Elec. GC-1, $25, Cheyenne, $75; Heath mobile power supply, HP 10, $30; Heath VF1, VFO, $10. Gonset Super Six, $20. RME Clipper, $20. Wells, 1601 Lamar Ave., Petersburg, Va.

331 COPIES QST, run 1922-1949. R. Ekholm, 181 5th, So. Boston, Mass.

SUPERCHARGER 40 HP Volkswagen Judson, like new condx, worth $65. Trade for ham gear? W2KJY, 2414 Springhill Rd., Huntsville, Ala.

CENTRAL 20A, $160.00; Johnson Courier 500W amplifier, $130.00; HQ-100C, $110.00. Free 100W amplifier with 20A. K2VBL, 212-GL4-0647.

SELL-Trade: 15-watt 6 meter phone transmitter, complete, $35. Electronic keyer, $20. 40-watt plate modulator, $15. Complete 75 meter 10 watt mobile transmitter, mike, supply, xtal and converter, $45.00. 750v./250 Ma. supply, $15.00. 75 meter mobile converter, $10.00. Need: BC-221, tube checker, BC-779, grid dipper, receiver, or??? Stan, W8QKU, 2748 Meade, Detroit 12, Mich.

COLLINS S/Line, 30L1 and Station Control. Best Offer. Bill Beardsley, K1SDN, 100 Bunce Rd., Wethersfield, Conn.

NOVICES! Heath AT-1 with 807 final, excint wiring, gud wkg condx, complete with key, $20.00. Prepaid in U.S.A. Also business radio's Noistop, great for the mobile rig. In like-new condx. Both complete with manuals. WB2KDK, Patton, 19 Edgemere Dr., Matawan, N.J.

WANTED: Electronic keyer and speed key. J. Williams, HQ, XIX USAC, Ft. Chafee, Arkansas.

200V, $625.00: HQ-170C, $200; both in excint condx. W8BPX, 7300 E. Aracoma Dr., Cincinnati 37, Ohio. Tel: 351-2612.

SELL: Viking 1 xmtr in Viking II cabinet, with Viking VFO. Vy clean. W2HFM, 60 Lindgren, Merrick, L.I., N.Y.

HQ-180, excint condx, hardly used, $325.00; DX-20, $25.00; Johnson low-pass filter with meter, $30.00; Astatic JT-30C mike, $5.00. Call Bob, St. Louis, Mo., area. Tel: HA7-7257 after 6:00 PM.

SELL: KWM-2, #10694, with silent-fan mounted on rear to cool the 6146s. P/S Mod. 516F-2, #12117 with spkr. built-in. Purchased new May of 1962. Has spinner-knob. In mint condx, never used mobile. Used vy little. Certified check or m.o. for $850.00. E. R. Codman, K9MUD, RR #2, Box 495, New Carlisle, Ind.

FOR Sale: QSTs. Almost complete run from 1932. Few before, to 1929. Complete set of CQ from Jan. 1945. Complete set of 73 from Oct. 1960. About 650 magazines. Excint condx. $150 ppd USA. W6JAT, 14666 Berry Way, San Jose, Calif.

QSTS. 1934 thru 1938, bound, $10/yr, 1933 (Jan missing), $4.00; 1939, $6.00. Feb. 1936; April, 1937; Jan-April 1940, 40¢ each. Postpaid. J. D. Spaulding, 74 Polo Village, Tucson, Ariz.

SB-10 wanted for cash. Must be bargain. For sale: Viking mobile transmitter, $45.00. New Wilcox plate transformer pri. 220V secon. 2430-1315 CT-1315-2430 at 1.7 amp. continuous. $45.00. RCA 7094, $7.50. Swap? John Lee Best, Jr., W4KUV, 610 N. Madison Ave., Goldsboro, N.C.

MUST Sell Heathkit Mohawk receiver. Expertly built. Less than one year old: $275.00 or highest offer. Contact Steve Frohman, WA4LNW, 1401 Shawhan Terrace, Chattanooga, Tenn.

KNIGHT V-44 VFO, excint condx, $20.00. KØTBO, 201 East Cedar, Cherokee, Iowa.

FOR Sale: Hammarlund HX-50, #935 and Hammarlund HQ-170C, # 6899-C with spkr. in spotless condx w/orig. boxes, manuals: $500. James Brown, WA4LUN, Box 238, Troutman, N.C.

COLLECTOR'S Item: Volumes I through XV: John F. Rider "Perpetual Troubleshooter Manauls". Covers schematics and layouts of old radios staring in early 1900s and up. Western, Atwater-Kent, United, Detrola, International and many, many others. Set of 15: $80.00. Shipped collect R.E.A. for postage. Richard M. Jacobs, WAØAIY, 1015 Glenside Place, University City, Mo. 63130.

GOING SSB. Heath Cheyenne, Comanche, spkr, mike, AC pwr. supply. Fine condx. $175.00? Bob Beach, K3CJH, RD 7, Butler, Penna.

SELL: SR-150 with A/C; HT-41; HA-1 keyer. Many extras. Beam and tower and mike, plus others. All perf. condx. Contact WA5ALI, Box 3332, Lafayette, La. Tel: CE 56830.

NEED Power supply section for CV89A teletype converter and repair parts for Wehat Wheatstone perforator made by teletype. Roy Brougher, W5HPB, 4002 Devonshire Dr., Houston 25, Texas.

FOR Sale: Final amplifier, 80-20 meters, with 2-813s. Complete with modulator and power supplies. Contained in two 24" Bud cabinets. Neat and clean construction. Deliver to within 150 miles radius. $175.00. Lindsley Colclough, Hillsdale, New York.

FOR Sale: HQ-180C receiver with speaker. Fresh factory tune-up job, in mint condx. $300.00 cash. Timothy Gladden, 4601 Hamilton Circle, Charlotte, N.C. 28213.

COLLINS 32V3 for sale. $200 plus shipping charges. W8VID.

FOR Sale: First 25 dollars takes my S57S Turner dynamic microphone. In mint condx. W2BIQ, R.D. #1, New Canaan, Conn.

RTTY Eqpt. Swap or sell. Want: Johnson SSB adapter and VFO. W4FO, 320 West Kingston Ave., Charlotte 3, N.C.

SELL: Knight VFO, $20. Like new. W. Rau, Henderson, Minn.

FOR Sale: HT-32 Sideband exciter, $295.00; HQ-170 receiver, $225.00; Central Electronics 600L broadband final, $225.00. All in excint condx. Will deliver within 60 miles. Steve Mann, K2CJN, 22 Magnolia, Briarcliff Manor, N.Y.

HE-45B and halo, $100 or will trade for low-band mobile. 807 xmtr wid mod, $12. WA2GVJ, Whitney Point, N.Y.

SELL, Swap or buy ancient radio sets and parts, magazines. Laverty, 118 N. Wycombe, Landsdowne, Penna.

WANTED: Good used DX-60 transmitter, $50.00; also linear amp. GSB 101 or halo, $165. J. Arnold, W3LOR, 116 Georgetown Ave., Pittsburgh, Penna. 15229.

HQ-110, vy gud condx, modified for fast break-in, with automatic clock timer, $150. Will ship. K8LBQ/1, 1867 Yale Station, New Haven, Conn. 06520.

MUST Sell: Mint HQ-170C, $170.00: B C-221-M, $50.00. T. Lawyer, W2LBE, 45 Sturgis Rd., Bronxville 8, N.Y.

HEATHKIT SSB, HR20, HX20, AK-7, HP-10, HP-20, professional wiring, factory aligned, new. Ten per cent off kit price. Will consider separate sales. Don Vaughan, W4MTY, 4607 Briarcliff Rd., Atlanta, Ga. 30329.

WANTED: Commercial, Military, all types, ARC, ARN, ARM, BC, GRC, PRC, TRC, URR, URM, TS, 618S, 17L, 51R, others. Ritco, P.O. Box 156, Annandale, Va.

WANTED: Johnson Valiant SSB adapter. State price and condition. W7DH.

ATTENTION! Have you seen "Equipment Exchange"? Interesting Buy, Sell, Swap offers galore! Rush postcard for sample copy. Brand, Sycamore, Ill.

SELL: Collins 32S1, $465; power supply 516F-2, $80, 40M Hy-Gain beam 402B, $50; 40M Mosley beam S402, $60. W2-PBZ, 64 Knickerbocker Rd., Closter, N.J. Tel: 201-PO-8-2891.

MUST Sell for friend in Navy: BC-603 converted with p/s, $20; BC-342N, $50, HRO and Q5er with coils, p/s and preselector, $75; broadcast band ARC-5, $20; 6-meter Hy-Gain beam, $10; 65W 6-meter xmtr and VFO, less p/s and mod., $30; 6-meter converter 12.2 Mc I.F. with p/s, $15; 90W 2-meter xmtr less p/s and mod., $30; 2 meter converter, 14 mc I.F. with p/s, $15. You pay postage. F. F. Taylor, 2025 William, W7BX, Chehalis, Wash.

INFORMATION Wanted for converting DX-60 to 6 meters. WN4MNY, Bob Bishop, Box 266-C, Mars Hill College, Mars Hill, N.C.

FREE: For latest copy of Hams Hobbymart with hundreds of classified buy, sell or swap ads. Write Kruse, K1WPZ, P.O. Box 38, Rowayton, Conn.

SACRIFICE! Heath Apache xmttr, $175.00 (with SB-10, $225); Collins 75A-1, $175.00; 500-watt linear, $75. Whole station, with cables and relays, $450.00. Bill Darby, Box 226, Perry Point, Md.

NO Time to operate. Complete 1 KW SSB, AM, CW station. Less than 40 hours use. Cost $1900. Sell for $1100. Will ship. Singly HT32A, $400. Includes D-104 w/PTT stand; HT33A, $500; NC303 with xtal calibrator and WWV adapter, $300. W7PMC, Philipsburg, Montana.

SELL: Heath DX-60 and HR-10 rcvr with VFI, like new condx, $145.00. K4FHG, 2001 Thomas Ave., Anniston, Ala.

SELL: 75A4 one filter, #3481, $450. K1RHS, Maybury, Box 135, Seymour, Conn.

CLEGG 99er for sale, late model: $93.00 plus shipping. F. Bloomingdale, K2JSA, 113 Henderson Blvd., Syracuse 9, N.Y.

COLLINS 516E1 mobile power supply, plus KWM-1 rack, $69.00; 353E-1 less filter for 51J3, $10. Electro-Engineering E-6543 ½ amp swing choke. Chas. White, W6MP, P.O. Box 32, Fullerton, Calif.

FOR Sale: Collins 75A-3, $285.00; GSB-100, $150.00; Viking Courier, $125.00. Will deliver within 100 miles of my QTH. All with manuals. Harold Hayflick, W2OGA, 1203 E. Broadway, Hewlett, N.Y.

GONSET GSB-100, in exc. condx, $240; SX-110, gud condx, $110. KØYPU, Dean Gearhart, R.R. #1, Anamosa, Iowa.

COLLINS 51J-4 w/3 6 Kc mechanical filters, cabinet, $825; NC-303 w/xtal calibrator, $290. Both excint condx, recently factory checked, guaranteed, perfect recgrs. You can't go wrong at these prices. K1OGA, 19 Mt. Vernon, West Roxbury 32, Mass.

MORROW Twins MB 560-A xmtr and MBR-5 rcvr, mobile p/s, mike, Master Matcher, whip ant., cables, mount, in A-1 shape. $150.00. Complete. KØAEK, 6551 East Dakota Ave., Denver, Colorado.

KWM-1 in mint condx. Serial 453, with noise blanker, Collins AC and DC supplies and mobile mount. Will ship in original cartons. $450.00. Cash. W8UEJ, 3761 Highgate, Muskegon, Mich.

COMPLETE 180 watt AM-SSB-CW station: Heath Apache, SB-10, Drake 2A, integrated control panel, plus dozens of extras. Write for details. Best offer. K2KHR, 1223 East 52nd St., Brooklyn, N.Y. 11234. Tel: 212-RN-3-8740.

COLLECTOR'S Item: 861 tube. Ten dollars, plus shipping. Also other surplus. List on request. W2EZM, 431 Oakland, Maple Shade, N.J.

SELL: DX-40, $37.00; HG-10, $25.00; QF-1, $5.00; TM-1 CW Monitor (see December 1962 QST), $10.00. All are in gud condx. Will answer any mail received. Chuck Crisler, WA5-ERC, 154 Ronald Blvd., Lafayette.

G-76, with WRL AC and Gonset DC supplies, microphone, speaker, etc. In gud condx. Cinema student at USC. Trade for 16mm camera of comparable worth or 300 cash. Harvey Laidman, W8SLR, 837 W. 36th Place, Los Angeles, Calif. 90007.

FOR Sale: 40-meter beam. Los Angeles area. WA6JPM, Anaheim, Calif. Tel: JE-49387.

SELL: Gonset G-66B receiver with matching 12-volt p/s. In excint condx, $90. AC power supply free. Hack Wilson, K6-UDB, 4952 Mt. Almogosa Dr., San Diego 11, Calif. Tel: 278-9871.

TEST Equipment: Dumont 304A D.C. 'scope, $100; TS-34AP test scope, $25.00; Heathkit O-10 'scope, $20; Mosley Model 3 X-Y recorder, $425.00; Precision E-310 audio signal generator, $100; Assembly Products V-O-Ma meter relay, $50.00; Precision 88 VTVM, $50. Herb Belin, 1078 Mountain Ave., Berkeley Heights, N.J.

WANTED: Heath Comanche receiver. W9CES, 6018 W. Henderson, Chicago 34, Ill.

HALLICRAFTERS SX-101 Mark III, $195.00; HT-32, $295; Automatic T-O keyer, $40. W2PRU, 2 Gate Lane, Levittown, L.I., N.Y. Tel: 516-WE-13766.

DISCOUNTS! All reconditioned and guaranteed. Home trial. E-Z terms available. Act now. G-76, $224.10; HX-50, $296.10; Invader, $395.10; G66B, $79.20; Scout Deluxe, $89.96; DX-100, $135.10; Meteor, $67.05; 20A, $107.10; NC-109, $98.10; HQ-140X, $125.10; Viking II, $112.05; HG-303, $53.10; PMR-6A-12V, $53.96; HR-20, $116.10; HX-20, $179.10; DX-40, $44.96. Leo, WØGFO, Box 919, Council Bluffs, Iowa.

CUSTOM Building VHF gear, converters, transmitters, etc. 432 Mc. equipment. Free Quotes. Frontier Electronics, Orr 1, Minn. Everett, WØHPS and Frankie Hoard, WØPYC.

GRICE Electronics: Collins 75a 75A-4, $475.00; KWS-1, $925.00; 75-S-1 w/noise blanker, $450.00; CC-1 carrying case, $65.00; 32-V-2 transmitter, $250.00; 310B exciter, $150.00; Globe King 500-C, $250.00; B&W LPA-1 & p/s, $325.00; Swan SW-175, $150.00, SW-140 (new), $150.00; Valiants, $275.00; HQ-110's, $170.00. P.O. Box 1911, Pensacola, Fla. 32502.

TRANSFORMER Hermetic 50-400 CPS 215V .030A, 6.3V1.5A, $2.50 prepaid. K8OSM, Box 3251, Detroit, Michigan 48214.

FIRST Certified check or money-order for $17.50 gets $30 Gift Certificate won at Hamfest toward any E-Z Way Tower. Art Charlap-Hyman, W5ZNO, 4651 Louise Ave., Encino, Calif.

FOR Sale: BC-342N receiver, $40.00 plus shipping. Good working condx. Emil Kubanek, W8BVR, RR #1, Box 13, East Saugatuck, Mich.

WANTED: Exciter coils for Collins type 32RA transmitter. Robert LaFleur, Mayville, N.D.

QSTS, 28 copies, Sept. 1916 to December 1927. Entire lot only. $150.00 PP. SASE for details. W5PQA.

BOOST Reception: 3.5-30 megacycle SK-20 Preselector kit, $18.98. Boost modulation, AAA-1 clipper-filter kit, $10.99. Reduce noise, NJ-7 noiseiector, IF, wired, $4.49. Postpaid! Literature free. Holstrom Associates, Box 8640-T, Sacramento 22, Calif.

WANTED: Drake 2-B. Hechtman, Box 981, Berkeley, Calif.

HOWARD RADIO—must clean out our warehouse: 75A-4, $425; 75S-1, $325; 32S-1 & 516F-2, $500; 30L-1, $395; KWM-2, $925; 312B-5, $245; 5100B, $200; 5100, $169; NC-270 w/Spkr (New) $269; NC-300, $185; NC-183, $185; G-76 w/AC & DC PS's, $345; Globe 500B, $295; RME 6900, $229; SX-101 Mk III, $195; HQ-170C, $195; HQ-160C, $165; HT-37, $290, Globe 350, $195; Invader 200, $395; HT-32, $320; 2A, $190; Ranger, $129; G-43 (New Demo) $119; HRO-50 w/Spkr & 6 Coils, $195. The following new equipment is in stock for immediate delivery: Entire Collins line; Transceivers with all accessories: SW-240's, TR-3's, SB-33's, & SR-150's. Free new & used list. Box 1269, Abilene, Texas 79604.

EQUIPMENT Excess to my needs. SSB, VHF, power supplies, tubes and components, you name it! List for stamp. W4API, Box 4095, Arlington, Va., 22204.

ART-13, complete with power supply, $80 or trade for DX-60 or equivalent. Write Michael Windolph, 3644 Rocky River Dr., Cleveland, Ohio.

SELL: Elmac AF68A, $149.00; Hallicrafters SX-96, $145.00; Vibroplex Original, $15.00, Morrow 5BR-2, $35.00. All in excint condx. W2ZKD, TAlmadge 8-9822.

SELL: Excellent Drake 2A with calibrator. Best offer over $160.00 takes it. Keeth Lawrence, WB6BUM, 13212, Stanbridge Ave., Downey, Calif. 90242.

PRINTED Circuit resist, applies with ordinary pen, $1.00. Box 19083, Tate, Indianapolis, Indiana.

WANTED: Used 275-watt Johnson Matchbox, no SWR indicator. May be scratched or dented. WIFTE, 222 North St., Windsor Locks, Conn.

WANTED: TA-33, K1IIK.

SELL: Collins 75A-4 rcvr. Serial No. 4385. In excint condx. Price: $450.00. Will take offers. Miriam L. Renton, 165 Grant Ave., Vandergrift, Penna.

WANTED: One copy John H. Morecroft's "Principles of Radio Communication". W3JHR, 5209 Bangor Dr., Kensington, Md.

MUST Sell: SX-101 Mk III, in A-1 condx: $185.00, NC-98, like new condx, $65.00. Larry Gittings, 117-26 239th, Elmont, N.Y.

FOR Sale: Plate Transformers, 3600-0-3600 VAC at 1000 Ma., with dual 110V and 220V primaries, $35.00. Peter W. Dahl, 5331 Oaklawn Ave., Minneapolis, Minn. 55424.

RECEIVE Worked Trumbull County Award for Trumbull County and Warren Amateur Radio Association members contacts since January 1, 1959: Trumbull County 20 contacts including 10 members; other W, K and VE 10 contacts including 5 members; DX 5 contacts including 3 members. Send log data. 50 cents, certification by two amateurs that you have QSLs to K8BXT, Lovett, Box 809, Warren, Ohio.

COLLINS KWM-1 w/access.; Eico #368 FM/Gen F/W, $45.00. W9OZY, 207 Rush, Roselle, Ill.

QST Complete file to date. Best offer! Also antique radio collection. Send large SASE for complete listing. Philip Weingarten, 67-61 Alderton St., Forest Hills, L.I., N.Y. Tel: TW 6-3545.

COLLINS 32S3 with homebrew supply, used vy little. $625.00. W3GRF, 6959 Temple Hills Road, Washington, D.C. Tel: CY 7-9111.

SELL: HQ-110/Matching speaker, $125.00; DX-40, $39.00; VF-1, $10; DB-23, $23.00; OM-2, $23.00; HE-45B, $70. Key Dismukes, Dahlonega, Ga.

SELL: 75A4, serial No. 1144, with 3.1 and 6.0 filters, spinner dial, $425.00; Telrex TM30 Triband, like new condx, $175.00; RIS 175 rotator, $50.00; HT32B, used 50 hours, $425.00. Express collect. A. A. Farrar, W1CLS, 33 Lantern Lane, Weston, Mass.

SELL: Modulation transformer for Viking II, type SNC, #P-1992, $10; I'll ship. Steve Blaisdell, K7SVB, Box 336, Grand Canyon, Ariz.

SIX Meter Communicator III, with Gonset Six and Two Meter VFO. In gud condx, $180.00. Jack Rudbart, 21 Ravona St., Clifton, N.J.

GONSET: G-76, $285.00; AC power supply, $75.00. Or your best offer. In mint condx, used under fifty hours. J. Lincoln, K1QHE, 120 Woodville Rd., Falmouth, Mass.

AUCTIONFEST: Ft. Lauderdale, Fla., Armory, S.W. 24th St., & 4th Ave. Saturday, March 21st. Doors open 8 A.M. Broward Amateur Radio Club.

HAM License School! Preparation courses in code and theory. Call Ron Reed at GRanite 8-3245. 11671A San Vicente Blvd., W. Los Angeles 49, Calif.

GONSET GSB101 linear amplifier, $139.00; Don't be afraid of low price. Spotless, mint condx. No scratches. Used vy little. First certified check others will be returned if sold. W7YAM, 4545 East 8th St., Tucson, Ariz. Phone EA61559.

SELL: Dual power supply, 700 VDC, .400 Ma., 350 VDC, 200 Ma, bias, $35.00; 100 W, 6146 AB1, modulator, matches pair 6146 or 807, $25; BC458, moditied, and BC457, both for $10.00; All four with P/S cabinet, $65.00; Heath 0-7 'scope, $25.00; WA-2 preamp., $10; regulated lab supply, cabinet, 2 meters 400 VDC, 150 Ma., $25.00; 10½" rack mtg., plate supply, 1300 VDC, 300 ma., CCS, with 28" rack, $30.00; 813 with fil. xfrmr, $10; 829B, $3.00; rotary inductor with turns counter, $10.00; R175-A choke, $1.50. Meters: $3.00 each: 10 Ma., 3" rd., 5 Ma and 500 Ma., 3" square, 0-4 amp, RF, 2" rd., K1TWN, 833 Wapping Rd., Portsmouth, R.I.

BARGAIN: Globe LA-1 linear, needs $22.00 power transformer from WRL, otherwise perf. condx. $35.00. K8EHD, Steve Hart, 712 E. Sandusky, Findlay, Ohio.

FOR Sale: HQ-110C, w/matching spkr, in excint condx, $160.00. Ship express collect. Ted Cook, PM, Montauk, S.Y.

OVERSTOCKED Used transmitters-receivers every one a good value—Adventurers, 39.50—Globe Chiefs, 35.00—Scouts, 39-49—Eico-720, 69.50—Knights—R-100, 89.50—DX40s, 45.00—S-85, 75.00—HT-41, 279.00—HT-32, 325.00—HT37, 295.00—SX-11, 250.00—101A, 295.00—S-40-77-s, 50.00—Drake-2A, 175.00—2B, 199.00—HQ170, 225.00—HQ129X, 125.00—HQ-100s, 125.00—HQ180C, 349.00—HQ110, 150.00—Polycom-6-2, 250.00—Clegg R99er, $100.00—Sonar80, 250.00—B&W5100-51SB, 395.00—Valiant, 250.00—75A1, 250.00—32V3, 250.00—75A4-428-scr, 550.00—KWM-2, 995.00—new 75S1, 480.00—SW240, 250.00—SW175, 175.00—SW140, 175.00—Viking 1, 95.00—Viking 2, 125.00—TX-1, 195.00—RX1, 149.00—T-bolt, 350.00-6-2—TBolt, 395.00—SB-10, 75.00—DI-Central Scope, 75.00—Write for latest used list—Bill Beck-K4QOK-Tenny Freck-W4WL, Freck Radio & Supply Co., 38 Biltmore Ave., Asheville, N.Car. Mail orders filled promptly. Satisfaction guaranteed.

KWM-2, new, $825.00; HA-6 transverter, never opened, $195.00; 32S-1, $415.00; 75S-1, $325.00; Drake 2-B, 3 months old, $219.00. W8WGA, Barnes, AC-513-2770409, 3451 Ridge Ave., Dayton 14, Ohio.

FOR Sale: Elmac Af-67, PMR7, M1070, Dow Key 12V relay, all for $190 Herbert Combs, Star Rte., Jensen Beach, Fla. W4KEB.

FOR Sale: SR-150 transceiver, AC and DC power, mobile mount, cables, $625.00; Drake 2B, Q-Multiplier, xtal calibr., $225.00. Like new condx. Luther Anderson, 31 Agate Rd., East Brunswick, N.J. Tel: CH 6-1422.

WANTED: Teletype 14 transmitter-distributor and end-of-line indicator parts; General Radio Synchronometer, catalogs K, L, previous. Sell: typing reperforators, parts, gears, motors, W4-NYF.

GOING To College: must sell rig. Drake 2B, 2BQ, DX-100B, for $325.00 or you make offer. Jack Orr, K8PET, Evart, Michigan.

NATIONAL NC-188 with Heath Q-Multiplier and speaker, $85.00. K6VSS, 2563 Erickson, North Sacramento, Calif.

SALE: NCX3, NCXA supply. Perfect 6 months old, $380.00. Will ship in original boxes. W5BWA, Alexandria, Louisiana.

WANTED: Collins F500B Series mechanical filters for 51J. State condx, bandwidth, and price in your first letter. K8COI, Box 247, Wilmington, Ohio.

SELL: Hammarlund HQ-129X with spkr, $95.00; Hallicrafters S-38 rcvr, $18.00; Central Electronics Sideband Slicer/Q-multiplier AP1 adapter and AP3 cable, $30.00. All in vy gud condx. W3YTL, 848 Medway Rd., Phila. 15, Penna.

KWM-2 AC supply, late model, $850.00 cash. James E. Farner, 1217 Terrace Trail, Hurst, Texas.

G-76 with ACP/S and keying monitor, $300. SX-71, $100; TBS50D, $35.00; Gonset Supersix, $20.00. Superceiver, $35.00. Heath Mohican, $75; VFO, $15.00. Complete mobile, $125. W8DRV, 7761 Big Creek, Cleveland, Ohio 44130.

SELL: Ranger, F/W, vy gud condx, $130.00; NC-155, in mint condx, $140; B&W 52 ohm low-pass filter, $8.00. Two 115VAC Dow-Key co-ax relays, $8 each; Knight VFO, vy gud condx, $19; Vibroplex bug, $5.00. Need money for school. K3LIZ, 239 W. 21st St., Chester, Penna.

75A-4 with blanker, 3 kc. filter. Serial 3742, really a cream-puff, $525. WØUDZ, 2317 Vine St., West Des Moines, Iowa.

75-S3, KWM-2, 30-L1 312-B5, ⅓ off. 312-B4, $140; Ranger FW recent factory aligned, Johnson T-R switch and relay, $175.00. All in A-1 condx. Area code 812, GR-6-3426. WA9-DSY.

WANTED: Pair 810 tubes; Jennings vacuum variable UCSL, 4-250 mmf. John Zimmerman, Jarratt, Va. K4WKG.

MUST Sell: Valiant F/W in mint condx, $195.00; also must sell RME 6900 rcvr, FB for SSB, AM, CW. Built-in xtal-cal., WWV, $175.00. Dan Safran, 163-70 Sixteenth Ave., Whitestone 57, L.I., N.Y.

MOBILE: Elmac PMR-7, AF-67 (just back from the factory), M-1070 supply, Webster Band Spanner Antenna, and mobile antenna mount, complete with instruction books. First $125.00 (firm) takes it. I'm going sideband. D. R. Rudisill, WA5GZQ, 3221 Plymouth, New Orleans 14, La.

FOR Sale: 75S3, $500; Poly Comm 6 AC/DC, $250.00; Gonset GC-105, $200, like new condx. First certified check or money-order. Will ship express collect. J. P. Chawalek, 304 W. 8th, Oswego, N.Y.

SALE: Personal station: 32S-1, SN 1959, 75S-1, SN 2794, 516F-2, SN 2877, all cables. Best offer over $750 by end of February. Ten day money back guarantee if you pay shipping. W5ILR, 1837 Minter Lane, Abilene, Texas 79603.

COLLEGE Bound and I need the money. Will sell Valiant, f/w for $275.00. HRO-5 with 4 coils for $85.00. All in excint condx and with manuals. Contact David Ransohoff, K8RMT, 3536 Biddle St., Cincinnati, Ohio 45220.

COLLINS VFO for 75A4; 7DE-24, new, $39.00; 70E-23 for KWS-1, new, $39.00; 7JK-1 for KWM-1, new, $39.00; 75S-1 noise blanker, 136A-1, new, $49.00. Richard E. Mann, 7205 Center Dr., Des Moines, Iowa.

SX-101 Mark II with R-47 speaker, $175.00: Apache with AM-2 SWR Bridge, $185.00; all for $350.00. In excint condx. Sry, no shipping. Will deliver within reasonable distance. Ed Spieth, K2CKQ, 2208 Plum St., Schenectady.

VIKING II and Johnson 122 VFO for sale, $150.00, or your best offer. Want 3.1 Kc mechanical filter, F-455J-31, and vernier knob for 75A4. Jim Duffey, K9YZQ, 1407 Main St., Alton, Ill.

FREE Matching speaker, if package deal. Best offer accepted HQ-110, Viking Valiant. In excint condx. Well known signal won many contests. K3ANS, 114 East Wayne Ave., Easton, Penna.

MOVING: High or low power parts, tests equipment, HT-6 200 watts, HQ100C, any reasonable offer. No lists, sry. W2DBF, 777 Rte. 202, Somerville, New Jersey.

DRAKE 2A, $179. In gud condx. WB6CBS, Kellick, 4038 Manzanita Dr., San Jose 17, Calif.

SELL: Frequency shift converters manufactured by RCA, type CV57, $75.00, less tubes; $135.00 with tubes. Brand new TV camera kit, $120.00 less lens and Vidicon tube. Send for lists. Spera Electronics, 37-10 33th St. L.I.C. 1, N.Y.

HAM BUERGERS. Used Equipment, money back guarantee. Collins 75A4 mint, $575; Globe Champ 300A, $249.00; Gonset G66, $119.95, Gonset G50, $285.00; Gonset GSB100, $295.00; Hallicrafters HT32A, $449.95; Hallicrafters SX-101, $279.00; SX42W/spkr, $149.95; Heath HX20W/AC supply, $249.95; Johnson Viking 2W/VFO, $174.95; Johnson Pacemaker, $269.00; National NC-183, $124.95; Phasemaster 2W/VFO, $195.00. Trades. Write for free list. Ham Buergers, Wyncote, Penna. Tel: CA 4-1740. Happy DXing in 1964.

ENTERING Military service. Must sell complete 6 & 2 meter station: Johnson "6N2" transmitter; Eico 730 modulator, Heath HW-20 power supply, National 6N2 VFO, all factory-wired, $230.00; Drake 2B receiver with xtal calibrator, spkr, extra xtals and Ameco Nuvistor converters for 6 and 2 meters, $280.00; Heath Monitor 'Scope, $50.00. All of the above approximately two months old, with manuals and guarantee cards. If bought as a package, subtract 10%. Also, Heath 6-meter SSB transmitter and linear amplifier, factory-aligned, never used, $250.00. Jim Hagedon, Jr., K8YQH, 4808 Laurelann Dr., Dayton, Ohio.

FOR Sale: Like new SX-117 receiver, used less than one year. Will ship in original carton. Best offer. Also a Viking Navigator CW VFO xmtr. Best offer. WØOGI, Box 147, Rocky Ford, Colorado.

HEATH Marauder HX-10, $310; RME 6900 rcvr, $200; Tri-Band Antenna TA-33 Jr., $40.00; Electro-Voice 951 mike w/stand, $20; Mc Jones 634N, 150W dummy antenna, $30; B&W 710 10 mtr. balun, $10; B&W 52 LP filter, 1 kw, $10; Bird 43 directional wattmeter, $40; Alliance U98 rotator w/bearing, $17; Knight dip meter, $10; FXR coax relay, 115 VAC, $5; cable, RG-9B/U, w/UG-21/U connectors, 25 ft. lengths, $2.00; plus music. WB2AGH, Ron Scholer, 46-01 Fayette Pl., Great Neck, L.I., N.Y. Tel: (516) HN 6-0251.

CRYSTALS Airmailed; Kits, MARS, Nets, SSB, CD, etc. Custom finished etch stabilized FT-243 .01% any kilocycle 3500 to 8600 $1.75. (Five or more same or mixed frequency $1.50). (Ten or more same frequency $1.25). 1700 to 20,000 Kilocycles $2.25. Overtones above 10,000 Kilocycles. Add 50¢ each for .005%. QST Kits, FT-243; "DCS-500", "Three Band Converter", "IMP" $9.95 virgules set. "SSB Package" Mixer or Filter— $11.95 virgules set. Write regarding specific needs. Airmailing 10¢—crystal surface 5¢. Crystals since 1933. C-W Crystals, Box 2065-Q, El Monte, California.

"HOSS-TRADER" Ed Moory sells following new demonstrators, factory warranty: Swan Tri-Bander, $259.00; Galaxy 300, $249.00; SBE-33, $299.00; NCX-3, $295.00; SR-150, $495.00, New Hunter Bandit, $449.00; new Loudenboomer, $199.00, Package deal: New KWM-2, Adcom supply and Mobile Mount, $1195.00. Used bargains: TR-3, $439.00; 75S-3, $459.00; 32S-3, $559.00; 32S-1, $419.00; 30L-1, $359.00. New Hy-Gain TH-4 beam and demo Ham-M rotor, $179.00; HT-37, $269.00; HT-32, $295.00; SX-101, $169.00; SX-111, $135.00; Mosley CM-1, $79.00; Drake 2-B, $189.00; 2-A, $175.00; HQ-170, $179.00, New TR-3, old price, $495.00; immediate delivery: HT-44 and SR-160s. Terms cash. Ed Moory Wholesale Radio, W5BDR, Box 506, DeWitt, Arkansas, Phone WHitney 6-2820.

APACHE $195; SB-10, $70; both like new. Ken, K4VVT, Rte. 5, Easley, S. Carolina.

SELL: Knight VF-1, in mint condx, $20.00. WB2DOP, 58 Meadow Lane, Bloomfield, N.J.

HAMMARLUND HQ-150, excint, $170.00. K3OCN, Bert Hyman, 3327 Clarks Lane, Baltimore, Md. 21215.

COLLEGE, Must sell, Warrior linear amplifier. Best cash offer. K3LDV, 318-1 Pollock A., University Park, Penna.

SPLURGE! Send one buck ($1) and receive the next 12 exciting issues of The Ham Trader. Bargains! Gear, accessories, etc. Box 153Q, Franklin Square, N.Y. 11010.

SELL: Home-brew amplifiers with pair of 304TLs in push-pull circuit, complete with spare 304TL, 2000 volt plate supply and adjustable bias, in a 4 ft. wooden rack. Want $150.00. K9YNG, 300 North Walnut, Clinton, Ill.

FOR Sale: Complete station or individually: DX-40, VF-1, HQ-120, 40M Dipole, Vibroplex Deluxe, antenna relay, mike, Conrad monitor, miscellaneous junk, $190.00. Will haggle. Will deliver. Barry Goldstein, W2ROH, 91 Morris Dr., East Meadow, N.Y.

SELL: Complete volumes QST in binders, 1932-1939 and 1945-1960 runs. Will ship collect for your best offer over cost of binders plus postage. W3KB, 1061 Beverly Road, Jenkintown, Penna. 19046.

WANTED: HT-30, in gud optg. condx. WA2QXF, 37 Landing Rd., Huntington, N.Y.

FOR Sale: T-150 Knight xmtr, $80; 25-watt c.w. xmttr, 40 and 80 from 1961 Handbook, in excint condx, $20.00. CV67 Klystrons, $3.00. WB2GVF, Box 481, Bradford, N.Y.

MUST Sell: Complete station—$475.00 or in part: Valiant, $250.00; HQ-170 $235.00; TR switch, $20; D-104, $15.00; low-pass filter, $10.00. All gear in A-1 condx. K1KSS, 231 Laurel Hill Dr., So. Burlington, Va. or call 802-3725.

MOSLEY Tote-Tenna. Windowsill mounted for 10-15-20, catalogs, $156.00. Best offer or swap gud AM xmttr within 200 miles. CQ: 1960, 1961, 1962. 73 Mag: 1961, 1962, $5.50/yr. K1OMJ/2, 2526 Watt, Schenectady, N.Y. Tel: 372-8144.

SELL: 75A4, Vernier dial, matching spkr, Serial #812, all factory improvements, in excint condx: $425.00 F.o.b. G-E 100V, serial #830 perfect, $460.00 F.o.b. QST File: 301 issues 1920 to 1957, fair to excint condx $50.00 F.o.b. Stamp for list. W5DU, Raymond B. Frank, 1017 San Pablo N.E., Albuquerque, N.M.

FOR Sale: R388 receiver, $350.00; RCA 16 mm sound projector (trade?) worth $150.00; also Bell & Howell 50F Projector with amplifier and lens missing, (worth $50.00); Motorola FMTR0DB and FMT14OD 2-way radio less acc., $75.00; Acc., $25.00; Motorola T41G with acc., $125.00, used 6198 or 7038 Videcon tubes, $25.00; Communication Service P.O. Box 303, Georgetown, S.C. Phone (days) 546-4666, (nights) 546-4666.

SELL: SR-150 transceiver and PS-150 AC supply, 6 months old, like new. Will ship prepaid in factory cartons to first check for $500. Ken Birman, K8YYC, 42 Broadway, Battle Creek, Mich.

APACHE $175.00, excint condx, W7HVR, Jerry Schoepflin, 805 S.E. 69th, Portland, Oregon.

HAMMARLUND HQ-140X, $120.00; Central Electronics 10-B, $70, both in excint condx. Jim Connor, KØADL, 5607 Ash Drive, Springfield, Va.

FOR Sale: TS 174U frequency meter, 20-250 Mc, modulation, original calibration chart, spare set of tubes, original AC power supply, technical manual, like new, $125.00. Byron Fortner, W9FYM, RFD #10, Box 486, Indianapolis 19, Ind.

CLEGG 99er Xcvr, spotless, used less than 20 hours, $125.00; original Heath "10er" kit in unopened carton, $35.00; Heath Cheyenne and Comanche, complete with both 12V DC and 115V AC Heath power supplies, manuals, mike, mounting rack, connecting cables, Webster Bandspanner all-band antenna, all in A-1 condx, best offer over $190.00. Willis Hodel, K9ZQW, Metamora, Ill. Will ship.

RANGER Very clean, $135.00. Will deliver within 50 mile radius of NYC. F. J. Pauer, 151 Vreeland Ave., Rutherford, N.J. Tel WE 9-9354.

SELL: Complete Collins dream station for SSB and CW. Like new condx: 75S-3, serial 10639; 32S-3, serial 10324; 312B-4 station control; 516F-2 ac supply; 30S-1 linear, Hallicrafters HA-1 T.O. electronic keyer; Vibroplex electronic key, Vibroplex bug key, Heath HO-10 monitor scope; Numechron 24-hr. clock with timer, Electro-Voice 664 mike and stand, Astatic 10-D mike; TH-4 Hy-Gain beam, all manuals, cables, factory cartons, etc. About $100 more of many small items. Will sell only as complete station. Retail value in excess of $3700. Sell for best offer over $2800. Lyle Walters, W9DUE, 1602 Briarwood Dr., Carbondale, Ill.

AF-68 Elmac transmitter, PMR8 receiver, M1071 power supply, 75 whip, mount and coil, 10 meter, 6 meter whip, relay and mike. Like new condx. $500 value. Sell for $300 cash. K4AOZ.

FOR Sale: Heath HW-12 80 meter transceiver, HRA-10-1 100 kc xtal calibrator, HP-23 power supply for above. $180. Jack Twichell, Jr., WA2UEN, 12 Ingleside Ave., Pennington, N.J.

SALE: HT-37, $300; SX-101A, $300; Heathkit SWR, $15.00; D-104 mike with G-stand, $15.00; B&W T&R switch, $10.00; Package deal: $600.00. All excint condx. F.o.b. Globe. AT-4. Needs repairs. $20.00. Jack, 44 Commonwealth Blvd., New Castle, Del. Tel: EAst 8-4026.

SALE: HQ-170 w/clock, in mint condx, in orig. carton: $200.00 or your best offer. Will ship anywhere. A. L. Godshall, W3SDE, 509 Lansdale Ave., Lansdale, Penna.

VALIANT: In A-1 condx. Must sacrifice $200.00 or your best offer K2TPX, 207 Motley, Valley Stream, L.I., N.Y.

HALLICRAFTERS SX-110. Cost $170.00. Will sell for $130. in excint condx. Local deal preferred. Pullman, 10 E. 198th St., Bronx 68, N.Y. N.Y.

QST File 1942 to 1962, run complete except for 1945 and 1946 partial; CQ 1950-1953 and 1956 to 1959 complete. 1954 and 1955 partial. Lot for $25.00. You pay shipping. Walt Kozacko, W1SS, 1711 Central Ave., Needham, Mass.

RME 4350 Amateur Band receiver and speaker. Refer QST Sept. 1958. $110.00. Johnson Ranger transmitter AM-CW, 160 to 10 meters, $110.00. W2FDE, 14 Wickford Ave., Trenton, N.J. 08618.

BC611 Pr w/manual, $40.00; D-104, $10; Variac 7A cased w/cords, $15.00; Leece 12V50A alt., complete, $45.00; Chry 35A, same, $30; 3000 CT 1/2A cased, $15.00; 75A3 w/acc, $295.00. Art Ford, W2HAE, 85 Franklin St., Northport, L.I., N.Y.

FOR Sale: Original 6-meter NBFM walkie-talkie featured QST 6-62; 22 transistors, 5 diodes, Collins mechanical filter, squelch, alkaline batteries, 52.525 Mc, 1 watt output. Built by Hal Greenlee, W3AXF, and purchased by us from him. Beautiful masterpiece. Worth several hundred, $85.00 plus postage. Richard M. Jacobs, WAØAIY, 1015 Glenside Pl., University City, Mo. 63130.

WANTED: Mechanical Filter for Collins 75S-1; c.w. 500 CPS, Type F455Q-5. W4SHL.

SELL: Eico 723, in perf. condx: $30.00. Eddie, K3YGL, 895 Kennebec St., Pittsburgh, Penna. 15217.

MOHAWK, 10-A, in gud condx, WA8BHR, Mike Naruta, 4466 Burtch Rd., North Street, Michigan 48049.

GONSET G-50, late serial number, in mint condx, $250.00; Instructograph, electric with 42 new tapes, $40.00; Astatic 10-D Sideband mike with PTT stand, $25.00; Cal-ident Tymeter clock, $14.00, Bud code practice oscillator and monitor, $9.00; Master Mobile Mount bumper mount, 444SS, used only one week, $10.00; Heath HP-20 power supply, $12.00. Robert Caliva, WA6IQV, 6927 Cedar St., Huntington Park, Calif. Phone LU-2-9682.

HEATH MR-1 Receiver, new, Wired, $90.00. Wortman, W2LJU, 19 Nassau Road, Yonkers, N.Y.

WENT Air Force: Low priced for quick sale. Push-pull 813 amplifier, 500 watt power supply, diagrams, enclosed rack, $70; coax ant. relay, $5.00; B&W LP filter, $10. $75.00 takes all! W1ZIP, rig near Boston but write to me at 269B Randolph Ave., Grand Forks AFB, North Dakota.

SALE: Gonset 2 meter GC-10S w/AC-DC cords. In gud condx. $160. You pay shipping. WB2FCB, 1370 Anchor Court, Wantagh, N.Y.

SELL: Johnson Viking II factory-wired; B&W low pass filter, Matchbox, Jones MicroMatch and Indicator, $170; Hammarlund HQ-140X w/spare tubes and Tecraft 2-meter converter attached, $150; Heath factory aligned HX-20 xmttr, HR-20 rcvr and HP-10 12VDC power supply, $340. All instruction manuals included. K2KXZ, Fishel, 19 Purdy Court, Rockville Centre, N.Y.

NC-300, $225; DX-100, $140; Dow Key TR switch, $8.00; new Heath SWR bridge, $15.95; Knight VFO, $25.00. Equipment perfect. K5RXH, 914 Woodbine, Houston, Texas.

FOR Sale: like-new 75A4, Ser. 4155, ver. knob, 0.5, 3.0, 6.0 Kc filters, in mint condx. $550.00; Hallicrafters HT-32, also excint condx, $300. W5CUX, W. Wigton, 7399 Pineville, Jacksonville, Fla.

DUMONT O-Scope for trade. Want: Mobile rig (prefer a transceiver). WA5AAO, Box 57, LaGrange, Texas.

WANTED: 5 or 6 element 6 mtr. beam, also CDR rotator. Will pay shipping charges. Dick Patefield, WA9ESU, 10929 W. Cleveland, West Allis, Wisconsin 53227.

FOR SALE: Viking Ranger PTT, FW, DK relay, D-104 mike, G-Stand, SX-111, R-48 matching speaker, 14-AVS all-band vertical, Johnson low pass. Entire station for $355.00. WA2OBD, 15 Tain Drive, Great Neck, L.I., N.Y. 516-HN-6-2759.

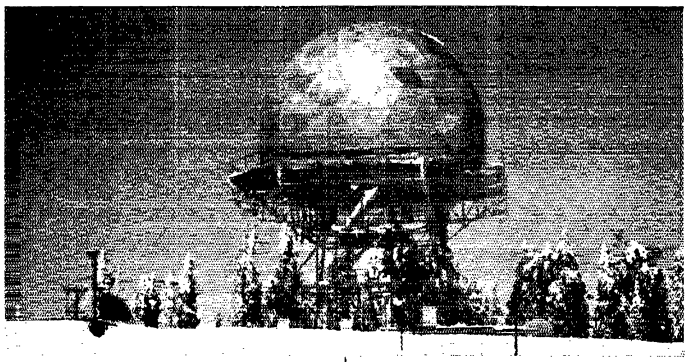
COLLINS 75A4 serial 2838. Looks new. Electrically, mechanically and physically like new. 1.5, 2.1, 3.1 Kc Collins filters. Vernier knob. All and only Collins modifications installed. Collins matching speaker and manual. $595. Bruce, W7JMS/5, 2844A Quay Loop, Holloman AFB, N.M.

DX-20 with key, 3 xtals, $27.00; T-60 xmttr, $32.00. Homebrew antenna matcher, neon RF indicator, $8.50. All in excint condx. WN9IFR, 17W042 Indian Hill, Bensenville, Ill.

Index of Advertisers

FIELD ENGINEERING WITH A FUTURE

Meet Joseph M. Bonica, K1STY. Although a ham for only two years, Joe's enthusiasm will match any old timer's. He's presently working phone on two meters but plans to operate mobile as soon as he can fit it into his busy schedule. Joe is quite serious about his interest in electronics. He should be. It has paid off with a relaxing hobby and a rewarding career with Raytheon.



Joe began his career with Raytheon in 1957. He designed, constructed and tested specialized test equipment, taught FAA personnel, wrote a series of important installation specifications and supervised several major installation programs. Today he is Supervisor in charge of FAA Air Route Surveillance Radar installations for Raytheon's Electronic Services Operation. Joe's proudest achievement was marked by the award recently received by his group from the Air Traffic Controllers Association. They were cited for their outstanding contribution to the nation's air traffic safety through the successful installation of the ARSR-2 System.

At Raytheon, field engineers are playing an increasingly important role in the installation, maintenance and operation of complex, sophisticated electronic systems. In space, on the ground, under the seas, in every environment probed by electronics, Raytheon engineers are finding and meeting new challenges. The opportunities for qualified people are many and rewarding.

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For complete details, write Mr. R. E. Guittarr, Electronic Services Operation, Raytheon Company, Equipment Division, Northwest Industrial Park, Burlington, Massachusetts.

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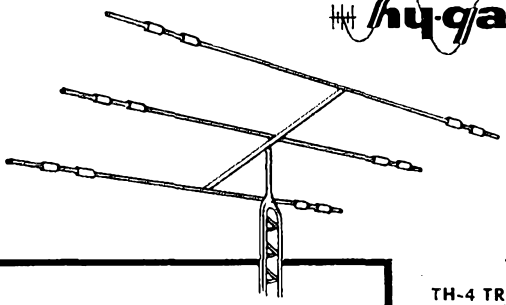

THUNDERBIRD JUNIOR TRI-BANDER

For 10, 15 and 20 meters. 3 elements. Handles 600 watts P.E.P.; takes up to 300 watts AM. Delivers maximum forward gain; up to 25 db front-to-back ratio; SWR of less than 1.5:1 at resonance. Turning radius 14'9"; boom 12'. 28 lbs. **No. 90 CZ 472-GH.** *Only*..... **$69.95**

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TH-4 TRI-BANDER. For 10, 15 and 20 meters. Less than 1.15:1 SWR. 4 elements. Outstanding gain; high F/B. Slim-Traps handle 2 kw P.E.P. Boom, 16'; turning radius 17'10". Longest element, 32'. 43 lbs. **No. 89 CZ 756-GH.** *Only*..... **$117.50**

TH-3 TRI-BANDER. As above, but 3 elements. High gain. Boom, 14'; turning radius 14'8". 37 lbs. **No. 89 CZ 754-GH.** *Only*..... **$99.75**

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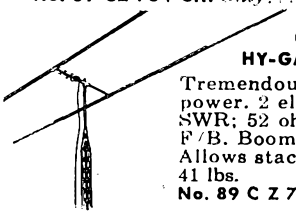

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Our Founder

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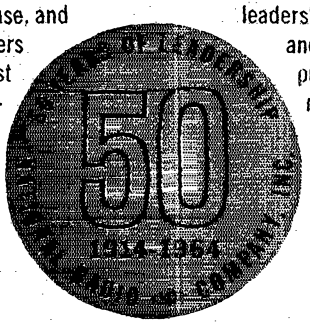

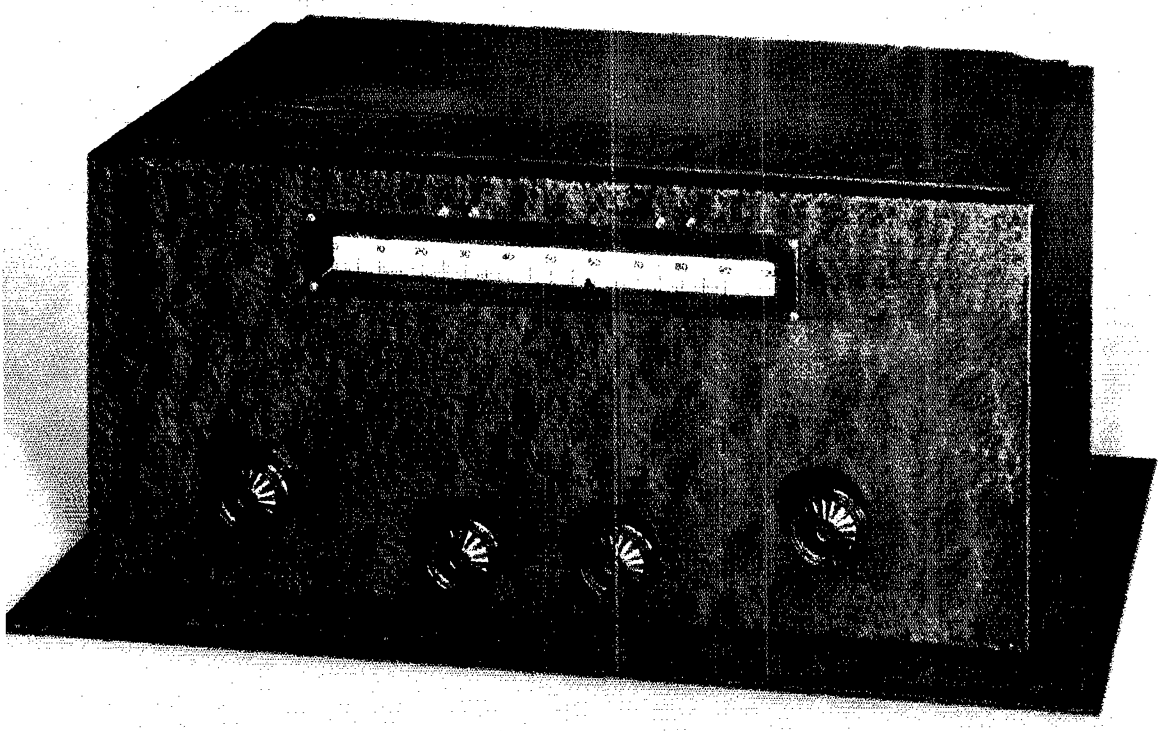

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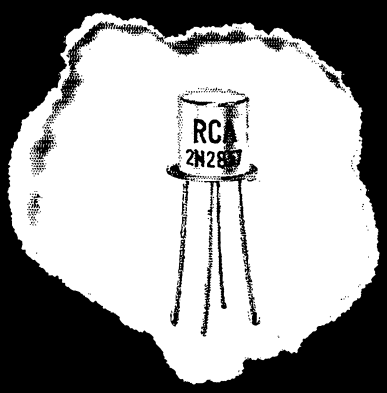

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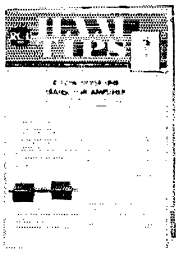

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