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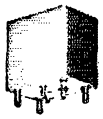

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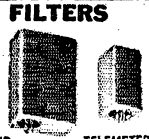

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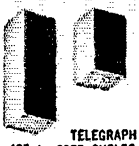

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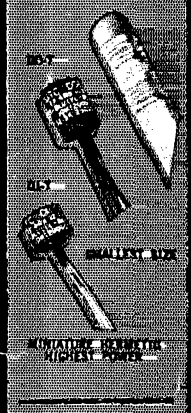

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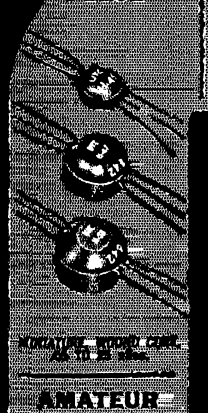

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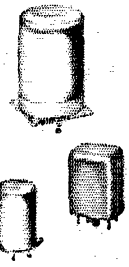

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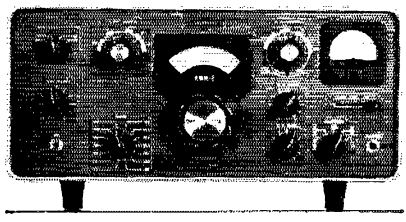

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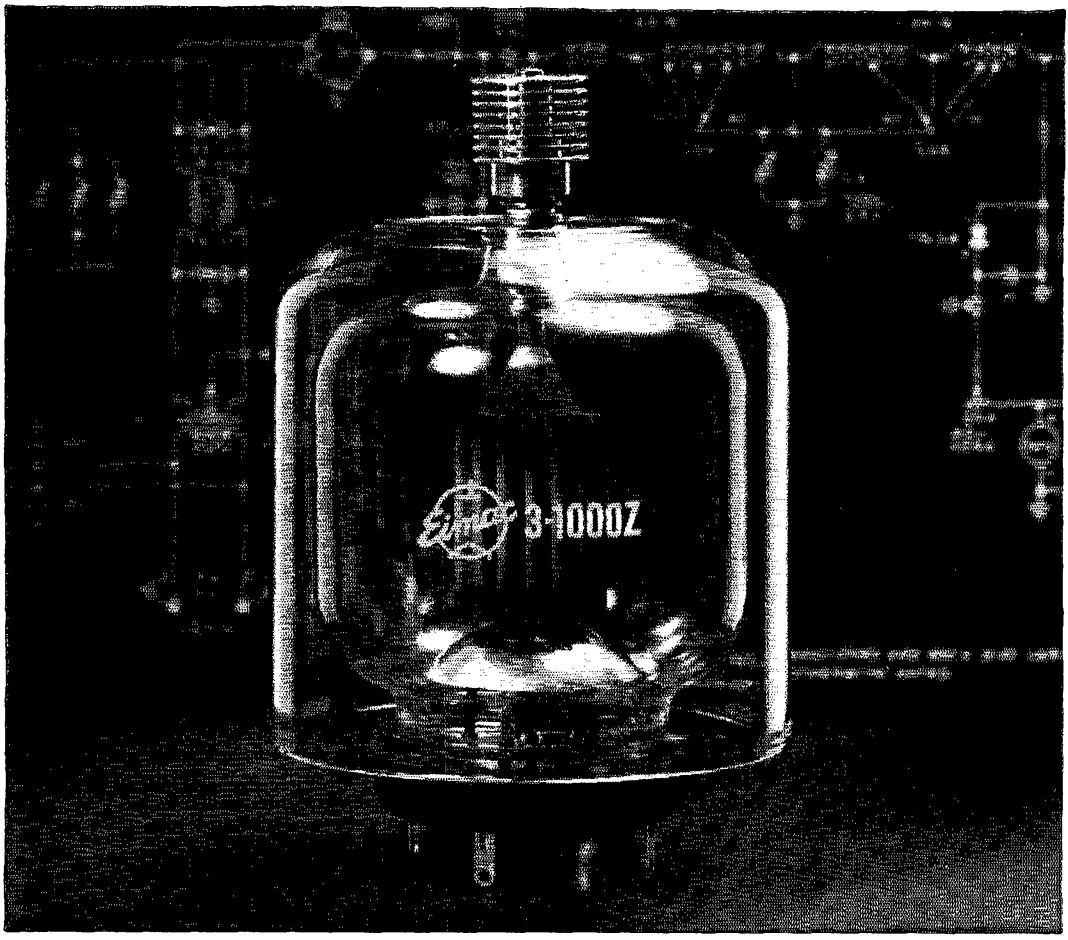

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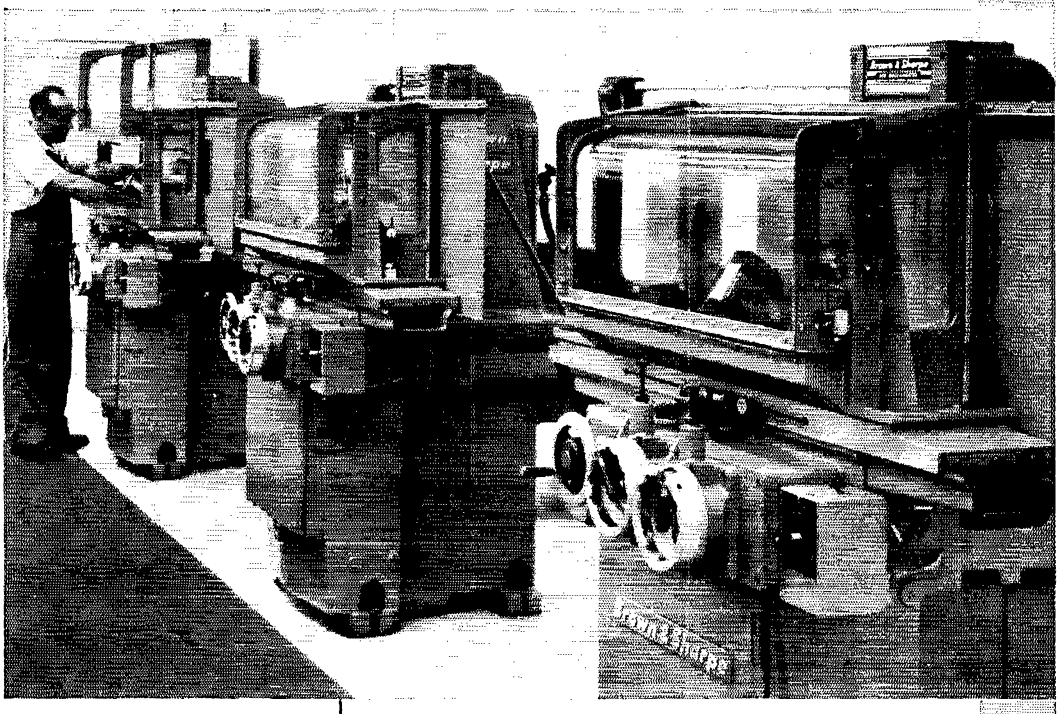

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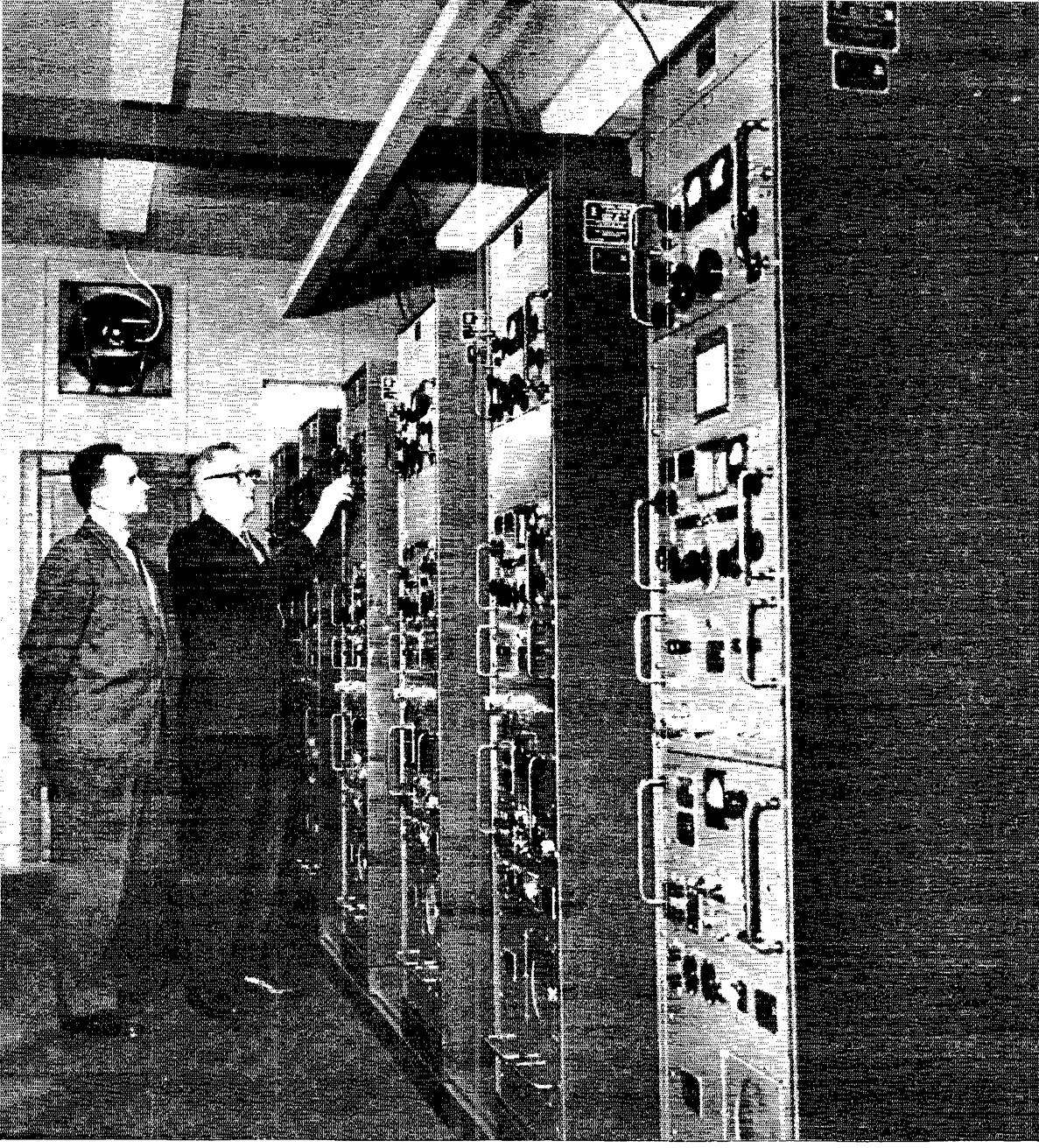

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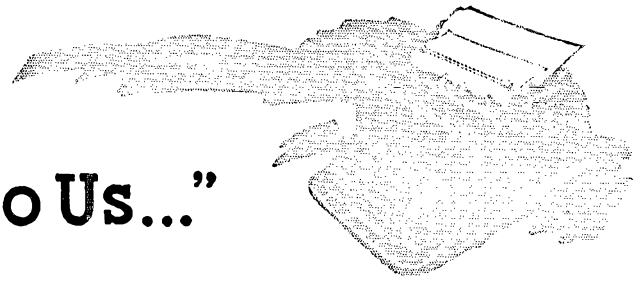

"It Seems to Us..."

INCENTIVES — CONTINUED

As we write, here and there on the voice bands the actions of the Board at its May meeting are being cussed and discussed, particularly with respect to the decision to reinstate an advanced class of amateur license.

Discussion is good. But we seldom hear in these sessions a fair evaluation of the Board's action because so much misinformation is involved. Where it all comes from is beyond us. In at least one case we've heard an Official Bulletin number improperly cited as the source! Some of the misstatements are that all amateurs will be called in for re-examination; all General and Conditional licensees will be restricted to c.w. operation; the Board's action was taken at the request of the military and all hams will now have to join MARS; or that FCC has already issued a directive restricting 20-meter voice operation to Extra Class holders!

Spreading rumors does not permit a fair appraisal of the Board's action. We hope that the June *QST* editorial has helped to clear the air, and at least permit the formulation of views based on facts. This month we'd like to discuss a number of other comments heard on the air or included in correspondence from those unhappy with the League's position.

"I thought the League was supposed to represent my interests." It does, but the best interests of over-all amateur radio are not necessarily the immediate personal interests of each individual. Over the years, the ARRL Board has taken a number of actions which were unpopular with many members at the time, but which proved to be the wise course.

"It is undemocratic (pointless, illegal, etc.) to take away privileges once granted." In 1949, FCC, on its own initiative, proposed to take away all 75- and 20-meter voice privileges from *even Advanced Class Amateurs* and require them to pass the Extra Class exam. The League was opposed because it felt this was going to too much an extreme, and far beyond the simpler upgrading the League had suggested at the time. But the retroactive procedure is hardly without precedent in our regulatory agency.

"I don't want any privileges taken away from me." What good would, say, the 20-meter band be to Generals and Conditionals if at the next international radio conference the record of amateur performance were so inadequate that the band was lost to *all* amateurs? The Board's real concern is the status of the amateur service, particularly in the field of technical proficiency, in the eyes of regulatory authorities.

"Members will leave the League in droves." The fact is that February through April membership dues receipts are higher than the corresponding period a year ago. It is certainly true that a number of unhappy (and perhaps misinformed) members have threatened to resign from the League, and some already have. The Board in its discussions showed a thorough awareness of the likelihood that this would happen, perhaps in hundreds of instances. But the Board would not be shaken in its determination to upgrade the standards of amateur radio.

"Many people won't have the time or background to take an advanced test and so will drop out of ham radio." Such comment makes the assumption that amateur radio consists exclusively of voice operation on certain bands. In actuality, as every look at occupancy demonstrates, this is but a part of amateur work; no one has spelled out that any or all such parts will be denied those who do not obtain higher grade licenses. Each element of the whole program will be given careful study to permit upgrading but not to affect practical operating progress more than absolutely necessary. In any event, there will still be many hundreds of kilocycles and various modes of emission available to General and Conditional Class licensees who won't or can't progress to the higher grade.

"Incentive licensing won't relieve congestion in our bands." It may or may not, but such is not the objective. The purpose is to raise the over-all technical level of the amateur body.

"I can't afford a trip to the distant FCC office." In the 1930s, in the midst of a depression, many thousands of hams found a way to do so. Both the economy and transportation facilities have improved considerably since then!

"I demand that a vote be taken of all amateurs." The Board has in the past found that formal polls of opinion were not much help.

In the most recent such survey through *QST*, only ten per cent of the membership bothered to respond. As anything like a majority response would thus seem an impossibility, any amateur disagreeing with the results would still charge that it was not a true evaluation. Actually, a "poll" *was* taken, in a sense, through publication of the February editorial. Several thousand amateurs took the opportunity to express an opinion. A great majority agreed that "something should be done," although sentiment was about evenly divided on the question of restricted voice bands.

"*If the test was good enough in 1953*, it is good enough today." In other words, ham radio should stand still?

"I just can't copy 20 words per minute so I'll lose my privileges." We'll say it again — a higher code speed is *not* involved in the Board's proposal.

"The manufacturers will all be against this proposal." We've heard differing opinions from them as well as from amateurs. A surprising number of manufacturer and distributor personnel have told us privately, however, that they personnally support the proposal; they are reluctant to say so publicly.

"Obviously you intend to let only professional electronic engineers use the bands." By no means. There are thousands of amateurs who are — or *can be* — as capable as professional electronics people. The Board's objective is to provide an incentive so that many of us will be spurred to attain that status. A high school education and a few years' *serious* pursuit of ham radio should enable any amateur to pass the higher level exam after only a short refresher period. Amateurs who may be in difficulty are those who have memorized the examination answers, purchased all their gear without any concept of what is behind the panels, and engaged in communication purely as a plaything.

"You guys at West Hartford are the only ones concerned about the situation." Not so. An FCC staff member at the 1962 ARRL National Convention said, in part," . . . the demands from all quarters for frequencies have put the Commission in the position of having to ask not only 'what have you done for the public interest lately,' but also 'what guarantee do we have that in the future the public interest will be served by your continued operation?' . . . it appears to many of us at the Commission that too much amateur time and energy are being dissipated in quarreling among yourselves over the merits of c.w. versus voice, or whether a W prefix is preferable to a K, rather than concentrating on demonstrating to the Commission that you are utilizing your assigned frequencies in an efficient, intelligent manner and that it is in the public interest to have frequencies available for ham operation."

Also, a statement in a recent paper by the Radio Society of Great Britain is pertinent: "It must be shown to all other users at the next International Telecommunications Conference that the amateur radio movement is thoroughly conversant with modern practice and that its equipment and operating procedure conform to, or exceed, the best commercial practice."

—•••—

The League's position was adopted by the Board of Directors, a group of sixteen mature and capable amateurs elected by the membership to formulate ARRL policy. They have no commercial or selfish interests, but are dedicated solely to acting in what their judgment indicates is in the over-all best interest of amateur radio. Their thinking was for the longer term, to make us have meaning in the quality of our amateur service. Many fears expressed by members presume immediate implementation and thus severe personal disadvantage. This is unrealistic. The Board's action was one of broad intent. Likewise, the Board was concerned that any plans for upgrading be tempered with careful study on specific points of implementing the program, and that a resulting course of action be both considerate of the handicapped and allow ample time for conversion so that good and necessary aims would be accomplished with a minimum of inconvenience or change for all sincerely interested amateurs. The Board's action, knowing beforehand of the furor it would create, took considerable courage. We believe that a thorough examination of all the facts would lead any responsible amateur to the same conclusion.

QST

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American, Canadian, and British amateurs and their families are invited to a DL4-DL5 Hamfest in the Patrick Henry Village Community Center in Heidelberg, Germany, on August 3 and 4. Transmitter hunts, equipment displays, tours of historic Heidelberg, a swap shop, and much more will highlight activities. For more information, write TSgt Russ Lawson, DL4BS, Box 614, 6910th RGM, APO 175, New York or Postfach 3049, Darmstadt 6100.

Remember to address all League correspondence after July 1, 1963, to

The American Radio Relay League, Inc.

225 Main Street

Newington 11, Connecticut.

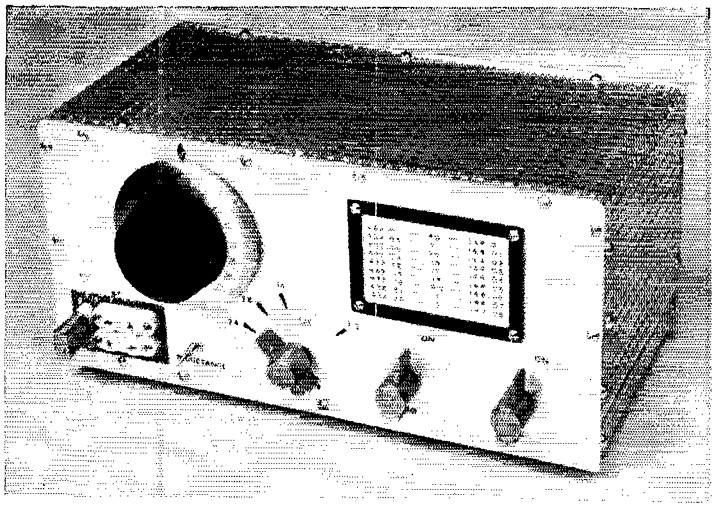


Fig. 1—A VXO especially for v.h.f. men. Calibration on the front panel is for a favorite crystal used for c.w. work on 144 and 432 Mc. Crystal sockets at the lower left are mounted on insulating material, to reduce circuit capacitance to the lowest possible value. Frequency variation per crystal depends on which socket is used. Pointer knobs are for the output plate circuit and the spotting and power switches. The vernier dial is a National type AM.

A Stable but Variable Frequency-Control System for the V.H.F. Bands

BY EDWARD P. TILTON,* W1HDQ

A FEW minutes' listening on the v.h.f. bands will show that, however little some of us may like it, the day of variable frequency control on 50 and 144 Mc. is here. If the listener is the least bit critical he may observe that this is something less than an unalloyed blessing. Leaving operating ethics out of the discussion, widespread use of the v.f.o. is resulting in desecration of that last refuge of the pure d.c. note, the world above 50 Mc. Amateurs conditioned to the sound of v.f.o. transmitters do not regard this as a tragedy, but long-time occupants of the v.h.f. bands may shed a nostalgic tear now and then as they contemplate the buzzsaw notes and incidental frequency modulation of some present-day v.h.f. stations.

There are acceptable v.f.o. signals on 6 and 2, and not all fuzzy v.h.f. signals are attributable to methods employed for frequency control, but the facts are that the difficulty of maintaining really good stability increases with frequency, so good v.f.o. control is not easy at 50 Mc. and higher. A v.f.o. that sounds fine in the 8-Mc. range may be only fair when you listen to its 6th harmonic on 50 Mc., and it is likely to be unacceptable to the critical ear on 144. By the time you multiply to 432 Mc., even average crystal control is not good enough for narrow-band work. It was the need to stay put on one spot near 432 Mc. that forced the writer into the project to be described. Being able to move around at will was a secondary consideration.

Instability — Causes and Cures

With crystal control, drift is due mainly to temperature variation. Voltage fluctuations and hum modulation can be ironed out satisfactorily with a VR tube and adequate filtering of the power source. Mechanical vibration problems associated with self-controlled oscillators are largely eliminated with crystal control. Drift caused by heating underlines a fundamental fact

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

Exactly 25 years ago (in July, 1938, QST*), the author of this article saw his first* QST *effort in print. Appropriately enough, for purposes of the present discussion, it described a v.f.o. — at a time when crystal control was still king. Now when almost everyone uses v.f.o., with effects not always the best, he attempts to reconvert us, presenting a description of a variable-frequency system using crystals.*

of frequency control of any kind: for good stability, the oscillator, crystal or self-controlled, *must be run at low input.*

In the interest of simplicity and economy we sometimes run a crystal oscillator up to nearly the maximum safe input for the tube involved. This won't hurt the tube, but it produces heating cycles that are bound to swing the oscillator frequency. You may not notice it at 50 Mc., or even at 144, but a shift of a hundred cycles at the oscillator frequency (about par for the average crystal oscillator) will who-o-o-p your signal right through the passband of the sharp receiver at the other end of a 432-Mc. circuit.

Our first step toward correcting this was to install a crystal oven. Several firms supply them at moderate cost. Some use ordinary mounted crystals, and the Motorola assembly we tried requires only a second crystal socket alongside the one you already have, to try it. The second socket is wired to the 6.3-volt heater line, and the voltage is applied to and removed from a small heater unit by thermostatic control, built in. If you have a heating-and-cooling cycle at present, a crystal oven will reduce it by maintaining the crystal at a nearly constant temperature. We went a step further and built an outboard oscillator that would run at lower input than the 6CX8 pentode oscillators used in our v.h.f. exciters.[1] These stages now operate as frequency multipliers to 24 or 25 Mc.

Drift of the original oscillator was measured at 6 Mc., and found to be about 50 cycles, mainly in the first 30 seconds of each transmission. Not bad, but certainly no help to the several fellows with whom we keep skeds on 432-Mc. c.w., where it showed up to the tune of more than 3 kc. With the oven-controlled low-input oscillator there was still some drift, the frequency moving down about one kilocycle, and then back again, in one-minute cycles. The oven was working, all right, but its thermostat was producing these 1-kc. excursions at 432 Mc. Removing the oven we found that the

[1] Tilton, "A Two-Band Station for the V.H.F. Beginner," Part II, *QST*, August, 1961.

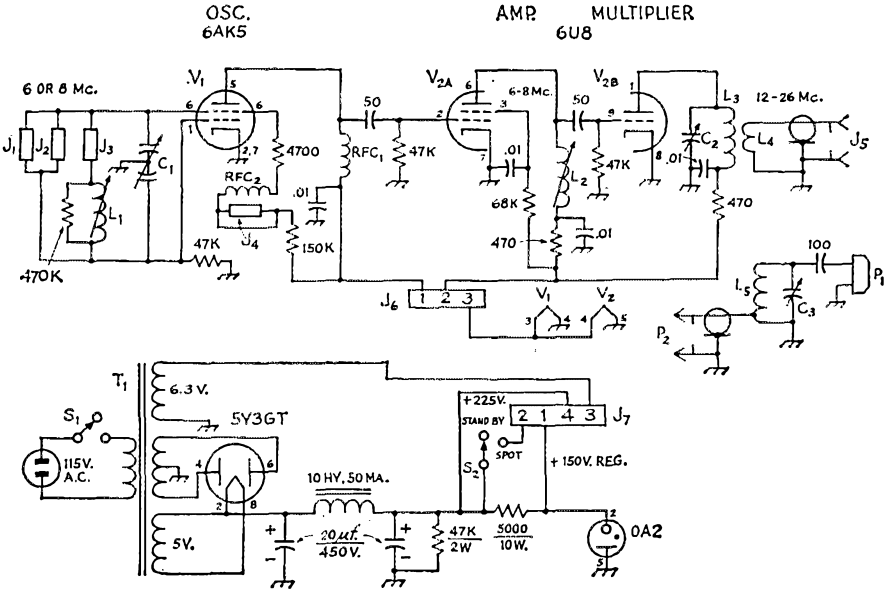


Fig. 2—Schematic diagram and parts information for the VXO and power supply. Unless specified, resistors are ½ watt. Decimal values of capacitance are in μf.; others in pf. Capacitors with polarity marked are electrolytic. Terminal strips J_6 and J_7 may be omitted and connections made directly where the power supply is built in. Pin 4 of J_7 permits use of the supply for other purposes.

C_1—100-pf. per-section split-stator variable (Hammarlund HF100-D).
C_2, C_3—50-pf. miniature variable (Hammarlund HF-50). Higher maximum capacitance (HF-100) may be used. Grounded-rotor type preferred.
J_1—Crystal socket for 0.05-inch pins, spaced 0.487 inch.
J_2, J_3—Crystal socket for 0.095-inch pins, spaced 0.487 inch.
J_4—2-terminal barrier strip. Omit if f.m. is not to be used. Remove jumper when f.m. is connected.
J_5—Coaxial receptacle.
J_6—3-terminal barrier strip.
J_7—4-terminal barrier strip.
L_1—16-24-μh., iron slug, ceramic form (Miller 4507).
L_2—24-35-μh., iron slug, ceramic form (Miller 4508).
L_3—3.5 μh., 21 turns No. 24 tinned, ½-inch diam., 32 t.p.i.
L_4—3 turns like L_3, spaced 1 turn from it. Make both from single piece of B&W Miniductor No. 3004.
L_5—Same as L_3, but tapped at 3 turns. Coax from L_5 to P_2 may be any convenient length.
P_1—300-ohm line plug.
P_2—Coaxial cable fitting.
RFC_1—750-μh. r.f. choke.
RFC_2—1.0 mh. r.f. choke.
S_1—S.p.s.t. switch.
S_2—S.p.s.t. switch. (See text).
T_1—Power transformer capable of delivering 200 to 250 volts d.c. at 50 ma. through filter, 6.3 volts a.c. at 1 amp. and 5 volts a.c. at 3 amp.

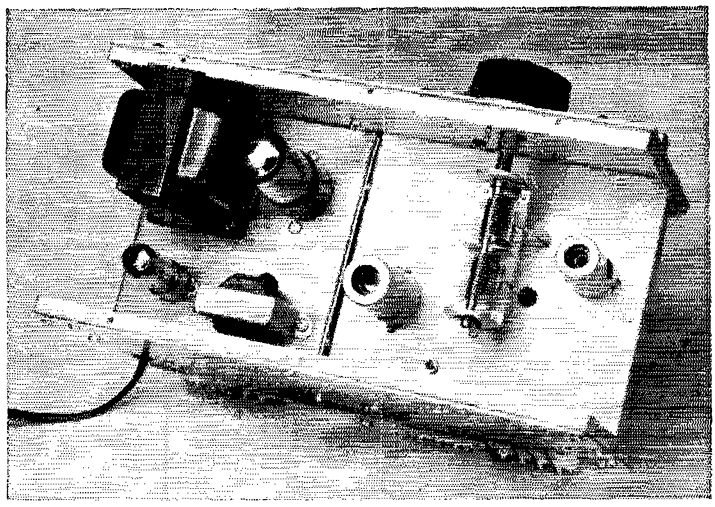


Fig. 3—Interior view of the VXO. The oscillator tube is at the right. The power supply, shown here as a separate assembly, could be built on the same chassis with the r.f. circuits, if the constructor wishes.

stability of our external oscillator was at least as good as that of the communications receiver used to check it. With a few minutes' warm-up it would hold close to zero beat on 432 Mc. for hours on end, and warm-up drift was less than 1 kilocycle at this frequency.

This is not exactly a startling discovery. We've known since time immemorial that oscillators, crystal-controlled or otherwise, should be used for frequency control only, and not as a source of driving power. However, this heating test pointed up the possibility of shifting the frequency with a variable capacitor, to provide flexible yet highly stable frequency control for all operation at W1HDQ, from 50 through 450 Mc.

The VXO Idea

There are several ways to pull the frequency of a crystal oscillator. An example of an elementary mechanical one was described in *QST* some years ago.[2] This is simple enough, but it works only with pressure-mounted crystals such as the surplus FT-243s, and it is not readily adapted to calibration. Voltage variation causes some shift, but not enough to do much good before the input goes too high or the output gets too low. Adding capacitance across the crystal[3] looked like the best bet. The swing obtainable can be increased by adding inductance in series with the crystal,[4] the amount being limited mainly by the degree of instability you are willing to accept.

With just variable capacitance (no series coil) the maximum usable swing is roughly 750 cycles for each megacycle of crystal fundamental frequency. A 6-Mc. crystal moves about 4 kc.; an 8-Mc. one about 6 kc., for crystals in the small metal hermetically-sealed holders. FT-243s and other pressure-mounted crystals having high holder capacitance *may* swing quite a bit less. There is a certain *total* capacitance at which each crystal goes out of oscillation, and it varies markedly from one to another, depending on crystal activity and mounting methods. Crystals made especially for VXO use may swing a bit more.[3] They're worth the price, if you want really flexible control and high calibration accuracy, with a minimum of crystal changing. Our pet is one that was not intended for swinging, but is the small type. Marked for 6000 kc., it covers 432.24 to 432.0 Mc. and 144.08 to 144.0, without use of the series coil. This gives us all the coverage we want for weak-signal c.w. work in these two bands, but it goes lower than 6000 kc., and if it had been ordered for a shade higher frequency it would have been more to our liking for 144-Mc. service. About 6001 or 6002 would have been ideal. Available swing is mainly on the *low* side of the marked frequency, with most crystals.

With the series coil, L_1 in Fig. 2, about three times as much variation is possible without serious degrading of the stability. This means 100 kc. per crystal at 50 Mc. and 300 kc. at 144, with average 6-Mc. crystals. 8-Mc. crystals do about as well. Rubberiness varies considerably when the series coil is used, as without it. One ordinary FT-243 8.3-Mc. rock in our surplus collection will swing from 50.34 down to almost the low end of the band before it becomes too unstable or drops out of oscillation, but don't plan on this kind of luck. The need for variable control is confined mainly to the low part of the band, and three or four crystals will do the job for most 6-meter men. Random spots higher in the band need not be swingers, ordinarily.

On two meters, precise control at the low end, and in the region just above 145 Mc., is nice, but other segments are well served with fixed or small-swing frequencies. Operation on 220 and 420 is almost always channeled to one narrow

[2] Engleman, "A Variable-Frequency Crystal Holder," *QST*, February, 1956.

[3] Shall, "VXO-II, Variable-Frequency Crystal Exciter," *QST*, July, 1959. Piezo Crystal Co., Carlisle, Penna., will supply crystals especially for VXO use, on order.

[4] Shall, "VXO — A variable Crystal Oscillator," Jan., 1958, *QST*, p. 11.; V.H.F. adaption by Saborsky, "A V.H.F. Variable-Frequency Crystal Exciter," *QST*, November, 1960.

segment of the band, easily handled with one crystal for each, even when the high-stability circuit is used, as it should be, for best results on the two higher bands.

A Practical VXO Design

Our photographs show an experimental VXO currently in use at W1HDQ. The case is handmade, and the power supply and r.f. units are on separate chassis. A standard box and a single chassis would serve at least as well. Layout is not critical except as described below.

The oscillator, V_1, is a 6AK5, but almost any small receiving r.f. pentode will do. The frequency is pulled by the split-stator capacitor, C_1, connected between plate and screen. The oscillator plate voltage is regulated 150. Input is held to about 3 ma., combined plate and screen, so this oscillator is not going to move much unless you move it with C_1. An r.f. choke is used in the plate circuit, instead of a resonant coil, as tuning here would tend to pull the frequency.

To build up the very-low oscillator output to a usable level, and to provide isolation, a buffer amplifier follows, using the pentode section of a 6U8, V_{2A}. This tube was selected because it has the lowest grid-plate capacitance of any dual tube of the pentode-triode class. The triode portion V_{2B}, is a multiplier, the output frequency depending on the crystals used. Provision is made for covering 12 to 26 Mc. with C_2L_3. The plate circuit of the pentode amplifier is broadly tuned, and an intermediate setting of the slug in L_2 can be found that will permit use of either 6- or 8-Mc. crystals in the oscillator. The plate circuit of the multiplier may then be tuned to the second, third or fourth harmonic of 6 Mc., or to the second or third of 8 Mc. Which output frequency you use may depend on the type of circuit into which the VXO works. More on this later.

Mechanical layout of the oscillator portion was dictated by the need to keep circuit capacitance to a minimum. The lower the total capacitance in the circuit, the higher the frequency will go with C_1 at minimum, and the wider swing you'll achieve per crystal. This rules out crystal switching, though if convenience outranks crystal economy in your objectives, switching can be used. Crystal sockets are mounted on a Plexiglas insert in the front panel, instead of directly on the metal. The tuning capacitor is shimmed up an extra quarter inch above the chassis, to hold down its minimum capacitance, and r.f. leads through the chassis have half-inch clearance holes. Any one of these steps yields little, but combined they net quite a few more kilocycles coverage at 432 Mc. This dividend is at the low-C end of the range of C_1, where oscillator stability is at its best.

Three crystal sockets, J_1, J_2 and J_3, are wired so that a crystal may be plugged into the circuit either with or without the series coil. Two different types of sockets in parallel, J_1 and J_2, permit small-pin or large-pin crystals to be plugged into the high-stability low-swing portion of the circuit. Use a wider variety of sockets if your crystal stock requires it, though each one adds a little capacitance.

Any crystal you plug into this circuit will oscillate on its fundamental, including those intended for overtone operation. Most crystals above 12 Mc. are overtone types, the third overtone being used up to about 50 Mc. A crystal marked for 24 Mc. will oscillate near 8 Mc., but not necessarily at exactly one-third the marked frequency. If you're ordering crysta's especia ly for this purpose, we recommend 6 to 6.5 Mc., which will cover 50 to 52 Mc., 144 to 148, 220 to 225 and 432 to 450 Mc. The output frequency would then be, preferably, 12 to 13 Mc., as this will allow the crystal oscillator stage of most

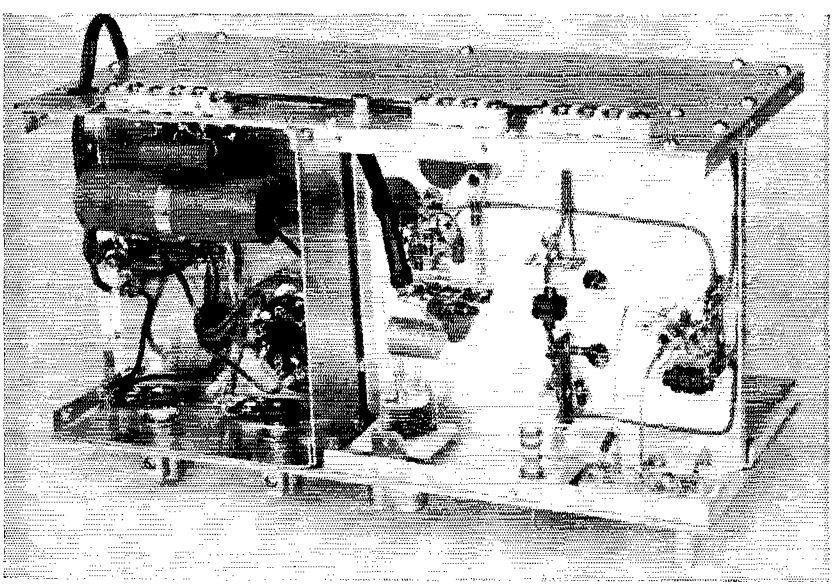


Fig. 4—Bottom of the VXO. The oscillator components are at the right, the amplifier and multiplier stages near the center, and power supply at the left.

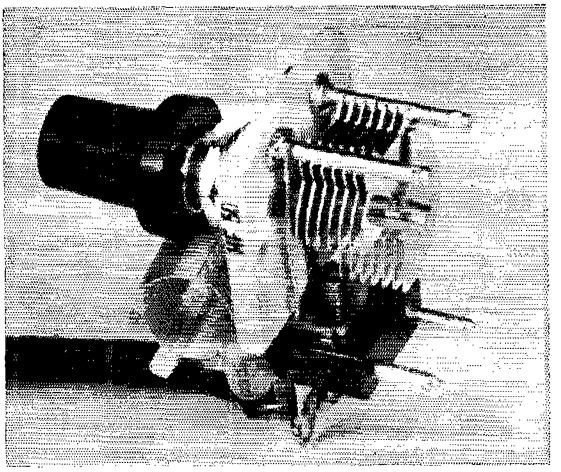


Fig. 5—Coupling assembly to be used for plugging into the exciter driven by the VXO. Components are L_5, C_3 and P_1, of Fig. 2. The tuned circuit covers 12 to 26 Mc. A larger variable capacitor may be used to make the value of L_5 less critical, if desired.

v.h.f. transmitters to work as a frequency multiplier when driven by the VXO. Use of 8-Mc. crystals and 24-Mc. VXO output is usually satisfactory where the first stage in the transmitter proper is a pentode, but triodes are likely to give self-oscillation trouble, unless operated as multipliers.

Coupling to the Transmitter

The coupling system shown in Figs. 5 and 6 is not the simplest way of hooking the VXO to a transmitter, but it has certain advantages. Low-impedance coupling terminated in the tuned circuit, L_5C_3, permits use of any convenient separation between the VXO and the transmitter. R.f. from the plug, P_1, can be fed in o the transmitter in several ways. Some experimenting may be needed with your setup, but typical circuits are shown in Fig. 6.

Triode Overtone Oscillators. Don't try to plug directly into the crystal socket without modifying the circuit. Mounting an extra socket, J_2 in Fig. 6A, allows you to return to direct crystal control at will, yet gives optimum transfer of power from the VXO. Remove the regular crystal from J_1 when the VXO is used, of course. With the capacitive feedback circuit, Fig. 6B, the 50-pf. capacitor should be shorted out, and the VXO output fed to J_1.

Pentode Oscillators. The pentode crystal oscillator circuit used in many *Handbook* v.h.f. transmitters should have its cathode r.f. choke shorted by means of a switch. So should the 6CX8 pentode oscillator used by the writer in the 50- and 144-Mc. rigs described in August, 1961, *QST*,[1] and the similar circuits in the 1963 *Handbook* v.h.f. station. Plugging into the crystal socket may work with such circuits, but more reliable operation is likely when the cathode is grounded for r.f., as with S_1 in Fig. 6C.

Another possibility in working into an existing transmitter is to disable the transmitter crystal oscillator, and couple into the grid of the second stage from the VXO. Opening the screen or B-plus lead of the first stage, as is done with S_2 in Fig. 6C, is handy for this, and a crystal socket may be connected to the grid of the second stage, as shown by J_2 in Fig. 6C. Here again, reversion to standard crystal control is easy.

Simplification is possible when the VXO is built directly into a transmitter designed for it. Here, the output of the isolation amplifier will be sufficient to drive a frequency multiplier to 24 Mc., so one stage is saved compared with the system wherein the VXO is used to work into the crystal oscillator stage of a transmitter designed for 6-, 8- or 24-Mc. crystals. But don't skip the buffer amplifier; its functions are vital.

Operation

For maximum stability, particularly in 432-Mc. c.w. work, we leave the VXO on continuously during an operating period at W1HDQ, and preferably warm it up a few minutes before going on the air. This way there is almost no frequency change, except those deliberately made by moving C_1.

Refinements in the spotting technique can be made to suit the operator's preference, though we use the circuit as shown. With power applied to the amplifier and multiplier through S_2, the signal is just plainly audible on 432 Mc., when the heaters are on in the rest of the transmitter. It is stronger progressively on each lower band, but the signal from the oscillator alone is inaudible, even on 50 Mc. If you make a practice of zeroing the other fellow's frequency most of the time you may want to install a small relay, actuated by your main transmitter control, in parallel with S_2. Then leave the switch in the open position normally, closing it only for spotting purposes. A spring-return substitute for S_2 may be desirable in this case.

The series coil, L_1, is adjusted by the core stud seen on the front panel, just to the right of the crystal sockets. Moving the core into the coil raises its inductance and increases the swing per crystal. Some practice with various crystals will be needed before you know just what to expect from each one. The coil comes into play only when the crystal is plugged into J_3. Instability increases with inductance, and also with

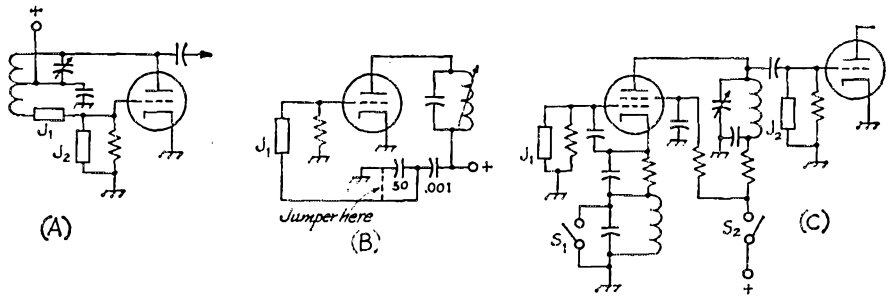


Fig. 6—Modifications of various crystal oscillator circuits for conversion to amplifier or multiplier service with VXO drive. A and B are typical triode overtone oscillators. C is a popular pentode oscillator. Two options are shown here. To convert the oscillator to a multiplier stage, close S_1 and S_2 and feed drive into J_1. The oscillator may be disabled by opening S_2, in which case drive is fed to J_2.

increasing capacitance in C_1. Listen to the note critically, and check for mechanical effects when the unit is jarred. Don't push your luck, or expect to swish all over the band with one crystal, even though you'll find one now and then that will make this possible. A movement of 100 kc. at 50 Mc. or 300 kc. at 144 should be possible with most crystals before the instability approaches that of even a good v.f.o.

F.M. and Other Possibilities

Frequency modulation of the variable oscillator is a cinch. A small audio voltage inserted at J_4 will give good-quality f.m. on 144 Mc. and higher, even with the high-stability oscillator arrangement. For 50-Mc. work it may be necessary to use the series-coil circuit to get enough deviation for good audio recovery at the receiving end. All that is needed is a microphone transformer, a flashlight cell and a carbon microphone. Remove the jumper shown across J_4 in Fig. 1, of course.

A topnotch f.m. signal can be generated with a very simple audio amplifier having a limiter, and a good microphone. Swinging the frequency with a varactor diode across C_1 offers interesting possibilities, but another *QST* article on this subject is in the works, so we merely drop the hint at this time.

If f.m. is not to be used, omit J_4, RFC_2, and the 4700-ohm resistor, and connect Pin 6 to the 150K dropping resistor.

For several years the writer has been playing off and on with a heterodyne version of the VXO. This supplies super-stability, very high calibration accuracy, and continuous coverage of 50 to 50.9, 144 to 147, all of the 220-Mc. band and 432 to 450 Mc. bands. It's complicated, and fairly expensive, requiring at least 4 tubes (without power supply) and 8 special crystals. We've had quite a hassle getting rid of spurious beats, and we still do not have a final form evolved, but some considerable use of experimental models of the device at W1HDQ indicates that it is worth the effort, to the few who seek the ultimate in signal quality. If there is enough interest, we may yet produce a "picture version." Until then, the equipment described above will enable us to say, "Look for me on 432.032 Mc.," and be able to deliver, confident that we will not only be there, but will *stay*, until we need to move.

QST

NOTICE

The Cleveland Amateuradio Convention, Inc., has reluctantly been obliged to cancel plans for a 1963 ARRL National Convention in that city, October 4–6, because of insurmountable difficulties in compiling a program schedule adequate to meet the requirements for approval by the League. We join the convention committee in expressing regret that this action was necessary.

Strays

K5MOJ would like to hear from other amateurs who are interested in astronomy and radio-astronomy. Write Maynard Soileau, 602 Chataignier St., Villa Platte, La.

COMING A.R.R.L. CONVENTIONS

July 6-7 — West Virginia State, Jackson's Mill

Aug. 31 and Sept. 1 — Atlantic Division, Washington, D. C.

September 14 — Kentucky State, Lexington

September 14–15 — Dakota Division, Sioux Falls, South Dakota

September 28 — Ontario Province, Hamilton

October 11–13 — Southwestern Division, San Diego, Calif.

October 26–27 — Midwest Division, Wichita, Kansas

November 29–30 — Delta Division, Lafayette, Louisiana

Simplified Transmission-Line Calculations

BY B. R. HATCHER,* K1SAW

A SECTION of transmission line having an electrical length of a quarter wave can be used as a transformer to match a load resistance to another transmission line. The quarter wave section is often referred to as a Q section, and its characteristic impedance is given by:

$$Z_Q = \sqrt{Z_T R_L}$$

where Z_T is the characteristic impedance of the line to be matched, and R_L is the load resistance.

The first nomogram, Fig. 1, may be used to determine Z_Q when Z_T and R_L are known. To use the nomogram, connect the values of Z_T and R_L with a straight line. The intersection of the line with the Z_Q scale gives the impedance of the Q section required for a match.

The length of a quarter wave line is given by:

$$\text{Length (feet)} = \frac{246\ V}{f\ (\text{megacycles})}$$

where V is the velocity factor (about 0.975 for air insulated lines with ceramic spacers at intervals of a few feet). Odd multiples of a quarter wave may also be used if it is more convenient; the required characteristic impedance is the same as for a single quarter wave.

For amateurs, Q-section transformers are most readily adapted to parallel-conductor transmission lines. While manufactured Twin-Lead is readily available on the market, often one requires an impedance other than the 75-, 150-, or 300-ohm line available commercially.

* South Road, Pepperell, Mass.

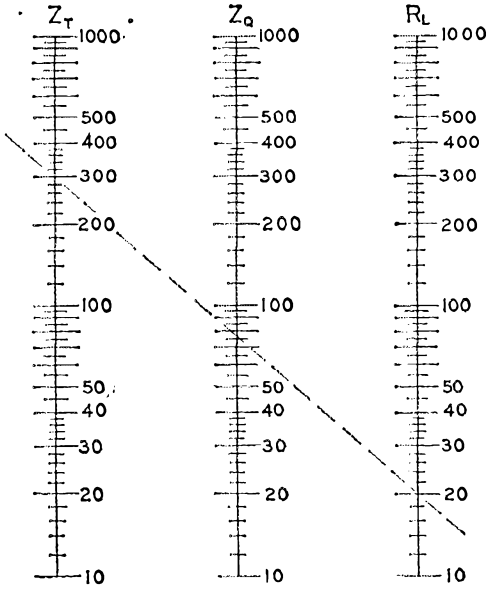


Fig. 1—Nomogram for determining characteristic impedance of a quarter-wave matching section when load resistance and desired impedance are known. Example (dashed line) shows that for matching a 20-ohm load to a 300-ohm transmission line a quarter-wave section having a characteristic impedance of 75 ohms is required.

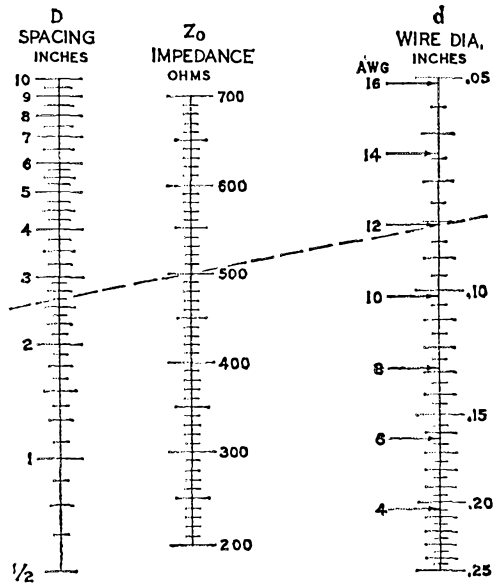


Fig. 2—Conductor diameter, center-to-center spacing, and characteristic impedance of parallel-conductor lines are related by this nomogram. If any two are known, the third can easily be found by drawing a straight line. The dashed line illustrates the solution of Example 1 in the text.

In the second nomogram, Fig. 2, the scale D is the center-to-center spacing of the conductors, measured in inches and fractions of an inch. Z_0 is the characteristic impedance of the line in ohms, and d is the conductor diameter in decimal fractions of an inch. Also on the d scale are indicated several points representing various A.W.G. (B&S) wire sizes.

The nomogram is used by drawing a straight line through any two known quantities. The third quantity is given by the intersection of the straight line with the appropriate scale.

Example 1

It is desired to make 500-ohm line using No. 12 wire. What should the spacing be?

Solution

Draw a straight line through 500 ohms on the Z_0 scale and A.W.G. 12 on the d scale. The straight line intersects the D scale at 2⅝ inches, which is the required spacing.

Example 2

A piece of transmission line has 0.25 inch diameter conductors spaced 3 inches on centers. What is the impedance?

(Continued on page 148)

15-year old WNØDTJ led 'em all in the 1963 Roundup with over 26,000 points. Brooks has worked all states, made CP15 and RCC and puts in a special word of praise for WØJJT, who helped him obtain his license.

1963 Novice

Roundup Results

THE 12th ARRL Novice Roundup found many first-time contesters burning the midnight oil during the first two weeks of February, the 2nd-17th. The event was a whale of a success with logs received from 309 Novices, 91 non-Novices and a sprinkling of non-competing! This represents an increase of about 35% over the previous year — scores up too, as the tabulation will show. Comments were enthusiastic and indicated that the patient help of the Generals was really appreciated.

Top score this year came from the Midwest Division where WNØDTJ, of Nebraska, scored better than 26K, *f.b.*! There were many others demonstrating the quality of operating that means fine contest operating in coming years. In fact, all the following lads topped the 10,000 mark in the Roundup:

WNØDTJ	26,474	WN9ESH	13,776
WN8FFO	23,936	WN9CSR	13,104
WN6AWT	21,045	WN4JTI	12,192
WN5CTC	18,000	WN9FEW	11,616
WNØCVA	15,510	KN1VWL	11,374
WN5DTP	15,288	WNØBOQ	10,950
WN2DKQ	14,304	WN8DGE	10,830
WN5CNR	13,804	WV2WWN	10,127

Code proficiency certifications were way, way up for the period, easily twice the normal with N-R participants looking for those extra points toward their score. We'll see many of these fellows back in '64 (Feb. 1-16) to help a brand new crop in the annual ARRL Novice Roundup.

— *E. W.*

Non-Novice Scores

K1QPN 11,475, W1AW (W1WPR opr.) 7770, K1VTM 3162, K1BCS 2916, W1DMD 1640, K1NUN 1311, K1RKH 1120, K1VHS 636, K1WZY 492, K1VJE 342, K1PUA 209, K1WZX 196, K1USK 84, W1PIJ 72, W1MRQ 36. WA2WCG 7350, WA2JZM 3360, WA2YLL 2925, WA2ZRD 1558, W2BWW 1248, WA2WGI 1020, WA2VLK 460, WB2CON 396, WA2KIZ 372, WB2ABD 192, WA2PZD 175, WA2YDB 108, WA2JTB 80, WA2QPX 66, K3RJX 11,123, K3OJK 2208, W3MSR 728, K3VOP 189, K3URZ 25, K3KNB 9. K4VFY 9724, K4RIN 5840, W4LYV 3799, K4BWQ 3390, WA4EHL 1924, K4NOV 1248, WA4BIX 684, K4UWH 600, K4VGC 481, W4ZZV 432, WA4HFB 105, WA4CKD 30, K5IUH 9984, K5JIT 4600, WA6RUS 3286, W6OEO 1711, WA6KCP 855, WA6ZEB 312, WA6USQ 54, WA6VCQ 48, K6BXI/6 23, WA6YEE 1, K7LPZ 4862, K7QIE 1060, K8DOC 10,780, W8CXS 7708, K8SWW 4100, W8RGF 3708, WA8COZ 2241, WA8AGH 2175, K8MNG 1176, WA8BJD 286, K8KQV 144, WA8ASV 38, WA9EKJ 3296, WA9AUM 2910, WA9ATA 2000, WA9DMH 1900, W9DGA 1407, WA9BMG 1300, W9YYG 1260, K9EEH 850, K9HYE 682, K9UCP 420, K9DVK 319, W9CRN 280, WA9CVI 135, K9ZCB 84, W9ZDK 3. WØETT 6885, KØLHH 2964. WAØCVS 580, KØDET 18. WAØAFW 4, KP4BJU 20, KZ5MCN 2006.

Soapbox

"Worked 5 new states in the first 4 hours but couldn't work my own section." — *KN3SPC*. . . . "Most of the fellows caught on fast, but some — wow! I thought the contest would be over before I could explain!" — *WN9FBC*. . . . "A minor detail curtailed my activity during the first week of operation, had to take my Ph.D. preliminary exams, hi!" — *WN9FEW*. . . . "A great contest, the most fun of my Novice year." — *WN9ETJ*. . . . "Even though 40 was pretty rough most of the period, I had a wonderful time. A real thrill too, getting a call from Chuck at W1AW." — *WN8COR*. . . . "I found myself looking for new ways to make my operating more efficient and believe I'm a slightly better operator for it." — *WN8DXN*. . . . "Met some fine ops and hope to work everyone on the general bands soon with my new call. Thanks for a very pleasant two weeks." — *WN2ALF*. . . . "Working Alaska on 80 and a VE8 on 15 were my highlights." — *WN2DYV*. . . . "I can hardly wait till next year when, as a General, I can help the Novices work for points." — *WN2CRX*. . . . "Worked 19 states and two Canadian Provinces." — *WN6BDA*. . . . "Say, what happened to the South? Did it secede from the Roundup?" — *WNØDTM*.

SCORES

Scores are grouped by ARRL Divisions and Sections. The operator of the station listed first in each section is award winner for that section. *Example of listings*: KN3USF 6346-167-38-19, or, final score 6346, number of stations 167 number of sections 38, total operating time 19 hours.

ATLANTIC DIVISION

Eastern Pennsylvania

KN3USF.....6346-167-38-19
KN3TGJ.....3277- 93-29-26
KN3TEJ.....1000- 40-20-26
KN3UUN.....731- 43-17- 6
KN3TUY.....666- 37-18-10
KN3VBC.....480- 32-15-17

Maryland — District of Columbia

KN3SPC.....1728- 72-24-21
KN3VBD.....576- 48-12-22
KN3WBB.....63- 9- 7- 1

Delaware

KN3VSV.....2028- 78-26-11

Southern New Jersey

WV2WWN..10,127-232-41-40
WN2DDC.....2624- 82-32-30
WN2DCW...1000- 50-20-23

Western New York

WV2ZFF.....8550-170-50-18
WN2DGW...6192-157-36-34
WN2BGA.....3366- 99-34-38
WN2BYU.....1820- 65-28-25
WN2CIP.....1380- 50-23- -
WN2FPG.....880- 44-20- 8
KN1YSQ/2....570- 38-15-24
WN2FJU.....84- 6- 4- 2
WN2FVE.....70- 10- 7- 2
WV2ZQR.....60- 5- 4- 1
WN2CIQ.....48- 8- 6- 4

Western Pennsylvania

KN3VBL.....7544-164-46-39
KN3UKE.....6696-176-36-25
KN3VCH.....5376-158-32-40
KN3VTS.....1474- 67-22-10
KN3TLP.....703- 37-19- 5
KN3UZA.....342- 38- 9-11
KN3USC.....231- 21-11-10
KN3TYY.....40- 10- 4- 3

CENTRAL DIVISION

Illinois

WN9ESH...13,776-272-48-38
WN9CSA.....7191-143-47-26
WN9FBC.....6052-163-34-35
WN9DUV.....4884-122-37-27
WN9EOD.....2548- 91-28-21
WN9EXH.....2520- 75-28-12
WN9CRX.....2460- 72-30-40
WN9CIO.....2304- 72-32-15
WN9BPH.....1275- 51-25-10
WN9CWL.....1045- 55-19-16
WN9FYG.....192- 16-12- 7
WN9CHG.....140- 18- 5- 7
WN9FVZ.....140- 14-10- 2
WN9EVM.....90- 15- 6- 3

Indiana

WN9FEW . . . 11,616-222-48-40
WN9CRY . . . . 4323-121-33- –
WN9CET 2494- 71-29-34
WN9BQU 2204- 61-29-15
WN9CYW 432- 27-16- 8
WN9BXO 16- 4- 4- 5

Wisconsin

WN9CSR . . . 13,104-242-52-30
WN9FAB 7872-154-48-34
WN9CWH 6929-154-41-37
WN9ETJ 3333-101-33-24
WN9FWT 1441-121-11-22
WN9BVP 1355- 74-15-37
WN9EVJ 1275- 75-17-27
WN9EOO 1113- 53-21-11
WN9CWO 1089- 53-20-31
WN9ETW 760- 28-20-10
WN9FBO 392- 28-14-18
WN9FHP 130- 13-10- 9
WN9ESX 128- 16- 8-12

DAKOTA DIVISION

Minnesota

WN0DBW . . . 3201- 97-33-15
WN0FAM 6- 3- 2- 1

DELTA DIVISION

Arkansas

WN5DTP . . . 15,288-273-56-37

Louisiana

WN5ERC 1485- 55-27-19
WN5EID 45- 5- 3- 3
WN5FCT 18- 6- 3- 4

Mississippi

WN5CAC 2490- 83-30-27

Tennessee

WN4JTI 12,192-244-48-34
WN4UUM 5590-115-43-39
WN4HJK 3852-107-36-29
WN4JCD 2460- 72-30-23
WN4HZQ 297- 18- 9- 4
WN4HRK . . . . . 88- 11- 8- –

GREAT LAKES DIVISION

Kentucky

WN4KEY 4428-108-36-19
WN4HPP 1- 1- 1- 2

Michigan

WN8ETY 7770-175-42-24
WN8FEY 7605-195-39-34
WN8CZI 5318-117-34-13
WN8COR 3663- 99-37-35
WN8DIK 2754- 81-34-26
WN8EQZ 2656- 83-32-13
WN8FRD 1768- 58-26-22
WN8DLR 1577- 83-19-27
WN8FMI . . . . 1512- 63-24- –
WN8FRE 1314- 63-18-19
WN8GAO 946- 43-22-19
WN8CYQ 901- 43-17-16
WN8GES . . . . . 663- 51-13- –
WN8DFI 640- 40-16-32
WN8EMH 630- 70- 9-24
WN8ENV 585- 39-15-31
WN8FCA 525- 35-15-25
WN8DXW 85- 7- 5-13
WN8GRD 3- 3- 1- 3
WN8GME (WN8s DZI' GME) . . . . . 6076-189-31- –

Ohio

WN8FFO . . . 23,936-374-64-39
WN8EWT . . . 13,590-282-45-40
WN8DXA . . . 12,560-294-40-32
WN8DDM . . . 8692-212-41-29
WN8EKQ 6804-174-36-40
WN8CHK 5920-133-40-22
WN8EOZ . . . . 5040-134-35- –
WN8DZL 4800-135-32-32
WN8FXT 4428-123-36-24
WN8EFA 4218-114-37-37
WN8FGO 3876-114-34-31
WN8FKJ 3502-103-34-18
WN8EKR 3328-104-32-27
WN8EBE 3250-120-25-40
WN8EMD 2880- 96-30-26
WN8CXU 2788- 72-34-22
WN8DXN 2481- 77-27-29
WN8CWS 2150- 71-25-15
WN8HCF 2117- 68-29-36
WN8CHU 1628- 74-22-12
WN8DDS 1474- 67-22-35
WN8EFM 416- 26-16- 6
WN8FTW 330- 22-15- 5
WN8EQB 200- 20-10-21
WN8EEX 198- 22- 9-11
WN8GLF 143- 13-11- 8
WN8FCK 70- 10- 7-12
WN8GAH 9- 3- 3- 8

HUDSON DIVISION

Eastern New York

WN2BYJ 4350-145-30-12
WN2DXL 1694- 67-22-29
WN2CDV 1034- 47-22- 7
WN2AQD 650- 35-13-13
WV2ZWK 594- 33-18-18
WN2ERK 559- 38-13- 7
WN2DIU 551- 29-19- 7
WN2BUD 310- 31-10- 7
WN2ADQ 176- 44- 4-14

N.Y.C.-L.I.

WN2DKQ . . 14,304-298-48-36
WN2CRW . . . 6912-206-31-39
WN2DWK . . . 6438-164-37-34
WN2DBY . . . . 5664-152-32- –
WN2ALE 4340-140-31-23
WV2ZAH 4114-121-34-39
WN2CJW 3042-102-26-22
WN2CRL . . . . 2484- 77-27- –
WN2AEW 2461-107-23-23
WV2ZYC 1914- 72-22- 8
WN2DTH 1672- 88-19-15
WN2DBW 1554- 74-21-40
WN2ENW 1245- 83-15-20
WN2EMJ 1176- 56-21-30
WN2FBZ 1134- 44-21-13
WN2GDD 1003- 59-17-10
WN2ETF 976- 61-16-12
WN2DVJ 645- 33-15- 5
WN2DXM 516- 28-12-10
WN2DTV 250- 15-10- 4
WN2CKO 200- 20-10- 5
WN2ACF . . . . . 36- 36- 1- –
WN2FCB 1- 1- 1- 1

Northern New Jersey

WN2DDA 8106-193-42-38
WN2ALF 6176-178-32-28
WN2AUN . . . . 6123-142-39- –
WN2EIH 5320-152-35-20
WN2DYV 4323-131-33-30
WN2CQL 3751-121-31-22
WN2DER 3030-101-30-28
WN2BZW 2883- 93-31-14
WN2EZA 2838- 86-33-19
WN2DEG 2472-103-24-40
WN2CRX 2150- 71-25-18
WN2DEP 2060- 88-20-19
WN2FCT 1870- 75-22- 9
WN2CZZ . . . . 1298- 59-22- –
WN2DYJ . . . . 928- 58-16- –
WN2EUI 629- 37-17- 9
WV2ZSN 98- 14- 7-10
WN2GFO 1- 1- 1- 5

MIDWEST DIVISION

Iowa

WN0CVA . . . 15,510-282-55-38
WN0DKC 7245-161-45-22
WN0CZA 2250- 75-30-26
WN0DQN 516- 33-12-36

Kansas

WN0DPA 1612- 52-26-15
WN0DOZ 1600- 54-25-36
WN0DZI 6- 3- 2- 2

Missouri

WN0BOQ . . . 10,950-204-50-40
WN0DBZ 7785-173-45-31
WN0CWV 2619- 77-27-36

Nebraska

WN0DTJ . . . 26,474-411-62-40
WN0EGK 476- 24-14-13

NEW ENGLAND DIVISION

Connecticut

KN1YHM 5610-187-30-31
KN1WXN 5130-180-27-15
KN1WMQ 4320-110-36-36
KN1ZHH 3720-110-31- 9
KN1YPP 1540- 70-22-21
KN1YFE 1260- 55-18- 4
KN1YHF 527- 31-17- 5
KN1ZND 520- 25-13-26
KN1YGS 403- 31-14- 5
KN1WKA 120- 15- 8- 7

Eastern Massachusetts

KN1VWL . . . 11,374-222-47-35
KN1ZSY 6444-179-36-40
KN1YJK 5412-164-33-30
KN1ZFV 4681-151-31-33
KN1WLU 4290-115-33-19
KN1WLV 3663-111-33-21
KN1VXB 3161- 94-29-12
KN1YOT 2280- 85-24-19
KN1YFD 1817- 64-23-27
KN1ZLG 1428- 57-21- 8
KN1ZQC 858- 66-13-22
KN1UNP 180- 15- 6- 1

Western Massachusetts

KN1YMS 3144-121-24-40

New Hampshire

KN1WPM 3720-110-31-27
KN1YCC . . . . . 1680- 70-24- –
KN1ZBU 1062- 59-18-14

Rhode Island

KN1YUL 5760-134-40-25
KN1YYL 76- 9- 4- 3
KN1WXY 4- 2- 2- 2

Vermont

KN1YJT 2128- 61-28-31

NORTHWESTERN DIVISION

Oregon

KN7TKC 432- 36-12-11

Washington

KN7UMJ 2187- 81-27-32
KN7VDY 1456- 46-26- 8
KN7UMS 1365- 65-21-30
KN7TXP 1197- 57-21-33
KN7UQG 540- 45-12-22
KN7SQT 319- 29-11-15
KN7TTZ 154- 22- 7- 7
KN7UYQ . . . . . 15- 5- 3- –
KN7VRB 8- 4- 2- 5

PACIFIC DIVISION

Santa Clara Valley

WN6CAA 3658-103-31-30
WN6BDA 1840- 82-20-40
WN6HFH 920- 45-20- 5
WN6BZL 880- 55-16-21
WN6CEP 820- 41-20-18
WV6YQZ 88- 22- 4- 3
WN6BIG 4- 2- 2- 4
WV6ZLV 2- 1- 1- 1

East Bay

WN6CNV 1387- 73-19-16
WV6YXU 153- 17- 9-12

San Francisco

WV6VVQ 5733-132-39-26
WN6BIK 4658-137-34-27

Sacramento Valley

WV6ZTH . . . . 2370- 79-30- –
WN6AVE 630- 35-18-35
WN6BAD 532- 38-14-11
WN6AQW 44- 11- 4-10

San Joaquin Valley

WV6ZLP 1596- 74-19-40
WN6AUI 1161- 43-27-15
WN6BLM 442- 34-13-32

ROANOKE DIVISION

North Carolina

WN4ISW 2295- 70-27-40
WN4LGG 1988-781-28-20
WN4JBV 360- 30-12-10
WN4JAO 90- 10- 9- 5
WN4FLY 54- 9- 6- 6

South Carolina

WN4JQZ 595- 35-17-17
WN4LBO 55- 11- 5- 9

Virginia

WN4KVR 9450-215-45-21
WN4FSD . . . . 4576-128-32- –
WN4KSJ 3842-113-34-38
WN4HBR 88- 11- 8- 7
WN4LIS 48- 8- 6- 4

West Virginia

WN8DGE . . . 10,830-265-38-33
WN8GOV 288- 24-12-28
WN8EUA . . . . . 176- 16-11- –

ROCKY MOUNTAIN DIVISION

Colorado

WN0DTM . . . 9114-186-49-32
WN0DQK 1408-101-38-40
WN0DGL 1992- 73-24-23
WN0DFX 1350- 50-27-18

Utah

KN7UNY 855- 45-19-12
KN7VRT 108- 12- 9- 6

SOUTHEASTERN DIVISION

Alabama

WN4HSH 2430- 81-30-39

Eastern Florida

WN4IRE 1680-130-36-26
WN4INI 1755- 55-27- 7
WN4FNH 840- 32-20-12
WN4IIO 2343- 71-33-40

Western Florida

WN4JIM 6847-167-41-37
WN4MIC 4998-119-42-32
WN4HLB 429- 20-13-11

Georgia

WN4JOB 150- 15-10-16

West Indies

WP4BJJ 2508- 66-33-23
WP4BIS 2407- 83-29-17
WP4BLW 169- 13-13- 7

SOUTHWESTERN DIVISION

Los Angeles

WN6AWT . . . 21,045-345-61-36
WN6AGT 5733-147-39-26
WN6BIV 5412-123-44-39
WV6YNC 1750- 70-25-11
WN6ALX 1584- 72-22-21
WN6CEG 495- 30-11- 7
WN6CSO 392- 28-14-14
WV6ZJK 264- 24-11- 7
WN6ARH 234- 22- 7-22
WN6AQV 184- 23- 8- 8
WN6CLY 140- 14-10- 6

Arizona

KN7TTJ 5624-152-37-29
KN7SVB 4674-113-38-26
KN7VUB 36- 18- 2- 6

San Diego

WN6BRN 4680-120-36-26
WN6BTC 2821- 91-31-23

WEST GULF DIVISION

Northern Texas

WN5CGU 4576- 94-44-26
WN5BJS 2992- 88-34-35
WN5EQQ 660- 44-15-39

Oklahoma

WN5CTC . . . 18,000-285-60-29
WN5DQT . . . 12,096-209-54-32
WN5EOQ 5240-116-40-38
WN5FFK 2000- 80-25- 7
WN5EQA 160- 10- 8- 1

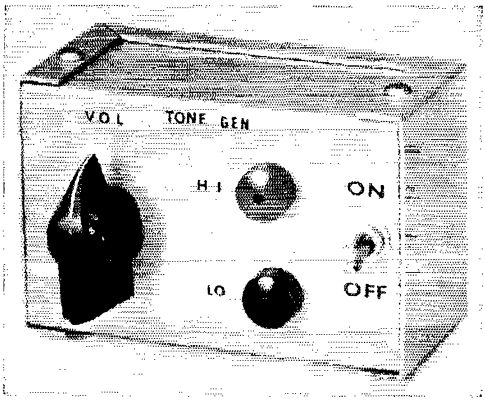
Southern Texas

WN5CNR . . . 13,804-223-58-40
WN5ESR 1876- 57-28- 7
WN5EBC 392- 28-14-12

Check logs: WA2DSR W2-HAZ W2MUM WA2RGK W5ARJ WA5BCT WA5CBL WN6GGA K9HSK.

Activity was hot in the Central Division with all 3 section leaders topping 10K. Leading this active pack was Illinois' top contender, WN9ESH, with a home-brew 6AG7-1625, R-55 receiver and an inverted-Vee.

If your s.s.b. transmitter has no built-in provision for two-tone testing with a single audio tone, a two-tone audio generator is what you need. With its help you can adjust the linear for maximum output without flattening, and can get a good estimate of your p.e.p. input. This one will fit in your pocket — without taking much out of it!



An Accessory for S.S.B. Testing

BY MICHAEL I. NEIDICH,* K2ENN

Pocket-size dual audio oscillator for making two-tone tests. Using transistors in *RC* oscillator circuits, it is entirely self-contained.

Two-Tone Test Oscillator Using Transistors

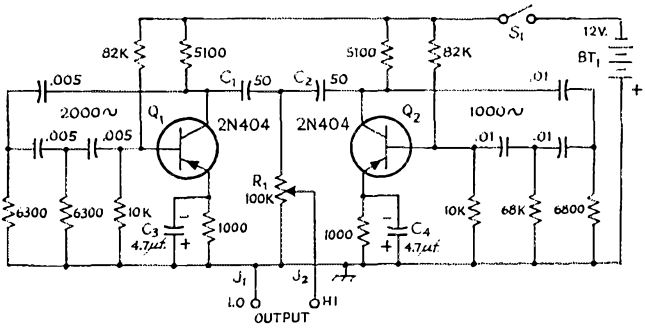
This miniature — in both cost and size — two-tone transistorized test oscillator, along with an oscilloscope, will enable the s.s.b. operator to obtain and calculate the maximum undistorted output power from his rig.

The theory of the two-tone test may be found in the ARRL *Handbook*, and should be read and understood before making any measurements. This article is concerned primarily with the operation and construction of the test oscillator.

The circuit is given in Fig. 1. It consists of two transistorized *RC* phase-shift oscillators, one at 1000 c.p.s. and the other at 2000 c.p.s. Their outputs are combined through C_1 and C_2 and fed to the output-level potentiometer R_1.

Except for values, the two oscillator circuits are identical. Each uses a common-emitter amplifier (Q_1, Q_2) and a three-section *RC* phase-shift network. The network shifts the phase of the collector signal by 180 degrees and applies it back to the base. Since the signals at the base and collector are 180 degrees out of phase to begin with, a loop phase shift of zero occurs at the frequency at which the network produces 180 degrees of shift. The attenuation which the signal suffers in passing through the phase-shift network is made up for in the amplifier. Thus when the loop gain

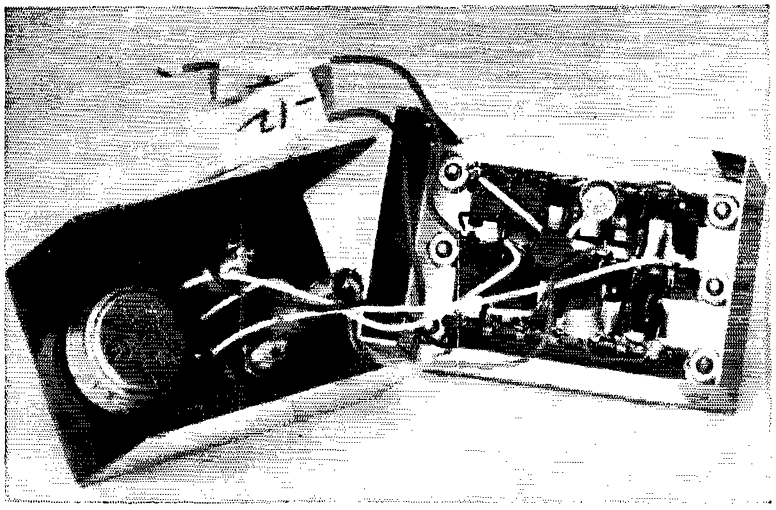
* 931 Walt Whitman Rd., Huntington Station, L. I., N. Y.



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

Fig. 1—Circuit diagram of the two-tone test oscillator. Capacitors not listed below are 25-volt ceramic. Resistors are ½ watt, 10 per cent tolerance or better.

BT_1—Transistor battery, 12- to 15-volt (Burgess Y10).
C_1, C_2—Mica or ceramic; see text.
C_3, C_4—4.7-μf. tantalum, 3 volts.
J_1, J_2—Pin jacks.
R_1—0.1-megohm control, audio taper.
S_1—S.p.s.t. miniature toggle.



The oscillator circuit wiring is supported between three tie-point strips mounted parallel with each other on one piece of the Minibox. The volume control, output tip jacks and on-off switch are mounted on the other piece of the box.

is unity, oscillation occurs.

The oscillator shown in the photographs was built in a 3¼ × 2⅛ × 1⅝-inch Minibox, though a slightly larger box would have made assembly less crowded. Essentially, the component arrangement follows the circuit diagram. However, any convenient layout may be used since the circuit is not the least bit critical. Be sure to use sleeving where necessary to prevent accidental contact between wires.

It is recommended that RCA brand 2N404s be used, and that C_3 or C_4 not be made any smaller. This is done in an effort to maintain equal-output signals from both oscillators.

To place the unit in operation, connect the 12-volt battery and turn S_1 on. R_1 will allow smooth adjustment of the output signal from the millivolt level to approximately one volt peak-to-peak. This should be adequate for microphone inputs of average sensitivity. Should more output be required, increase the value of C_1 and C_2, keeping the two equal at all times.

Having connected the output of the oscillator to the microphone input, tune up the transmitter with a dummy load and couple some of the output r.f. to the vertical plates of the oscilloscope and sync the scope in. The transmitter should be adjusted for maximum power output without flat-topping of the waveform on the scope. When this is done, the power may be calculated by using the following formula:

Peak-envelope Power Input =

$$E_B I_B \left[1.57 - 0.57 \frac{I_Q}{I_B} \right]$$

where E_B is the d.c. plate voltage, I_Q is idling plate current, and I_B is the two-tone d.c. plate current. The relationship is accurate if the amplifier is perfectly linear and the two tones are sinusoidal and have equal amplitudes. Under other conditions, the error may be appreciable. QST

Strays

The FCC occasionally slips up and issues the same call letters twice, but WØDIB (both of them) wonder how often two licensees with the same call have worked each other. It seems that Paul Matthews of Denver, Colorado, was mistakenly issued WØDIB last January, although the same call already belonged to Tom Wildman of Mitchellville, Iowa. The two men got together on the air on April 8 and have, of course, exchanged QSLs. They've also arranged to exchange pictures of their WØDIB licenses. Paul's call has since been changed to WAØDIB.

—···—

Dr. Sam Rosen, WA2RAU, has long had an on-the-air friendship with ZS6BDV, Issy. A few weeks ago, Doc took a trip to radio row in New York, and as he stepped up to one of his favorite parts counters, he heard another customer tell the clerk, "I am ZS6BDV from Johannesburg, South Africa, and will be in New York about two days. While I am here, I would like very much to contact a ham called Doc, WA2RAU. His telephone number is unlisted and I cannot reach him." A million in one shot, enabling two good radio friends to meet.

—···—

The Rev. Arthur Shepherd, G3NGF, is compiling a register of Methodist radio amateurs, clubs, and short-wave listeners. Those interested may register with Arthur for membership in WAMRAC (World Association of Methodist Radio Amateurs and Clubs), 121 Main Street, Asfordby, Melton Mowbray, Leicestershire, England. The first WAMRAC Activity Weekend was held May 24-26, with participants from Singapore to Indiana.

Automatic Gain Control for C.W. Reception

BY WILLIAM SABIN,* W4YFA

MODERN practice in receiver design is to use a so-called product detector in conjunction with a high-speed a.g.c. for c.w. reception. A properly operated product detector reduces spurious outputs caused by adjacent signals beating with each other, and the a.g.c. limits the range of variation of the signal level reaching the detector. This article is concerned with the rather special requirements of the a.g.c. circuit for good c.w. reception. The technique discussed is then applied to an old receiver.

To begin, we will assume that your "old faithful" has been equipped with a new product detector and that it performs as advertised. We will assume also that, having been knocked off your chair a few times by the c.w. kilowatt down the road, you are properly impressed with the large-signal output of the detector and with the need for an automatic (and fast!) level control.

Requirements for C.W.

For c.w. reception the "manual" mode of operation is usually preferred. That is, the audio gain is left in a more-or-less fixed position and the sensitivity, or r.f. gain, control is used to adjust the output level. Basically, we try to find a setting at which a desired signal can be received adequately with a minimum of interference from an undesired signal. Practically, the maximum setting is determined by the loudness of the strongest signal within the passband, assuming there is a limit of endurance for the operator.

Now when the receiver is wide open to pull through a weak signal and our former friend across town comes on, that's when we would like to have some a.g.c. in a hurry. The trouble is, of course, that the a.g.c. drives the desired signal into oblivion, since the receiver is now desensitized. At best, the weaker signal fluctuates up and down in accordance with the stronger one. No simple receiving system can overcome this problem completely, but if we can reduce the sensitivity control to a point at which a.g.c. action becomes unobjectionable, very often our educated ear can once again read the weaker signal in the presence of a stronger one. We accomplish this by establishing some definite signal level beyond which a.g.c. action occurs. For weaker signals, true manual gain control is retained. We select a level such that a substantial amount of signal is delivered to the detector. The audio control sets the loudness of this level at the headphones. The flatness of the a.g.c. action assures that no signal will be louder than this level. Finally, the a.g.c. should not permit the receiver to generate annoying clicks or spurious outputs.

In short, we desire to use a very fast a.g.c. as an ear-saving adjunct to the normal manual-gain mode of operation.

Extensive experimentation and listening tests, culminating in a very hectic Sweepstakes Contest, indicate that a "double-loop" system provides a very satisfactory effect. A fast-attack, fast-recovery a.g.c. is applied to the i.f. stages. The gain of these stages is brought up between dots. A fast attack, medium-speed-recovery a.g.c. is applied to the first r.f. stage. This bias holds between words at 25 w.p.m. and may be thought of as a kind of "signal-conditioning" whereby the hotness of the receiver is adjusted to suit the signal. The practical result is that the sensitivity of the receiver is turned down and the clipping action which is taking place becomes much less prominent. (Severe clipping can be quite fatiguing after a while.) Also, the readability of a weaker signal, in the presence of a stronger one, is materially improved automatically.

Hardware

Fig. 1 is the circuit arrangement used by the author in an SP-200X Super-Pro (vintage 1940, a good year!) and is one aspect of a more extensive modernization. This receiver, as modified, is intended for c.w. reception, primarily.

The input to the a.g.c. amplifier is taken from the plate of the last i.f. stage. A trimmer capacitor adjusts the coupling and establishes the level at which a.g.c. action begins. In the author's case no trouble was caused by b.f.o. leakage into the a.g.c. amplifier, but other situations may require caution in this respect.

The cathode follower provides a low source impedance for the a.g.c. rectifier. This helps to speed up the response.

The a.g.c. rectifier is an adaptation of what is known as a pumping circuit. The charge acquired by C_1 on the positive swing of the i.f. cycle is pumped into C_2 and C_3 on the negative swing. For this action to occur, the signal must exceed the back bias on V_{1C}. This is the old familiar delayed-a.g.c. idea in modern dress.

*Re-Entry Systems Dept., General Electric Company, Cincinnati 15, Ohio.

An "ear-saver" a.g.c. system that goes to work at a preset level below which the manual gain control operates normally. As in all c.w. a.g.c. systems, the b.f.o. must be isolated from the a.g.c. rectifier, a requirement that can be met by many product-detector circuits without further change in the receiver.

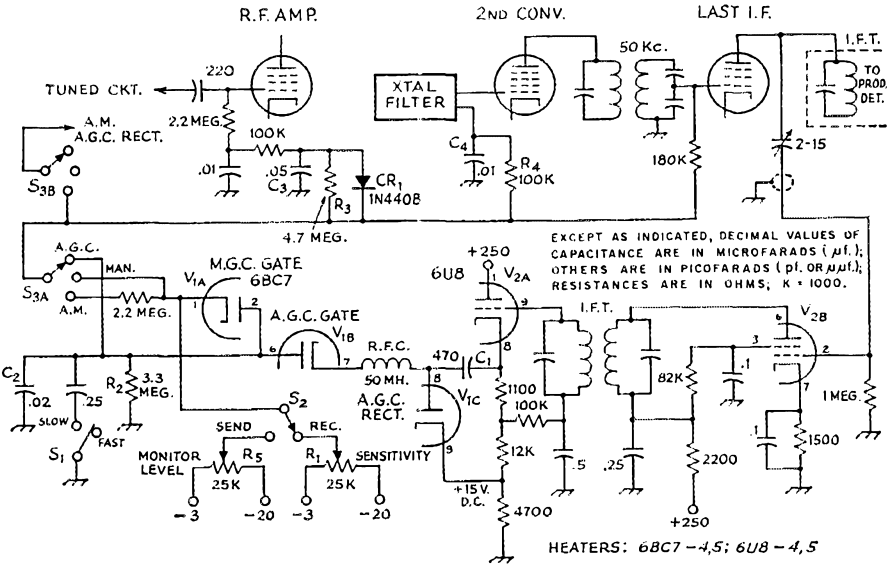


Fig. 1—The c.w. automatic gain control circuit as applied to the SP-200X receiver. Method of applying a.g.c. voltage to i.f. and r.f. stages in other receivers may differ in detail, depending on grid-return circuits. See text for discussion of proper time constants. Resistors are ½-watt composition; capacitors below 0.01 μf. may be ceramic or mica, higher values ceramic or paper. Component designations not listed below are for text reference.

R_1, R_5—Linear-taper control.
S_1—S.p.s.t. toggle.
S_2—S.p.d.t. toggle.
S_3—Rotary, 1 section, 2 poles, 3 positions.

As the voltage on C_2 builds up, V_{1A} becomes reverse biased and the sensitivity control is taken out of the circuit. This makes the a.g.c. response characteristics independent of control setting.

The voltage on C_2 is applied immediately to the 50-kc. i.f. stage and shortly thereafter to the other stages. The decoupling circuits are necessary evils and cannot be eliminated in our simple system.

When the signal suddenly disappears, C_2 discharges quickly through R_2. C_4 discharges a little more slowly. C_3 discharges even more slowly through R_3 because CR_1 in this case is reverse biased.

A comment is in order regarding the amount of a.g.c. decoupling and filtering actually needed. Audio beat frequencies produced in the a.g.c. rectifier, as well as the intermediate frequency itself, can get back to the various grids and cause oscillations and cross-modulation. The latter effect is aggravated if the various tubes have poor remote-cutoff control characteristics. The end result is that most of the beneficial effects of the product detector are destroyed. So a minimum amount of filtering is unavoidable. The filtering delays the time response a little.

Finally, the stages having a.g.c. applied should have a stiff voltage source for the screens. Otherwise, the response tends to become "thumpy" due to fluctuating screen voltages.

Conclusions

The author has not tried to present a sure-fire recipe for every receiver, but rather to disseminate his own experiences and observations. No startling innovations are claimed or implied. The techniques described are well known to professional receiver designers (which the author is not) but perhaps not by all basement experimenters.

The results have been highly satisfactory and represent a valuable improvement in the receiver. A.g.c. cannot by itself pull an S3 signal out of a wolf pack of American kilowatts, of course (there's a real challenge for you!). The major benefit is that a lot of the fatigue and knob-twisting, while listening for weak signals, is eliminated.

We invite experimentally inclined c.w. enthusiasts to try their luck on their own receivers, if the factory has not already provided an adequate a.g.c. for c.w. reception. QST

Strays

K4AIP, K4NQQ, and WN4MIV, all of Smyrna, Georgia, plan a DXpedition through the Appalachians in July. The three will stop their truck-trailer at the highest points of twelve states and will send special QSLs to those stations contacted, with a certificate to stations contacted from five or more locations. Operating dates are between 4 P.M. and 1 A.M., EST, July 11–27. Details on time, date, location and frequencies are available on request from Arnold Constable, WN4MIV, 212 Stonecreek Road, Smyrna, Georgia. The boys will top their trip with a visit to ARRL Hq.

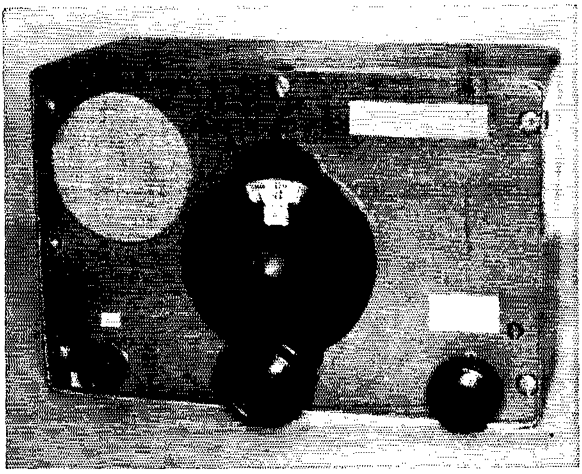


Fig. 1—The 50-Mc. transistor receiver, in a box 5 by 7 by 4 inches in size. The vernier dial tunes the converter oscillator. At the lower right is the antenna trimmer, and at the left an r.f. gain control and switch. A small self-contained transistor broadcast receiver, which serves as the i.f. amplifier and audio system, is mounted behind the speaker opening.

A 50-Mc. Double-Conversion Transistor Receiver

Good Performance and Portability at Moderate Cost

BY WILLIAM L. NORTH,* W4GEB

HERE is a double-conversion 50-Mc. superhet that can be built in 10 to 15 hours, at a cost of less than 35 bucks. Both figures are subject to considerable variation; the skilled junk-box operator will be able to shade them by appreciable margins. Construction is made simple and inexpensive by using a small transistor broadcast receiver for the i.f. and audio, and then adding a 50-Mc. tunable converter ahead of it. Obviously, the choice of the broadcast package so used is a major factor in the over-all cost and performance of the finished product.

* 712 Hallwood Ave., Falls Church, Virginia.

The broadcast receiver used in this instance was selected because one like it, purchased for entertainment purposes, appeared to be quite sensitive and selective. It requires only two penlite cells for power, and it costs less than $14. Being only about the size of a package of king-size cigarettes, it converts easily into a compact v.h.f. receiving unit. A wide range of such receivers is available, both above and below the one used here in both performance and price. It is not anticipated that difficulties will be encountered in using other receivers in this way. Battery voltage is not critical, but there is reason to believe that better 50-Mc. reception might be possible with 6 to 9 volts, as commonly provided in many other receivers.

The 50-Mc. Front End

The converter portion of the 50-Mc. receiver, Fig. 2, consists of a tuned r.f. stage and an autodyne mixer-oscillator. The oscillator is tuned by means of a vernier dial on C_2. The r.f. stage tuning is also brought out to the front panel, at the lower right in the front view, Fig. 1. This may be used to compensate for different receiving antenna characteristics, and enables the user to keep the input circuit precisely tuned. The oscillator and mixer circuits could be gang-tuned, but peaking the mixer tuned circuit, L_3, at the middle of the desired frequency range is quite satisfactory.

Since most activity is concentrated in the lower portion of the band, only this segment is covered. The mixer is peaked at 50.8 Mc., and the oscillator may be set to cover 50 to 51.5 or 52 Mc. without need for mixer retuning. The oscillator circuit, L_6-C_2, actually operates at half the desired injection frequency, the second harmonic being used to heterodyne the incoming signal to an intermediate frequency of 1610 kc. The oscillator tuning range is about 24.2 to 25.2 Mc., to cover the lower half of the 50-Mc. band. Operating the oscillator in this way avoids interaction with the 50-Mc. tuned circuits, and works out

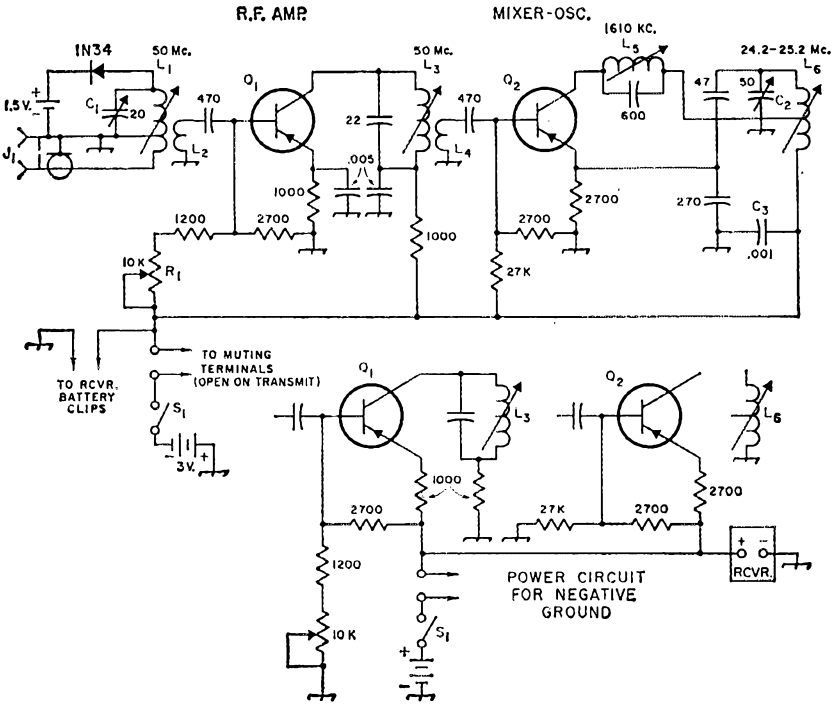


Fig. 2—50-Mc. converter used ahead of the broadcast receiver, to provide a complete transistor superhet. Decimal values of capacitance are in μf.; others in pf. Unless otherwise specified, capacitors are ceramic, resistors ½-watt composition. Power circuit changes for negative-ground receivers are shown at the lower right.

C_1—20-pf. shaft-type trimmer.

C_2—50-pf. shaft-type trimmer.

J_1—Coaxial fitting.

L_1, L_3—8 turns No. 24 c.c. wire, closewound on ⅜-inch brass-slug form. Tap L_1 at 1 turn.

L_2—1 turn No. 24 c.c. over cold end of L_1.

L_4—1 turn No. 24 c.c. over cold end of L_3.

L_5—53 turns No. 32 enam. wire, closewound on ½-inch iron-slug form.

L_6—15 turns like L_1, center-tapped.

R_1—10,000-ohm control, with switch.

S_1—Switch on R_1.

Q_1, Q_2—V.h.f. transistor (Philco 2N1742 used here).

very satisfactorily. Stability is good, and peaking the antenna trimmer does not swing the oscillator frequency. The antenna circuit tunes quite sharply, and it is good practice to keep it peaked on the received signal. With the antenna connected the circuit can be peaked on noise, in the absence of any signal.

The r.f. gain control, R_1, also on the front panel, is connected in a forward base-biasing circuit recommended by the transistor manufacturer. Increasing the base bias in the direction of the collector bias causes increased collector and emitter current, with a consequent voltage drop across R_1 and its 1200-ohm series resistor. This results in lowered emitter-to-collector voltage, and decreased gain.

The penlite cell and 1N34 diode in the antenna circuit provide protection for the r.f. amplifier transistor. These are not necessary components for receiving, but if a 50-Mc. transmitter is to be used with the receiver the protective device is recommended. The diode, which is reverse-biased, acts as a heavy load on L_1C_1 when the r.f. peak voltage across this circuit exceeds about 1.5 volts. Another cell and diode, polarized opposite from these, could be placed across L_1C_1 for additional protection, but this has not been found necessary by the writer.

Construction

The photographs show the external and internal appearance of the receiver, though considerable variation from this should be permissible. The aluminum case is 5 by 7 by 4 inches in size. While a metal enclosure may not be a necessity, it tends to eliminate stray pickup of signals and noise in the broadcast receiver's normal tuning range.

The first step in layout work is to determine the placement of the broadcast receiver. Inasmuch as the converter i.f. output is inductively coupled to the broadcast set's loopstick, the placement of the receiver should allow ample room for mounting L_5 in the desired position. When this determination has been made, a chassis for the receiver can be designed to suit the materials on hand and the form factor desired. In constructing this receiver, the following simple steps were taken.

First, a hole the size of the receiver speaker grille was cut in the panel at the appropriate location. The receiver batteries were removed,

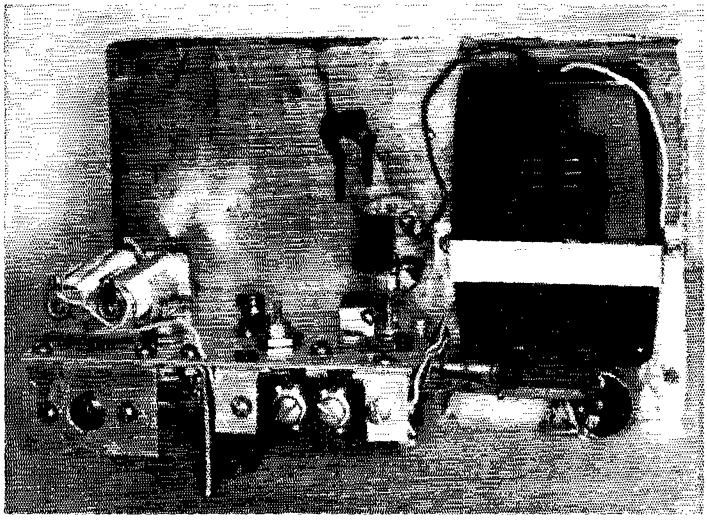


Fig. 3—Interior view of the 50-Mc. receiver. The transistor broadcast receiver is at the right. Note the mixer plate coil, L_5, mounted horizontally, below the receiver case, for coupling inductively to its built-in loopstick.

and leads soldered to the battery clip terminals. These were made long enough to feed through an opening in the plastic case of the receiver, to the external battery and the switch to be used for the complete 50-Mc. receiver. The latter, S_1, is part of the gain control assembly, and is mounted at the lower left side of the panel, as seen in the front view.

A small aluminum chassis was fabricated and fastened to the panel. Its layout took into consideration the facts that r.f. leads had to be short, L_1 should be shielded from L_3, and the i.f. output coil had to mount parallel and close to the receiver's loopstick. Because the broadcast receiver has a plastic case, no tampering with its r.f. circuits is required.

The receiver is fastened to the front panel with a bracket of aluminum. It is set at the high end of its tuning range, 1610 kc., and normally left with its gain control about halfway on. With new batteries there was ample volume with this setting, but as battery voltage dropped off it became necessary to raise the audio gain. A finger-sized hole was punched in the end of the case to provide access to the control. The r.f. gain control on the converter provides ample volume control, even on strong signals, so a panel control for audio gain is not needed.

The broadcast receiver used in this application has the positive side of the battery grounded. This serves as a common bus, to which the transistor emitters and base-biasing circuits are returned. Modifications for negative ground are shown in Fig. 2. In this case, C_3 may be eliminated. Break-in terminals for operating in the push-to-talk mode are shown. These are not mandatory, but they are handy for single control of the send-receive function.

Adjustments

Putting the receiver into operating condition is quite easy. *Before* plugging the transistors into the converter, resonate L_1 and L_3 with a grid-dip meter near the middle of the desired portion of the 6-meter band. The inductance of L_1 should be adjusted with C_1 near the middle of its range.

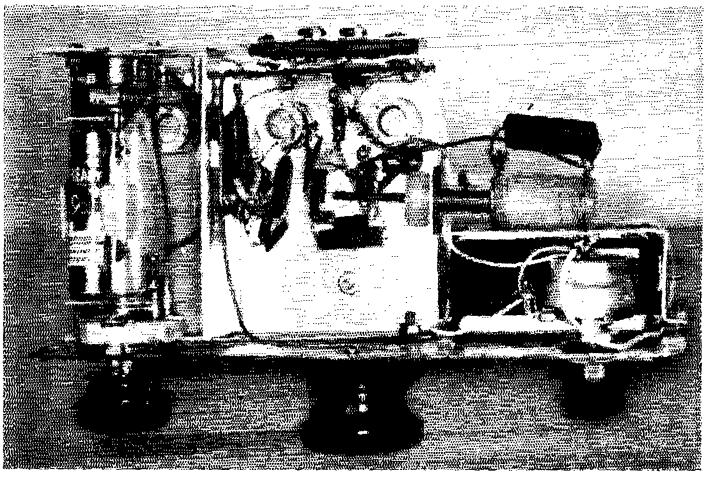


Fig. 4—Bottom view of the 50-Mc. receiver. The input circuit is at the upper left. The two coils in the upper center are the mixer and oscillator circuits. The large coil at the right is the i.f. output at 1610 kc.

Next resonate L_1C_2 to the middle of its range. Next resonate L_1C_2 to about 24.5 Mc., using the dipper. Adjust L_5 for about 1610 kc.

Connect a 1-ma. meter across the muting terminals. With the receiver switch off and S_1 open, plug in Q_2. Now turn S_1 on. If the converter oscillator is working properly there will be 0.25 to 0.5 ma. of current, and touching the stator of C_2 will cause a slight rise. If no oscillation is in evidence, it is likely that the tap on L_1 will have to be moved up. In some cases it may be necessary to connect the end of L_5 directly to the top of L_6, though if this has to be done oscillation may be less stable.

Now check the frequency of oscillation. This can be done with a general-coverage receiver that will tune the 24-Mc. region, or with a grid-dip meter in the *indicating* position, coupled to L_6. The slug in L_6 can be adjusted so that C_2 will give the exact frequency range desired. Disconnect the meter and jumper the muting terminals together temporarily.

Open the switch, plug in Q_1, and close the switch again. Advance the gain control, R_1, to about three-fourths on. Adjustment of C_1 and L_3 should result in peaking of the background noise, if an antenna is connected to the converter input. A signal generator is helpful, but not necessary, for these adjustments. You are now ready for 50-Mc. reception.

Results

The sensitivity of the completed receiver has not been checked accurately, but with only a folded-dipole antenna nearly all signals heard in this area are audible here. The frequency stability is excellent, and the r.f. gain control is very effective, reacting only slightly on the local oscillator frequency. With new batteries and the receiver's gain control set about half open, volume is adequate on local signals. If the audio is run too high speaker vibration tends to cause an audio howl, due to microphonic effects in the oscillator tuning capacitor. This does not occur at reasonable audio levels.

Since you don't get something for nothing, it should be recognized that the over-all performance depends to a large extent on the characteristics of the broadcast receiver used in this way. Noise limiter, b.f.o. and some other features usually found in the best communications-receiver setups are lacking, but the author is more than satisfied with his investment in this receiver. Using it and a low-powered transmitter, operating on 50 Mc. has turned out to be a lot of fun. QST

High Claimed 1963 DX Contest Scores

WE may be in a period of poor conditions but DX Competition scores reflect anything but that! Fantastic multipliers on the lower-frequency bands account, in part, for the following totals in the 29th ARRL DX Competition held this past February and March. Final and complete results will appear just as soon as checking has been completed. In the following tabulation only those *claimed* c.w. scores over 200,000 points and those phone scores over 100,000 points are listed. Following the call is the *claimed* score, multiplier and number of contacts.

C. W.

Single Operator

HC1DC....1,028,565- 95-3609
W3GRF....684,603-307- 743
YV5AGD...657,972- 98-2238
W4KFC....630,576-302- 701
W8FGX....624,600-300- 694
W4YHD....602,920-284- 710
W3ECR[1]....604,299-289- 697
K4RDE[2]....507,486-281- 604
W9EWC[3]....498,304-272- 612
W4DHZ....490,248-264- 619
W8VSK....477,717-289- 555
W4DQS....466,070-265- 586
KV4CF....463,266- 69-2238
HP1IE....456,459- 71-2143
W3ALB....445,050-258- 575
W2FXN[4]....440,505-251- 585
W4RQR....396,988-244- 543
CE1AD....372,408- 59-2106
K1DIR....337,662-222- 507
XE2OK....333,933- 79-1502
W2GGE....331,785-219- 505
W3EIV....330,750-225- 490
W2AYJ....328,536-216- 507
W3BES....327,240-216- 505
K1RTB....319,220-220- 547
W3OCU....309,258-207- 502
WA2OJD...307,632-208- 493
YV4AV....303,844- 74-1416
KP4CC....297,600- 62-1600
K2GUN....296,730-210- 471
W9ERU....294,168-206- 479
W4MCM...284,745-205- 463
HK7BE....284,580- 62-1545
W6EPZ....279,642-209- 446
W6ZDF/KM6
277,068- 66-1400
W2WZ....272,958-194- 469
W3IYE....268,983-209- 429
HK7ZT....263,952- 72-1232
W2HO....262,200-190- 460
ZP9AY....259,740- 65-1337
W6KG....254,412-191- 444
G4CP....252,180- 60-1481
GW3JI....251,883- 57-1473
W4BCV....249,039-177- 469
W3MVB....241,878-182- 443
W1JYH....241,773-203- 397
CE3AG....241,152- 64-1256
W4DXI....234,585-195- 401
W3HHK....229,710-190- 403
W5BRR....228,288-192- 397
JA1VX....225,992- 52-1454
W5CKY....225,792-196- 384
W8ZJM....223,440-196- 380
W1BIH....222,870-190- 402
HB9JG....222,805- 55-1352
W3GHS....219,096-179- 408
W6HOC....216,948-202- 358
W6GRX....216,876-186- 389
W6LDD....215,895-185- 389
W9RQM....209,208-184- 379
W3KT....208,071-183- 379
PAØLOU....206,754- 51-1380
W4CKD....204,660-180- 379
W1FZ....204,174-171- 398
W3EQA....201,872-176- 385
HL9KH....201,135- 53-1265

Multiple Operator

W3MSK...1,139,280-376-1010
W6RW....682,872-296- 769
W3WJD....658,035-315- 697
W3TMZ....657,972-294- 746
W4KXV....621,291-281- 737
K6EVR....610,896-286- 712
WØNFA....524,552-266- 662
PJ5ME....484,902- 62-2607
W3KFQ....417,972-244- 571
W3MWC....394,092-246- 534
W3ADO....386,552-229- 564
W3GRS....380,457-231- 549
W3GHM....367,710-227- 540
VP9L....337,557- 53-2123
W4BVV....320,400-225- 475
ON4DY....254,676- 57-1501
W2SKE....251,526-206- 407
WB2APG...232,179-193- 401
W1MX....229,080-184- 415
HA1KSA...201,824- 53-1272

PHONE

Single Operator

XE1CCB... 588,200- 80-2452
XE1CV....585,298- 97-2016
HC1DC....487,272- 79-2058
K5MDX....332,232-218- 509
YV5AGD...318,087- 81-1309
LU1DAB...259,302- 46-1878
VP5BP....241,215- 65-1234
KZ5AF[5]....237,750- 50-1581
YV1IK....204,724- 62-1105
TG9SC....202,566- 53-1274
W2FXN....198 432-156- 420
K2GXI....195,816-164- 405
PJ2AF....181,610- 55-1102
VR3O....173,880- 69- 845
W4BVV....165,416-156- 355
VP3HAG...164,142- 66- 828
W3ALB....141,384-137- 344
W3TLN....130,875-125- 349
W3OCU....122,220-126- 331
CO8RA....119,970- 62- 666
VP7CX....112,926- 59- 638
K1RTB....107,744-112- 336
KZ5LC....103,776- 47- 736
WA6IPY...102,279-103- 331

Multiple Operator

W3MSK....676,392-232- 827
W6HJT....426,624-202- 704
W8NWO....206,190-174- 395
W3WJD....180,272-152- 396
W3ADO....173,584-152- 382
W2SKE....165,168-148- 372
W8NGO....107,442-127- 282

[1] W3MFW, opr. [2] K4SXT, opr. [3] W9SZR, opr. [4] W3SQX, opr. [5] KZ5GRS, opr.

Strays

Hams of seven Phoenix, Arizona, high school radio clubs formed a Council of Clubs recently. They would like to hear from other high school clubs. Write to Washington High School ARC, 2217 West Glendale Avenue, Phoenix, Arizona.

The Gus-Watchers

BY JOHN G. TROSTER,* W6ISQ

QST QST CATS Net -- hey, I just worked Gus at 5R8CE/FH8 on the Comoros. He's on 14,032 answering at 026. Good S-6. Already made out the QSL."

"Yeah — good go, we know. All the CATS worked Gus last night. But you'd better change the call. Gus is FR7ZC/FH8!"

"Nooooooo — he signed 5R8CE/FH8."

"Nope, he was FR7ZC/FH8 last night."

"You sure he's still on the Comoros?"

"Hold it, fellas. I heard the east coast calling FR8CE/FH8 last night."

"Listen, tonight I distinctly heard a W9 who was working him, and it was FH8CE/FB8.'

"Yeah, must be Frank Baker 8 — that's what it gives for the Comoros in DXCC — why not?"

"You're all wrong. He was signing FH8CE — no 'slant'. He was FH8CE the first time he was on the Comoros. Why change now?"

"Ya know, maybe Gus went back to the Tromelins."

"Naw — but maybe the Gloriosos. Not many west-coasters worked him from slant G."

"I'm sure he was signing slant something."

"I'll bet he's not on the Comoros yet . . . maybe."

"Maybe a pirate."

"Naw, that was Gus' fist."

"Didn't you guys listen to him sign?"

"Heck no — too busy jockeying for position — and what do ya mean, 'you guys'?"

"What did Don Chesser's DX mag . . . ahhh 4KVX . . . say he'd sign?"

"Dunno — not due until tomorrow. Darn it — I'm gonna change my subscription to Airmail Special Delivery tomorrow!"

"Well, look. There's no reason to sign 5R8CE/-FH8. If anything, he'd sign FR7ZC/Frank Baker 8 — like the prefix in DXCC. Ya know, he was using that FR7 call on other islands."

"I tell you, fellas — five minutes ago, Gus signed 5R8CE/FH8. I worked him — wherever he is — and he hasn't changed islands since last night. I tell ya, he signed 5R8CE/FH8 — I'm sure . . . ahhh . . . almost."

"Well, look, fellas, this ought to settle it. A couple of nights ago I heard a VK QSOing a Zed-S and I'm *almost sure* the Zed-S said Gus was going to the Comoros yesterday and would use FH8CE 'slant' something . . . I'm almost . . . "

"CQ CATS Net — Gus was working 'em fast about 14,032 — but he's QRT-ed now. All through with that island, I guess."

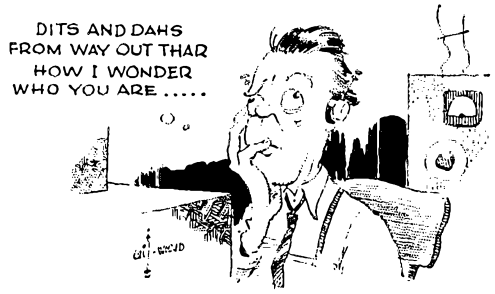
"What call was he using?"

"Yeah, what call?"

"W4BPD/FB8"

"Whaaaaattt???"

"I said W4BPD/Frank Baker 8 — or maybe it was Frank Henry 8 — or something 'slant' like that I don't know. Why, what's the difference?"



"W4BPD/FH8! I'll tell ya what's the difference! Even if it was 'slant FH8', that's the most ridiculous one yet!"

"What's so ridiculous about him using his own call?"

"Ya just can't, that's what."

"Well, he could, ya know, if you guys would write Barry, W7UGA/K3UIG and your Senators about S.920, and your Congressmen, and get that reciproc . . . "

"Ok, ok, ok, righto friend, first thing . . . "

"Yeah, like I said, bet Gus would like to sign W4BPD/AC7 'er somethin'. He could, ya know, if you guys would write. And you guys could sign your own calls . . . "

"Yeah, how about that??? Maybe next vacation I could be a EA6 or a OY — brrrr . . . too cold. Lessee, where were we — oh — ok-ok first thing in the morning. But what about now? What's Gus' call? And what island's he on?"

"Now look, you guys — everybody's worked him. I vote for FR8CE/FB8."

"Noooo — it's FR7ZC/ Frank *Honolulu* 8.

"But Frank *Baker* 8 is the Comoros DXCC call."

"Well, all you guys are going to cause a lot of trouble at Ack's. Because you ain't gonna get a QSL unless you use 5R8CE/FH8 — ahh, I'm almost sure . . . "

"Look, let's be logical! We're absolutely certain . . . well, maybe . . . that Gus is on the Comoros! All right now, follow this. He used FR7ZC/T on the Tromelins, right? He used FR7ZC/E on Europa, right? He used FR7ZC/G on the Glorious, or Gloriyuses, or Gariocas or whatever they were, right? Sooooo, isn't it *obvious* it *has to be* FR7ZC/C?"

"Yeah, sounds good to me."

"Well, I don't know . . . I'm almost certain he was signing 5R8CE/FH8 tonight . . . I think . . . "

"Be logical, he has to be signing FR7ZC/C."

"Yeah, that FR7ZC/C sounds ok to me. I'm gonna send old Ack my QSL for FR7ZC/C."

"I don't see how '5R8' can sound so much like 'FR7'."

(*Continued on page 152*)

*45 Laurel Ave., Atherton, Calif.

The 4-1000A in Grounded Grid

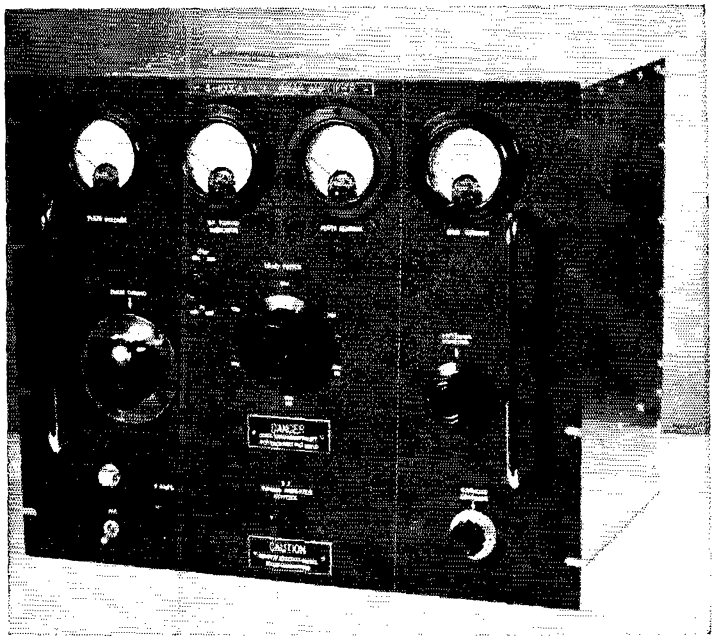


Fig. 1—K9LKA's kilowatt 4-1000A grounded-grid amplifier. Meters across the top of the panel are, from left to right, for plate voltage, relative r.f. output, plate current and grid current. The band-switch control is in the center, flanked by the plate tuning control and capacitor switch S_2 on the left, and the output loading control on the right. Along the bottom are the filament switch, panel lamp and fuse; r.f.-indicator sensitivity control, and the input tuning control.

Most high-power triodes available at surplus prices do not have a sufficiently high amplification factor to permit zero-bias operation. Tetrodes may be converted to high-μ triodes by connecting the screen to the control grid. However, in the case of most tetrodes, this connection results in excessive control-grid dissipation at the driving-power level required to obtain normal rated output. The 4-1000A is one of the few exceptions to this rule[1] and is also one that is available in usable condition at relatively low cost from a number of sources. The triode connection results in considerable circuit simplification, especially in grounded-grid operation, since regulated bias and screen supplies are eliminated and neutralization is not required.

Zero-Bias Triode Operation in a 1-Kw. Linear

BY LARRY KLEBER,* K9KLA

MANY construction articles describe radio gear that is almost impossible to duplicate with facilities available to the ordinary ham because of unusual mechanical requirements. Complicated gearing, chain drives or special metal shapes that require power tools found only in machine shops sometimes cause an otherwise excellent article to be passed by. In addition to the mechanical problems, cost is frequently completely out of reach for the would-be constructor.

Here is a kilowatt linear amplifier covering 10 through 80 meters that has several features to recommend it to the fellow who wants to increase power. First of all is the cost. Using all new parts, except the meters which are readily available from used- or surplus-equipment sources, the total expenditure will be less than $150 plus the cost of the tube. If you are willing to do some horse trading, scrounging and junk-box raiding, you can do it for considerably less. Type 4-1000As from broadcast or police radio transmitters are readily available at prices from $20 to $50. Surplus JAN tubes are listed by several *QST* advertisers, and they are regularly offered in Ham-Ads. Remember, the Eimac 4-1000A is built like a Mack truck and, once you have acquired one of these tubes in good condition, you can expect years of satisfactory service if you don't abuse it by overdriving the grid. That is why a grid-current meter is mandatory.

Secondly, construction is extremely simple. All mechanical work can be performed with ordinary hand tools. An electric drill will cut the con-

* 922 Whitney Blvd., Belvidere, Illinois.

[1] The Eimac data sheet on the 4-1000A as a grounded-grid triode qualifies this by adding, ". . . if a plate voltage of at least 3000 volts is used." — Editor.

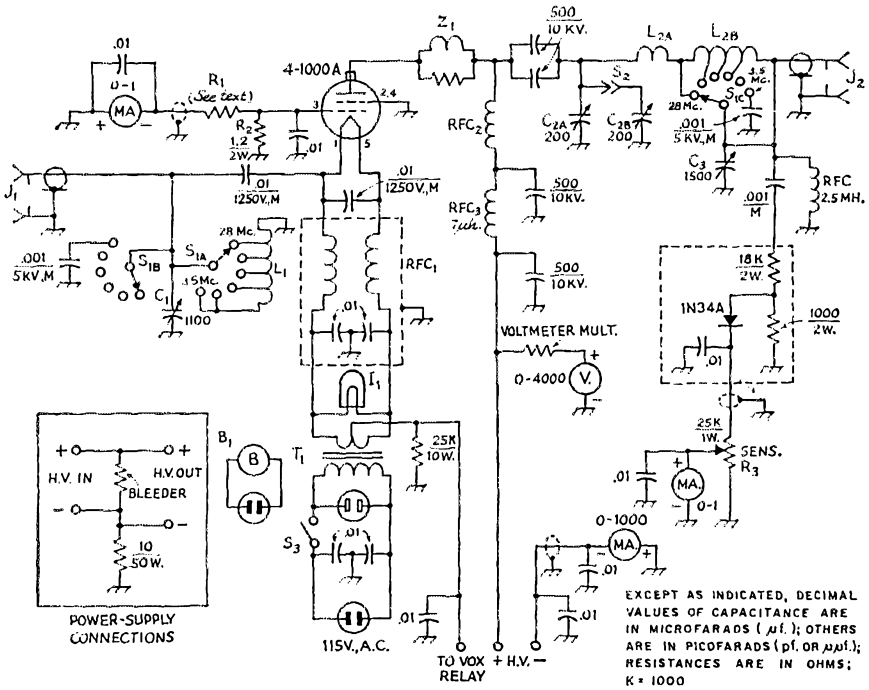


Fig. 2—Circuit of the 4-1000A grounded-grid amplifier. The 500-pf. 10-kv. fixed capacitors are TV doorknob type; others are 1-kv. disk ceramic, except M indicates mica.

B_1—Centrifugal blower, 60 c.f.m. at 0.6-inch static pressure (Ripley 8472).

C_1—Triple-section broadcast-replacement-type variable, 365 pf. or more per section, sections connected in parallel.

C_2—Dual air variable, 200 pf. per section, 7000 volts (Johnson 152-503/200CD70).

C_3—Air variable, 0.03-inch plate spacing (Cardwell PL-8013 or B & W 51241).*

I_1—6-8-volt panel lamp.

J_1, J_2—Chassis-mounting coaxial receptacle (SO-239).

L_1—6 turns No. 10, 1½-inch diam., 1½ inches long, tapped at 1¼, 1⅞, 2½, and 4⅛ turns from ground end.

L_2—Approximately 14 μh., tapped at 7, 3.5, 2.5 and 1.75 μh. (Barker & Williamson 850A band-switching inductor).

R_1—Approx. 27 ohms; see text.

R_2—Made up of four 4.7-ohm ½-watt carbon resistors in parallel.

R_3—Linear control.

RFC_1—30-amp. bifilar filament choke (B & W FC30A).

RFC_2—Solenoid r.f. choke (B & W 800).

RFC_3—Solenoid r.f. choke (Ohmite Z-50).

S_{1A-B}—Single-section double-pole six-position ceramic rotary switch, 60-degree index (CRL 2551).

S_{1C}—Heavy-duty single-pole six-position rotary switch (part of L_2 coil assembly, modified as described in the text).

S_2—See text.

S_3—S.p.s.t. toggle switch.

T_1—7.5-volt, c.t., 21-amp. filament transformer (Stancor P-6457, Chicago F-725).

Z_1—2 turns No. 8, ½-inch diam., shunted by three 150-ohm 1-watt carbon resistors in parallel.

* The Cardwell capacitor is listed in the 1963 Allied catalog. The B & W capacitor, which is identical, is not stocked by B & W as a retail item, and may or may not be available at any particular time, depending on manufacturing needs. It is advisable to check with B & W before ordering from this source.

struction time considerably, but it is not an absolute necessity. The meter holes can be cut with a bit brace, or with a hand drill and file. Best of all, every single component is standard merchandise and is readily available. Your favorite ham supplier may not have every item in stock, but he should be able to get any of them for you in a hurry.

Triode Operation

The 4-1000A may be connected for high-μ triode operation by placing the grid and screen elements at the same d.c. and signal potentials; in this case, both are grounded. This connection offers several advantages for sideband operation. First, no grid-bias or screen-voltage power supplies are needed. In addition, the drive level of this grounded-grid stage is compatible with the power-output level of modern sideband exciters. Finally, neutralization is not required.

The Circuit

The circuit of the amplifier is shown in Fig. 2. Excitation is fed to the filament through a 0.01-μf. 1250-volt (working) mica capacitor. A ceramic capacitor is not suitable for coupling since it will not stand the current. The cathode coupler, consisting of C_1 and L_1, does an excellent job of

input matching. RFC_1 is the new B & W FC-30A bifilar filament choke which is more efficient than the earlier type FC-30. With the center tap of the filament transformer returned to ground through an extra pair of contacts on the VOX or antenna relay, the no-signal resting current will be approximately 60 ma. with 3000 volts on the plate. With the relay contacts open on standby, the 25K bias resistor drops the plate current to a negligible value.

A B & W type 850-A coil-switching unit is used in the pi-network output circuit. The type 852, incidentally, is not suitable for use with the 4-1000A, since it is designed for a much lower plate load impedance. Its use would not only require much higher input and output capacitances, but would also result in an abnormally high-Q circuit in this amplifier. Instead of an expensive vacuum variable for the tank capacitor, C_2 is a split-stator air unit with 0.175-inch plate spacing. To reduce the minimum circuit capacitance on the higher-frequency bands, one section of the dual capacitor is used for 10, 15, and 20 meters; the second section is switched in parallel with the first for the lower frequencies.

The variable output capacitor C_3 is a 1500-pf. unit with 0.03-inch plate spacing. This provides sufficient capacitance for the phone end of the 80-meter band. However, more capacitance will usually be required for the low-frequency end of this band, and this is provided by connecting a fixed 0.001-μf. mica capacitor in parallel with C_3 in the last position of S_{1C}.

Parasitic Suppression

Several different makes of chokes were tried at RFC_2 in conjunction with many different resistance-inductance combinations in the v.h.f. suppressor Z_1. However, it was found practically impossible to completely eliminate parasitic oscillation on all bands until the B & W type 800 choke was tried.

Metering

Grid current is monitored very simply. The control grid is grounded through four 4.7-ohm ½-watt composition resistors in parallel, bypassed by a 0.01-μf. disk ceramic capacitor. The RC combination serves to hold the control grid very close to ground potential. Grid current is monitored by measuring the voltage drop across the resistors with the 1-ma. grid meter, calibrated 0–300 ma. full scale, and a series resistor.

A simple way to determine the value of the series resistor R_1 is to place a regular milliammeter with a scale of 200 ma. or more from the VOX relay terminal to ground. Apply excitation, and substitute resistors at R_1 until both meters have the same deflection at 150 ma. As an example, the Weston Model 301, 1-ma. meter requires a 27-ohm series resistor.

Plate current is measured by a 0–1-amp. d.c. meter shunted across a 10-ohm resistor in the negative high-voltage lead. This resistor is incorporated in the power supply, not in the amplifier itself. The 50-watt rating gives an ample safety factor, since the power dissipation would not exceed a few watts should the ammeter open up. Notice that the negative terminal of the supply must not be grounded except through the 10-ohm resistor.

A plate voltmeter has a definite place in this amplifier, or in any other amplifier where the d.c. input runs 900 watts or more, since it is required by FCC regulations. Even if you run less than 900 watts, it is reassuring to know exactly what your input is at all times.

To continuously monitor the r.f. output level of the amplifier and to aid in efficient tuning, a simple r.f. voltmeter has been incorporated in the circuit. Absolute readings are not necessary, so provision has been made for varying the sensitivity by adjustment of R_3.

Component Modification

Some of the components require minor modification before mounting. The last rotor plate and the last stator plate of the rear section of the tank capacitor C_2 are removed. This is section C_{2A} in the diagram, which is used alone on the higher frequencies. The operation is simple and requires no special tools. The alteration reduces the minimum capacitance to permit a more favorable Q on 10 meters. To further reduce the minimum circuit capacitance, the stators of C_2 are moved farther away from the chassis by mounting the capacitor in an inverted position; that is,

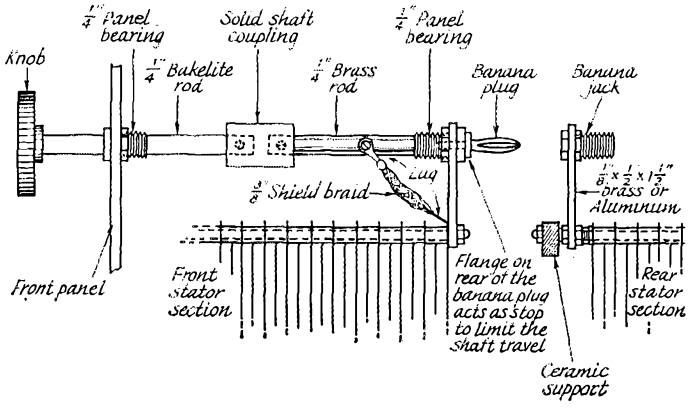


Fig. 3—Sketch showing details of the tuning-capacitor switch, S_2. The stator sections are connected in parallel when the panel control knob is pushed to engage the plug in the jack.

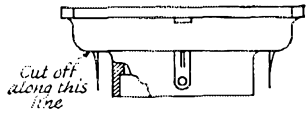


Fig. 4—Sketch showing how the lower portion of the tube socket is cut off.

with the stators on top. The mounting feet of the Johnson capacitor are easily moved to permit mounting in this manner, since the capacitor frame has duplicate mounting holes.

Fig. 3 shows the device used for S_2. Similar metal brackets are attached to adjacent ends of the stator-assembly rods of the dual capacitor. The bracket on the rear end of the front capacitor section (C_{2B}) carries a ¼-inch panel bearing through which a 3-inch length of ¼-inch brass rod slides. One end of this rod is drilled and tapped to accept the threaded shank of a banana plug. The other end of the brass rod is coupled to a 3⅛-inch length of ¼-inch bakelite rod which passes through another bearing in the panel to the control knob. The shaft coupler should be of the rigid type, either metal or ceramic. To assure good contact between the stator of C_{2B} and the banana plug, a piece of ⅜-inch flexible copper braid is used to connect the two directly, rather than to depend on the sliding contact at the bearing.

The banana jack is mounted on the other bracket. Be sure that the two brackets are drilled identically so that the plug and jack may be lined up accurately.

One other slight modification was made in the capacitor before mounting. A small triangular bracket was mounted inside the rear frame plate, that is, between the capacitor sections. This was fastened in place using the same screws which hold the ceramic stator bar against the frame plate. The upper point of the triangle extends sufficiently above the frame plate to allow mounting a 1-inch ceramic pillar. After the components were mounted on the chassis, the open end of the 10-meter section of L_3 was removed from the coil assembly, turned end for end, and fastened between the ceramic end plate and the ceramic pillar. A short length of ¼-inch copper tubing, also fastened to the ceramic pillar, connects the coil to one side of the blocking capacitors. Another short length of tubing connects the rear stator terminal of C_{2A} to the same point.

It will be noted that the 0.001-μf. fixed output capacitor requires an additional switch position. Fortunately, this is not difficult to provide, since there is already a hole for an extra stationary contact in the ceramic end plate of the B & W coil unit. All that is necessary is to obtain a switch contact from B & W [2] for one dollar (or make a reasonable facsimile) and mount it in the spare hole.

The socket for the 4-1000A is Eimac's new plastic type SK-510 (amateur net $6.50). It is designed primarily for duct connection to a blower. For the pressurized-chassis ventilating system used here, you can improve the air flow by cutting off the "nose" of the socket with a hacksaw, as shown in Fig. 4. Remove the socket contacts while this operation is performed, to avoid damaging them. Use extreme care in sawing. Although the socket is made of a tough plastic, unusual stress or strain may cause it to break.

You will note that the socket has slots next to the pins, right in the side of the molded fixture. To ground the two screen leads, pass a ¼-inch copper ground strap through the slot and solder it to the bottom of the screen contact inside the socket; then ground the strap to the chassis at the point where it emerges from the socket. The grid bypass capacitor should be installed in the same manner. One lead passes through the slot and is soldered to the bottom of the grid contact, while the other lead is grounded to the chassis. The leads should be only ¼-inch long.

Construction

The 14 × 17 × 4-inch chassis is made up of a pair of SecZak [3] R414 rails (4 by 14 inches), a pair of R417 rails (4 by 17 inches), and two P1417 panels (14 by 17 inches). Standard 13 × 17×4-inch chassis are readily available, of course, but the extra inch of depth provided by the SecZak units is necessary to accommodate C_2 which has a length of 13 1/16 inches. Machining of the front and rear chassis walls and the top deck is greatly simplified by using these handy rails and panels. No more trying to get big fingers and tools into small corners. You can do all of the drilling and cutting on flat plates, and then assemble your chassis.

[2] Barker & Williamson, Bristol, Penna. Mention 850A type number when ordering.

[3] SecZak products are available from Radio Shack Corp., 730 Commonwealth Ave., Boston 17, Mass., Terminal Hudson Electronics, 236 West 17th St., New York, N. Y., and California Electronics Supply, Los Angeles, among others.

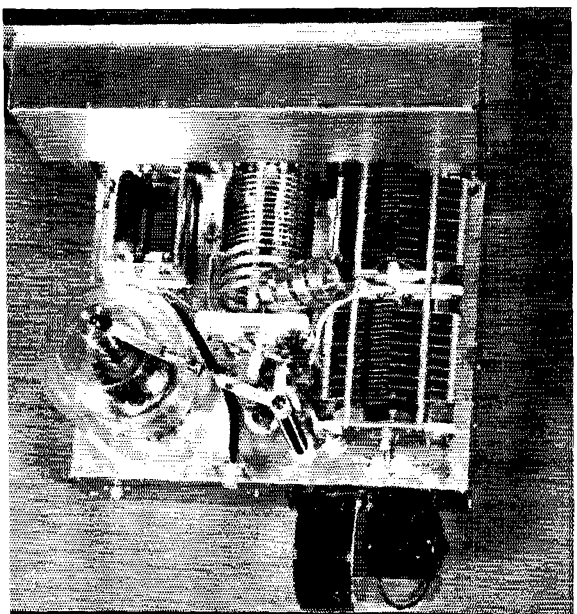


Fig. 5—Plan view of the 4-1000A grounded-grid amplifier. This view shows how the position of the 10-meter section of L_2 is changed.

Cathode Coupler

Place S_1, L_1, and C_1 close to the tube socket, as shown in Fig. 6. In this amplifier, Millen type 39005 universal-joint couplings were used between the shaft of C_1 and the front panel to allow the control to be placed symmetrically in respect to others on the panel. Even though the shaft and rotor of C_1 are at ground potential, use an insulated shaft coupling to couple the indicator dial to avoid the possibility of setting up a spurious tuned circuit. If you don't gang the input and output band switches, as described presently, use an extension shaft on the input switch so that the switch can be placed close to the tube socket.

Ganging the Switches

It is not difficult to gang S_{1A-B} and S_{1C} to provide single control. This can be accomplished by means of a National type RAD geared right-angle shaft coupler. A Johnson rigid ceramic shaft coupler (type 104–252) is attached to the tail shaft of the B & W coil unit. A short length of ¼-inch brass rod couples the gear end of the right-angle drive to the ceramic coupler. S_{1A-B} is mounted below deck with its shaft extending through a clearance hole in the chassis so that the shaft can be lined up with the shaft of the right-angle drive. The two shafts are coupled together by means of a ceramic semiflexible coupler (Johnson 104–262). Since the switch on the B & W coil unit has 60-degree indexing, S_{1A-B} must have the same indexing, rather than the more common 30-degree indexing. The 60-degree switch is, however, a standard item in the manufacturer's catalog. A 30-degree switch may be used, of course, if ganging is dispensed with.

Wiring

As the photographs indicate, very little actual wiring is required. The positive high-voltage lead enters the rear of the chassis through a Millen high-voltage connector where it immediately connects to the first 500-pf. bypass capacitor. RFC_3 is mounted between this capacitor and a feedthrough insulator which is connected to one side of the voltmeter multiplying resistor. The feedthrough carries the high voltage through to the top of the chassis where it connects to the second 500-pf. capacitor mounted on the chassis, and to the bottom end of RFC_2. A tapped ceramic pillar insulator threads onto the top terminal of this capacitor. The two blocking capacitors are suspended from a short copper strap fastened across the top end of the insulator, and a second strap connects them to the top of the r.f. choke. The parasitic suppressor Z_1 is inserted at the center of a copper strap connecting the top of RFC_2 to the plate cap of the tube.

Since the high-C input circuit carries considerable current, the r.f. wiring should be done with reasonably heavy wire (I used No. 10). This includes the short between the 80-meter contacts of S_{1A}.

A lead attached to the stator of C_3 passes down through the chassis via a second feed-through insulator to the box below containing the r.f. output-indicator components. A short section of RB-8/U connects the stator of C_3 to J_2. Be sure to ground both ends of the outer conductor.

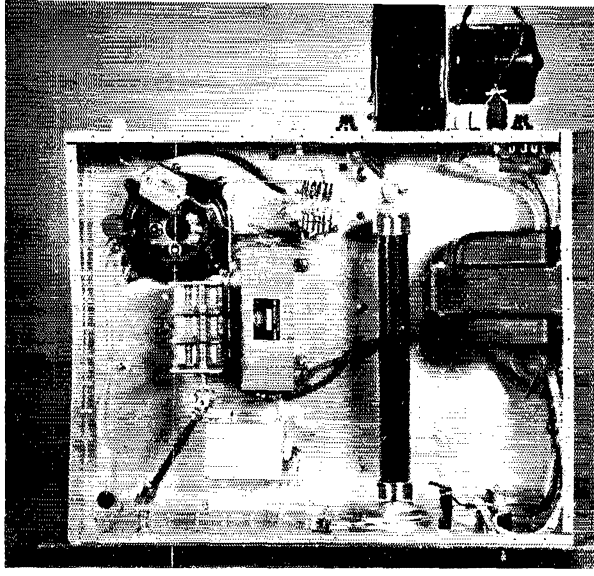


Fig. 6—Bottom view of the 4-1000A amplifier. The filament transformer and voltmeter multiplier resistor are to the right. The input coil, L_1, is at top center, supported on S_{1AB} by its leads. Input capacitor C_1 is operated through a pair of universal-joint shaft couplers so that the capacitor may be placed close to the tube socket without upsetting panel-layout symmetry. The small shielding box (2¼ × 2⅛ × 1⅝-inch Minibox), below the bifilar filament choke, houses the r.f. output-indicator diode and associated components.

Blower Mounting

Don't compromise on the blower. The 4-1000A requires 60 c.f.m. at 0.6 inch of static pressure. Some so-called 60-c.f.m. blowers aren't worth their salt when you try to pressurize the chassis. The blower suggested does an excellent job in this respect, and is priced quite reasonably.

Be sure to place the blower well away from the tube socket. If it is placed too close, it will create a pressure wall across the bottom of the socket which will tend to restrict the flow of air through the base and chimney.

An a.c. receptacle is set in the rear apron of the chassis and a short cord from the blower motor plugs into it.

The Panel

The panel is a standard 15¾ × 19 × ⅛-inch unit of aluminum. The four meters are in line across the top. A 4 × 17 × 3-inch aluminum chassis fits over the back of the line of meters to shield them from r.f. fields. It is held in place by eight No. 6 sheet-metal screws inserted from the front. Shielded meter leads (Belden 8882 wire) are brought up from below chassis through rubber grommets in the chassis and in notches filed in the bottom front corners of the meter enclosure.

The panel is fitted with chrome handles (Bud type H9113) for lifting the amplifier in and out

of the rack mounting. They also serve to protect the controls if it becomes necessary to place the unit face down on your workbench for service.

The lettering was done with Tekni-Cals, and the engraved plates are obtainable from Central Engravers [4] at 5 cents per letter.

The Shielding Enclosure

The two ends and the back of the shielding enclosure are made of 0.51-inch solid sheet aluminum, while the top is made of perforated sheet of the same weight. One of the SeeZak P1417 panels is used for the bottom cover. Aluminum angle stock, ½ inch by ½ inch, is used to join the pieces with the help of ¼-inch No. 6 sheet-metal screws spaced every two inches. All of the above pieces, including the angle stock, may be obtained cut to size if desired.[5]

Adjustment

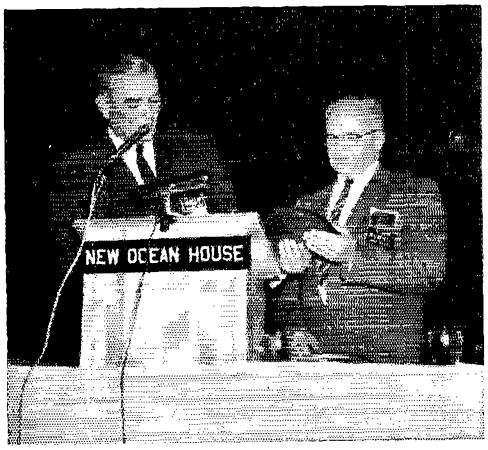
After checking out the filament circuit and grounding the center tap of T_1, reduce the sensitivity control of the r.f. voltmeter to near minimum. Select the proper band with S_1 and apply excitation. Adjust C_1 for a grid current of approximately 150 ma. Apply plate voltage and load, and resonate the output circuit with C_2. With a plate voltage of 3000 and grid current of 160 to 170 ma., alternately adjust C_3 and C_2 to increase the plate current to 300 ma. or slightly over. In observing the r.f. voltmeter, you will note that maximum output does not always occur at the point of resonance as indicated by the dip in the plate current.

The amplifier may be checked for linearity as described in the *Radio Amateur's Handbook*.

I am very grateful for the technical advice and suggestions of Bill Orr, W6SAI, and George Stinson, W9KDK. Their analysis of the problems encountered, as well as their suggestions for changes during construction, made this a much better amplifier, and a pleasure to build. Operating at an input of 1 kw. or less, this amplifier actually "coasts" and will give you years of trouble-free service. QST

[4] 529 South State, Belvidere, Illinois.
[5] From Dick's, 62 Cherry Ave., Tiffin, Ohio.

Strays



ARRL President Herbert Hoover, Jr., W6ZH, on the left, presenting the first annual "Ham of the Year" award to Win Jackson, W1WCI, based on W1WCI's unselfish efforts to help hundreds of people of all ages prepare for their amateur licenses. Presentation was made at the 1963 New England Division ARRL Convention on April 28, at Swampscott, Massachusetts. Nominations for the 1964 award may be made now; rules will follow those shown for the 1963 award, as outlined on page 162, January QST.

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The *Kalamazoo Gazette* reports that a Citizens Bander was sentenced to 21 days in the county jail for touching off a needless search in Lake Michigan. He used the CB rig in his car to call out, "Mayday, Mayday. I'm over the lake and dropping fast." As the newspaper headline indicated, he's safe for a while!

A bill has been introduced into the New Jersey General Assembly to authorized call letter license plates for New Jersey hams. You New Jerseyites who want the call letter license plates — write your representative and ask him to support Bill A647.

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They and Me

Ever hear a member say — "THEY ought to run our club this way!"

Ever wonder who are THEY, who get the brunt the live long day?

THEY are the ones some call a clique, who plan the work so things will tick.

THEY fix the lights and sweep the floor; THEY handle every needed chore.

THEY keep the clubroom up to snuff; THEY worry about the heat and stuff.

THEY line up speakers, pictures too, and the people who will work for you.

THEY do the leg work, write the mail, provide a program without fail.

Director's meetings THEY attend, committee meetings without end.

On evenings THEY could spend at home, on your club's business THEY must roam.

THEY take new members into hand; THEY run instruction sessions, and . . .

THEY must manage all the work other members prefer to shirk.

Some pay their dues and think they may stand and smirk.

THEY pay the same dues, it's true, but gain no more than YOU and YOU.

Is paying dues your duty's end, or can a helping hand you lend?

As true as "God can make a tree," YOU ought to change the THEY to WE.

— *SCARA News*, WA2OZQ, Editor

The Traveling-Wave Tube

Wide-Band Microwave Amplifier

BY BOB SCOTT,* W6PUB

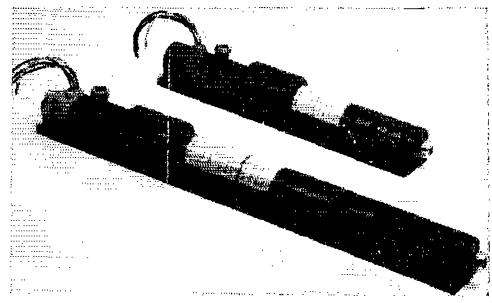
SINCE the invention of the klystron, which first made practical the use of the u.h.f. spectrum, a number of devices for generating or amplifying microwaves have come into being. Some of these devices, such as the klystron, the magnetron and the reflex oscillator, have in the past few years become almost commonplace. In addition to the more common types of microwave tubes, there are a number of newer, more sophisticated microwave devices with exotic names like carcinotrons, velocitrons, amplitrons, floating drift tube klystrons and traveling-wave tubes. All of these tubes use a form of interaction or exchange of energy between moving electrons and propagating waves. In addition, all of these devices in common use electron transit time to advantage.

The traveling-wave tube came into being because of the requirement for extremely wide bandwidths in surveillance receivers and electronic countermeasures equipment. Although lower in efficiency and power output when compared to some other microwave amplifiers, no other device can compete with the traveling-wave tube in its range of operating frequency. This article describes in simple language how a traveling-wave tube operates. A bibliography of suggested reading is given at the end of this article for those who wish to dig deeper into the mathematical aspect of traveling-wave tube operation.

Electrons and Magnetic Fields

To understand how a traveling-wave tube amplifies, it is necessary to understand the behavior of a free electron in the presence of an r.f. and a magnetic field.

A free electron moving in the field of an electromagnetic wave (for example, a microwave signal) will experience a change in velocity. The direction of the change depends on the polarity of the field relative to the electron's motion. As the change takes place in the velocity of the electron, there will be a corresponding change in the energy level of the wave. When the electron is accelerated by the field, the amplitude of the wave will decrease, and the energy lost in the wave is transferred to the electron in the form of increased velocity. The converse is also true. When the electron motion is retarded, the energy lost by the electron is converted to energy stored in the wave.



Two typical traveling-wave tubes in their focusing arrays ready to be placed into service. Although both tubes are rated at 1-watt output, one has a 60-db. minimum gain (1,000,000 times amplification), and the other has 30-db. minimum gain (1000 times amplification). The difference in the two tubes is the length of active helix. The longer tube is 16 inches long and the shorter is 11 inches long.

A free electron in the presence of a magnetic field will be captured by the magnetic field, provided that the field is strong enough to overcome any other forces acting upon the electron. It requires considerable energy for an electron to cross a magnetic field in a direction perpendicular to the lines of force in the field. However, the electron travels *along* the magnetic lines of force rather easily. If an electron is given a velocity in the presence of a magnetic field, its path will tend to be along the magnetic lines of force. This is the technique used to form a beam of electrons into almost any shape desired, and to hold this shape for some prescribed distance. In this manner it is possible to form electrons into solid pencil-like beams, hollow beams, sheet

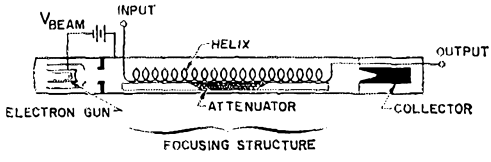


Fig. 1—Basic component parts of the helix-type traveling-wave tube.

* Applications Engineer, Microwave Marketing Div., Eitel-McCullough, Inc., San Carlos, Calif.

This article is in response to a number of inquiries asking what a traveling-wave tube is and what it does. Although its present cost puts it out of reach of amateurs, its principles of operation, put down in simple language, should be of interest to all microwave-minded hams.

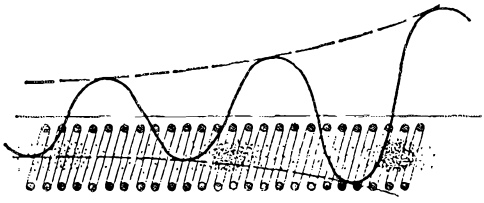


Fig. 2—This shows the relationship between the helix, the electrons, and the growing r.f. wave on the helix. The negative half of the cycle can be considered the retarding field. Note that the electron bunches occur during the retarding or energy-extracting half of the cycle.

beams, and other desired forms. All that is required is that the magnetic field be axially aligned in the direction we wish the electron beam to travel, and that the field be sufficiently strong to keep the beam from spreading due to the space-charge effect from the electrons themselves.

If it is possible to combine an electron beam, a magnetic field, and an r.f. wave in one device, there exists the necessary mechanism for interaction to take place between the r.f. fields and the electrons. As an energy transfer can occur between an r.f. field and an electron, and vice versa, it should be possible to construct either a device to *accelerate electrons* using r.f. energies (linear accelerator), or a device to *amplify the r.f. energy* (traveling-wave tube) using retarded electron motion.

The Slow-Wave Structure

When the need for a broad-band microwave amplifier became apparent, no practical way to build one was known. It was known that such a device was theoretically possible. However, as usual, there was a problem that seemed impossible to solve. For proper interaction between the r.f. wave and the electron beam to occur, the velocities of the wave and the beam would have to be approximately equal. An r.f. wave launched on a wire will travel at approximately the speed of light. To accelerate electrons to this speed so that a reaction between the wave and the beam could take place, would require enormous amounts of energy. It was necessary, therefore, to devise a method of slowing down the r.f. wave to match practical electron speeds. Several types of *slow-wave structures* have been invented — the helix, the folded waveguide, and the ring and bar structure, to name a few. However, in all instances, the r.f. wave is required to travel a much greater distance than the electron beam. Since the helix is the most common type of slow-wave structure, the helix is used as a practical example in this article.

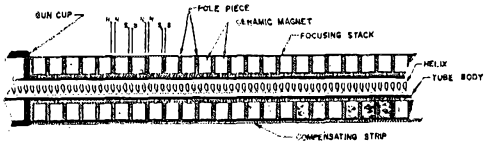


Fig. 3—A helix-type traveling-wave tube showing ceramic magnet focusing. Since the ceramic magnets are temperature-sensitive, a compensating material to shunt the magnets must be used so operation over wide temperature ranges is possible.

The t.w.t. helix is a hollow coil of wire, or tape, supported by an insulated framework on the outside of the coil (see Fig. 1). An electron beam is passed through the center of the coil. The r.f. wave propagates along the wire of the coil at approximately the speed of light but *advances along the helix* axially at a velocity that is determined by the diameter and the pitch of the helix. A good analogy to the relationship between the beam and the r.f. wave would be a handicap race between a modern jet airplane and a tired old World War I Jenny. To properly handicap the jet, it would be required to fly a prescribed number of loops around the Jenny over a certain distance. If the handicap were exactly right, both planes would cross the finish line together.

An electron "gun" is used to form the electron beam. It contains a cathode (the source of the electrons) and also various disk-like elements (grids) which will accelerate the electron beam and aim it down the helix. This electron gun is not simple. It must hold the right beam diameter and density, aim the beam accurately, and emit electrons for thousands of hours. The helix must be properly designed as to pitch, diameter and wire size. The glass, ceramic or metal that holds the helix straight must be manufactured to extremely close tolerances. It cannot bend or warp more than a few thousandths of an inch in the over-all length (ten or twelve inches). The magnetic field must be uniform over the length of electron travel and must be perfectly aligned so that the electrons travel the entire length of the structure without being lost by interception on the helix. At the proper operating voltages, the electrons should enter the helix at a velocity which is slightly *above* the velocity of the wave introduced on the helix. Under these conditions, electrons that are initially acted upon by a retarding r.f. field from the helix are either prevented from advancing or are slowed down. Electrons which are initially acted upon by an accelerating r.f. field are speeded up. After a sufficient length of time, the electrons in the beam will become bunched or *velocity modulated* into groups very similar to the bunches of automobiles produced on a highway where cars travel at different speeds (see Fig. 2). The faster cars catch up with the slower cars and bunches of automobiles are formed. Since the electrons have entered the helix at a velocity slightly greater than the velocity of the r.f. wave, the net effect is a decrease in the velocity of the electrons, or a loss of energy. Since the electron bunches are essentially traveling in phase with the r.f. wave, the energy lost in the beam will enhance the wave on the helix. The process of bunching and release of energy from beam to helix is a continuous and simultaneous process down the entire length of the tube. As the helix is a nonresonant structure at microwave frequen-

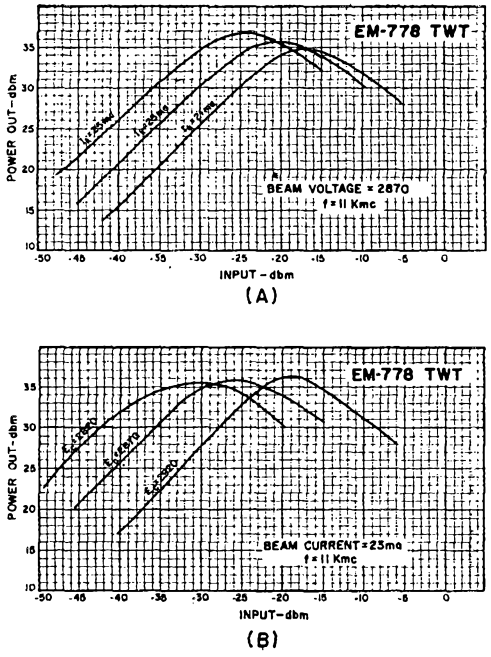


Fig. 4—These graphs show a plot of power output vs. power input at 11 Gc. In A, the beam current is varied while the helix voltage is held constant. Saturation of the tube occurs at the top of each of the curves. Saturation is the point where maximum electron bunching takes place. If the power input is increased beyond the saturation point, the power output will decrease. Note that the tube saturates sooner with increased beam current. B shows power output vs. power input curves taken with the beam voltage varied and the beam current held constant. Note that at the higher and lower voltage the electrons are traveling at a non-optimum speed requiring more power input before saturation occurs.

cies, the traveling-wave tube will amplify over extremely large frequency ranges approaching three or four octaves, depending upon the design of the tube.

Operation of the Traveling-Wave Tube

One can see from the brief description above that the traveling-wave tube is a highly complex device. The term "tube" is a misnomer. The traveling-wave tube is a complete broad-band r.f. amplifier inside a vacuum envelope. It is necessary only to apply the proper voltages and r.f. input to obtain amplification. As a complete amplifier package, the same care must be exercised in the r.f. circuitry as would be required of any r.f. circuit. Proper input and output couplings must be used. The design of r.f. couplers to cover wide frequency ranges is no simple matter. Feedback paths in the tube must be eliminated, since these will cause oscillations to occur as in any amplifier. Since the r.f. wave will travel either direction on the helix, the elimination of feedback caused by reflections in the input or output termination or the load is an interesting and troublesome problem. To prevent energy from flowing in the backward direction on the helix, an attenuator is placed near the center of the tube. This attenuator absorbs all of the r.f. energy on the helix. Since the electrons passing through the attenuator section are well bunched, the interaction process again occurs after the beam leaves the attenuation section, and the tube continues to amplify even though, r.f.-wise, the helix is comprised of two separate sections. The placement of the attenuator on the helix, the amount of attenuation required, and the match into and out of the attenuator must be very exact, and is one of the more difficult design problems in the construction of a traveling-wave tube.

The earliest method used to focus a traveling-wave tube was to wind a solenoid around the tube. This solenoid provided the magnetic field necessary to focus the beam. Solenoids are bulky, heavy, power-consuming, and generally must be cooled by air or liquid to remove the heat generated by the dissipated power. A much more satisfactory method of focusing has recently been devised. This is accomplished by means of small, disk-like, ceramic magnets (see Fig. 3). These magnets are arranged to produce a magnetic field that is periodic along the helix. The focusing action takes place at intervals along the beam. First the beam is squeezed down, and then allowed to expand. Before it expands too far, it is squeezed down again, and again allowed to expand. If done right, this kind of focusing will perform almost as well as the solenoid technique, reducing the weight of the solenoid-tube combination by as much as 75 per cent, the volume of the package by about 80 per cent, and the power required to focus the tube to zero.

Operation of the traveling-wave tube is a relatively simple matter. In the case of the solenoid-focused tube, the proper solenoid current to produce the field should be provided, and the tube heater turned on and allowed to warm up. Any cooling air required by the tube or the solenoid is turned on. All other voltages can now be applied to the tube with the exception of the

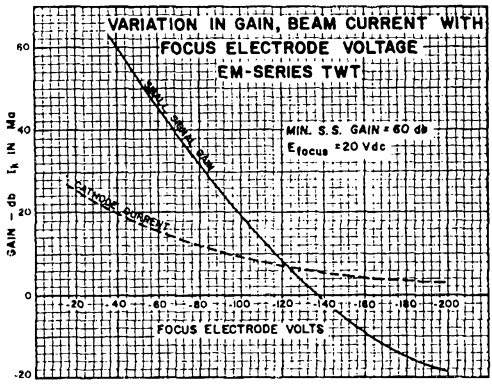


Fig. 5—This graph shows a typical curve of focus voltage vs. small signal gain of a traveling-wave tube. The gain and power output can be varied by changing the focus voltage. This makes it possible to provide an a.g.c. circuit to control power output and gain.

voltage that controls the beam. In some cases this will be a positive grid or anode voltage; in other cases it will be a decrease in a negative bias voltage, or a positive pulse applied to a negative bias voltage. The beam is brought up slowly to make sure the tube is properly aligned in the magnetic field. Alignment can be determined by metering the intercepted current on the helix. With the beam at a low level so that any interception will not damage the tube, the tube is aligned with the solenoid-adjusting screws so that helix interception is at a minimum. It is now possible to increase the beam current to its normal value, making sure that none of the tube elements is damaged by interception. It is good engineering practice to use current overload relays in the helix circuit, and an interlock on the cooling air and the solenoid current, should either fail.

In the case of the permanent magnet-focused, traveling-wave tube, it is necessary only to let the cathode warm up, supplying air to the collector if necessary, and then apply the proper operating voltages to the tube. Once the turn-on procedure has been observed, the tube will amplify by merely providing an r.f. input. Typical operating curves are shown in Figs. 4 and 5.

I am sure that few amateurs can presently afford traveling-wave tubes in their ham shacks, since the cost of most tubes is in the same range as that of a fairly good automobile. However, I am also sure that in the future, traveling-wave tubes will find their way into the equipment of many u.h.f-minded hams. The FCC has already anticipated this interest by allocating considerable spectrum space in the microwave region for amateur use. When the ham of the future requires a good broad-band microwave amplifier, I am sure that an inexpensive traveling-wave tube will be available! See you on 10.5 Gc.! QST

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NEW BOOKS

Allied's Electronics Data Handbook, published by Allied Radio Corporation, 100 North Western Ave., Chicago 80, Illinois. 80 pages, 6 by 9 inches, paper cover. Cat. No. 37 K 398. Price, 35 cents.

This is a revised and enlarged edition containing an up-to-date listing of most commonly used tables, formulas and reference material. New data includes basic transistor formulas, symbols, and circuits. There are charts on transistor radio and mercury battery interchangeability, American and British tube interchangeability, Greek alphabet designations and attenuator network formulas. Reference material contained in the earlier editions has been retained: Log and trig tables, EIA and military color codes, math constants, fundamental algebraic formulas, most-used electronic formulas and abbreviations.

Fun with Radio-Controlled Models, by Edward L. Safford, Jr. Cat. No. 106. Published by Gernsback Library, Inc., 154 West 14th St., New York 11, N. Y. 160 pages, 5½ by 8½ inches, paper cover. Price, $3.20.

This book is a step-by-step, learn-by-building text on several phases of radio control of models. The reader begins by assembling basic radio control units, such as the relay and steering devices, to learn how they operate. Later chapters explain the use of manufactured devices in radio controlled boats, cars and airplanes. A glossary of terms and definitions is included at the rear of the book. This book is slanted more for the beginner than for the advanced r.c. modeler.

Essential Characteristics, ninth edition, published by Receiving Tube Department, General Electric Company, Owensboro, Kentucky. 300 pages, 6¼ by 8½ inches, paper cover. Pub. No. ETR-15J. May be obtained from tube distributors or direct from the General Electric warehouse, 3800 North Milwaukee Ave., Chicago, Ill. Price, $1.50.

The ninth edition of this handbook includes not only the usual tube data but also information on replacement capacitors, service aids, and technical publications available from the manufacturer. As before, the book includes typical tube characteristics curves, tube outline drawings, circuit diagrams showing typical applications of receiving tubes and capacitors, and construction data for loudspeaker enclosures.

How To Read Schematic Diagrams, by Donald E. Herrington. Published by Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Cat. No. RSD-1. 128 pages, including index, 5½ by 8½ inches, paper cover. Price, $1.50.

This book explains the purpose and meaning of the various types of electronic equipment diagrams. There are illustrations of the different symbols of electronic components. Along with the discussion on schematic diagrams is basic theory on the various components themselves, such as resistors, capacitors, etc. Although some of the symbols and code letters assigned to component groups do not agree with IRE standards, the book includes most of the ones that are found in use today.

Repairing TV Remote Controls, by Leon Cantor, and Harry Horstmann. Published by John F. Rider Publisher, Inc., 116 West 14th St., New York 11, N. Y. Cat. No. 303. 128 pages, 5½ by 8½ inches, paper cover. Price, $2.50.

This book is written for the professional TV serviceman. The various systems of controlling TV sets from a remote location are covered, with emphasis on the operation of the remote control receiver and transmitter. Circuits of each are covered, and testing and alignment information is given.

Basics for Beginners

A. C. in Radio Circuits

Part V — Low-Frequency Transformers

BY GEORGE GRAMMER,* W1DF

TO GO BACK for a moment, the idea of an induced voltage — that is, a voltage generated in a conductor or coil when the conductor or coil is in a changing magnetic field — was introduced in Part I of this series. Last month, in Part IV, the application of the principle in inductively coupled radio-frequency circuits was discussed. At this point it is appropriate to take a look at the way inductive coupling is used at frequencies well below the r.f. spectrum.

Although the basic principles are the same no matter what the frequency, the practical details differ so much in different frequency ranges that it is a temptation to look on a transformer for the 60-cycle power-line frequency as being a quite different sort of device than an r.f. transformer for, say, 1500 kc. The approach used in designing the low-frequency transformer ignores circuit *Q*s, coefficients of coupling, and other quantities that are foremost in r.f. transformer design. Also, the construction of low-frequency transformers differs from that used in the r.f. circuits we have been considering up until now. Coils for r.f. circuits are wound on insulating forms. Coils for 60-cycle transformers, and for frequencies corresponding to the air-vibration rate of sound, up to around 15,000 cycles, are wound on iron cores (Fig. 1). They also have many more turns than we find in r.f. coils. The iron core and the large number of turns are necessary at such low frequencies. This is because the magnetic field changes slowly at, say, 60 cycles per second as compared with 7,000,000 cycles (7 Mc.) per second. (In fact, the rate at the latter frequency is over 100,000 times faster!) So to get much induced voltage we have to use many turns and also use iron. The iron increases the strength of the magnetic field many, many times as compared with its strength in air.

* Technical Director, ARRL.

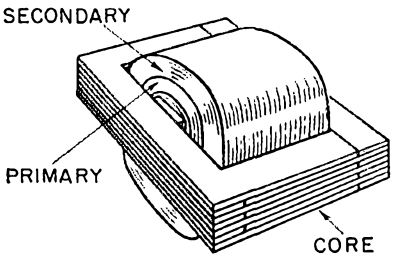


Fig. 1 — The iron-core transformer, used for frequencies up to 15,000 or 20,000 cycles. The coils are wound on a "leg" of the core midway between the outsides. Sometimes the primary is wound over the secondary instead of the reverse order shown. The core consists of thin sheets called laminations.

The Transformer Core

In order to make the iron most effective, the core is built up of thin pieces called laminations. Laminating the core reduces the losses in it, for reasons explained later. The laminations are stamped out of thin sheets of a special grade of steel, and nearly always have the "E" and "I" forms shown in Fig. 2.[1]

In assembling power-transformer cores, alternate laminations (or small groups of them) are laid facing oppositely, as shown in Fig. 2. This is done in order to make the magnetic "resistance" — called **reluctance** — of the core as low as possible so a given current in a coil wound on the core will set up a strong magnetic field. Most of this "resistance" is in the butt joint between an E and its associated I; in effect, interleaving the laminations in this way bypasses the magnetic field around the butt joints.

In audio transformers it is sometimes necessary for one or more coils to carry direct current along with the audio-frequency current. In these, you may find all the E laminations stacked one on top of the other, and the I's similarly, with just a simple butt joint between them. In some cases there may even be a small air gap between the E and I pieces. This is done for another reason: there is a limit to the strength of the magnetic field that can be set up in iron, an effect called magnetic saturation. Once the saturation point is reached a change in the coil current no longer causes a corresponding change in the magnetic field, and as a result the induced voltage drops off. The transformer won't work properly under these conditions. Direct current in a winding causes a steady magnetic field to be set up in the iron. This field uses up a lot of the core's magnetic

[1] Other forms of core construction are also used, but are not too frequently encountered in amateur equipment. Also, other materials than the "transformer steel" mentioned are in use.

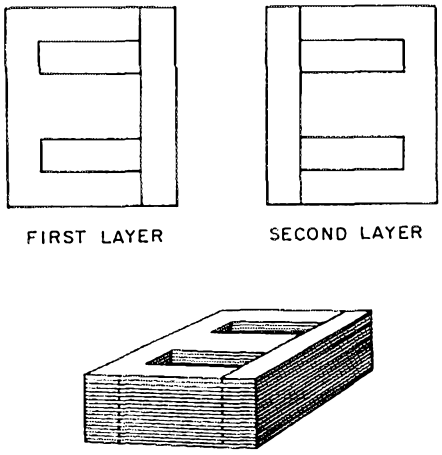


Fig. 2—E and I laminations used in transformer cores for frequencies below the radio-frequency range. The method of stacking laminations to form a power-transformer core is also shown.

ability, so the air gap has to be inserted in order to hold the total magnetization within the proper working range. Of course, the higher magnetic "resistance" means that more turns have to be used in the coils to generate the same induced voltage. This is unfortunate, but the compromise is necessary.

A core assembled as shown in Figs. 1 and 2 is called a "shell-type" core, because the core surrounds the windings.

Turns Ratio

An iron core has another advantage. The magnetic field finds it much easier to stay in it than to leak out into the air. So all we have to do is wind the coils around the iron core and they are all in essentially the same magnetic field. This means that the voltage per turn will be the same in all of them. Let's see how it works out.

Suppose we have a 60-cycle transformer having two coils, one of 200 turns and the other 400 turns. If we connect the 200-turn coil to a 115-volt source, the voltage induced in it will be 115 volts. But since the 400-turn coil is in the same field and has twice as many turns, the voltage induced in it will be 230 volts. Simply by winding on the right number of turns we can get any voltage we want, within constructional limitations. This is the way power transformers — the transformers that heat the cathodes of our tubes and supply the power for the plates — are made.

Primary and Secondary Power

But there is another aspect. The transformer can't manufacture power itself. In fact, it will turn some of the power supplied to it into heat — heat in the windings and heat in the core. This is lost power, but it can't be helped; the wire and iron aren't perfect from an electrical standpoint. If they *were* perfect, all the power put into the **primary** winding — the one connected to the power source — could be taken from the **secondary** or output winding. However, for rough estimates we usually assume that we *can* take as much power from the secondary as is put into the primary. This is approximately true, because a well-designed transformer will turn only a small percentage of the total power into heat.

Now the consequence of the fact that the secondary power is never more than the primary power is this: if the secondary voltage is larger than the primary voltage, the secondary current has to be proportionately smaller than the primary current, and vice versa. In other words, the current multiplied by the voltage has to be the same in both windings (neglecting those heat losses, of course, which show up as additional power going into the primary). So if the secondary voltage of the transformer in the example above is twice the primary voltage, the primary current will have to be twice the secondary current.

Impedance Transformation

One thing about transformers of this type that you need to keep in mind is that the currents depend on what is connected to the secondary winding. If a 2300-ohm resistor is connected to the 230-volt secondary winding the current will be 0.1 ampere. The current in the 115-volt primary winding will be 0.2 ampere, by the rule just mentioned. The source of power is "seeing" a load of 0.2 ampere at 115 volts. This load looks like 115/0.2, or 575 ohms, although the actual secondary load is 2300 ohms. If we connect a 230-ohm resistor to the secondary, the secondary current will be 1 ampere and the primary current will rise to 2 amperes. In that case the primary sees a load of 57.5 ohms.

The load "looking into" the primary is not something that is a fixed property of the transformer. It is determined by the *secondary* load resistance and the ratio of turns on the primary and secondary windings.

By choosing the proper **turns ratio** for the windings, we can make any given load resistance look like some value that is more suitable for our power source. This is summed up in a rule: the impedance ratio of the transformer is proportional to the *square* of the turns ratio. In the first example above, the turns ratio was 2 to 1, so the impedance ratio was 4 to 1. (We talked in terms of resistance rather than impedance because it's simpler, and in most cases we do deal with simple resistance rather than impedance.)

Incidentally, the rule applies to tapped windings. Don't make the mistake of assuming that one half of a center-tapped winding, for example gives you half the impedance — half the voltage, yes, but only one-fourth the impedance.

Impedance Matching

Fig. 3 shows a couple of examples of impedance transformation and also gives the general rule. Transformers having the required turns ratio are used for changing **impedance levels** in audio-frequency circuits when the actual load does not **match** the resistance that would be optimum for

the generator. A familiar example is the output transformer used between an audio power tube and a loudspeaker. The speaker will have some low value of impedance or resistance, such as 4 ohms, while the power tube wants a load resistance of possibly 5000 ohms for its best operation. The transformer turns ratio would be chosen accordingly, thus bringing about a match between the speaker and tube.

Incidentally, the resistance that is matched is the *optimum* load resistance for the source of power, not the resistance that may be in that source (and all sources of power *do* have internal resistance). We *could* match the source's internal resistance, and such matching does in fact result in the highest possible power output. However, it also results in poor efficiency and, in the case of devices such as vacuum tubes and transistors, a great deal more distortion than is wanted. The *optimum* load resistance considers these factors, and is chosen to give us the best possible all-around compromise.

Regulation

In order to put emphasis on the underlying principles, this discussion has neglected a very important practical aspect of transformer operation. The wire in the windings does have resistance; the iron in the core does have losses; and the magnetic field is not *exactly* the same about all windings. The relationships between primary and secondary voltage, power, and impedance would be true in a perfect transformer, but the materials and methods of construction to produce such a transformer have yet to be found. The practical transformers we have to work with fall short of this ideal performance.

Current flowing in the resistance of the windings causes voltage drops inside the transformer. The voltage thus lost is not available for useful output.

Losses in the core have two basic causes. One is **hysteresis** — the iron doesn't take too kindly to having the direction of its magnetization changed, and this direction must be changed each time the alternating current reverses its direction of flow. The result is that energy is used up in the magnetic "turn-over" each half cycle. This energy is supplied by the source of primary power, which means that the primary current must be somewhat larger than would be the case if the hysteresis loss were not there. The second cause is **eddy currents.** The iron core is a shorted turn, electrically, so the changing magnetic field induces a voltage in it as well as in the windings. This current path is broken up by slicing the core into laminations and giving them a thin coat of insulating lacquer. But even this does not eliminate the loss completely. The energy for this again comes from the primary source, increasing the primary current. The increased primary current caused by core losses causes an additional voltage drop in the primary.

Finally, the part of the magnetic field that is *not* common to both windings makes each winding appear to have a small amount of inductive

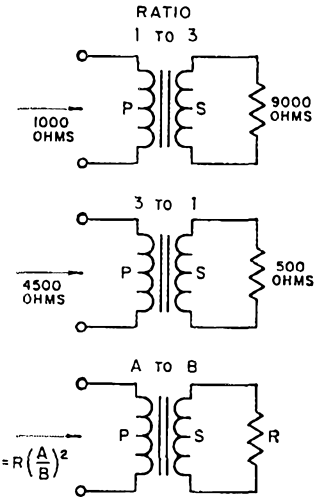


Fig. 3—Examples of impedance transformation. The name "primary" (P) always is applied to the winding to which the source of power is connected. The secondary, S, is the winding from which power is taken.

reactance. This too causes additional voltage drops in the primary and secondary.

All this adds up to the fact that the secondary voltage is not quite in proportion to the turns ratio but is somewhat smaller — perhaps 10 per cent smaller in a well-designed transformer at full load. Also, not quite as much power can be taken from the secondary as goes into the primary winding. The technical term for the extra voltage drop is **voltage regulation.** It is usually defined as the difference between the output voltage at full load and the output voltage with no load on the secondary, divided by the output voltage at full load.

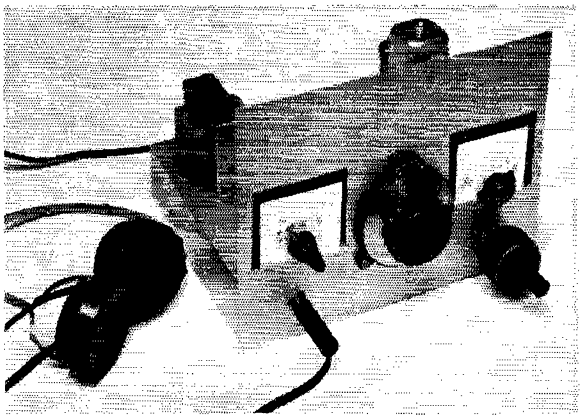
Shielding

Finally, there is another aspect of inductive coupling that you will use continually. This is the matter of **shielding.**

If you put a coil inside a metal enclosure, the enclosure will act like the secondary of a transformer. The coil itself is the primary. The voltage induced in this "secondary" will cause a current to flow in it. The current in turn sets up a field that opposes the primary magnetic field that produced it. If the resistance of the enclosure is low, the two fields will just about cancel each other *outside* the enclosure. Thus the enclosure is a **shield** which prevents the coil from being magnetically coupled to other circuits outside it.

This method works fine at radio frequencies, but to get the same result at audio frequencies the shield would have to be very thick. In this frequency range we depend on the iron core to confine the field by offering it the most favorable path. An iron enclosure or transformer case, not necessarily one of low electrical resistance, also helps for the same reason.

(Part VI of this series will appear in an early issue. — *Editor.*) QST



The panel arrangement of the three-tube superhet. The knob at the left is for mixer tuning. In the center is the vernier-drive band-spread dial and at the right the band-set knob. Just below the band-set knob are the audio and regeneration controls.

The Novice RS-3

A Three-Tube Regenerative Superhet for Beginners

BY LEWIS G. McCOY,* W1ICP

PROBABLY the simplest receiver to build, yet one that can be depended on to provide communications, is the type of unit described in this article. This receiver will cover the frequency range from approximately 2.5 Mc. to slightly higher than the 21-Mc. band. It can be used for receiving the three low-frequency Novice bands and will provide adequate bandspread with the method of tuning used. Every effort was made to keep the circuit as simple as possible, and just as important, to keep the cost at a bare minimum.

Fig. 1 shows the circuit of the receiver. A 6U8 combination mixer-oscillator is used in the front end of the receiver. Output from the mixer is fed to a 1600-kc. intermediate-frequency amplifier. The pentode section of another 6U8 is used as a regenerative detector. Audio output from the detector drives the triode section of the tube which serves as the first audio stage. This in turn drives the audio power amplifier, a 6AQ5. The output of the 6AQ5 is enough for either headphones or a speaker. A half-wave type transformer is used in the power supply. The rectifier CR_1 is a silicon type and the filter consists of C_{13}, L_6 and C_{14}.

For those readers not familiar with the superheterodyne type of circuit, and that's what this is, an explanation is in order. Let's assume a signal at 3700 kc. is picked up on the antenna and fed into the mixer. Also being fed into the mixer is a signal from the oscillator that is exactly 1600 kc. higher or lower than the 3700-kc. signal, depending on how the oscillator is tuned. Let's suppose the oscillator is tuned to the higher frequency, or 5300 kc. (1600 kc. plus 3700 kc.). The two signals in the mixer beat against each other, producing a signal at 1600 kc. which is fed into the detector. After detection it goes into the audio stages.

Of particular interest in our receiver is the regenerative detector. The detector can be made to oscillate by coupling some of the energy of the plate circuit back to the grid via L_3. When the detector is at the oscillating point, a weak signal is amplified many times. Additionally, the regenerative detector provides considerable selectivity. The oscillation is controlled by varying the screen voltage on the tube with R_3.

Getting the Parts

As we said earlier, every effort was made to keep the cost of the receiver as low as possible. One way to do this is to use salvaged parts. Of course everyone, particularly a beginner, doesn't have a well stocked "junk box." However, it is easy to obtain a ready-made junk box by getting

* Technical Assistant, *QST*.

For Novice work, this receiver will outperform any ready-built job costing twice as much — even if all the parts are bought right off the dealer's shelves. But at least half the cost can be saved if you've got an old TV chassis to cannibalize. With such "junkbox" contributions, you'll have a thoroughly practical Novice receiver for less than $15.

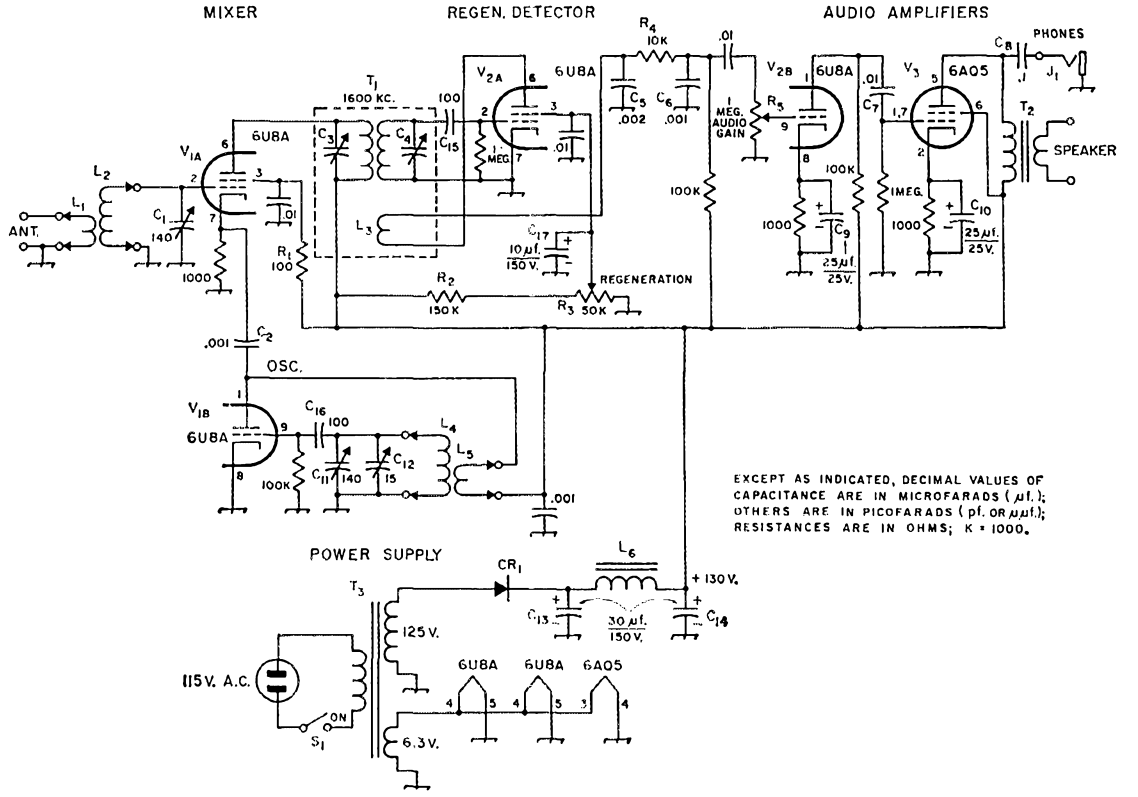


Fig. 1—Circuit diagram of the three-tube superhet receiver. Unless specified, resistances are ½ watt.

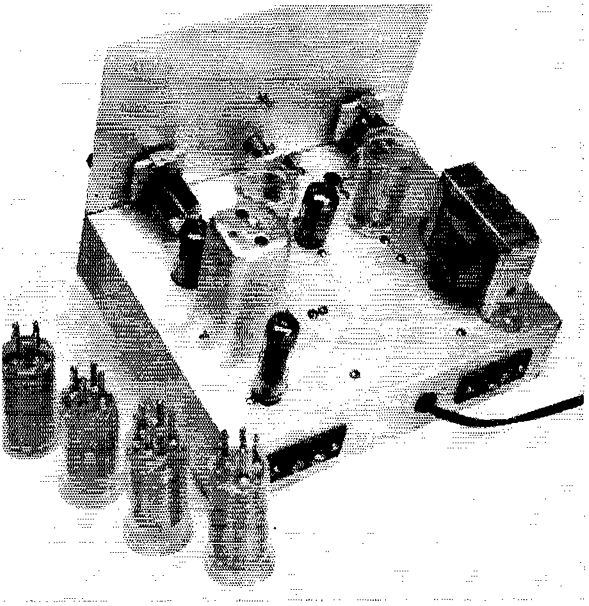
C_1, C_{11}—140-pf. variable (Hammarlund HF-140).
C_2, C_6—0.001-μf. disk ceramic.
C_3, C_4—See text (capacitors are trimmers and part of T_1).
C_5—0.002-μf. disk ceramic (can be two 0.001-μf. units in parallel).
C_7—0.01-μf. disk ceramic.
C_8—0.1 μf. paper.
C_9, C_{10}—25-μf. electrolytic, 25 volts.
*C_{12}—15-pf. variable (Hammarlund HF-15).
C_{13}, C_{14}—30-μf. electrolytic, 150 volts.
C_{15}, C_{16}—100-pf. mica.
C_{17}—10-μf. electrolytic, 150 volts.
J_1—Headphone jack, open circuit.
CR_1—Miniature selenium or silicon rectifier, 400 volts P.I.V. 130 volts r.m.s. or more.
L_1–L_5 inclusive—See Table I.
L_6—2 hy. or more, minimum current 30 ma. (see text).
R_1—100 ohms, ½ watt.
R_2—150,000 ohms, ½ watt (see text).
R_3—50,000-ohm control (see text).
R_4—10,000 ohms, ½ watt.
R_5—1-megohm control.
S_1—Single-pole, single-throw toggle switch (can be type mounting on volume control).
T_1—1600-kc. i.f. transformer (Miller 612-W4).
T_2—Output transformer; single tube to voice coil.
T_3—Power transformer; 125 volts, 50 ma.; 6.3 volts, 2 amp. (Knight 61 G 411 or equivalent).
* The vernier dial drive for C_{12} is Layfayette Radio type F-346-70MM.

an old TV set. Several articles in the past [1] have described gear made from old TV sets and as we and our readers have found, the sets can be obtained from TV servicemen for a few dollars or, in some cases, just for the asking. You'll find that the majority of parts for this receiver can be scrounged from an old set.

A beginner usually doesn't know what can be substituted for what if he doesn't happen to have a part of the same value shown in the circuit.

When you look at Fig. 1, at the values on the various components, a beginner may assume that he *must* have those values on his components before the unit will work. Actually, there is quite a wide range of values for certain components that will work, and to make it easier for the beginner, we'll list them. The maximum plus-B voltage in this receiver is between 130 and 140 volts. This means that *any* capacitor with a working voltage higher than 140 volts could be used. There is an exception to this in the case of the audio tube cathode bypass capacitors C_9 and C_{10}. Any working voltage over 25 volts is satisfactory for these two units. On all the electrolytic capacitors (the ones with the polarity marked on the circuit) the *minimum* value is given. For example, in the power-supply filter section, C_{13} and C_{14} are shown as 30 μf. each. Any value

[1] McCoy, "Surplus Tubes — An Old TV Set 150-Watt Amplifier," *QST*, Sept. 1961. "A 'Novice Gallon' or General 150-Watter," *QST*, June 1962.



At the far right is the power transformer and just in front of it L_1, L_2 and C_1. The mixer-oscillator tube is at the front center with the plug-in coils to its right and left. At the left side of the chassis is T_1 and to the rear of it is the 6AQ5 audio amplifier. The terminals just below the 6AQ5 are for the speaker. The other terminals are for the antenna input.

greater than this can be used. You may find that when you strip down an old TV set that you'll have some 40-μf. or even 60-μf. capacitors. They can be used for C_1 and C_{14} as long as their working voltage is over 140 volts. Any capacitance value higher than those specified can be used.

In our old TV set we found a dual potentiometer with an a.c. switch on the back. This is the unit used for S_1, R_3, and R_5. Originally, this was the volume and brightness control on the set. The brightness control was a variable resistor of 50,000 ohms and the volume control, one megohm. The volume control value is a fairly standard one in TV sets but the brightness control may be as low as 5000 ohms. This value would be too low to use for the regeneration control. However, any value between 25,000 to 100,000 ohms should work. In such a case, the value of R_2 could be changed accordingly; more about this later. One thing more about these controls: we used the ganged job because it was convenient. However, there is no reason why the controls couldn't be separate if you don't find a ganged unit to fit the values. It would mean a slightly different panel arrangement, but it would work just as well.

All the fixed-value resistors should be available in good supply from the TV set. However, on the ceramic-type bypass capacitors you may find only 0.001 μf. or 0.01 μf. We have specified 0.002 μf. at C_5. In this case, all you need do is connect two 0.001-μf. units in parallel to get 0.002 μf. C_{15} and C_{16} are 100-pf. mica capacitors. Any value between 100 pf. and 470 pf. should work OK.

The power supply filter choke, L_6, is a 7-henry, 50-ma. unit that we happened to have in the junk box. However, the average TV choke is about 2 hy. and this will be adequate.

You should be able to use the output transformer (T_2) and speaker from the TV set, assuming you get a speaker with it. The three tubes used in the receiver, 6U8s and a 6AQ5, are all commonly used in TV sets. If the set you get doesn't have them, you may be able to get some used tubes from the TV serviceman.

Construction Details

Before getting a chassis to mount the components on, it would be a good idea to collect all the parts first. The reason is that you may need a larger chassis than the one we used, which is aluminum and is 9 × 7 × 2 inches. Some of the components from the TV set may be larger than those we used and you would therefore need a larger chassis.

Regardless of the size of the components, follow the layout shown in the photographs for the placement of the plug-in coils and the tubes. When mounting the 1600-kc. i.f. transformer, cut a square hole one by one inch, as you will

Table I

Mixer Range	Coil Data
2.5 to 6.4 Mc.:	L_1 — 10 turns No. 24, 1-inch diam., 32 turns per inch. L_2 — 46 turns No. 24, 1-inch diam., 32 turns per inch. (L_1 and L_2 made from a single length of B&W Miniductor 3016)
6.0 to 16 Mc.:	L_1 — 6 turns No. 20, 1-inch diam., 16 turns per inch. L_2 — 14 turns No. 20, 1-inch diam., 16 turns per inch. (L_1 and L_2 made from a single length of B&W Miniductor 3015).
16 to 32 Mc.:	L_1 — 2 turns No. 20, $\frac{5}{8}$-inch diam., 16 turns per inch. L_2 — 8 turns No. 20, $\frac{5}{8}$-inch diam., 16 turns per inch. (L_1 and L_2 made from a single length of B&W Miniductor 3007).
Oscillator Range	
2.9 to 5.1 Mc.:	L_4 — 32 turns No. 24, 1-inch diam., 32 turns per inch. L_5 — 10 turns No. 24, 1-inch diam., 16½ turns per inch. (L_4 and L_5 made from a single length of B&W Miniductor 3016).
5.0 to 12 Mc.:	L_4 — 17 turns No. 20, 1-inch diam., 16 turns per inch. L_5 — 4 turns No. 20, 1-inch diam., 16 turns per inch. (L_4 and L_5 made from a single length of B&W Miniductor 3015).
10 to 22 Mc.:	L_4 — 7 turns No. 24, 1-inch diam., 16 turns per inch. L_5 — 3 turns No. 24, 1-inch diam., 16 turns per inch. (L_4 and L_5 made from a single length of B&W Miniductor 3015).
	L_3 — 7 turns No. 20, $\frac{5}{8}$ inch diam., 16 turns per inch (B&W Miniductor 3007).

The coil forms used are Allied Radio No. 24-4P (four prong) for L_1-L_2, and 24-5P (five prong) for L_4-L_5. Different type forms are used so coils cannot be incorrectly plugged in.

need an opening at the base of the transformer to mount the feedback coil, L_3. L_3 is mounted in place by slipping the coil over the base of the rod that supports the two coils of the i.f. transformer. The leads from L_3 can be connected to a tie-point strip mounted at the edge of the transformer hole. Once the coil is set in its correct position (we'll tell you how in the tune-up procedure) it can be held firmly in place by melting some paraffin and dripping it around between the coil and the support rod.

The coil information is given in Table I and Table II. In Table I, the coil forms are merely used to hold the coils which are made out of Miniductor stock. Actually, a few more pennies could be saved here if the builder desires and is ambitious enough. Instead of the coil forms, you could get some old glass tubes and break the glass away and then dig out the material in the base of the form that holds the glass tube. The tube bases could be used to hold the coils, cementing the coils to the tube bases with Duco cement to hold them firmly in place.

Fig. 2 shows the method for making the coils. In each case a single length of coil stock is used to make L_1-L_2. This is also true of L_4-L_5. For example, the 80-meter coil is made from a piece of stock two inches long, or 64 turns. Unwind two turns from each end of the coil, and then from one end of the coil count off ten turns and push the 10th turn in toward the axis of the coil so you can get at the wire to cut it. Cut it and then unwind ½-turn on each side. You'll have to solder a couple of inches of wire to each of these ends to have enough lead length to reach through the coil-form pins. The coil can then be fed into the coil form and the leads brought through the pins, trimmed off, and then soldered. However, before putting the coil in the form take a file and file off the ends of the coil form pins. The pins are nickel coated and the solder won't "take" very well to nickel. The same procedure is followed in making the rest of the miniductor coils.

You can save the cost of the commercial coil stock by winding the coils yourself on the forms specified. Allowing for the cost of a small spool of wire, the net saving is about $3.50. Table II gives the winding data. Wind all the coils in the same direction (this is important, especially in L_4–L_5) and wire them exactly as shown for the Miniductor coils in Fig. 2.

Whichever type coil you choose (the results are the same with either set) be careful in soldering the wires in the coil-form pins. The polystyrene forms will soften if heat is applied to the pins for more than a short period.

Tune-Up Procedures

Once the unit is wired, plug in a pair of headphones or connect a speaker to the receiver, attach an antenna and turn the unit on and let it warm up. A good band to start with is the 5-to 15-Mc. range, as there are always plenty of signals in this region. Set C_{11}, the bandset capacitor, at about midrange and then gradually turn the regeneration control toward full on (toward the end

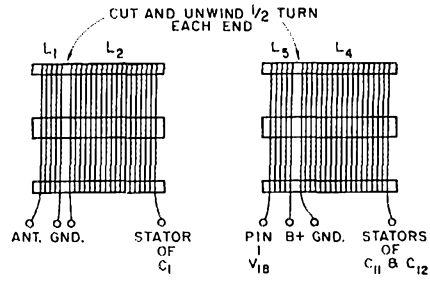


Fig. 2—This drawing shows the method of making the coils from the Miniductor coil stock.

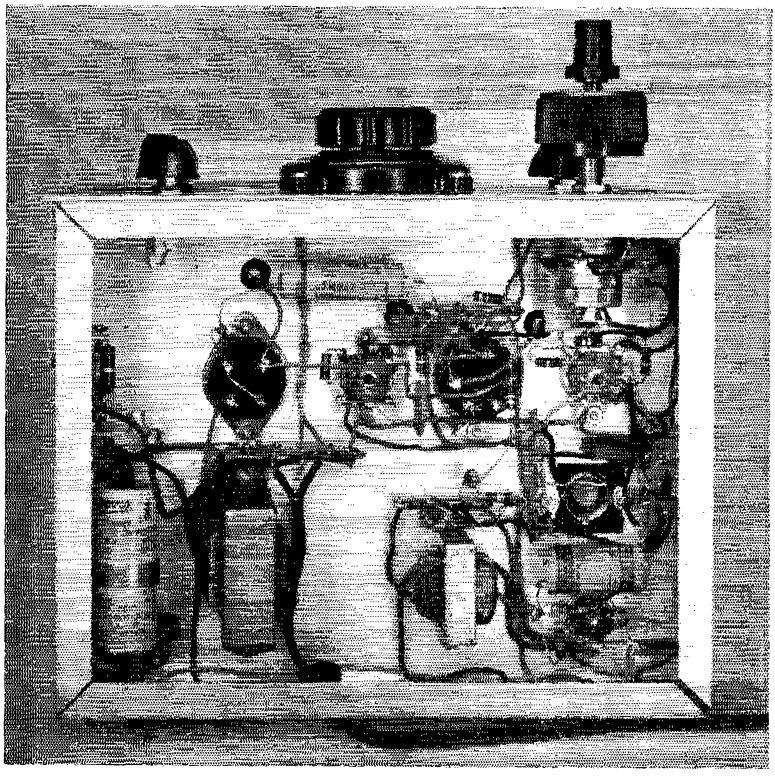
connected to R_2). At one point you should hear the detector break into oscillation as evidenced by a sudden increase and change in the character of the background noise. Tune the bandspread capacitor C_{12} to a signal and then peak the mixer tuning by means of C_1 for maximum signal strength. Next, gradually decrease the setting of the regeneration control and at the point just before the detector goes out of oscillation the signal should come up in strength quite strongly. This is the best setting for the control for c.w. or s.s.b. signals. For a.m. phone signals the control should be set just below the point of oscillation. If you find that the detector doesn't oscillate at all it may be because you have connected L_3 backwards (don't feel bad if you did, that's what happened to us the first time!). Reverse the leads to L_3 and try again.

If you have access to a high-resistance d.c. voltmeter, connect it between the screen, pin 3,

TABLE II

Using the same type of coil forms listed in Table I, you can save additional expense by winding your own coils. All of the coils listed below are made with No. 22 enameled wire.

Mixer Range	*Coil Data*
2.5 to 6.4 Mc.	L_1 — 8 turns, close wound; ⅛-inch spacing between L_1 and L_2. L_2 — 35 turns, close wound.
6.0 to 16 Mc.	L_1 — 4 turns, close wound; ⅛-inch spacing between L_1 and L_2. L_2 — 13 turns, close wound.
16 to 32 Mc.	L_1 — 2 turns, spaced over ⅜ inch, with one turn interwound with L_2. L_2 — 7 turns, spaced over ⅜ inch.
Oscillator Range	
2.9 to 5.1 Mc.	L_4 — 28 turns, close wound; ⅛-inch spacing between L_4 and L_5. L_5 — 7 turns, close wound.
5.0 to 12 Mc.	L_4 — 16 turns, close wound; ⅛-inch spacing between L_4 and L_5.
10 to 22 Mc.	L_4 — 6 turns spaced to cover ⅝ inch. L_5 — 2 turns spaced to cover ⅜ inch with one turn interwound with L_4. L_3 — 7 turns, close wound, ⅜-inch diameter. This coil can be tied with thread or string to hold the turns together and then slid over the base of the i.f. transformer and positioned to give regeneration as described in the text. Once the correct position is determined it can be paraffined in place.



Grouped at the left in this bottom view are the power supply components. At the lower right center is the audio output transformer. L_3 is visible in the square hole at the right hand side of the chassis.

of the detector and chassis. The best spot for the detector to come into oscillation is between 20 and 30 volts on the screen. You can check this by turning the regeneration control and observing the voltmeter. If it should come into oscillation at a lower or higher point than this voltage range try moving L_3 either in or out and then checking again. Once you find the right spot you can use the paraffin to set L_3 in place. If you remember earlier we said that you may have to juggle the value of R_2 if you cannot find a 50,000-ohm control. If the value of the control is less, say 25,000 ohms, then you'll probably need about 75,000 ohms for R_2. In any event, shoot for a combination that will give from zero to about 40 volts on the screen when R_3 is turned through its range. Also, and this is important, always turn off the receiver when making any soldering changes. We don't want you "shocked" out of ham radio.

Once you have the regeneration control operating properly, you can calibrate the receiver. Put in the lowest-frequency set of coils and, starting with C_{11} set at maximum (fully meshed), tune through the range of C_{12}, listening for ham signals. Depending on your location in the country, you may come across WWV, the United Bureau of Standards signal. This will give you a marker at 2.5 Mc. They also broadcast on 5, 10, 15, 20 and 25 Mc. Another station you might spot is the Canadian time signal station CHU at 3.33 Mc., which is of course just below the 80-meter amateur band. Next, reduce the capacitance of C_{11} about 25 per cent from maximum. Go through the tuning of C_{12} and follow this procedure until you hear amateur signals. Once you locate the 80-meter band you can mark the dial setting of C_{11} so you have a permanent record.

Familiarize yourself with the tuning ranges of both the oscillator and mixer coils. In some instances the mixer range will permit you to tune to the ranges 1600 kc. either side of the oscillator frequency. For example, you can peak the mixer on either the high or low side of a given oscillator frequency if the mixer coil happens to cover both ranges. It merely means that you should check both noise peaks when searching for the bands and calibrating the receiver. Once you find the correct setting you'll know it because the amateur signals will get much louder at the correct mixer setting.

If you happen to be able to borrow either a grid-dip oscillator or a signal generator it is a simple matter to feed a signal from either into the receiver for calibrating the unit.

Performance

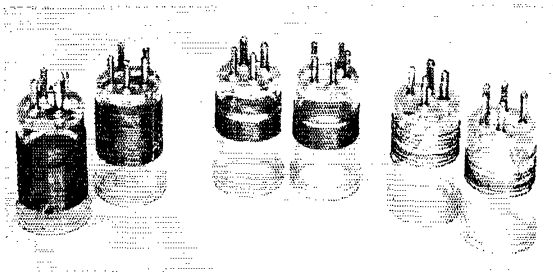
We mentioned earlier that the cost of this receiver can be kept under $15 by making use of parts scrounged from an old TV set. If you have to buy all the parts new the price jumps to about $30. Of course, the big question in the reader's mind is how does the RS-3 compare with kits in the same price range — or even the higher-priced commercial jobs. To find out, we checked it against a general-coverage single-conversion

receiver in the $100 price range; this set had a 455-kc. i.f. and an r.f. stage.

Using a signal generator for measurement, the first thing checked was the ability of the receiver to pull in weak signals. Even though the commercial job had an r.f. stage, it did not outperform the RS-3. We may be partial (!) but the RS-3 actually took the edge when the mixer tuning and regeneration were carefully set for optimum reception. This wasn't really surprising, because earlier on-the-air checks against higher-priced manufactured receivers had shown similar weak-signal performance.

The second check was on image rejection. To repeat a point discussed earlier, the mixer will respond to signals 1600 kc. on either side of the oscillator frequency. One of these is of course the desired signal and the unwanted one is called the image. If a strong image signal is present in the mixer, it will interfere with the desired one. On 80 meters, the RS-3 showed an image rejection of about 130 times (42 db.). In other words, a signal at the image frequency had to be 130 times stronger than a desired signal in order to produce the same audio output from the receiver. At the 21-Mc. end of the range the ratio was about 30 times (29 db.). This decrease is to be expected since the image ratio becomes poorer in all receivers as you go higher in frequency. The RS-3 was better than the manufactured set by more than 10 db. on all bands with the exception of 7 Mc. It is far superior in image rejection to the lowest-priced manufactured receivers – ones that have single conversion and no r.f. stage.

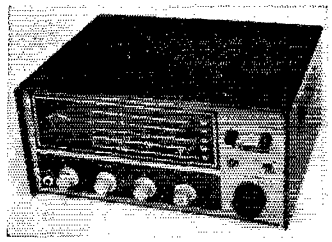
For the money, it's a difficult receiver to beat. QST



Here's a shot of the homemade coils. They are all wound with No. 22 enamel wire. The complete set will provide the same coverage as the commercial coils.

• Recent Equipment —

Heathkit HR-10 Receiver



In calling the HR-10 a "basic" amateur-band receiver kit, the Heath Company probably means that it includes those features that have become practically routine in receivers having any real claim to the "communications" title. There is an r.f. stage, first mixer/oscillator, two i.f. stages, diode detector, b.f.o., a.g.c. rectifier, automatic noise limiter, and two audio stages, the last being a power pentode. The power supply is built in but, as is customary in all receivers above the "SWL" class, the speaker is not, nor is it supplied with the kit. There is provision for a plug-in crystal calibrator, but this, too, is an accessory which must be purchased separately.

Liberal use is made of multipurpose tubes; the seven tube envelopes include three triode-pentodes and a triple diode. Fig. 1 is a block diagram of the set. The unusual feature, for a receiver in this price range, is the two-crystal half-lattice filter in the high-frequency (1681-kc.) i.f. This intermediate frequency is high enough to result in satisfactory suppression of images, and the filter provides adjacent-channel selectivity comparable with that obtainable in a conventional two-stage amplifier at 455 kc., so no further conversion is needed.

The front-end circuits are the familiar ones: an inductively-coupled antenna circuit — with the antenna coupling adjusted for working from coaxial lines — gang-tuned with the mixer grid circuit and high-frequency oscillator. The latter is of the "hot-cathode" type. There is an antenna trimmer, controlled from the panel, across the r.f. grid-tuned circuit. A similar trimmer capacitor is connected between the oscillator cathode and ground, for aligning the band edges on the dial; this is marked "CAL RESET" on the panel. The 3.5- and 7-Mc. mixer tuned circuits are loaded by resistances; these are not explained in the instruction book but presumably help level off the gain as compared with the other bands and perhaps also help broaden the tuning so tracking becomes less critical. All coils are slug-tuned and shunted by fixed capacitors; in the oscillator tuned circuits each fixed capacitance is a combination of silver mica and N750 temperature-compensating capacitors. The coils, fixed capacitors, and band switch are furnished as a preassembled, prewired unit.

Each of the five amateur bands — 3.5 through 28 Mc. — is spread over practically all of the tuning dial. Calibrations are fairly linear, and are marked off at 10-kc. intervals on the four lower bands. The steps are 20 kc. on 28 Mc. The tuning rate is slow enough for easy tuning — 12 turns of the knob to go through a band, corresponding to about 50 kc. per complete knob rotation.

The crystal filter and its input transformer work directly from the plate of the 6EA8 pentode mixer. The frequencies of the two crystals are 1.7 kc. apart, giving an effective bandwidth of 3 kc. at 6 db. down. With proper tuning of the input transformer, the selectivity curve is quite flat for about 2 kc. on top. The rated bandwidth at 40 db. down is 9 kc.

Following the filter are the two i.f. amplifier stages, the second tube of which is a 6EA8 triode-pentode with the triode used as the beat oscillator. The b.f.o. is not coupled directly to any part of the i.f. circuit, but there is enough internal coupling between the triode and the pentode control grid to let the pentode section act as a b.f.o. amplifier. The amplified b.f.o. voltage, along with the i.f. signal, is then applied to a diode detector, one section of a 6BJ7. Thus the b.f.o. voltage at the detector depends on the manual gain setting; the more the gain, the greater the b.f.o. voltage. This works in the right

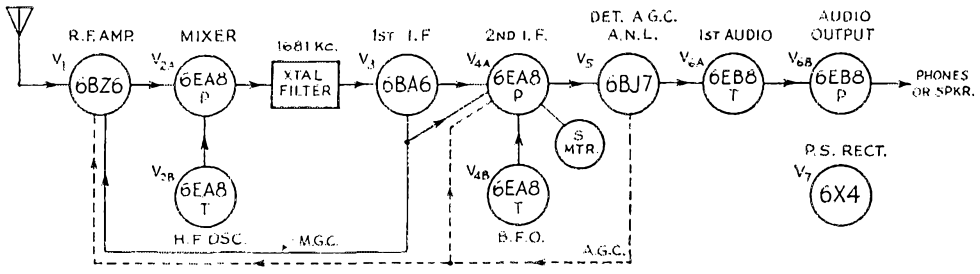


Fig. 1—Block diagram of the HR-10 receiver.

direction, but even so the stray coupling does not give enough b.f.o. voltage to prevent overloading on strong signals when the r.f.-i.f. gain is high. Better c.w. reception resulted by increasing the coupling between the triode and pentode control grids. This was easily done by soldering about an inch of wire to each grid prong on the 6EA8 socket, spacing the wires so the rectified voltage across the detector diode load resistor (Pin 1 to ground) was 15 to 20 volts, as measured by a v.t.v.m., with the manual gain all the way up. There is an equivalent improvement in handling strong s.s.b. signals.

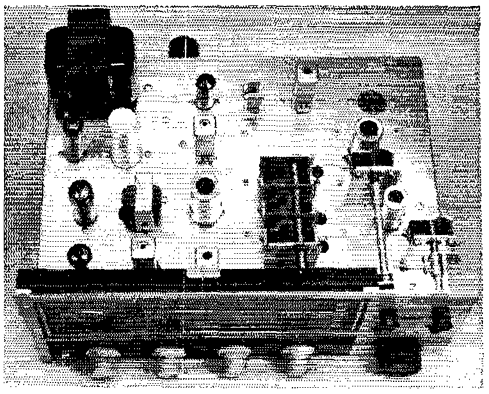
The second diode of the 6BJ7 is used as an a.g.c. rectifier. The automatic gain-control voltage is applied only to the r.f. and second-i.f. amplifier grids, although the manual gain control (variable cathode bias) is applied to the first i.f. in addition to these two. The third diode is a shunt-type automatic noise limiter which, like all limiters of this general type, is useful only when the b.f.o. is off. (Incidentally, the circuit diagram in the instruction book has "on" and "off" reversed on the a.n.l. switch.)

The audio voltage from the detector is amplified in the triode section of a 6EB8. The triode is resistance coupled to the pentode power-amplifier section of the same tube. An 8-ohm audio output is provided for use with a speaker, and a 500-ohm output for headphones. The speaker is disconnected when the headphone plug is in the PHONES jack on the front panel.

The power supply uses full-wave center-tap rectification with a two-section *RC* filter. There is no voltage regulator in the receiver, with the result that the oscillator frequencies change somewhat with various settings of the manual gain control, and with changes in line voltage. The total change is only a few hundred cycles, which is not at all bad for unregulated oscillators. However, it can be annoying, especially in c.w. and s.s.b. reception, if the line voltage is at all sensitive to varying household loads. A VR tube on the oscillators would get rid of it.

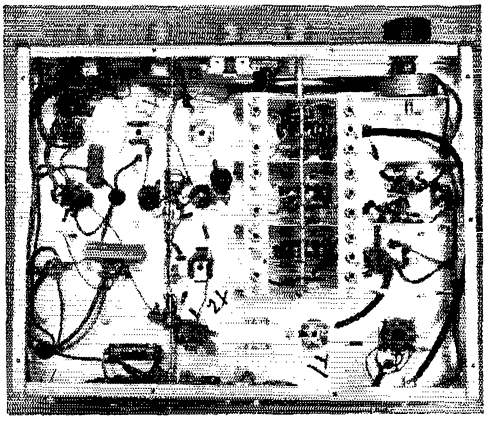
Aside from this, the only thing that can be criticized is the hum in headphone reception. This is not a simple matter of plate-supply filtering — more filter was tried with little improvement — but appears to be tied up with a.c. chassis currents arising from the heater wiring. It goes through a minimum at a rather high setting of the audio gain control, at which point it can be fairly well masked by noise and signals at high settings of the r.f. gain control — if your eardrums are built to stand that much volume. An external attenuator for the headphones probably would help in this respect.

On the plus side, the receiver handles nicely, is easy to tune on any type of emission, has good phone selectivity, and has good temperature stability. A number of drift runs at 21 Mc. showed a maximum excursion of about 2 kc. during the first half hour or so of warm up (from a cold start) after which the frequency moved back, reaching the original setting in about two hours from start. The construction is solid, and the stability against vibration and shock is very good. Although the set does not have sharp selectivity for c.w., a fairly good single-signal effect can be obtained if the b.f.o. is set off to one side of the selectivity curve.



Chassis layout of the HR-10. The power supply and audio section is along the left side; the i.f. runs from back to front in the center, with the filter crystals at the rear; r.f. section is at the right. The variable capacitor nearest the right-hand edge of the chassis is the antenna trimmer; the one behind it is the calibration reset trimmer.

Miscellaneous features: an octal socket is provided for a plug-in 100-kc. crystal calibrator. The necessary wiring to this socket and a panel on-off switch are part of the receiver, although the calibrator itself is not furnished. An octal "accessory" socket on the rear chassis wall has two pins wired in series with the r.f. gain control; these can be used for an external stand-by switch or relay, but are normally connected together through a jumper in an octal plug. The panel stand-by switch is in series in this same circuit. Thus on stand-by the cathodes of the three tubes on the manual gain control are opened while the



The preassembled r.f. section occupies the upper right section of the chassis in this view. Aside from the bunching of small components that one expects around miniature tube sockets in modern equipment, the bottom of the chassis has an "open" appearance that should make for ease in wiring. The small variable capacitor on the panel at top center is the v.f.o. pitch control.

remainder of the receiver is operative. There are separate a.g.c. and b.f.o. switches; the former also cuts in the S meter when thrown to the "on" position. The S meter is one arm of a d.c. bridge in the plate circuit of the last i.f. stage.

We are unable to comment on any aspect of assembling the kit, as the set was received completely wired. The preassembled r.f. section should save considerable time. So should the wiring harness which is part of the kit. The under-chassis space is not crowded, so assembly and wiring here should offer few mechanical problems. On a "general principles" guess, the only point that might tax the constructor would be the ever-cantankerous dial cord.

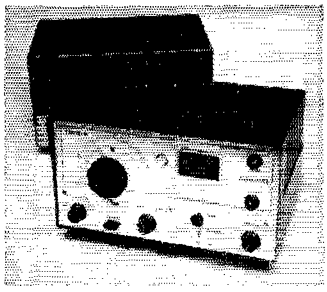
The assembly instructions appear to be done with the usual Heathkit thoroughness, but the book is a little on the sketchy side in explaining the circuit features and in operating instructions.

— *G. G.*

Heathkit HR-10 Receiver

Height: 6½ inches.
Width: 13¾ inches.
Depth: 11½ inches.
Weight: 18 pounds.
Power requirements: 117 volts, 50/60 cycles, 50 watts.
Price class: $80.
Manufacturer: Heath Company, Benton Harbor, Mich.

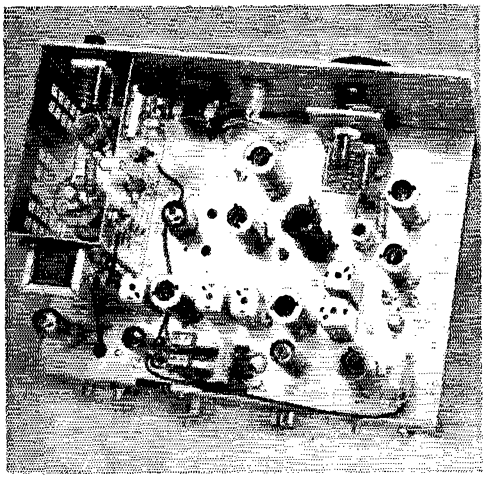
The Clegg "Thor" 50-Mc. Transceiver



LIKE its Greek deity predecessor,[1] the Clegg Laboratories Thor is packed with novel but practical ideas. Obviously it was designed with the special needs of the v.h.f. operator in mind, and it has a number of features that have not been available to the purchaser of v.h.f. gear heretofore.

The Thor is the first v.h.f. transceiver wherein the transmitter frequency can be made to follow the receiving frequency automatically, for example. Separate-frequency operation is also possible. By use of a variable oscillator common to both transmitting and receiving, and eliminating frequency multiplication with v.f.o. control, highly stable signals are produced, coming and going. Transmitter output is over 40 watts, a.m. or c.w. The receiver does an excellent job on all modes, including s.s.b.

[1] Recent Equipment: The Clegg Zeus V.H.F. Transmitter, *QST*, Sept. 1961, p. 55.



Interior of the Thor r.f. unit. The transmitter final amplifier assembly is at the left, v.f.o. tuning at the right.

How It Works

In receiving, the signal is first amplified in a 6CW4 stage, V_1. This r.f. amplifier has three tuned circuits, adjusted for essentially flat response across the desired range, 50 to 52 Mc., with good attenuation of signals above and below. A tunable oscillator and cathode follower, V_6, covers 39.3 to 41.3 Mc., its output beating with the signal in the first mixer, V_2, a 6EH7, to give output at 10.7 Mc. The tunable oscillator is also used as the v.f.o. in transmitting.

The mixer plate circuit has a 10.7-Mc. crystal-lattice filter, for selectivity where it does the most good: up near the front end of the receiver.

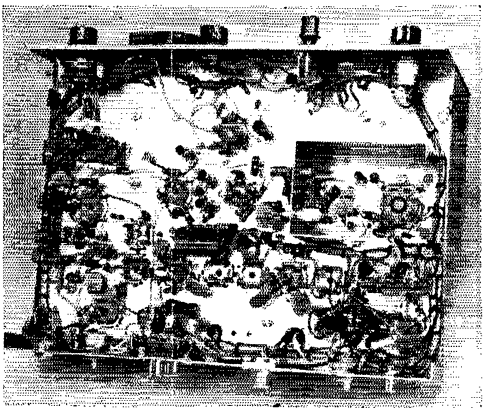
A triode-pentode 6BL8, V_3, combines the functions of second mixer and crystal oscillator, the latter on 11.156 Mc. Mixer output is on 455 kc. Two transformers designed for the flat-topped steep-sided response desirable in v.h.f. work are used between the second mixer and a 455-kc. amplifier, V_4, another 6EH7. A 6AL5, V_{14}, and two audio stages in a 6BM8, V_5, complete the receiving lineup.

Receiver selectivity quoted by the manufacturer is 5 kc. at 6 db. down and 12 kc. at 50 db. down. This is not razor-sharp, as c.w. or even sideband operators think of selectivity, but it chops off signals in the 50-Mc. band in a way that will be a revelation to hams accustomed to

the response of the usual v.h.f. transceiver. More *important*, the selectivity "up front" helps markedly to cut down blocking and cross-modulation by strong signals close to the fellow you're trying to hear, and interference from out-of-band signals is below levels normally encountered in 50-Mc. receivers and converters.

In transmitting, output from the tunable oscillator V_{6A}, is fed to a 12BA7, V_8, which serves as either a mixer or doubler. The 39.3-Mc. energy is mixed with the output of a 10.7-Mc. crystal oscillator, a 6U8 triode, V_{7A}, to give a 50-Mc. signal. V_{7A} is also the b.f.o. for receiving c.w. and s.s.b. signals. For crystal control, the 6U8 pentode section, V_{7B}, works with either 8- or 12-Mc. crystals, doubling to 25 Mc. in its plate circuit. We run into the limitations of block-diagram presentation in showing how this is done, but the crystal-controlled excitation is fed to a different grid of the 12BA7, and the stage then operates as a doubler to 50 Mc.

Next comes a novelty in transmitting circuitry, a 6DJ8 cascode amplifier, V_9. This type of circuit is well-known to v.h.f. men as a receiving amplifier, but it has virtues in this transmitter application also. It is stable, requiring no neutralization, and broad enough so that it need not be gang-tuned to the other transmitting circuits. The 6DJ8 builds up the output sufficiently to drive a 7558 50-Mc. amplifier, V_{10}, which drives the final 6883 (12-volt version of the 6146), V_{11}. Output with the unit tested is approximately 45 watts. The transmitter output circuit is a pi network.



Bottom of the 50-Mc. transceiver. Clean, open layout, even in a small-sized assembly, is made possible by putting only the r.f. and control circuits in the package that will be at the operating position.

Layout

Like the Zeus, the Thor is a two-package

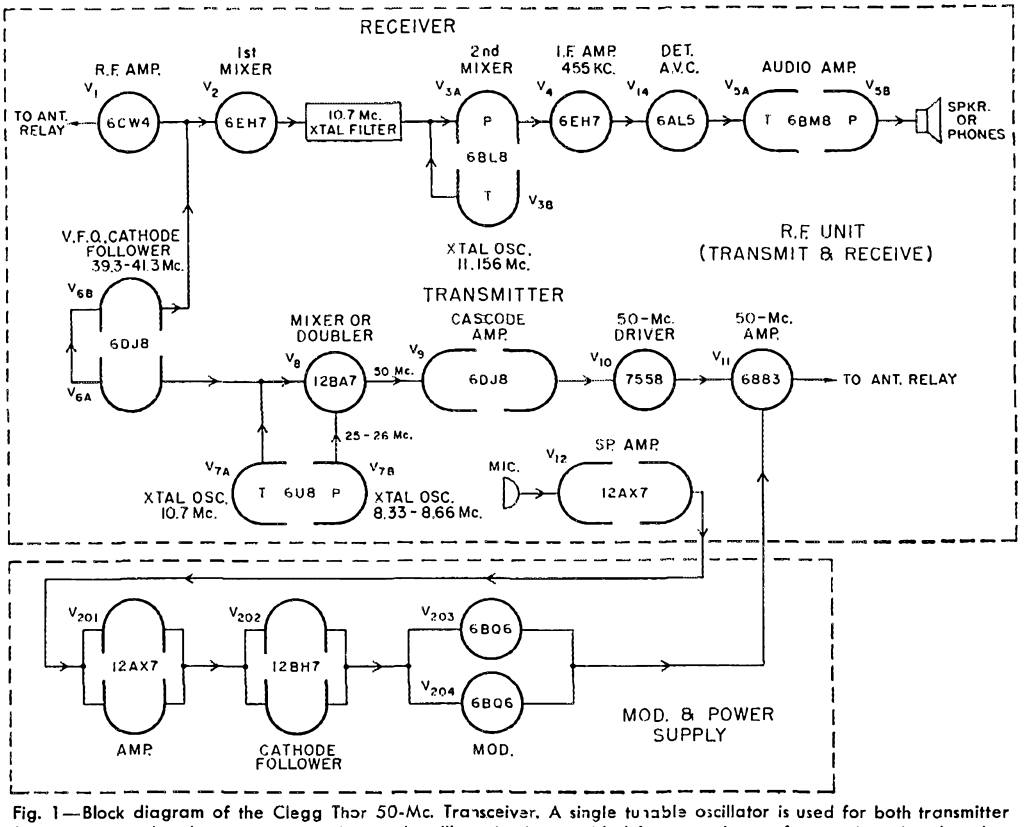
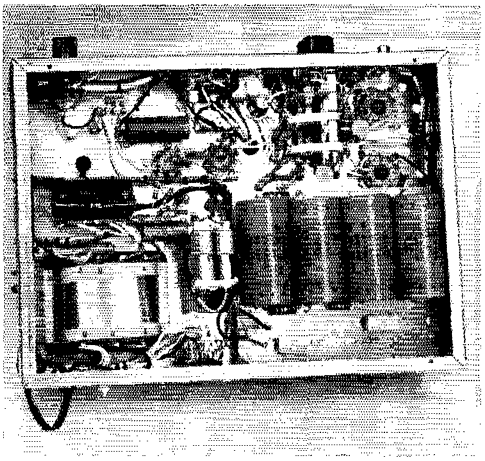


Fig. 1—Block diagram of the Clegg Thor 50-Mc. Transceiver. A single tunable oscillator is used for both transmitter frequency control and receiver tuning. A crystal oscillator is also provided for operating on frequencies other than that of the station being received.



Bottom of the Thor power supply and modulator. The power supply uses four small diode rectifiers, two of which are just visible in the lower right corner of the picture. Electrostatically shielded power transformer is at the lower left.

design. All portions of the equipment that require adjustment in normal use are in the r.f. package, a small lightweight assembly that takes up little room at the operating position. This includes the first speech amplifier, V_{12}. A larger and heavier assembly, shown at the bottom of our block diagram, contains the power supply and speech stages, V_{201}, V_{202}, V_{203}, and V_{204}. The modulator stage uses two 6BQ6s in push-pull. Speech clipping and filtering give this audio system the characteristic Clegg punch.

The power supply is tubeless, using four small diodes. The power transformer is electrostatically shielded. A separate power supply for 12-volt d.c. input is available, for those who would like a real "power-house" 50-Mc. mobile installation. The cable for interconnecting the a.c. supply and the r.f. unit is 10 feet long, permitting installation in a variety of ways. No external send-receive relay is needed, since this function is built into the Thor.

Operation

The tuning range of the Thor is limited to 50 to 52 Mc. This recognizes the practical fact that nearly all use of the band is in the lower portion. With the selectivity of the Thor receiver, you wouldn't want to tune more with one sweep of a vernier dial. The planetary mechanism employed covers the calibrated part of the dial in slightly over 2½ turns of the knob.

Operation higher in the band than 52 Mc. is possible with crystal control. With v.f.o. control, the transmitter frequency is always within a few cycles of the receiving frequency. For transmitting on a separate frequency it is recommended that crystal control be used.

An interesting receiving feature is provided with the receiving mode switch. At the far left position reception is a.m. The next three positions to the right are for c.w. or sideband, with different levels of b.f.o. injection. This is necessary in obtaining the best reception of both c.w. and sideband signals of different strengths, as the b.f.o. level determines the gain through a.g.c. action and the a.g.c. cannot be turned off. C.w. signals that are really T9 have a beautiful clear quality with this receiver. Sideband sounds fine and is quite easily tuned in, considering the wide tuning range of the receiver. (Two megacycles *is* wide, when you have fairly high selectivity.) Stability is adequate for both these critical modes.

The heterodyning system of the Thor has two unwanted by-products: there is no beat-oscillator effect when using crystal control (because V_{7A} is turned off when crystal control is used) except within heterodyning range of your crystal frequency, and you cannot transmit conveniently with v.f.o. except on the frequency of the station you are working. There are ways around these limitations, but they are neither convenient nor very safe. The first is no great problem, as presumably most work with crystal control would be close to a band edge, and the station being worked would usually be there, too. The important point to keep in mind when using v.f.o. is to be sure that the station you call on voice is in the band — and that means above 50.1 Mc. for U.S. phone operation. (Remember those over-eager beavers who piled onto VP7CX on 50.05?) To call him legally with the Thor, you either *have* to use crystal control, or move the tuning dial back above 50.1 Mc. each time you transmit.

Looking at the front panel, the receiving mode switch is in the lower left corner. The crystal socket is directly below the tuning dial. Next is the v.f.o.-crystal switch. The main control switch is lever-operated, with the SEND position at the top, RECEIVE in the middle, and ANL at the bottom. The volume control and a.c. switch knob is at the bottom right corner. Above it are the amplifier tuning and loading controls. To their left is the S-meter, and a translucent white pilot light is between the meter and the tuning dial.

The rear apron of the r.f. unit carries the microphone jack, speech gain control, S-meter adjustment, antenna and power connectors, and phone and speaker jacks. The modulator front apron has the fuse receptacle, keying jack, phone-c.w. switch, and modulator-current meter jack.

— *E. P. T.*

Strays

An authentic Tibetan Prayer Wheel ritual defines "OM" as "a magic word in Hinduism which symbolizes much in little space and stands for infinity."

OK1OO again reminds W/K amateurs to send QSLs and SWLs only via the Central Radio Club in Prague. It is against Czech regulations to QSL direct.

• Technical Correspondence

SILICON TRANSISTORS FOR THE AMATEUR

Technical Editor, *QST:*

Diffused silicon transistors have a number of advantages over germanium which are of particular interest to amateurs. They will operate with internal (junction) temperatures up to 200 degrees C (390 degrees F) and will withstand 300 degrees C not operating, while germanium types are limited to 100 degrees C. In general, voltages applied to silicon devices can be much higher — up to 120 volts for some types — while germanium types are usually rated at less than 50 volts and more often at 20 to 30 volts. And better yet, if the maximum voltage of a diffused silicon device is reached, it will simply go into a low-resistance breakdown, and as long as there is sufficient current limiting in the circuit no harm will be done. Exceeding the breakdown voltage on high-frequency alloy germanium transistors will often destroy them.

Double-diffused silicon transistors can be used in many types of circuits and, compared to other transistors, give more performance per dollar. The same transistor often can be used as an r.f. oscillator or amplifier, as an audio or video amplifier, and for switching. Because transistor designs take less space, simplify physical construction and power-supply requirements, and do not generate significant heat in some applications, they can be more economical than tubes. The upper frequency limits of these transistors range from 60 to 1000 Mc.

This type of transistor was at one time considered expensive, but the expanding and continuous production of a number of manufacturers has increased availability and consequently lowered prices. Types that might be used for amateur applications are listed in Table I, along with their most significant characteristics. These types are readily available from distributors and are in general demand by industry, so that prices are reasonable for ham use. The list is restricted to small-signal, high-frequency, and medium-power devices since for high power (over 5 watts) germanium gives more watts per dollar, although only at low frequencies.

— *Bill Hamlin, WA6SVE, ex-W1MCA, Fairchild Semiconductors, Mountain View, Calif.*

Table I

Silicon Diffused Transistors
Recommended for Amateur Equipment
(N-P-N Types Unless Otherwise Noted)

Type	Case	Watts Disc. Air	Watts Disc. Case	V_{CBO}	V_{CER}	h_{FE}	h_{fe} (h.f. unless noted)	Class
2N696	TO-5	0.6	2.0	60	40	40 at 150 ma.	3 at 20 Mc., 50 ma.	D, F
2N697 [2]	TO-5	0.6	2.0	60	40	75 at 150 ma.	4 at 20 Mc., 50 ma.	D, F
2N699 [3]	TO-5	0.6	2.0	120	80	80 at 150 ma.	4 at 20 Mc., 50 ma.	D
2N706	TO-18	0.3	1.0	25	20	40 at 10 ma.	4 at 100 Mc., 10 ma.	A, C
2N708	TO-18	0.36	1.2	40	20	40 at 10 ma.	4.5 at 100 Mc., 10 ma.	A, C
2N718	TO-18	0.4	1.5	60	40	70 at 10 ma.	4 at 20 Mc., 50 ma.	C
2N720	TO-18	0.4	1.5	120	80	80 at 150 ma.	4 at 20 Mc., 50 ma.	C
2N978*	TO-18	0.33	1.25	−30	$-20(V_{CEO})$	60 at 150 ma.	2 at 20 Mc., −50 ma.	A
2N1420	TO-5	0.6	2.0	60	40	140 at 50 ma.	5 at 20 Mc., 50 ma.	A
2N1975	TO-5	0.8	3.0	100	80	140 at 50 ma.	38 at 1 kc., 1 ma.; h_{fe}(LF)	B
2N1984 [1]	TO-5	0.6	2.0	50	$25(V_{CEO})$	70 at 1 kc., 1 ma. h_{fe}(LF)	2 min. at 20 Mc., 50 ma.	A, B
2N1985 [1]	TO-5	0.6	2.0	50	$25(V_{CEO})$	30 at 1 kc., 1 ma. h_{fe}(LF)	2 min. at 20 Mc., 50 ma.	B
2N1986	TO-5	0.6	2.0	50	40	150 at 150 ma.	2 min. at 20 Mc., 50 ma.	D, F
2N1987	TO-5	0.6	2.0	50	40	50 at 150 ma.	2 min. at 20 Mc., 50 ma.	D, F
2N1989	TO-5	0.6	2.0	100	60	40 at 30 ma.	2 min. at 20 Mc., 50 ma.	D, F
2N1990	TO-5	0.6	2.0	100	10 μa.(I_{CEX}) at 75 v.	20 min. at 30 ma.		E
2N1991*	TO-5	0.6	2.0	−30	$-20(V_{CEO})$	Complementary to 2N1985		F

* P-N-P.
[1] Highly recommended for all types of small signal applications.
[2] Neutralized power gain at 30 Mc. is 18 db., low-level stage; as power stage, delivers 1.5 watts at 30 Mc.
[3] Neutralized power gain at 30 Mc. is 17 db., low-level stage; 70-Mc. oscillator efficiency is 30 per cent.

Key to Terminology

Case — Standard outlines: TO-5 — 0.34 inch diam. by 0.26 inch high; TO-18 — 0.23 inch diam. by 0.21 inch high.

Watts Dissipation —
Air — Watts at room temperature (25 degrees C) with no heat sink.
Case — Watts with transistor case held to 25 degrees C by heat sink (radiator).

V_{CBO} — Maximum voltage between collector and base with emitter open (equals diode breakdown voltage).

V_{CER} — Maximum voltage between collector and emitter with 10 ohms between base and emitter. This is lower than the voltage with base shorted to emitter and is recommended as the maximum operating voltage in most applications.

V_{CEO} — Maximum voltage between collector and emitter with base open. It is slightly lower than V_{CBO}.

h_{FE} — D.c. current gain from base to emitter biased for the collector current shown. Peak gain is usually at a lower current.

h_{fe} (HF) — High-frequency a.c. gain from base to collector at the specified frequency. This gain multiplied by frequency gives the gain bandwidth product (f_t) or the frequency where the gain is 1.

h_{fe} (LF) — A.c. current gain at 1 kc., indicating audio frequency performance.

Class — A — Small signal video or r.f. amplifier.
B — Small signal low frequency amplifier.
C — Low power r.f. or a.f. oscillator and amplifier.
D — Medium power r.f. or a.f. oscillator and amplifier.
E — High voltage blocking oscillator and avalanche (breakdown) circuits.
F — Switching; substitute for relays in electronic keys, etc.

MICRO-BAND F.M.

Technical Editor, *QST*:

A few years ago, I thought up a receiving method for c.w. which would use a string of multipliers in the i.f. system. It can be shown that two signals separated by .1-kc. at the fundamental would be 1.0-kc. apart at the tenth harmonic, or at the output of the i.f. multipliers. Thus with this method the forty-meter c.w. band would be equivalent to being 2000-kc. wide. With more multipliers it could be even wider, completely solving the c.w. QRM problem.

Anyway, I also thought of a m.b.f.m. method similar to Mr. Wasmuth's. In a letter of August 4, 1960, Mr. George Grammer told me that:

Multiplying the frequency deviation of an f.m. signal is quite practical, but it is somewhat questionable whether there are any real advantages to such a method. . . . It might be more favorable from the detection standpoint . . . (but) the signal-to-noise ratio would be set by the earlier stages in the receiver. . . . [The bandwidth of the signal is determined by the modulation *frequency;* the first set of sidebands is removed from the carrier by the modulation frequency, regardless of the deviation (see *Radio Amateur's* Handbook, Chapter Twelve). — EDITOR]

In *this* m.b.f.m. system, detection will not be helped either, because the percentage frequency deviation of the f.m. signal remains constant with multiplication. A normal straight discriminator could be used at 455-kc. but would give low output; this could be made up by further amplification or by lowering the detection frequency.

In years to come, when the f.m. bandwidth shall reach 1 cycle (or 100-*kc.* by 2063), it may be necessary to use a string of multipliers, followed by a converter down to a low frequency for detection (or for further multiplication-conversion-detection).

I think Mr. Wasmuth's article was very imaginative and interesting and will be very hard to beat for April 1964. — *Harry J. Gensler, Jr., K8OCO, Detroit, Michigan.*

Technical Editor, *QST*:

With interest I have just read the April, 1963, issue of *QST* and noted the technical article "Micro-Band F.M." by W8SBQ, detailing basic particulars concerning the utilization of carrier deviation multiplication in f.m. receiver systems instead of in transmitters for the purpose (primarily) of conserving electromagnetic spectrum space.

This writer wishes to inform you, however, that this "system" is an *exact duplicate* of the "Carrier Deviation Separation Multiplier" system invented by the undersigned and legally disclosed to Registered Patent Attorneys of Washington, D. C. in January, 1958. The system encompasses far more extensive and varied applications than merely f.m. communications, although the *exact* application set forth in W8SBQ's article is fully covered in detail in my disclosure and subsequent "claims."

You will find attached copies of documentation fully supporting the above statements, and your attention is particularly invited to the clearly printed dates of the documentation.[1]

Although this writer congratulates the excellent "unlibited thunking" approaches of the Coffee Dunkers of Detroit and of W8SBQ, I am compelled to request that *QST* publish immediately a clarifying statement of some kind correcting the misinterpretations regarding prior concept credit given the Coffee Dunkers and W8SBQ for this remarkable discovery. Such credit rests both morally and legally with the undersigned, and *not* with any other party or parties. Further, the attention of all persons involved in this matter is invited to U. S. Patent Laws, making it illegal for *anyone* (whether for profit or not) to construct and use (even for one's self) devices invented by another without the inventor's consent.[2] The requested clarifying statement must be insisted upon to remove doubts in the minds of readers of *QST* as to the actual legal inventor of this system, since failure to do so might well result in damage to the undersigned in negotiations with equipment manufacturers for "commercial rights." Further, such "commercial rights," claimed as "reserved" in *QST* by the author of the article in question are non-existent in view of the facts, and are the sole property of the undersigned. — *R. G. Matthews, W4EAW, College Park, Georgia.*

[1] These are dated in 1958 — nothing was received to indicate that a patent *has* been issued. — EDITOR.

Technical Editor, *QST*:

The Microband f.m. article in the April (of course!) issue may have been just in good clean fun but as often happens there may be more than a kernel of truth in it. Also, if it stimulates thinking or experimentation it has accomplished some good.

At any rate I found myself musing over the possibilities of micro-bandwidth f.m., and wound up performing a few experiments. Of course the big fallacy in the article's argument is that the spectrum width must always at least be equal to the bandwidth of the intelligence to be transmitted. Reducing the deviation in the case of f.m. merely degrades the signal-to-noise ratio. The only way to utilize micro-bandwidth f.m. is in some form of transmission which does not require wide bandwidth (RTTY is an example). Then the receiver bandwidth may be reduced also, so the signal-to-noise ratio will not be degraded but will in fact be improved.

The approach used by the "Coffee Dunkers" was rather involved and archaic. Having tried f.m. on many occasions I have found that even the Foster-Seeley type discriminator is a tedious thing to set up and still requires a separate limiter. My favorite, for reasons of simplicity, has been the standby of the TV industry — the quadrature detector. It is self-limiting, has high output, uses few components, and requires very little power.

Fig. 1 illustrates the normal quadrature detector used at this station. Since a quadrature detector relies on phase shift in the tank circuit in the quadrature grid, a higher-*Q* tank circuit would result in narrower bandwidth. Going to extremes in high-*Q* tanks brought me up to the quartz crystal. I substituted a 453-kc. crystal in the detector in my receiver, and found that the bandwidth from one peak to the other of the traditional "S" curve in the detector's output was about 50 cycles — so narrow that it became difficult to measure accurately. A trial of several other crystals indicated that the bandwidth was approximately 100 cycles per megacycle of the crystal frequency. At 7010 kc. the peak separation was 750 cycles, fairly near the normal RTTY shift. Perhaps loading the crystal slightly with a lower resistance or some capacitance would widen it out a little.

The story doesn't stop there, either. . . . I also tried the 6BN6 as an audio discriminator, substituting a toroid and capacitor, resonant at 2500 cycles, in the quadrature grid circuit and found that the total audio bandwidth was approximately 10% of the tank frequency, or 250 cycles. While too narrow for normal a.f.s.k., perhaps something like it

[2] Not so! — EDITOR.

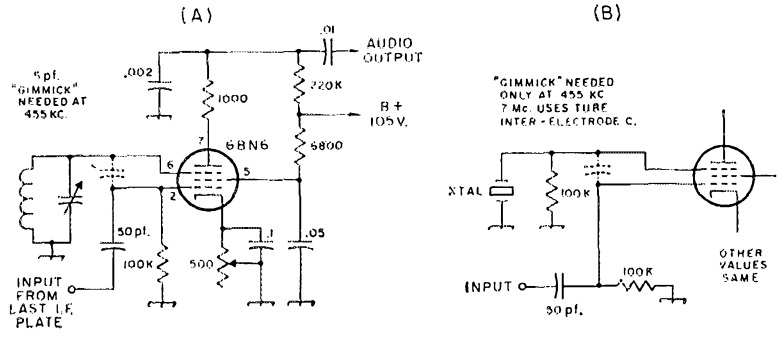


Fig. 1—(A) Typical f.m. detector circuit using the 6BN6; (B) substitution of crystal for tuned LC circuit for narrow-band detection.

could spur a move toward narrow-shift f.s.k. or a.f.s.k. At any rate it is a simple circuit and the potentialities have merely been scratched. — *Fred B. Cupp, K8AOE*
Willoughby, Ohio

PROPAGATION CONDITIONS AND COMMUNICATIONS

Technical Editor, *QST*:

One of the reasons for the crowded conditions on the high-frequency bands is the widespread belief in predicted propagation conditions. Like weather predictions these forecasts have a definite value, but they remain merely predictions. I have observed that the average man puts aside his raincoat when it becomes clear that the predicted storm is not coming, whereas the average amateur radio operator listens carefully to the prediction but seldom examines its accuracy. As a result most amateur stations may be heard apprehensively huddled about the predicted maximum usable frequency leaving the DX to talk with itself.

Several months ago I spent one evening listening to international broadcasting stations as far away as Japan, and a veritable thicket of commercial and military telegraph and teletype stations, both above and below the ten-meter amateur band, but not a single signal was heard inside the band. After all, it was 8:00 P.M. and everyone knows that ten meters is closed at that time. I have listened to the ten-meter band on three occasions since, always hearing at least one QSO. The average distance between here and the stations heard was 500 miles. Perhaps I was merely lucky; I did listen only four times in all. Nevertheless, this observation raises some interesting questions.

To estimate how well we are actually utilizing the potentialities of our bands, I made a study of the 7-Mc. band. The predicted maximum usable frequency is often near 7 Mc. and so it is heavily populated, both by amateur radio stations and by propaganda broadcasters. There is no doubt that those broadcast stations are covering great distances, but how well *are we doing*?

In order to find out, I listened regularly for about a month at 0215 GMT on 7080 kc. immediately after the code practice transmission from W1AW. All QSO's were logged, and the distances between stations were determined with the help of the *Callbook* and an atlas. The results are shown in Fig. 1A.

The stations heard here fell into three distinct groups: ground wave, one hop, and two hop, with skip distance of 750 miles. The small size of the ground wave hump simply indicates that relatively few of the stations in this country are my next-door neighbors.

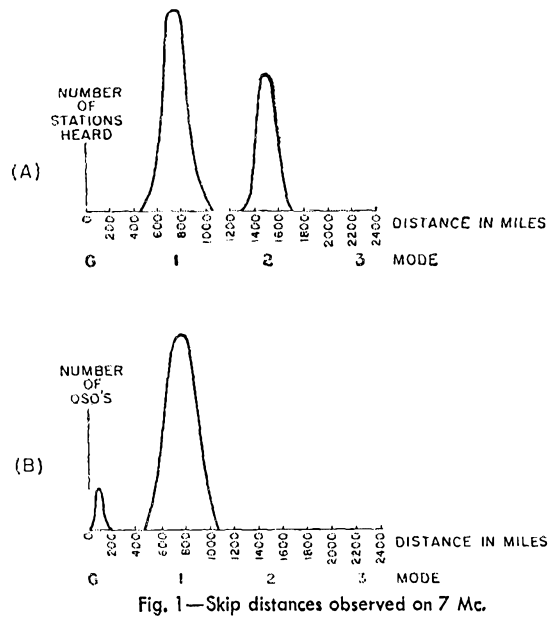


Fig. 1—Skip distances observed on 7 Mc.

The next hump represents one-hop reception from a distance of 750 miles. Sixty per cent of the stations heard were coming in by one-hop reception. The third hump represents two-hop reception from a distance of 1500 miles. Forty per cent of the stations heard were coming in by two-hop reception, indicating that the band will easily support two-hop communication. There is no three-hop hump, which confirms my suspicion that there are relatively few maritime-mobile stations.

Before turning to Fig. 1B, I might indicate that the receiver used was a 15-year old superhet with the original factory-installed tubes. The r.f. and i.f. amplifier tubes both show one-half the "minimum acceptable" transconductance. This receiver features barn door selectivity and uses a guy wire to the TV mast for an antenna. Thus it is safe to assume that anything I can hear you can hear better.

The second graph shows the average QSO distance under the same conditions. There are a few ground wave QSO's, only a single three-hop QSO and everyone else was using one-hop communication. Thus it appears that 40 per cent of the signals on the band are now considered QRM, but are potentially useful for communications.

Therefore, I would suggest that if you really have a special interest in communicating with others at distances of about 500 miles, you might try to repeat my results on ten meters where there is no QRM. If, on the other hand, you wish to take advantage of the excellent long-distance characteristics of the 7-Mc. band, open up your gain control a few decibels and easily double your range. If you live near the coast, you may even take advantage of the third hop. — *James E. Gray, W0GNY, Boulder, Colorado*

RADIATION FROM OPEN-WIRE LINE AT 420 Mc.

Technical Editor, *QST*:

W1FZJ, on page 62 of February *QST*, questions the usual assumption that the radiation from feed lines of the open-wire variety can be neglected at u.h.f., specifically in the 420-Mc. band.

Such a question cannot be answered except experimentally. Theory shows that perfectly parallel conductors whose separation is negligible compared to a wavelength radiate only a negligible fraction of the energy they carry. Sam's question, however, refers to practical, non-perfect lines whose separation is of the order of one-hundredth of a wavelength. As it happens, some very simple equipment is in use at VE2AQJ to demonstrate the properties of antennas and transmission lines to beginners. The necessary experimental work to check the question practically, therefore, took a very short while.

The equipment consists of a 6J6 self-excited oscillator, a pair of Lecher wires rather more than two meters long, and a diode detector coupled to a 150-microampere meter. Aerials are cut from a scrap wire as needed. The frequency of the oscillator is 425 Mc. as measured by the Lecher wires. The wires themselves consist of two lengths of 20-gauge wire about 9 mm. apart, and have a characteristic impedance of about 350 ohms. The lines are stretched straight and parallel, and have only a length of dry pine near them throughout their length.

The experiments were conducted in a basement room about 30 feet square. While reflections from walls and structural steelwork make precision measurements impossible comparative results seem meaningful.

The oscillator was coupled to the Lecher wires, and its frequency was checked. The Lecher wires were then terminated in a half-wavelength vertical aerial, and some field-strength measurements were made. With an antenna connected to the diode detector, the field was capable of pinning the meter at distances of 3 to 4 meters. Distortion of the field is noticeable, but rotating the field-strength meter into the horizontal plane cut the reading to zero (an excellent demonstration of the polarization of the wave).

The aerial was then removed from the Lecher wires. The field-strength meter gave no reading until it was brought within 30 mm. of the line, after which the reading increased rapidly. This demonstrates the accuracy of the theoretical prediction that radiation from the parallel lines is negligible compared to the energy they carry.

The half-wave aerial was then laid on the wood frame of the Lecher wires, roughly parallel to them. The field strength meter showed substantial radiation from the aerial. Thus a

perfect feed line, run too near any metal object, particularly a near-resonant one, couples with it and the object radiates.

Lastly, a length of commercial open-wire 300-ohm line, much the worse for frequent winding up into a coil and unwinding for use, was roughly straightened and coupled to the oscillator in place of the Lecher wires. It radiated excellently.

If strict attention is paid to the construction of a 420-Mc. open-wire feed line, no untoward losses should occur, even when the separation of the lines is rather greater than 0.01 wavelength. However, were I to erect such a line, I would check the radiation from it along its length with a simple r.f. sniffer, to make sure that there were no impedance bumps on the line, and that no hidden 6-inch spikes were radiating inside wooden supports.

— *Frank P. Hughes, VE2AQJ*
KENOGAMI
Quebec, CANADA

Editor's Note: Since the current in the line no doubt was higher without the antenna than with it, this test is probably on the severe side in respect to line radiation from transmission-line type currents. However, in a practical installation radiation from parallel currents on the line, because of field coupling between the line and the antenna as well as a possibly unbalanced antenna, can be far more serious unless steps are taken to prevent the existence of such currents. Coaxial lines suffer from similar problems.

DXING UNTIL 1980 AND LATER

Technical Editor, *QST*:

Amateurs in general, and DXers in particular, are pretty much aware that the increased or decreased activity of "ole Sol" is closely related to long distance h.f. communication. Recordings of sun spots go back many years, and much data has been collected by scientific bodies all over the world. A display of typical published data from these sources going as far back as 1846 is shown in Fig. 1. Prior to the period starting early in the current century its value is largely historical in relation to DXing; its real usefulness to amateurs is in projecting maxima and minima during our own life time and on into the future.

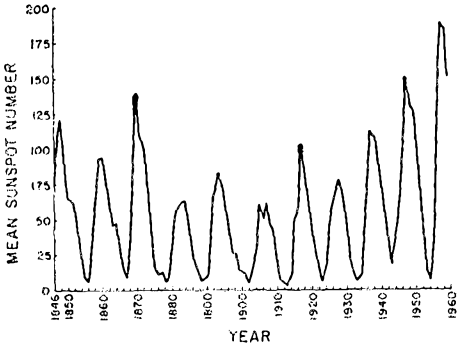


Fig. 1—Recorded sunspot activity, 1846–1960.

TABLE I

Year	Mean Sun Spot Number Max.	Min.	Years Between Peaks
1847	122		
1856		5	
1860	95		13
1867		10	
1870	140		10
1878		5	
1884	65		14
1889		5	
1893	90		9
1902		4	
1907	65		14
1913		2	
1917	105		10
1923		6	
1927	80		10
1933		5	
1938	118		9
1943		15	
1948	155		10
1954		5	
1957	190		9
1964 (Est.)		2	
AVERAGE	122.5	6.4	11.2

A readout of the data shown in Fig. 1, and some further doodling, provides the numbers shown in Table I. These data enable us to determine an average number of years for each cycle of sun spot activity as well as an average peak year and an average minimum year. It turns out that the mean number of sun spots at the peaks averages out at 112.5 while the valleys average out at 6.4. The well known 11-year cycle is re-confirmed since data shows that the peaks average at 11.2 years. There is another effect which seems likely when the actual peak sun spot numbers are considered. Admittedly this lies in the realm of speculation on future events but there appears to be a much longer cyclic variation in the sun's activity upon which the 11-year cycle is superimposed. Fig. 2 is an attempt to portray this cycle, which has a 160-year period. Some credence is lent to this as a possibility in light of recent 11-year cycles. Each of these has been higher in sun spot number than the one preceding. With the known related good DX conditions in 1957–58, the assumption can be made, if indeed we are still on the upswing of a 160-year cycle, that 1968 should be terrific for DX, and 1980 should be a real humdinger. What happens 80 years later when we skid to the next long-term low isn't going to bother many of us who read this!

Cheer up, fellows, things will get worse for a year or so

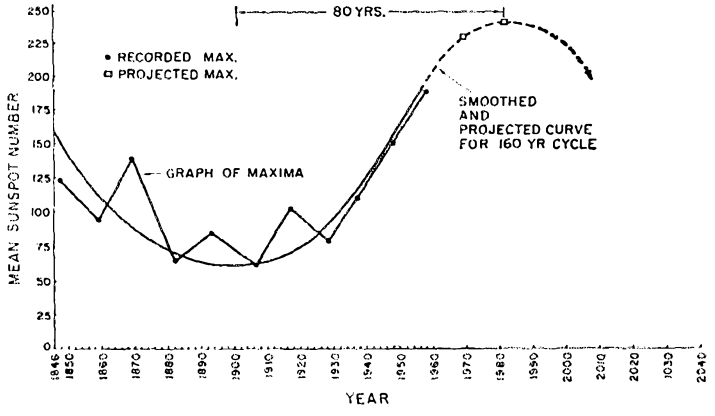


Fig. 2—Projected sunspot curve estimated by the author based on peak variations in Fig. 1.

and then will be much improved by 1968 if past events can foretell the future. — *R. R. Welsh, W2PTM, Haddonfield, New Jersey*

Editor's Note: Mathematicians may point out that there is some danger in extending predictions to a 160-year cycle on the basis of observed data covering only a little over 100 years. Sunspot records actually extend back to 1750, during which time there was a "peak" peak in 1778 and a broad high period extending from about 1837 to 1870. Several long-time cycles may be operating simultaneously. (Menzel, *Our Sun*, The Blakiston Co., Philadelphia)

POWER FREQUENCY SYNCHRONIZATION

Technical Editor, *QST:*

The major electric power companies are on the verge of completing the installation of equipment which will greatly benefit the field of communication. Much of the change is now fact, and the very near future will see the completion of the greater part of the job.

The nature of the change is simply that the major power networks are being tied permanently (except for occasional breakdowns) together, thus providing in-phase reference voltage at greatly separated points for various purposes, not all of which are immediately apparent.

One point of significance is that synchronous motors at remote places will rotate "together", whereas before this step was taken they would drift with respect to each other at a rate depending on the instantaneous absolute error. It is now possible, for instance, to operate facsimile machines over great distances without recourse to the use of frequency standards such as fork and crystals. While the power frequency will still drift ever so slightly, the entire network follows, and long term performance is better than the finest standards.

Other possible uses include remote positioning with the use of synchros and television frame and sweep sync, eliminating the necessity for transmitting such pulses as circuitry is developed to take advantage of power-sync. Slow-scan will also benefit.

— *William T. Tyrrel, W2VKG*
Facsimile Products Dept.
Fairchild Camera and Instrument Co.
East Northport, L. I., New York

MORE ON THE SIDEBAND PACKAGE

Technical Editor, *QST:*

I completed W6TEU's "Sideband Package" in August, 1960 and have had it on 80 through 10 meters since that time. Its suppression of the unwanted sideband and carrier is excellent and stable. The response of the wanted sideband is extremely close to the characteristic curve published in the original article. I matched the crystals for my filter by listening to the second harmonic (900 kc.) of the oscillator with the receiver b.f.o. on. By comparing crystals in the oscillator I was able to pair crystals which oscillated within a few cycles of one another.

However, the principal reason for writing is to comment upon some of the modifications suggested for the unit:

In January 1960 *QST* ("The S.S.B. Package Plus"), W1SSN suggested electronically regulating the +195-volt needs of the unit. The resistor and VR tubes perform very satisfactorily in my exciter. There is one pitfall, however. If the load resistance seen by the 6146 plate is excessively high, the screen will draw too much current and cause the +195 supply to go out of regulation. With proper loading in the 6146 no regulation problems will develop.

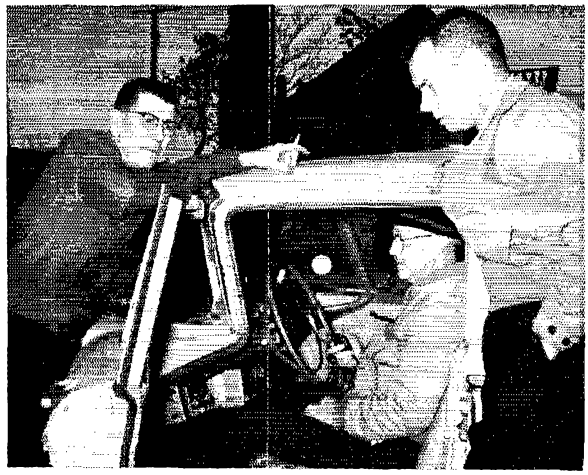
In February 1960 *QST* ("Some Notes on the Sideband Package") W3CVS says he had trouble with coil L_{105} contributing to feedback. I had no trouble with the coil and did not shield it. Also, I did not find it necessary to increase the coupling between windings of T_1, T_2, or T_3, although it might increase the output of the generator. I modified the control circuit (cathode of V_{106}) to eliminate thermal noise during "receive," but if one used a coax relay with good isolation for the receiver, instead of a t.r. switch, this modification might not be necessary.

In connection with the article by VK2AC in October 1960 *QST* ("Phasing/Filter S.S.B. Generator"), the generator as described by W6TEU can perform entirely satisfactorily, if constructed and adjusted properly. Modification of the method of sideband selection for fear of passing the 5th harmonic of 450 kc. is not the least bit justified. Rejection of the carrier has never been a problem in my rig and it never requires adjustment. Even if some 2250-kc. energy were passed by the multipliers (and I think this unlikely because it would have to be generated by the doubler tuned to 900 kc. and passed by the 2nd multiplier which is tuned to 2700 or 1800 kc.), this signal is applied in parallel to the balanced modulator grids (V_{3A}). Since the plates are in push-pull, no signal should appear in the output circuit.

I drive a pair of 811As in an untuned-cathode grounded-grid linear-amplifier circuit with the Sideband Package. The circuit for the linear was taken from January 1960 *QST* ("A Table-Top Half Kilowatt", by W1JLN/FOE). The wedding of the two units seems a happy one. It is my feeling that the W6TEU design leaves little to be desired.

— *W. Lawton Metcalfe, W4FQR*
Tampa 9, Florida

Strays



Members of the Central Indiana Mobile Radio Club annually provide communications for door-to-door Heart Fund volunteer collections. In the picture, three of the operators involved listen to call from Heart Fund Headquarters in downtown Indianapolis. They are W9FZW, Club Activities Manager; W9NPV at the microphone; and K9KTL. The club cooperates each Heart Sunday by delivering supplies and picking up collected funds from volunteers.

160-Meter Revisions
FCC Adopts Fees
Third-Party Agreements
Reciprocal Operating Bill
Examination Schedule
Board Meeting Minutes

FCC ADOPTS APPLICATION FEES

In spite of universal opposition by its licensees, the Federal Communications Commission has enacted a schedule of license application fees to become effective January 1, 1964. The Report and Order in Docket 14,507 [1] was adopted May 6, 1963 by a vote of five to two, Commissioners Bartley and Ford dissenting.

The Commission's authority to set up fees is derived from Title V, Independent Offices Appropriation Act of 1952, 5 USC 140:

> ". . . Any work, service, publication, report, document, benefit, privilege, authority, use, franchise, license, permit, certificate, registration, or similar thing of value or utility performed, furnished, provided, granted, prepared or issued by any Federal agency . . . to or for any person . . . except those engaged in the transaction of official business of the Government, shall be self-sustaining to the full extent possible."

In deciding upon the fees, the FCC said it "was guided" by Bureau of the Budget Circular No. A-25, September 23, 1959. The fees range from $100 for major applications of TV stations, Public Land Mobile Radio Services and International Fixed Public stations down to $2 for commercial license renewals, restricted radiotelephone permits and amateur modifications. The fees finally settled on are, in most cases, lower than the ones originally proposed in the February 16, 1962 Notice of Proposed Rulemaking.

In its 18-page, single-spaced Report, the Commission attempts to answer most of the arguments offered in nearly 1500 comments filed in the Docket. To the argument that licenses are issued for radio services to benefit the general public, the Commission conceded this was so, but stated this did not offset the fact that certain members of the public (*i.e.*, licensees) benefit to a much greater extent than others. The FCC explains at length its authority to establish fees, and cites legal references spelling out the difference between fees and taxes.

The Commission also summarized and countered the objections filed in respect to particular services. It's obvious that amateurs made some impression on FCC:

> "22. Probably the most vigorous opposition of any one group to the fee proposal came from the licensees of the Amateur Radio Service. Though we shall not attempt to set forth the numerous arguments presented in opposition to the proposed fee for applications filed in the Amateur Radio Service, suffice it to say that as a result of those arguments we have revised the schedule of fees for the Amateur Service. No fee will be charged to those who apply for Novice Licenses since such licenses are for a one-year term and applicants for such licenses are often young people who are starting out in a new hobby. Also, we are persuaded that a lesser fee should be charged for modifications. Thus, the fee for filing applications for modifications will be $2.00. However, since the license term for Amateurs (except for Novices) is for a period of 5 years, we feel that the charge for renewals and initial applications in such cases should be set at $4.00. The fee for Amateur Special Call Signs pursuant to Section 12.81 will be increased from $5.00 to $20.00. This service is costly, as it involves research, and is of no significance to anyone except to the Amateur concerned. Therefore, we feel the larger fee is justified."

The comments of the League and of many individual amateurs had pointed out the amateur's voluntary emergency communications activities. Some comments expressed concern over the possibility of double fees; the fee for a regular amateur license, an additional fee for a RACES authorization or Disaster Communications Service license. The Commission conceded these points in part:

> "Certain other groups . . . use radio essentially for public safety purposes and we believe that these groups should also be exempted from the payment of fees. . . . Exemptions have . . . been provided for applicants in the Radio Amateur Civil Emergency Service (RACES) and in the Disaster Communications Service. Licensees in RACES are Amateurs who participate voluntarily in emergency communications networks for the purpose of providing communications during natural disasters and other emergencies. We agree with the argument that the payment of a fee would discourage participation in these worthwhile activities."

Fees in other services of personal interest to many amateurs include $10 for Class A Citizens Radio Service (30-watt stations in the 460-Mc. band); $8 for Class B, C, and D (the 11-meter

[1] *QST* readers interested in additional background information may find it in the following issues: March, 1954, page 44; May, 1954, pages 54; July, 1954, page 45; April, 1962, pages 64 and 89; May, 1962, page 50; June, 1962, page 61; July, 1962, page 57; and May, 1963, page 94.

Some Sample Fees

Amateur Service:	
New and renewed amateur licenses	$ 4
Special Call Signs under Section 12.81	20
Modifications	2
(No fee for Novices or RACES)	
Commercial Operator licenses	
New First Class	5
New Second Class	4
New Third Class	3
Renewals, all classes	2
Restricted radiotelephone permits	2
Citizens Radio Services	
All applications, Class A stations (460 Mc.)	10
All applications, Class B, C, D (11 meters)	8
Broadcast Services	
New, renewed, transferred or modified TV	100
New, renewed, transferred or modified a.m./f.m.	50
Change in call sign	20
All other applications	30

Exempt from fees: government stations, police, fire, forestry conservation, highway maintenance, local government, State Guard, hospitals, disaster relief organizations, beach patrols, school buses, nonprofit ambulances, rescue organizations, experimental stations and non-commercial educational stations in the Broadcast Service.

voice stations); $5 for first class, $4 for second class, $3 for third class commercial operator licenses, with a $2 renewal fee, and $2 for the Restricted Radiotelephone permit.

It must be emphasized that these are all *application* fees; effective January 1, 1964, the applicant's check, payable to the Treasurer of the United States, must accompany the application. If a person attempts an amateur exam and fails, he'll have to submit another $4 on his second attempt. The fees will go into the general fund of the U. S. Treasury. FCC will still get its funds through an annual Congressional appropriation, as in the past. There is no guarantee, therefore, of any increase in FCC services to licensees nor of an enlarged FCC monitoring service to improve enforcement of Commission regulations.

As we write this, the League's Executive Committee and General Counsel are studying the avenues of action open to us. It is almost certain that the League (and quite possibly, organizations representing other radio services) will file a petition for reconsideration.

CANADA-EL SALVADOR THIRD PARTY

The Canadian Department of External Affairs announced April 2 that the Governments of Canada and El Salvador have concluded an agreement to permit amateur radio stations in the two countries to exchange messages or other communications from or to third parties, provided that the amateurs should be paid no direct or indirect compensation and that messages should be of a technical or personal nature, where recourse to public telecommunications services would not be justified.

Canada has previously signed similar agreements with Chile, Costa Rica, Honduras, Mexico, Venezuela and the United States.

RECIPROCAL OPERATING BILL

As we write this, the Reciprocal Operating Bill S. 920 is still awaiting "clearance" from the government agencies. The next step will be hearings by the Senate Committee on Interstate and Foreign Commerce. Members of the Committee are listed on page 60, an asterisk denoting those who are also co-sponsors of S.920:

The ARRL Board of Directors held its annual meeting in Hartford the first three days of May. Shown here, seated from left to right at the formal session May 3: Dakota Director Compton, West Gulf Director Best, Delta Director Teetson, Southwestern Director Meyers, Pacific Director Engwicht, First Vice President Groves, Great Lakes Director Cartwright, Northwestern Director Roberts, Southeastern Director Born, Midwest Director Denniston, Vice President Handy, General Counsel Booth, President Hoover, General Manager Huntoon, Atlantic Director Crossley, Treasurer Houghton, Vice President Reid, Canadian Director Eaton, New England Director Chaffee, Rocky Mountain Director Smith, Roanoke Director Anderson, Central Director Haller and Hudson Director Kahn. Standing, same order: Associate Counsel Meen, Canadian Vice Director Dumbrille, Technical Director Grammer, West Gulf Vice Director Bryan, Hudson Vice Director Dannals and Assistant Secretary Williams.

Senate Commerce Committee

Democrats
Warren G. Magnuson, Washington
John O. Pastore, Rhode Island
A. S. Mike Monroney, Oklahoma
Strom Thurmond, South Carolina
* Frank J. Lausche, Ohio
* Ralph W. Yarborough, Texas
Clair Engle, California
* E. L. Bartlett, Alaska
Vance Hartke, Indiana
Gale W. McGee, Wyoming
Philip A. Hart, Michigan
Howard W. Cannon, Nevada

Republicans
Norris Cotton, New Hampshire
Thruston B. Morton, Kentucky
* Hugh Scott, Pennsylvania
Winston L. Prouty, Vermont
J. Glenn Beall, Maryland

A steady flow of individually-written letters to Senators, particularly those listed above, may well mean the difference between success and failure of the Goldwater Bill. (See pages 92 and 93, *QST* for May, for a list of sponsors and the text of the bill).

160 METER CHANGES

To accommodate a new chain of Loran stations being put into operation soon, as forecast recently by FCC (June *QST*, page 62), a revised table of amateur sharing arrangements has been drawn up cooperatively by the Commission and the Coast Guard, custodian of this radio aid to navigation in the United States. Loran is important to the safety of life at sea and has absolute priority in the 1.8–2.0-Mc. band. It is imperative that amateurs using the 160-meter band note the privileges available to them in their respective localities and take the utmost care to abide by these rules with respect to frequencies and powers.

The following table shows privileges and restrictions effective June 30, 1963. *Nearly every area of the country is affected*, so check this list carefully. "Night" in the table refers to the period between local sunset and local sunrise in each locality. Such times may be obtained from the "almanac" section of a local newspaper; alternatively, the monthly average time of sunset and sunrise furnished to broadcasting stations by FCC probably can be used by amateurs as well, in determining when power should be reduced.

The revised schedule remains subject to cancellation or revision at any time without prior notice or hearing if the needs of the Loran service demand it.

Area	Maximum d.c. plate input power in watts							
	1800–1825 kc/s		1875–1900 kc/s		1900–1925 kc/s		1975–2000 kc/s	
	Day	Night	Day	Night	Day	Night	Day	Night
Alabama	200	50	No operation		No operation		100	25
Alaska	200	50	200	50	No operation		No operation	
Arizona	100	25	100	25	100	25	500	100
Arkansas	200	50	No operation		No operation		200	50
California	No operation		No operation		200	50	500	200
Colorado	200	50	100	25	100	25	500	100
Connecticut	200	50	100	25	No operation		No operation	
Delaware	200	50	100	25	No operation		No operation	
District of Columbia	200	50	100	25	No operation		No operation	
Florida	100	25	No operation		No operation		No operation	
Georgia	100	25	No operation		No operation		No operation	
Hawaii	No operation		No operation		100	25	100	25
Idaho	100	25	200	50	200	50	500	100
Illinois	200	50	100	25	100	25	200	50
Indiana	200	50	100	25	100	25	100	25
Iowa	500	100	100	25	100	25	200	50
Kansas	500	100	100	25	100	25	200	50
Kentucky	200	50	100	25	100	25	100	25
Louisiana	200	50	No operation		No operation		100	25
Maine	500	100	100	25	No operation		No operation	
Maryland	200	50	100	25	No operation		No operation	
Massachusetts	500	100	100	25	No operation		No operation	
Michigan — Upper Peninsula	500	100	100	25	100	25	200	50
Michigan — Lower Peninsula	500	100	100	25	100	25	100	25
Minnesota	500	100	100	25	100	25	200	50
Mississippi	200	50	No operation		No operation		100	25
Missouri	200	50	100	25	100	25	200	50
Montana — West of 111° W	100	25	200	50	200	50	500	100
Montana — East of 111° W	200	50	200	50	200	50	500	100
Nebraska	500	100	100	25	100	25	500	100
Nevada	100	25	200	50	200	50	500	200
New Hampshire	500	100	100	25	No operation		No operation	
New Jersey	200	50	100	25	No operation		No operation	
New Mexico	200	50	100	25	100	25	500	100
New York — North of 42° N	500	100	100	25	No operation		No operation	
New York — South of 42° N	200	50	100	25	No operation		No operation	
North Carolina	200	50	No operation		No operation		No operation	
North Dakota	500	100	200	50	200	50	500	100
Ohio	200	50	100	25	100	25	100	25
Oklahoma	500	100	No operation		No operation		200	50
Oregon	No operation		No operation		200	50	500	100
Pennsylvania	200	50	100	25	No operation		No operation	
Rhode Island	200	50	100	25	No operation		No operation	
South Carolina	100	25	No operation		No operation		No operation	
South Dakota	500	100	100	25	100	25	500	100
Tennessee	200	50	No operation		No operation		100	25
Texas — East of 103° W	500	100	No operation		No operation		200	50
Texas — West of 103° W	200	50	100	25	100	25	500	100
Utah	100	25	100	25	100	25	500	100
Vermont	500	100	100	25	No operation		No operation	
Virginia	200	50	100	25	No operation		No operation	
Washington	No operation		No operation		200	50	500	100
West Virginia	200	50	100	25	No operation		No operation	
Wisconsin	500	100	100	25	100	25	200	50
Wyoming	200	50	100	25	100	25	500	100
Puerto Rico	No operation		No operation		100	25	100	25
Virgin Islands	No operation		No operation		100	25	100	25
Swan Island	500	100	No operation		No operation		100	25
Serrana Bank	500	100	No operation		No operation		100	25
Roncador Key	500	100	No operation		No operation		100	25
Navassa Island	No operation		No operation		No operation		100	25
Baker, Canton, Enderbury, Guam, Howland, Jarvis, Johnston, Midway & Palmyra Islands	No operation		No operation		500	100	500	100
American Samoa	500	200	500	200	500	200	500	200
Wake Island	500	100	500	100	No operation		No operation	

THIRD-PARTY AGREEMENT W/K AND HI

The governments of the United States and of the Dominican Republic have agreed, through an exchange of notes, to permit their amateurs to handle messages and other communications on behalf of third parties between the two countries, effective May 22. Messages must be of a technical or personal nature which, by reason of their unimportance, do not justify use of the public

telecommunications system. The amateurs must not have, of course, any pecuniary interest, direct or indirect, in the communications being handled. The United States already has such agreements with: Bolivia, Canada, Chile, Costa Rica, Cuba, Ecuador, El Salvador, Haiti, Honduras, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru and Venezuela.

TEMPORARY THIRD PARTY AGREEMENTS

On May 31 we learned that third-party communications could be handled between the U.S. and amateur station 4U1ITU at ITU headquarters in Geneva during the second session of the Panel of Experts, June 1–24, 1963; a W1AW bulletin was issued to this effect. There will be another such temporary agreement during the Extraordinary Administrative Radio Conference on Space Communications, October 1 through November 10, 1963. The usual conditions — relative unimportance and no pecuniary interest — are of course attached to these special agreements. No third party communications may be handled with 4U1ITU except when specifically authorized (as above).

BANNED COUNTRY

On May 1, the former colony of Netherlands New Guinea (PK, JZØ) came under the administration of the Republic of Indonesia, which had previously notified the International Telecommunications Union that it objects to communications between its amateurs and those in other countries. Accordingly, further QSOs between U. S. or Canadian stations and those in West New Guinea are prohibited by FCC and DOT.

LICENSE REVOKED . . .

Another amateur has lost his station license for failing to answer communications from the FCC. Josiah M. Hart, WAØCDN of Denver, Colorado was issued a citation for operating on 14,195 kc. with A-3 emission, on March 30, 1962. A follow-up letter was sent June 7, 1962. No response having been received by FCC, an Order to Show Cause was issued January 16, 1963. It, too, went unanswered; accordingly, FCC issued a Revocation Order on April 11, effective on May 20, 1963.

. . . AND LICENSE SUSPENDED

The Technician Class operator license of Floyd H. Johnson, WB6AZH, was suspended for three months for operation in the 14-Mc. band and failure to keep a complete log, violations which occurred between August 17 and September 25, 1962. The order, dated January 24, 1963, was not contested by Mr. Johnson, and went into effect on April 23, 1963.

EXAMINATION SCHEDULE

The Federal Communications Commission will give Extra and General Class amateur examinations during the second half of 1963 on the following schedule. Remember this list when you need to know when and where examinations will occur. Where exact dates or places are not shown below, information may be obtained, as the date approaches, from the Engineer-in-Charge of the district. *Even stated dates are tentative and should be verified with the Engineer as the date approaches.* No examinations are given on legal holidays. All examinations begin promptly at 9 A.M. except as noted.

Albuquerque, N. M.: October 12, 1 P.M.
Amarillo, Texas: September 11.
Anchorage, Alaska, 53 Federal Bldg.: By appointment.
Atlanta, Georgia, 718 Atlanta National Building, 50 Whitehall St. S. W.: Tuesday and Friday at 8:30 A.M.
Baltimore, Md., 415 U. S. Customhouse, Gay and Water Sts.: Monday and Friday, between 8:30 A.M. and 10 A.M. and by appointment.
Beaumont, Texas: 301 P. O. Bldg.: By appointment.
Birmingham, Ala.: September 4, December 4, 1 P.M.
Boise, Idaho: Sometime in October.
Boston, Mass., 1600 Customhouse: Wednesday through Friday 8:30 A.M. to 10 A.M.
Buffalo, N. Y., 328 P. O. Bldg.: First and third Fridays.
Charleston, W. Va.: Sometime in September and December.
Chicago, Ill., 826 U. S. Courthouse: Friday.
Cincinnati, Ohio: Sometime in August and November.
Cleveland, Ohio: Sometime in September and December.
Columbus, Ohio: Sometime in July and October.
Corpus Christi, Texas: September 5, December 5.
Dallas, Texas, 401 States General Life Ins. Bldg.: Tuesday.
Davenport, Iowa: Sometime in July and October.
Denver, Colo., 521 New Customhouse: 1st and 2nd Thursdays, 8 A.M.
Des Moines, Iowa: Sometime in September and December.
Detroit, Mich., 1029 Federal Bldg.: Wednesday and Friday.
Fort Wayne, Ind.: Sometime in August and November.
Fresno, Calif.: Sometime in September and December.
Grand Rapids, Mich.: Sometime in July and October.
Great Falls, Mont.: Sometime in September.
Hartford, Conn.: September 11.
Hilo, Hawaii: October 8, 9:30 A.M. to 4:30 P.M.
Honolulu, Hawaii, 502 Federal Bldg.: Monday through Friday.
Houston, Texas, U. S. Courts & Federal Office Bldg., 515 Rusk Ave.: Tuesday, Code tests, 8–9 A.M.
Indianapolis, Ind.: Sometime in August and November.
Jackson, Miss.: December 4.
Jacksonville, Fla.: October 16, 17.
Jamestown, N. D.: October 16, 10 A.M.
Kansas City, Mo., 3100 Federal Office Bldg.: Thursday and Friday, 8:30 A.M. to 11 A.M.
Knoxville, Tenn.: September 18, December 18, 1 P.M.
Lihue, Hawaii: October 22, 9:30 A.M. to 4:30 P.M.
Little Rock, Ark.: August 7, November 6, 1 P.M.
Los Angeles, Calif., 849 So. Broadway: Wednesday, 9 A.M. and 1 P.M.
Louisville, Kentucky: Sometime in August and November.
Memphis, Tenn.: July 11, October 3, 8:30 A.M.
Miami, Fla.: 312 Federal Bldg.: Thursday.
Milwaukee, Wisconsin: Sometime in July and October.
Mobile, Ala., 439 U. S. Courthouse and Customhouse: Wednesday, by appointment.
Nashville, Tenn.: August 7, 1 P.M., November 6, 1 P.M.
New Orleans, La., 608 Federal Office Building, 600 South St.: Monday through Wednesday, code tests Monday only at 8:30 A.M.
New York, N. Y., 748 Federal Bldg., 641 Washington St.: Tuesday through Friday, 9 A.M.–Noon.
Norfolk, Va., 405 Federal Bldg.: Friday.
Oklahoma City, Okla.: July 19, October 18.
Omaha, Nebr.: Sometime in July and October.
Philadelphia, Pa., 1005 New U. S. Customhouse: Monday through Wednesday, 8:30 A.M. to 10 A.M.
Phoenix, Ariz.: Sometime in July and October.
Pittsburgh, Pa.: Sometime in August and November.
Portland, Maine: October 8.
Portland, Ore., 201 U. S. Courthouse: Friday, 8:45 A.M.
Roanoke, Va.: Sometime in October.
St. Louis, Mo: Sometime in August and November.
St. Paul, Minn., 208 Federal Courts Bldg.: Friday, 8:45 A.M.

Salt Lake City, Utah: September 13, December 13, 1 P. M.
San Antonio, Texas: August 8-9, November 7-8.
San Diego, Calif., Fox Theater Bldg.: Wednesday, by appointment.
San Francisco, Calif., 323-A Customhouse: Friday.
San Juan, P. R., 323 Federal Bldg.: Friday.
San Pedro, Calif., 356 W. 5th Street: Wednesday, 8 A.M.
Savannah, Ga., 214 P. O. Bldg.: By appointment.
Schenectady, N. Y.: September 11-12, December 4-5, 9 A.M. and 1 P.M.
Seattle, Wash., 806 Federal Office Bldg.: Friday.
Sioux Falls, S. D.: September 10, December 3, 10 A.M.
Spokane, Wash.: Sometime in October.
Syracuse, N. Y.: Sometime in July and October.
Tampa, Fla., Rm 201, 221 No. Howard Ave.: By appointment.
Tulsa, Okla.: July 17, October 16.
Tucson, Ariz.: Sometime in October.
Wailuku, Hawaii: October 15, 9:30 A.M. to 4:30 P.M.
Washington, D. C., 1101 Pennsylvania Ave., N. W.: Tuesday and Friday. Code test 9:30 A.M. and 1 P.M.
Wichita, Kansas: Sometime in September.
Williamsport, Pa.: Sometime in September and December.
Wilmington, N. C.: Sometime in December.
Winston-Salem, N. C.: Sometime in August and November.

NOTE: Only General Class and Amateur Extra Class license examinations are given at FCC offices and examining points listed above. All examinations for Novice, Technician and Conditional Class licenses are conducted by volunteer supervisors.

MINUTES OF 1963 ANNUAL MEETING OF THE BOARD OF DIRECTORS THE AMERICAN RADIO RELAY LEAGUE, INC.

May 3, 1963

1) Pursuant to due notice, the Board of Directors of The American Radio Relay League, Inc., met in annual session at the Shoreham Hotel, Hartford, Connecticut, on May 3, 1963. The meeting was called to order at 9:36 A.M., with President Herbert Hoover, Jr., in the Chair and the following directors present:

P. Lanier Anderson, Roanoke Division
Roemer O. Best, West Gulf Division
James P. Born, Jr., Southeastern Division
Dana E. Cartwright, Great Lakes Division
Milton E. Chaffee, New England Division
Charles G. Compton, Dakota Division
Gilbert L. Crossley, Atlantic Division
Robert W. Denniston, Midwest Division
Noel B. Eaton, Canadian Division
Harry M. Engwicht, Pacific Division
Philip E. Haller, Central Division
Morton B. Kahn, Hudson Division
Raymond E. Meyers, Southwestern Division
R. Rex Roberts, Northwestern Division
Carl L. Smith, Rocky Mountain Division
Floyd C. Teetson, Delta Division

Also in attendance, as members of the Board without vote, were Wayland M. Groves, First Vice President; Alex Reid, Vice President; F. E. Handy, Vice President; John Huntoon, General Manager. Also in attendance, at the invitation of the Board as nonparticipating observers, were Canadian Division Vice Director Colin Dumbrille, Hudson Division Vice Director Harry J. Dannals and West Gulf Division Vice Director Ray Bryan. There were also present Treasurer David H. Houghton, General Counsel Robert M. Booth, Jr., Associate Counsel for Canada Arthur K. Meen, Technical Director George Grammer and Assistant Secretary Perry F. Williams.

2) On motion of Mr. Groves, unanimously VOTED that Item 11 of the agenda for the meeting, concerning the appointment of additional members of the Executive Committee, is moved up to follow the acceptance of reports of directors.

3) On motion of Mr. Meyers, unanimously VOTED that the minutes of the 1962 annual meeting of the Board of Directors are approved in the form in which they were issued by the Secretary.

4) On motion of Mr. Teetson, unanimously VOTED that the annual reports of the officers to the Board of Directors are accepted and the same placed on file.

5) Mr. Chaffee, as chairman, presented the report of the Finance Committee; Mr. Meyers, as chairman, presented the report of the Planning Committee; at the request of Mr. Born, RULED by the Chair that the report of the Membership and Publications Committee is deferred until later on the agenda; Mr. Smith, as chairman, presented the report of the Public Relations Committee; Mr. Groves, as chairman, presented the report of the Merit and Awards Committee; Mr. Kahn, as chairman, presented the report of the Housing Committee; at the request of Mr. Denniston, RULED by the Chair that the report of the Special Committee concerning 14 Megacycles is deferred until later on the agenda.

6) On motion of Mr. Denniston, unanimously VOTED that the annual reports of the directors to the Board of Directors are accepted and the same placed on file.

7) The Chair announced the opening of nominations for the appointment of additional members to the Executive Committee. Mr. Cartwright nominated Mr. Compton; Mr. Crossley nominated Mr. Kahn; Mr. Teetson nominated Mr. Best; Mr. Born nominated Mr. Crossley; Mr. Anderson nominated Mr. Denniston; Mr. Kahn nominated Mr. Meyers; Mr. Chaffee nominated Mr. Eaton. On motion of Mr. Teetson, unanimously VOTED that the nominations are closed. The Chair appointed Messrs. Dannals and Dumbrille as Tellers. The Tellers announced the result of the balloting as follows:

Mr. Compton.....12	Mr. Denniston.....13
Mr. Kahn.....15	Mr. Meyers..... 4
Mr. Best..... 4	Mr. Eaton.....11
Mr. Crossley..... 5	

Whereupon, the Tellers declared Charles G. Compton, Morton B. Kahn, Robert W. Denniston and Noel B. Eaton elected as members of the Executive Committee.

8) The Chair announced the opening of nominations for the appointment of special members of the Executive Committee. Mr. Kahn nominated Mr. Handy; Mr. Meyers nominated Mr. Houghton. On motion of Mr. Born, unanimously VOTED that the nominations are closed and the Secretary is directed to cast one ballot electing Francis E. Handy and David H. Houghton as special members of the Executive Committee.

9) At this point, supplementary oral reports were rendered by the officers of the League, and the General Counsel discussed at length various legislative and regulatory matters affecting amateur radio and the League.

10) On motion of Mr. Kahn, unanimously VOTED that the Board grants approval for the holding of a National ARRL Convention in New York City, August 21-23, 1964, under the sponsorship of the Hudson Amateur Radio Council.

11) On motion of Mr. Kahn, after discussion, unanimously VOTED that the Board initiate a program to better acquaint our membership with the League's history, accomplishments and goals by means of a well-planned program to appear in *QST*.

12) On motion of Mr. Denniston, unanimously VOTED that the Board commends the League President, General Manager and General Counsel for their successful efforts to regain additional frequencies and operating privileges in the 160-meter band.

13) The Board was in recess from 10:35 A.M. to 10:55 A.M.

14) On motion of Mr. Crossley, unanimously VOTED, at 11 A.M., that the Board does now resolve itself into a Committee of the Whole for the purpose of discussing the matter of incentive licensing. The Committee was in recess for luncheon from 12:31 P.M. to 1:33 P.M. The Committee rose at 2:32 P.M. and presented its report to the Board.

15) On motion of Mr. Chaffee, the following resolution was unanimously ADOPTED (Mr. Eaton abstaining):

The Board of Directors of The American Radio Relay League, Inc., in meeting assembled at Hartford, Connecticut, on May 3, 1963, considering that frequencies now assigned and essential to the amateur radio service will continue to be allocated by international conferences and treaties; in further recognition of the growing demand by other services for more frequency space; in the belief that even more efficient utilization of amateur frequencies is essential; after an extensive examination of the technical advances and growth of the United States amateur radio body in the last ten years, after carefully considering the many comments and suggestions from the membership, and after extensive deliberation; hereby establishes the following objectives as one of several major policies of the League to promote the continued existence and growth of amateur radio:

1. Extension of the existing incentive-licensing structure by re-establishment in the United States of an advanced class of amateur license requiring (a) holding of an amateur license of Conditional or General Class for a period of at least one year immediately preceding application therefore, and (b) a new written examination covering advanced amateur practice as applicable to modern amateur techniques. Further code examinations for then existing Amateur Extra and General and present Advanced Classes of licensees shall not be required. The effective date shall be such as to afford all existing amateurs ample opportunity to qualify for this new class of license.

2. Assignment of portions of the high frequency (h.f.) amateur bands as appropriate to the higher grades of licenses.

3. Modification of the rules concerning the Conditional Class license to limit the term and permit renewal only for handicapped persons, those in military service, or upon a finding by the Federal Communications Commission of genuine hardship.

4. A complete review and revision of the present written examinations for various classes of amateur licenses in light of present amateur techniques.

The Board directs the officers of the League, with the advice of its Executive Committee, to proceed with the implementation of these objectives.

16) On motion of Mr. Roberts, unanimously VOTED that the Board of Directors heartily affirms the actions previously taken by the Executive Committee in the promotion of improvement in amateur operating procedures and technical competence, namely:

RESOLVED, That with the continuing growth in the number of amateurs and the resultant increased crowding of amateur bands, the League considers that proper technical operation of equipment is more vital than ever to continued successful operation and efficient usage of amateur frequency assignments, and that the Headquarters staff, especially the technical and communications departments, are directed to institute a program to bring about a better understanding of technical capabilities and limitations of equipment and of operating techniques. (July 9, 1962).

RESOLVED that, in view of increasing congestion in our limited frequency assignments caused by the steady growth of the amateur body, The American Radio Relay League urges upon all amateurs a more strict observance of the following principles:

1) To make proper choice of bands below 30 Mc. appropriate to the distance to be covered.

2) To achieve equipment flexibility so that an adequate choice of frequency bands and powers for desired communications distances may be available.

3) To use minimum bandwidth, consistent with good engineering practice and compatible with the mode of transmission being employed.

4) To expand the use of v.h.f. for local contacts wherever possible, with the ultimate aim of conducting all short-distance communication in this portion of the spectrum.

5) To use the minimum power necessary for each communication. (January 19–20, 1963).

17) On motion of Mr. Engwicht, unanimously VOTED that the Board of Directors recommends to affiliated radio clubs that additional attention be given to operating and technical subjects in the planning of meeting programs and urges clubs to make full use of various educational facilities such as those in the training aids department of ARRL headquarters; in this connection, the Board urges that particular attention be given to the needs of newer amateurs.

18) On motion of Mr. Anderson, after discussion, unanimously VOTED that the General Manager add to the "suggested-operating-frequencies" listing in *QST* the following wide-band f.m. frequencies — 52.525 and 146.94 Mc.

19) On motion of Mr. Smith, after discussion, unanimously VOTED that the vice director of each division may be reimbursed for expenses incurred in performing duties on behalf of the League provided (1) each duty or series of duties shall have been specifically authorized in writing by his director prior to their performance and (2) such expenditures, when added to the other authorized expenditures of the director, do not exceed the amount budgeted for that division by the Board of Directors.

20) On motion of Mr. Smith, unanimously VOTED (Mr. Eaton abstaining) that the Board of Directors extends its sincere appreciation to Senator Barry Goldwater for his continued efforts toward reciprocal operating privileges and urges that each director exert a maximum effort to secure full support of S. 920 by the League membership.

21) On motion of Mr. Born, unanimously VOTED that the Board of Directors approves the continuance of the discussions, studies and implementations under way through the Communications Department to combine the strengths and capabilities of the Amateur Radio Emergency Corps and the National Traffic System so these elements constitute an Amateur Radio Public Service Corps of maximum effectiveness in public service.

22) On motion of Mr. Born, unanimously VOTED that the Board hereby express sincere thanks and deep appreciation of the untiring work and devotion of the vice directors, assistant directors, SCMs, SECs and QSL managers of the League.

23) On motion of Mr. Meyers, the following resolution was unanimously ADOPTED:

WHEREAS, on October 11, 1962, Marion E. Bayrer completed 25 years of continuous service to The American Radio Relay League, be it

RESOLVED, that the Board of Directors, meeting in Hartford, Connecticut, on May 3, 1963, in recognition of Marion Bayrer's untiring efforts on behalf of the League, does hereby express its deep appreciation of her loyalty, fidelity and intelligent devotion to the best interests of amateur radio.

24) On motion of Mr. Tee tson, unanimously VOTED, at 3 P.M., that the Board does now resolve itself into a Committee of the Whole for the purpose of discussing the matter of license fees. The Committee rose at 3:17 P.M. and presented its report to the Board.

25) On motion of Mr. Best, unanimously VOTED that the Board expresses its deep appreciation to the several vice directors present for their demonstration of interest in League affairs by attendance at this meeting, and particularly to ARRL members in Oklahoma for underwriting the expenses of the West Gulf Division vice director.

26) On motion of Mr. Eaton, after discussion, VOTED that the 1965 annual meeting of the Board of Directors shall be held in Quebec, P.Q.

27) On motion of Mr. Crossley, the following resolution was unanimously ADOPTED:

(Continued on page 154)

BOARD THANKS VOLUNTEER A.R.R.L. OFFICIALS

In reviewing the work of the League for the past year the ARRL Board of Directors again found that much of our progress is due to the volunteer efforts of elected and appointed officials in the administrative and field organization of our association. By unanimous action the Board has again expressed its sincere thanks to the Vice-Directors, assistant directors, SCMs, SECs and QSL Managers — an action which we know all amateurs will heartily endorse.

Euclid and a Quart of Resistors

BY TEODORE D. KORANYE,* W2SFW

TOMMY, a precocious lad of 11, had just graduated from a WN to a WA. Unlike many hams his age, he had a mania for designing and building special equipment which frequently involved the use of hard-to-obtain components.

Uncle Ebenezer, a retired arithmetic teacher, was his constant companion; not only for moral support but also to help him scheme where these components could be begged, borrowed or stolen.

On his daily walks, while Tommy was at school, Uncle Eb used to stop at Joe's TV shop or the Acme Instruments either for a 17 μh. choke or a 70 k.c. i.f. can or a 78.2-v. Zener diode. Tommy's current project, an attenuator pad, required odd-ball values of precision resistors and it was driving Uncle Eb frantic.

One fine morning Uncle Eb returned with a package under his arm and a look on his face like a cat that just swallowed the proverbial canary.

Returning from school, Tommy's first words were, "Uncle Eb, did you have any luck with those resistors I need?"

"Yes, Tommy, Acme Instruments finished their government contract and had a lot of 1% resistors left over. They were selling them cheap so I bought a whole quart jar full. In it you will find practically any value you can think of.

"Golly, there must be about a thousand resistors here" cried Tommy as he pawed through them and started to read some of the values. After examining the first five resistors his face fell a little and after reading the tenth one a tear started to roll down each cheek.

"Gee, Uncle Ebenezer, it looks like every cotton picking resistor in this jar is 11 ohms. I thought you said . . . "

Uncle Eb knew that when Tommy became annoyed with him he called him "Uncle Ebenezer" instead of "Uncle Eb".

"I meant what I said, Tommy, but first dry your tears and let me tell you a story. A long time ago, about 300 B.C., there lived in ancient Greece a pretty smart cookie who was a wizard with numbers; his name was Euclid. One of his observations on the behavior of numbers led to the theory of continued fractions. I might add that when this theory showed signs of having useful applications the Russians checked their historical records and decided that it was actually a Russian school teacher in 400 B.C. named Euclidovitch who should get the credit."

To Tommy this sounded like a crock of QRM and he started to fidget; so Uncle Eb cut down on his rhetoric and came right to the point.

"The theory says that the quotient of two integers, take the fraction 33/40 for instance, can be represented as follows."

$$\frac{33}{40} = 0 + \cfrac{1}{\frac{40}{33}} \quad \text{(PARALLEL)}$$

$$\text{but } \frac{40}{33} = 1 + \cfrac{7}{33} = 1 + \cfrac{1}{\frac{33}{7}} \quad \text{(SERIES)}$$

$$\text{but } \frac{33}{7} = 4 + \cfrac{5}{7} = 4 + \cfrac{1}{\frac{7}{5}} \quad \text{(P)}$$

$$\text{but } \frac{7}{5} = 1 + \cfrac{2}{5} = 1 + \cfrac{1}{\frac{5}{2}} \quad \text{(S)}$$

$$\text{but } \frac{5}{2} = 2 + \cfrac{1}{2} = 2 + \cfrac{1}{\frac{2}{1}} \quad \text{(P)}$$

$$\text{but } \frac{2}{1} = 2 \quad \text{(S)}$$

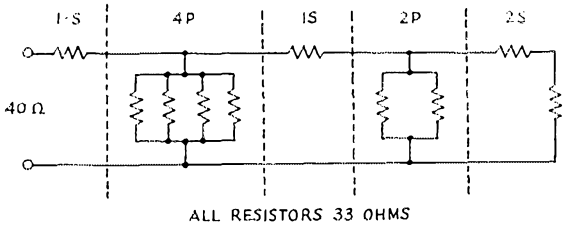
EQU. (1)

"Do you see the pattern? Now combining the individual elements of Eq: (1) we get the continued fraction,"

$$\frac{33}{40} = 0 + \cfrac{1}{1 + \cfrac{1}{4 + \cfrac{1}{1 + \cfrac{1}{2 + \frac{1}{2}}}}}$$

EQU. (2)

"Equation (2) is of interest only to the mathematician, but you notice the vertical row of digits in Eq. (1). If we consider 33 as a quart jar full of 33-ohm resistors and 40 as 40 ohms, the resultant resistance we require, we can construct a ladder network using the digits in Eq. (1) and writing them down alternately as a number of parallel and series connections of 33-ohm resistors like this,"



ALL RESISTORS 33 OHMS

"You can verify that the terminal resistance is exactly 40 ohms by the cumbersome method of combining series and parallel resistances by formula."

Tommy was still impatient, "But Uncle Ebenezer, I have a jar full of 11 ohm resistors and I want exactly 3 ohms."

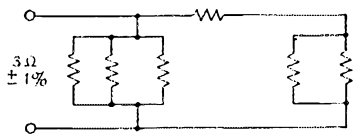
"It machts nichts what values you have as long as they are all alike; so following the rule and using a little shorthand notation we get this list of figures and the resultant schematic."

* 408 Winans Ave., Vestal, N.Y.

$$\frac{11}{3} = 3 + \frac{2}{3} \quad (P)$$

$$\frac{3}{2} = 1 + \frac{1}{2} \quad (S)$$

$$\frac{2}{1} = 2 \quad (P)$$



ALL RESISTORS 11 OHMS, 1% TOLERANCE.

"Golly, Uncle Eb, [after a few minutes of scribbling on paper] it checks perfectly. But remember those 27.3, 14.1, 59.2, and 71.7 ohm values I need?" [Note — now it's "Uncle Eb" again!]

"I'll do the first one for you, Tommy, and then you are on your own. Remember you must start with whole number integers so 11/27.3 is changed to 110/273 by multiplying top and bottom by 10, leaving the value unchanged. Doing much of the arithmetic and manipulations in your head, you can make a table of figures like this,"

$$\frac{110}{273} = 0 + \quad (P)$$

$$\frac{273}{110} = 2 + \quad (S)$$

$$\frac{110}{53} = 2 + \quad (P)$$

$$\frac{53}{4} = 13 + \quad (S)$$

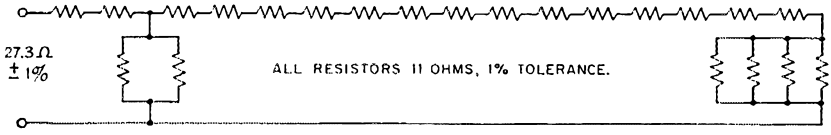
$$\frac{4}{1} = 4 \quad (P)$$

and a schematic like the one at the bottom of these columns —

With a gleam in his eye and pencil flying, Tommy was now filling sheet after sheet of paper with computations. With a twinkle in his eye Uncle Eb could not resist one final parting admonition.

"Remember, Tommy, use ordinary scratch paper for your figures and keep your cotton-picking hands out of my letter writing stationery." QST

Author's Note: Although mathematically this principle can be applied to capacitors and inductances as well as resistors, it is very unlikely that precise results can be obtained in actual practice with reactive components.



Strays

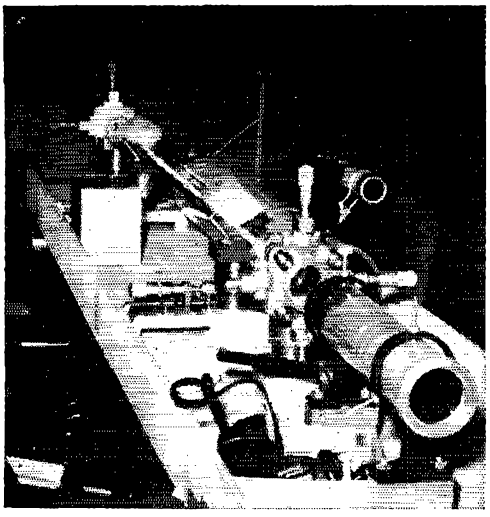
Boy Scouts making ham news: San Fernando Council, BSA, Troop 83, displayed ham radio at their Craft Fair on June 7 and 8. K6EZJ operated Friday evening and all day Saturday, and called "CQ Boy Scouts" on 20 and 40 meter phone . . . VE3BSW, Boy Scouts' World Bureau station, will operate from the Ottawa National Headquarters of the Boy Scouts of Canada, during the 6th Jamboree-on-the-Air, 19–20 October. VE3BSW will have two transmitters on the air for the full 48 hours, on 15, 20, 40, and 80 meters. Special QSL cards will be sent, but only in answer to cards received, or on request.

Tom Miller, W7QWH, SCM of Utah, received the Rocky Mountain Division PICON Award for the Utah Section from Division Director Carl Smith, WØBWJ, for his work in taping QST for the blind.

NOTICE

Effective July 1, 1963, our new address will be

The American Radio Relay League, Inc.
225 Main Street
Newington 11, Connecticut



The laser transmitting apparatus. A helium-neon laser tube is mounted between confocal mirrors. In the foreground are the spotting scope, a 3½-inch telescope, and the collimation scope. The message sent began "This is W6POP operating portable in the San Gabriel Mountains. . . . The transmitter is operating on a wavelength on 6,328 Ängstroms with a radiated output power of ⅛ milliwatt (125 microwatts)."

Operation Red Line

BY JACK L. PATTISON,* W6POP

118 Miles by Laser

IN this day of advanced communications and electronics techniques, it might seem impossible to find a field where the amateur can contribute a "first." On May 3 and 4, however, a group of amateurs established a new world's record by transmitting a voice message 118 miles across the California desert on a coherent light beam generated by a laser (Light Amplification by Stimulated Electromagnetic Radiation).

About two months previously, a group of hams employed by Electro-Optical Systems, Inc., of Pasadena, formed a radio club. One of the express purposes of the club's beginning was to "contribute something scientifically new to the field of electronics." After several meetings at which guest speakers described the latest laser development and techniques, EOS Club members decided to try to extend the range of laser communications.

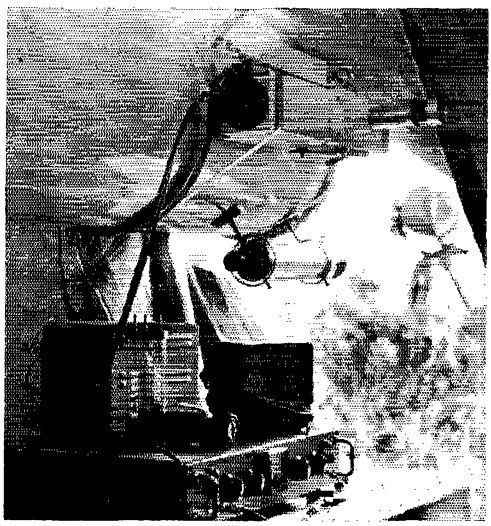
A helium-neon gas laser and a pair of confocal [1] mirrors were made available to the club for a limited time. Club committees arranged for transmitting and receiving equipment. The confocal mirrors were set up with micro-adjustment mountings and the transmitted laser beam was designed to be collimated to a two-inch diameter at the transmitter by the ten-power telescope. The laser was excited and modulated by a Viking II operating on 28.62 Mc. Measured laser output was ⅛ milliwatt.

At the receiving end, the laser beam was collected through a 12½-inch telescope which fed an S-20 photomultiplier tube and its associated translation equipment. An audio amplifier fed a loudspeaker and a tape recorder.

Operation Red Line went into action the weekend of May 3. By 3:30 P.M. on the third, 2- and 6-meter contact links were established. Tents were pitched and equipment set up for an after-sundown communications try.

After dark, the receiving telescope was aimed at the transmitter site by focusing on the blinking headlights of W6KHK's car. Sighting-in from the transmitter to the receiver was done with the light of a 5-million-candlepower aircraft flare. It took an additional half-hour of careful scanning to center the laser beam in the receiver-field. The time was 10:55 P.M.

Micro adjustments optimized the signals to a Q-3 level and modulation was begun and received. Atmospheric conditions shortened the first tests, but the transmission was repeated the next evening at 9:30, with much better results. Signals were Q-4 and -5 for a full hour and a half. The 118-mile distance is a new claimed record on 474,100,000,000 kc. QST



Receiving telescope with photomultiplier attached. Outside the tent is the flashing beacon used for signalling.

*10660 F. Roseglen St. Temple City, California.

[1] Confocal — having the same focus.

Henry, Are You Drunk?

BY STEVE AUG,* K2EOF/WØGSE

CREATIVITY never has been my particular forte when it comes to short stories, but I always have prided myself upon being able to re-tell a good tale. And what follows is an account told to me by an acquaintance some time ago. I repeat it here for the benefit of all Novices — and others — as it was told to me, in the first person:

I had been out late, one winter's night not long ago, and upon my arrival home I decided to see how the bands were before retiring.

It was one of those clear, cold nights — the type that can happen only in New England, and I had visions of the ether fairly tingling with activity — especially the low bands.

But, to my regret, 75 meters was filled from one end to the other with the same old gang on the same old frequencies.

Lest the evening be a complete loss, I decided to pound the brass a short while with my old, but little used, hand key.

On my way down the dial, I passed through the Novice band and heard a signal so strong I had to decrease the receiver sensitivity considerably.

It was a Novice calling "CQ" at a pretty fast clip. I decided to answer him since, I thought, any Novice sending at that speed is probably ready for his General Class ticket and would most likely want a General Class contact.

When he finished his "CQ" — a rather long one — I answered at about the same speed, and gave my call quite a number of times.

Well, he obviously heard me, because he returned and, after "tnx"ing me "vy much fer the FB call" began with a signal report: 599x, his QTH: the same town as mine, and told me his name was Henry.

When he turned it back to me I decided to have some fun with this chap and see whether he could receive as fast as he could send.

So, all I said was, "Henry," I said, "Henry, are you drunk?"

And Henry came back and said: "R R R (roger, roger, roger), FB OM, solid copy," and proceeded to describe, as completely as possible, his entire station including the dipole antenna, receiver, transmitter with its inevitable 807 (or was it a 6146) s.w.r. bridge, crystal calibrator, and miscellaneous other items including what sounded like a broken ohmmeter he wasn't using at present but would soon have repaired. And then he turned it back to me.

And I said, "Henry," I said, "Henry are you drunk?"

And Henry said, "roger, roger, roger, FB OM, solid copy" and proceeded to inform me as to how well he was progressing toward his General Class license and that, with a bit of brushing up on the theory, he would certainly be able to take the test in a couple of weeks. And then he turned it back to me.

And I said, "Henry," I said, "Henry, are you drunk?"

And Henry said, "roger, roger, roger, FB OM, solid copy," and proceeded, in the most beseeching terms, to implore me for a QSL card. He even gave me his street address (five blocks from me) no less than six times. And then he turned it back to me.

And I said, "Henry," I said, "Henry, are you drunk?"

And Henry said: "roger, roger, roger, FB OM, solid copy" and informed me that as it was growing late he would have to "hit the hay" (poor chap, I thought, lives in a barn). And Henry began the sign-off which, after "tnx"ing me "vy much fer the FB QSO, hpe cuagn" included: "73, 73, 73, 73, 73, 73, 73, 73, 73," and turned it back to me.

And all I said was: "Henry," I said, "Henry, are you drunk?"

And Henry said: "dit dididit dit, dit dit" (to the rhythm of "shave and a haircut, two bit .")

And I turned off the rig and went to bed.

QST

* 1360 Moline St., Aurora 8, Colo.

Strays

James J. Lamb, ex-W1AL, has been named Chief Scientist of the U. S. Army Electronic Research and Development Activity, Arizona at Fort Huachuca. Lamb is the holder of six patents, has contributed widely to encyclopedias and trade magazines, and has written more than sixty technical papers. He will join USAERDAA from the R & D Staff of Sperry-Rand Corporation. Mr. Lamb headed the *QST* technical staff from August, 1929, to October, 1938. He was on leave of absence from the League until September, 1945, working for Sperry-Rand and the war effort and contributing to ARRL publications as Consultant and Research Engineer.

W1NUC and K2OZT sent an article from *Chemical and Engineering News* (May 13, 1963) which reported on the frequency of use of various technical publications on file in the New York City public libraries. Of the hundred listed, *QST* stood 81st. The only other electronic publications on the list were *Electronics* (13th) and *Proceedings of the I.R.E.* (16th). Our magazine was the only hobby magazine on the list!

A Portable Hamshack

BY RICHARD E. WILLIAMS,* W3WAU/4

THE modern "packaged equipment" available to hams today ought to solve many of the space and location problems of the hamshack. However, no matter how hard we try, it seems that the XYL is never satisfied. Most of us, I am sure, have been criticized by the rest of the family on the appearance or inappropriate location of our amateur radio equipment.

When the wife announced proudly the coming of our third child, I could see the spare room being turned into a nursery even before she told me to relocate my equipment elsewhere. Fortunately, she had given me as much advance notice as possible and plans and construction of the "portable hamshack" were completed before eviction day.

The following specifications had to be met before receiving the "final stamp of approval" by the XYL.

1. The equipment must be child-safe. No exposed leads of any type and all equipment must be inaccessible to children.

2. The operating console must be compact, featuring easy removal of equipment and portability. Since we were a Navy family the hamshack must be easy to move when we receive orders to a new duty station.

3. The console must be of Early American styling. This was strongly recommended by the XYL since the console may, at some time or other, be located in the living or dining areas which are of Early American decor.

After complying with the rigid specifications laid down by the wife, the only problem remaining was to fit all of the equipment into a suitable enclosure with an end result of maximum operating convenience.

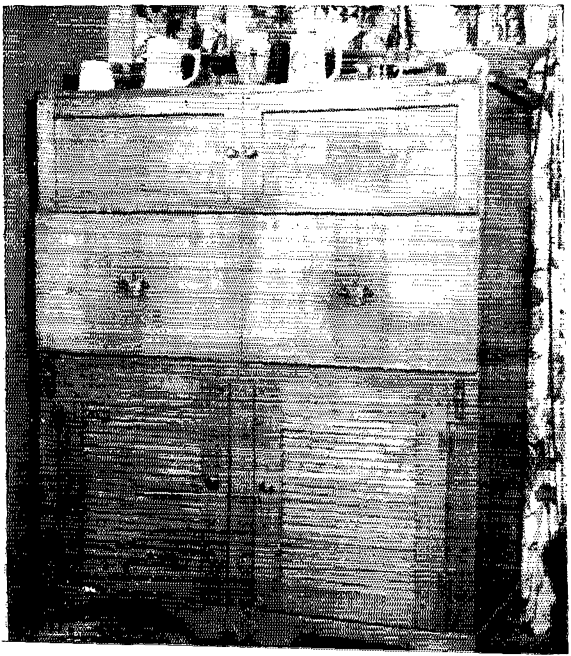
* 7613 West Powhattan Ave., Tampa 4, Fla.

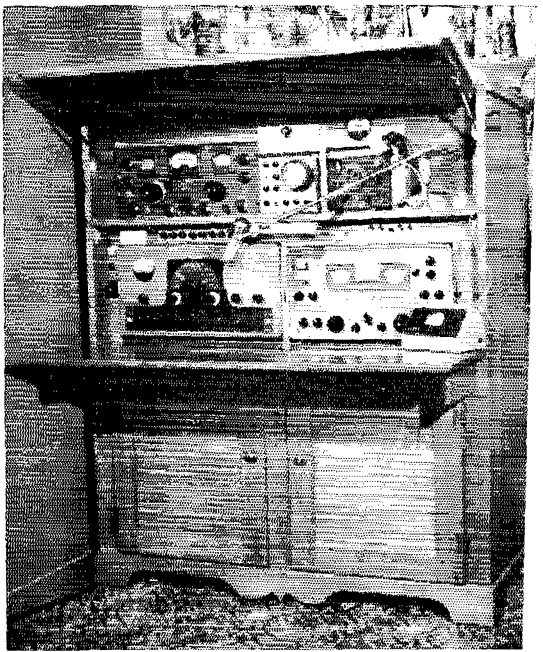
A suitable second-hand cabinet couldn't be found, so the console was constructed from the ground up for a cost of about $50, including all hardware. Maple and birch were used for the exterior. The interior shelves were made from ¾-inch plywood with the edges covered with veneer. As shown in the photographs, the operating table, which doubles as a door over the transmitter and receiver compartment, swings down into position and rests on two supports that extend from the front of the cabinet. The table is secured to the cabinet with a piano hinge and covered with gray Formica.

The second shelf is hidden by a door which swings upward to expose equipment located four inches from the front of the cabinet. This shelf is also covered with gray Formica.

All doors are held in their closed position by a magnetic catch. It is a matter of a few seconds to pull out the two table supports, lower the door which doubles as a table, raise the top door and begin operating. There is adequate storage space in the cupboards below the operating table. The shelves in these cupboards slide out from the rear in the event the space is needed for further equipment expansion.

On the top shelf is a standby receiver used for WWV monitoring and occasional short-wave listening, a home-built modulation indicator for checking both transmitted and received signals, a frequency meter and a speaker. Above the modulation indicator is a five-position coaxial switch used for selection of various antennas. Above the frequency meter is a running time meter which records the total hours of operation of the p.a. tubes in the transmitter. The microphone, mounted on a boom, is stored in the horizontal position, but swings down in front of the operat-





ing position when needed. A jack, located behind the mike boom on the speaker panel, is used to plug in a watt meter/s.w.r. indicator. This indicator is usually stored below the operating table in one of the cupboards when not being used. A small enclosed light mounted next to the speaker is used to illuminate the frequency meter and running time meter.

Each piece of equipment has its own power switch mounted on a small panel above the HQ-170. Indicator lights for these switches are located on a similar panel above the transmitter. A main power switch controls a relay which applies power to the console. No equipment can be energized unless the main power switch is in the ON position. One slight modification was made in the HQ-170 to permit the clock to run continuously with the main power and HQ-170 power switches off. One switch on the panel changes the antenna and speaker connections from one receiver to the other and is shown by lighting the appropriate indicator lamp. A small covered 25-watt tubular incandescent lamp is mounted between switch and indicator panels. This light gives adequate illumination for log keeping and note taking. An a.c. outlet, main power and transmit indicator lights are located on the left side of the transmitter. A small door on the right side of the HQ-170 covers a compartment used to stow log book and a key.

Each piece of equipment is fused and all wiring and relays are permanently installed. All wiring to the equipment merges from the wiring harness at the point of connection to the equipment, thus making it impossible to connect a wrong wire when re-installing components. Four coaxial antenna jacks, terminals from the balun coils, and a common ground terminal are mounted on the rear of the cabinet out of the reach of children and curious visitors.

The console described encloses, in one neat package, just about everything needed by a ham station. It could be easily adapted to include an s.s.b. exciter, for example. A detailed description of the construction and wiring was not given since each amateur station has slightly different requirements. It takes about five minutes to remove or install all of the components in the console thus making it easy to relocate the cabinet, remove equipment for field day, or prepare for the moving company.

If you or your family are dissatisfied with your present hamshack, why not take some time and put your equipment in a suitable enclosure? You don't have to be an expert woodworker to turn out some fine looking work. Besides, you'll not only have a shack that you can be proud of, but one that is a joy to operate. QST

Strays

The QRP ARC has scheduled its first worldwide QSO Party for this August. Contest period is 1800 GMT, August 24, to 2400 GMT on the 25th. Contest rules and full information about the QRP Club available from Jim Perry, K4WVX, 2691 56th Street North, St. Petersburg 10, Fla. Send a self-addressed, stamped envelope.

—•••—

The Japanese Amateur Radio League, JARL, has announced the dates, times and rules for the 4th All Asian DX Contest. Participants call CQ AA between 1000 GMT August 24th and 1600 GMT, August 25th. The contest exchange should be RST and age for OMs YLs give RST and the numbers "00." All bands, 80–10 meters, may be used. The only type of emission allowed is c.w. For more information and contest sample logs, write JARL, at: Contest Committee, P.O. Box 377, Tokyo Central, Japan.

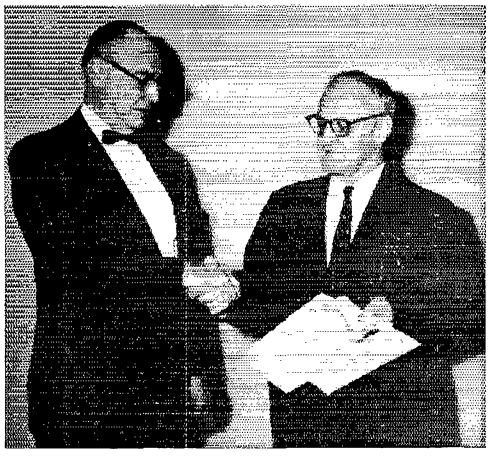
—•••—

When WA6ISR (West Covina, California) was in need of blood for a recent heart operation, area amateurs went all out, on the air and off, to arrange the blood donations. Credit goes to W1KUX/6 K6s LGR, KIH, YVN WA6s KST, RTF, SDQ, UZK, UIN, WGL, EPX, FAY and CJD and the Edgewood ARC.

—•••—

Who sez you can't QRP? K1VJC, running ¼-watt input, got a 579 report from W3AZR in Levittown, Penna. AZR's power? — ⅛ watt!

Among the 234 Medal-of-Honor winners honored by the President at White House ceremonies this year was Lt. Col. Jeff DeBlanc. Jeff, W5YDC, and XYL Louise, W5GFY, now reside in Saint Martinsville, Louisiana, where Jeff is a high school teacher.



Thomas Appleby, W3AX (right) receives his Old Timers Club certificate from Harold Robinson, W3RE, president of the Rock Creek Amateur Radio Association. W3AX, a retired Navy Commander, says he built his first ham gear when he was 13 years old, in 1899.

We are not sure, but this may be a photo of the only machine of its kind in existence. That is, this may be the only Piersen Telegraph Transmitter that was ever constructed. This is a most ingenious piece of apparatus, and don't we wish we had one in our shack!

A Telegraph Key With a Memory

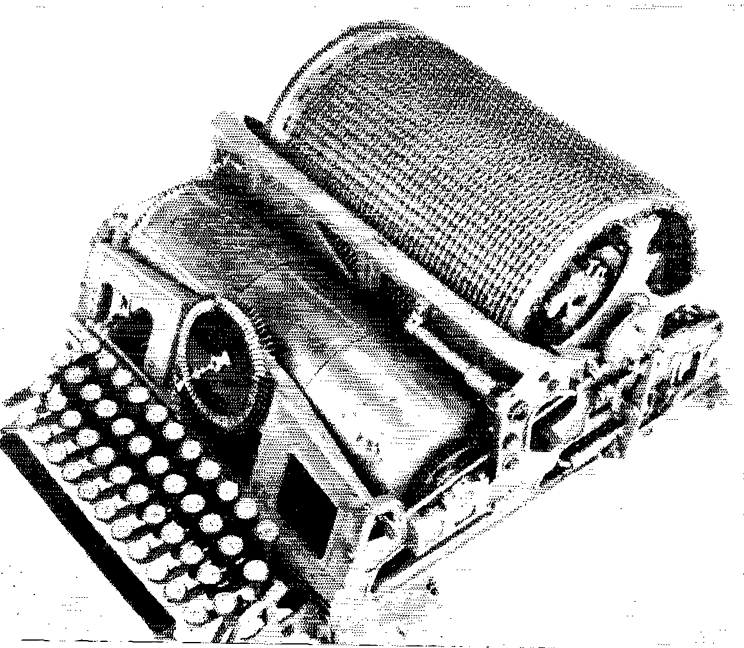
BY HARRY R. HABIG, * K8ANV

TODAY, with all the advancements in electronic keyers, it may come as a surprise to many that an automatic Morse telegraph keyer, featuring a mechanical memory drum containing 3240 memory bits, was available over 50 years ago — long before the advent of Kleinschmidt perforators, tape recorders or electronic bugs.

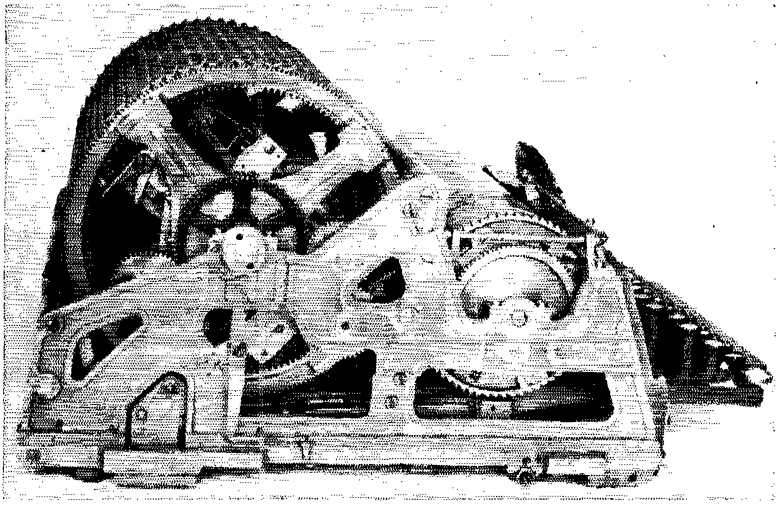
Designed and manufactured by Edwin H. Piersen of the Piersen Telegraph Company, Topeka, Kansas, in 1910, this amazing mechanical brain boasts the most modern appearance and precision workmanship of the latest teletype machine or electric typewriter — but it uses neither tape nor electricity in its operation.

Equipped with a standard typewriter keyboard and a spring drive motor, somewhat like the old Victrolas of our grandfather's day, the operator only had to wind the spring, connect the output of the keyer to his hand-key connections, and start typing his message. The Morse telegraphy emitted by the machine at a preset speed was perfect in every respect — perfect dots and dashes, and perfect spacing between characters and words. All the typing operator had to do was stay ahead of the machine — as much as 72 characters ahead of it, in fact — and keep the

* Development Engineer, 3531 Beldare Ave., Cincinnati, Ohio.



This view shows very clearly the drum which has the 3240 "fingers." The spring motor is in the drum just forward of the keyboard, its torque being transmitted to the memory drum through the gears which are visible in this and the side view photo. The dial above the keyboard indicates to the operator how far ahead he is—how many characters are stored up in the drum and not yet transmitted.



This side view of the Piersen Telegraph Machine shows the beautiful machine work that went into its construction and the gearing that transmits the torque from the spring motor to accomplish the functions.

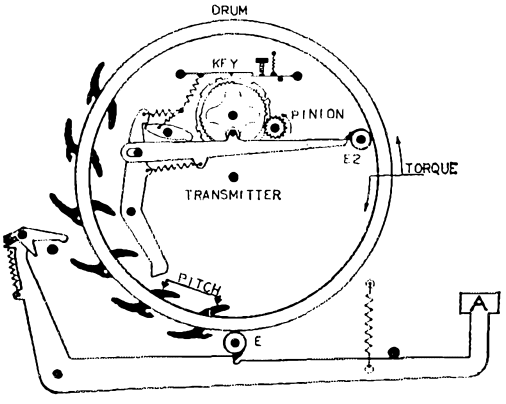
spring wound. But the machine was capable of producing hundreds of words of perfect telegraphy before the spring motor would require rewinding. A good typist, however, typing faster than the machine was transmitting, could store enough characters in the memory drum to stop typing, rewind the spring, and resume typing while the keyer emitted a constant flow of Morse.

How was it done? How could man invent a mechanical brain decades before magnetic tape was a gleam in the inventor's eye?

A modest-sized but beautifully complex drum with 3240 "fingers" is the heart of the machine. Each finger is an alphabetic character or numeral, and the characters are arranged in 45 rows of 72 fingers each; thus there are 72 "A's," 72 "B's," 72 "C's," etc. Referring to the diagram, the memory drum has a constant counter-clockwise torque applied by the spring motor at all times, while the transmitter assembly has a constant torque in the opposite direction. When a keyboard key is pressed, the single revolution escapements "E" and "E2" allow the drum or the transmitter to move one pitch when released. The pinion is rotated at a constant speed, selected and preset by a control on the keyboard. Of course, this complete assembly, illustrated in the abbreviated drawing, is repeated 45 times, once for each character.

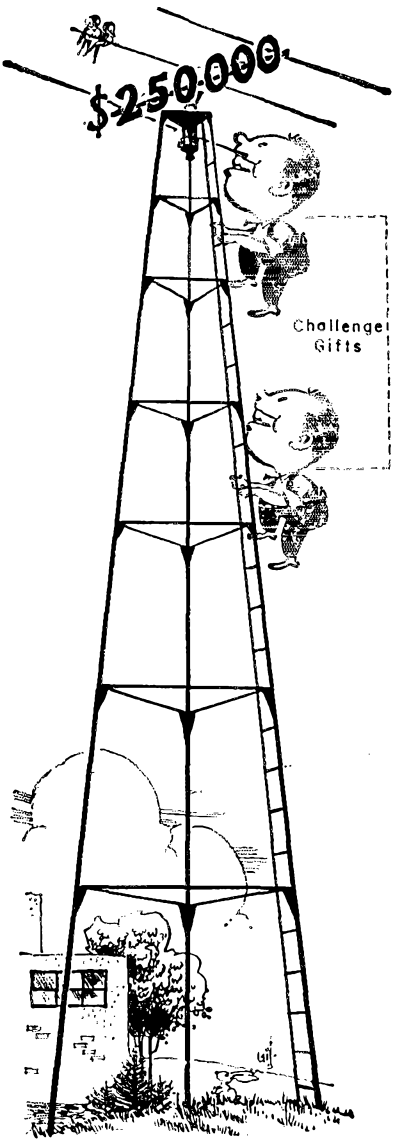
A dial on the face of the machine — containing 72 marks around its perimeter, a fixed index mark attached to the dial bezel and a hand centered in the dial pointing to the fixed index mark — informs the operator at any instant how much storage space is available in the memory drum and how far the transmitter has to go before reaching the end of the message. Each time a key is pressed, the dial and hand, as a unit, rotate one mark counter-clockwise, thus showing the number of characters the operator has recorded When the operator activates the transmitter the pointer only revolves clockwise, one mark for each Morse character transmitted, thus indicating how far from the home or starting position the transmitter is at any instant, and at the same time informing the operator how much storage space remains in the drum, available for use. The operator need type only as fast as the machine is transmitting, or he can keep as many as 72 characters ahead of the output, as long as the pointer is kept suspended off home base and until the spring motor requires rewinding.

This incredible gadget, a miracle of design and machining in any age, was exhibited and was awarded the Grand Prix at the Panama-Pacific Exposition in San Francisco in 1915. I am indebted to Mr. Robert W. Richmond of the Kansas State Historical Society for his assistance in obtaining historical information about the machine and its manufacturer from the archives of Topeka newspapers. I believe that the machine on exhibit in the Kansas State Historical Society is the only one in existence, but would appreciate hearing from anyone who knows anything of the present whereabouts of other models of the Piersen Telegraph Machine. QST



A simplified diagram of how the Piersen Telegraph Machine operates. Follow the text and you'll see how it worked. The inventor was a clever man indeed!

Building Fund Progress



The Building Fund drive in May completed a year of activity with 50% of its goal subscribed by members and an additional 30% pledged as matching funds. Only 20%, therefore, remains to be accomplished. With continued membership support, we should be able to get our man to the top of the tower soon. Have *you* provided him a boost?

Division percentages of quota achieved are now as follows:

	%		%
Hudson	71.9	Roanoke	48.1
Northwestern	67.9	Atlantic	40.9
New England	65.3	Canadian	40.6
Southwestern	64.0	Delta	36.1
Dakota	60.0	West Gulf	34.9
Midwest	55.9	Rocky Mt	34.3
Central	52.6	Great Lakes	33.6
Pacific	50.3	Southeastern	32.8

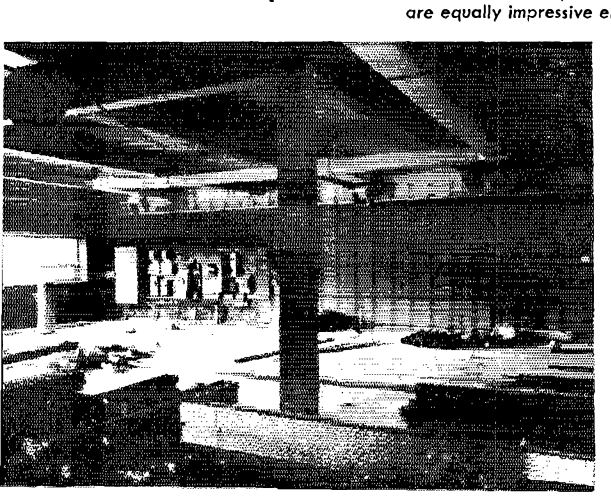
Foreign amateurs are showing considerable interest in the fund drive. Nearly a thousand dollars has been subscribed by members outside Canada and the U.S.!

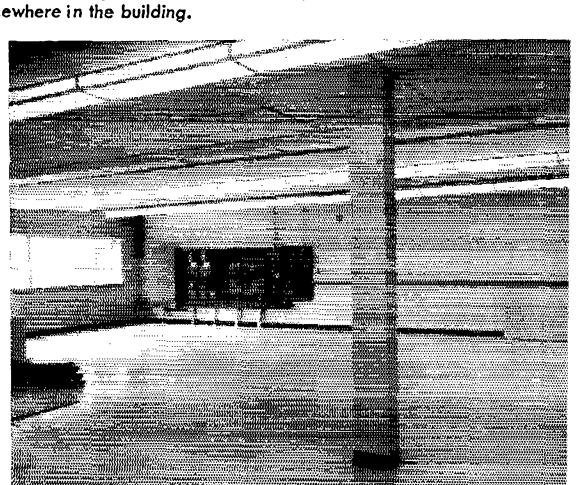
—...—

The carpenters' strike has come and gone, delaying construction only a couple of weeks. Finishing touches of internal partitions, painting, parking area surfacing, etc., are now in progress and will be completed by the time you read this. We've already moved a few stock items into the new building. The big move is scheduled for June 28–29, at which time we say a permanent good-bye to the quarters we have occupied for more than 30 years. On July 1 we expect to be in full swing at 225 Main Street, Newington 11, Connecticut, telephone (area code 203) 666-1541. A dedication ceremony will be held, probably in September when the lawn and shrubbery plantings are well established and the area has a reasonably completed look. But come and see us anytime!

QST

The two photos below show the changes that have been wrought in the new laboratory in a little over four months. The photo at the left was taken January 23, that at the right on June 3. The changes *are equally impressive elsewhere in the building.*





Members Are Saying

After reading in May *QST* that every dollar contributed would be doubled by a certain group, this certainly should be the incentive for everyone to help out. — *K2TML.*

Am shamefaced that I have not responded before now since it appears that I might be taking advantage of the matching funds. I am sure that there are many hams like myself who have had good intentions since the very beginning, but have needed the jolt that has been supplied. I am proud to be able to be a member of ARRL and the ever burgeoning society of radio amateurs of the world. — *K2ODM.*

The enclosed check is in appreciation of all that the League has done for amateur radio in the past and in anticipation of the work to be carried out from its fine, new building in the future. I will not repeat the lists of things the League has done for ham radio, but will only say that I feel that without the League's work, amateur radio would not be as varied and as interesting as it is today. — *K7NHV.*

We are sending you the money we promised from the proceeds of our auction. It came to a bit less than we anticipated but we made up the difference from the treasury. — *Quinebaug Valley Radio Club (Mass.).*

Please find enclosed our contribution. It is the opinion of all that the benefits received by League sponsorship far outweigh our small contribution, and if our forthcoming hamfest is successful we shall remedy this situation. — *Bristol Amateur Radio Club, Inc. (Tenn.).*

Like many others, I kept putting off my modest contribution. Two things caused me to put a stop to this procrastination. I received my expiration notice and May *QST* at the same time. In the latter, I read with great interest the offer of certain hams to match up to $75,000. With 2 notices before me and the realization that each dollar I contribute now goes twice as far, there is no justification for procrastinating any further! — *W2KXA.*

Delighted to read about seventy-five thousand from better-heeled brethren and sincerely hope the rest of the boys meet the challenge. Was a little disturbed to read that donations have been received from only 8,000 amateurs. Seems like a rather small percentage but then I strongly suspect that some of these nation-wide drives for funds would not get off the ground if it weren't for the house-to-house solicitations. It is difficult to spend money without being directly approached for it, at least for something like this. But I do share your optimism that we will make it. — *W1EEK.*

We feel that the League has done a lot for us and that this check will help to keep the ARRL working as efficiently as it now is. — *Winona Amateur Radio Club (Minn.).*

I have been putting off my contribution long enough. A review of the book *Two Hundred Meters and Down*, prompted me to do something about it. I believe that more amateurs should read Clinton B. DeSoto's masterpiece. We should all feel more than just a little indebted to Hiram Percy Maxim and the American Radio Relay League for what has been done for the amateur since those early days. — *W2LFL.* [Reprints of *Two Hundred Meters and Down* are available from Hq. at $2 postpaid. — EDITOR.]

Please add our name to the growing number of clubs and individuals who are helping the little man to reach the top of the magic tower. — *North Seattle Amateur Radio Club (Wash.).*

I am but 15 years old and quite limited in funds but please accept my small piece as but a microscopic token of my pride in the ARRL. — *WN2CST.*

I am a retiree with not much money or would do more. Also I am one of those plug-in hams that some of the fellows write about. So in the event I am ruled out of the game for being so ignorant I would not want too much investment in the new building! — *K7RLT.*

Of late I have found that the little fellow climbing the mast in *QST* has been looking at me with increasing reproach in his eyes. I finally couldn't take that sad, disappointed look any longer. — *WN2CSZ.*

My first glimpse into the enchanting world of ham radio was through the pages of an ARRL *Handbook* given to me by a ham about thirty-one years ago! The League has, in one way or another, been serving me ever since and I am happy to be able to make this small gesture of appreciation. — *W1QHS.*

I have been an ARRL member, with some necessary interruptions, ever since 1914! The League, during these 48 years, has done a great deal for me and my hobby, amateur radio. At last an opportunity comes to me to show ARRL my appreciation even in a relatively small way. — *W8IQ.*

Without the strenuous efforts of Mr. Maxim at the end of WW I, ham radio would have been a dead duck, I am sure. The League staff has represented the best interests of the ham many times since and will continue to do so in the future. The attached check is a very small payment on what I and every other ham owes the League. — *W4BP.*

The membership voted to contribute 10% of the club's current treasury balance. Enclosed you will find a check which represents this amount. Individual members of the club will forward their personal contributions separately. — *Westside Amateur Radio Club (La.).*

Amateur radio has meant a great deal to me and I am proud to say I have been a member for over thirty years and also am glad I can say I did my part in the building of such a worthy memorial. — *WØICV.*

Here is the final installment on my pledge. I just wish that everything I spend my money for was such a bargain. The soreheads and complainers we have with us always. Let's be thankful that amateur radio, for the most part, is made up of people who are willing to shoulder their part of the burden — cheerfully. — *W4OKY.*

Amateur radio cannot be all things to all hams, but for this one it has, and for nigh onto twenty-five years. For me the hobby was an invaluable therapy during confining illnesses, a beneficial crutch during convalescence, and a source of thrilling pleasure after recovery. The role of ARRL as a jealous watchdog of amateur radio is universally known and appreciated. Enclosed, in addition to my renewal is a small token of my personal appreciation. — *W4OBA.*

Hints and Kinks For the Experimenter

SQUELCH FOR THE COMMUNICATOR I

THE Gonset Communicator I has a long and useful history in the amateur service. One of the finer points it lacks, however, is a squelch to knock out the background noise during no-signal conditions. The addition of a one-tube squelch to the Communicator I is relatively simple. Adding the squelch circuit involves only a few connections to the receiver: one B plus lead, one heater lead, two shielded audio leads, a ground and a connection to the a.v.c. The only change to the Communicator is the snipping of both leads of the 0.1-μf. disk capacitor located on the Communicator's volume control, (R_2 in Fig. 1), and installation of two shielded audio leads at these same points.

The circuit diagram of the squelch is shown in Fig. 1. The connections for the shielded leads are shown at points "A" and "B" in Fig. 1. The shields of these leads are soldered to the grounded case of the Communicator's 250,000-ohm volume control. For convenience, both leads are terminated with phono jacks and are brought out along the left side of the chassis, as viewed from the rear. The use of phono plugs on the shielded leads facilitates connection of the squelch unit and simplifies removal of the Communicator receiver for servicing. Of course, soldered connections can be used if desired. The heater lead for the squelch unit is soldered to the hot side of the pilot light socket and the B-plus lead is tied to the 4000-ohm wire-wound dropping resistor on the CLIPPER switch in the Communicator. An a.v.c. lead is connected to the test point feed-through capacitor on the chassis rear.

All of the components for the squelch circuit, including the tube, are mounted inside a small Mini-Box. Mating connectors are provided for plugging in the leads to the Communicator. Mechanically, the completed squelch box is mounted to the Gonset case, or it can be placed outside the case as desired.

To use the squelch, rotate R_1 so the slider is at the right in Fig. 1. In this condition, the Communicator operation is normal with the front panel volume control providing its usual function. Now advance the squelch control, R_1, until the background noise suddenly drops out, leaving the receiver quiet in the absence of a carrier. An incoming carrier, higher in level than the background level, will open the squelch and the signal will appear in the speaker.

— *R. F. Welsh, W2PTM*

CONNECTING STRANDED WIRE

THE problem of mechanically connecting stranded wire to terminal strips without stray strands shorting to adjacent terminals has always been bothersome to me. Tinning the stranded wire beforehand is also a problem, since the stiffened wire is then hard to manage. I form the wire by dividing its strands roughly into two bundles and then forming these either into a ring or fork shape. The lead is then soldered. This makes a neat terminal lug that is also handy for barrier-type terminal strips where some commercial terminal lugs won't fit.

— *Dennis McManus, K3OGD*

KEY BASE

I USE the bottom portion of an old electric flat-iron, smooth side up, as a base for my transmitting hand key. The heavy weight, plus three rubber feet attached to the base, give the combination "stay-put" stability, and it looks good, too!

— *H. C. Nenstiehl, W2EAT*

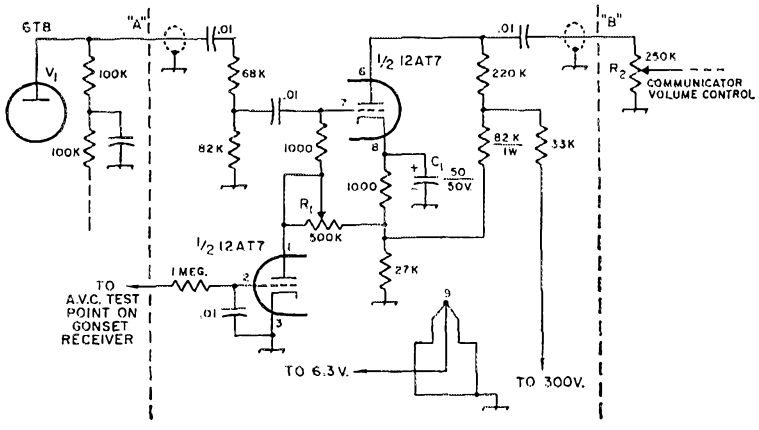


Fig. 1—Squelch circuit for the Communicator I is shown inside the dotted lines. Unless specified, all resistors are ½-watt. Capacitances are in μf. All capacitors except C_1 are disk ceramic; C_1 is electrolytic.

BETTER GRID-BLOCK KEYING WITH THE W3OPO ELECTRONIC KEYER

ALTHOUGH the transistor grid-block keying arrangement described in the author's original article on page 51 of *QST* for December, 1962, worked well with the transmitters with which it was tried, several hams have reported difficulty. In some grid-block systems, Q_{12} is being held in an "off" state (not saturated) because of insufficient emitter driving current which, in turn, prevents the transmitter from keying.

The revision shown in Fig. 2 was suggested by K4NST and some of his friends in Birmingham, Alabama. With this common emitter configuration, Q_{12} is easily driven to the "on" state (saturated), which allows the transmitter to be keyed. One additional transistor is required. The circuit has worked well with transmitters having voltages as high as −175 volts (K4NST) and as low as −65 volts (WA2VLK) across the key contacts. — *James C. MacFarlane, W3OPO*

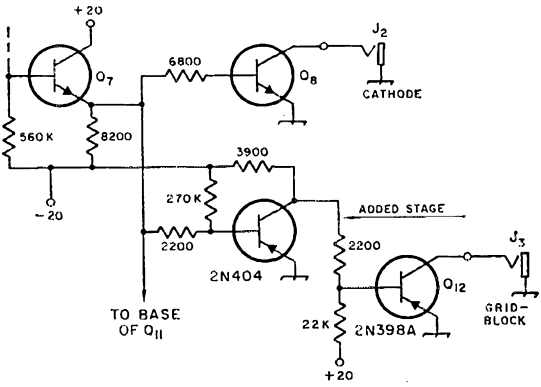


Fig. 2—Circuit for better grid-block keying with W3OPO keyer.

4CX250 TUBE LIFE IN THE KWS-1 TRANSMITTER

SOME owners of the Collins KWS-1 transmitter have experienced short tube life from the 4CX250B, 4X250B, or 4X150A (as the case may be) final-amplifier tubes. Examination of some of the defunct tubes showed that life had been limited by high filament voltage. Upon questioning some owners of KWS-1 equipment, it was found that some of them were under the impression that the nominal filament voltage of the transmitter (as read on the panel meter) should be 6.3 volts, and therefore adjusted the filament-voltage control accordingly. In addition, spot checks made on a few KWS-1 units showed that the panel voltmeter monitoring the filament voltage was out of calibration — as much as 10 per cent in one case.

Adjusting the filament-voltage control for 6.3 volts, especially when the accuracy of the filament voltmeter may be questionable, can result in an applied filament voltage to the amplifier tubes which may be excessively high. Filament-voltage limits on this family of tubes are 6.0 volts plus or minus five per cent, or a range of 5.7 to 6.3 volts. For longest tube life, it is recommended that the filament voltage not exceed 6.0 volts.

The KWS-1 owner, therefore, should check his filament voltmeter against a one per cent laboratory instrument of known accuracy — replacing the solid-state diodes in the metering circuit and recalibrating the meter, if necessary. Filament voltage should then be held close to 6.0 volts for maximum tube life.

— *William I. Orr, W6SAI*

REMOVING HERMETICALLY-SEALED CRYSTALS

A RECENT article, "Grinding Surplus Hermetically-Sealed Crystals," *QST*, March 1963, showed a technique for changing the frequency of hermetically-sealed crystals. In building filters and VXOs for various bands, I have had occasion to open up and modify a number of these crystals. Since the technique used is different from that used by W5EIM, it may be of interest to others.

Instead of using a gas stove, on which I didn't have the finesse to avoid overheating the crystal, I made a little attachment for the soldering gun which heats only the crystal can around the region of the soldering bead which seals it. A piece of No. 12 or 14 wire is formed tightly around the crystal can as shown in Fig. 3. The ends of the wire are bent so that they can be plugged into a solder gun, a Weller 8100 in my case, where the tip normally goes. The gun is turned on and the copper wire is tinned thoroughly before use. A little solder is fed in between the crystal can and the wire each time it is used in order to aid the heat flow into the can.

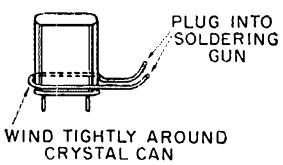


Fig. 3—W3TLN's soldering gun crystal can opener. The regular soldering gun tip is removed and the crystal can removing tip is inserted in its place.

For raising the crystal frequency, I use the solution recommended by Newland, "A Safe Method for Etching Crystals," *QST*, January 1958, and simply dunk the plated crystal, leads and all, into the bath. This seems to maintain the crystal characteristics better than the grinding I've tried. For example, in moving crystals which had good VXO pulling characteristics, the etching process had little effect on their VXO properties. In all cases, the crystal and its leads must be thoroughly cleaned with either water or alcohol before re-sealing.

— *Ben Vester, W3TLN*

CONDUCTED BY JEAN PEACOR,* K1IJV

Why Contests?

ACCORDING to Webster, "a contest is an earnest struggle for superiority, victory, defense, etc.; competition." A little something extra is found in an amateur radio contest though, as untold opportunities are offered in connection with our wonderful hobby. If for no other reason than to have clocks synchronized all over the world, contests are invaluable. As C Hour approaches, many a receiver is quickly shifted for one last check on the correct time. Then, how the ham bands change. From normal quiet frequencies, comes the roar.

Is it best to listen a while first? No! Plunge right in and enjoy the fun. Whether you are able to participate for the full contest time or only for a small portion, there is fun to be had for all. Some will win, many set as their goal bettering their previous year's score, some concentrate on seeking out that long awaited 50th state for WAS; but whatever the final results, it is excitement unequaled.

Contests bear out the saying "the more the merrier," and to all whose scores follow, congratulations for making this year's YL/OM Contest one of the merriest.

RESULTS: FOURTEENTH YL/OM CONTEST**

March 2-3, 1963

YL Phone

	Contacts	Sections	Score
KP4CL, Alicia Rodriguez	1,009	108	109,061
W5DVV, Shirley Freeman	918	92	84,456
KØEPE, Marte Wessel	821	77	63,217

OM Phone

K5MDX, David L. Thompson	137	55	9,419*
W5WZQ, David Blaschke	106	50	6,615*
K4JIG, Bill Egbert	98	47	5,757*

March, 16-17, 1963

YL CW

	Contacts	Sections	Score
W1RLQ, Grace Swenson	406	82	41,615*
W8DUV, Katherine Anderson	401	65	32,581*
K1IJV, Jean Peacor	347	71	30,796*

OM CW

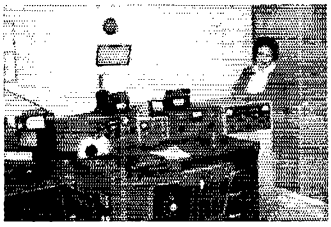
W5WZQ, David Blaschke	93	47	5,347*
K4BAI, John T. Laney, III	70	40	3,500*
K9LVK, Guy R. Mathis	71	38	3,373*

YL PHONE

K1LCI	15,966*	K6DLL	10,437*	K9EPE	63,217	K2DEM	122	K9AKF/5	300	K9UCG	70*	W2RUF	10,537
K1OLM	11,660	WA6HKE	10,170	KØITP	15,998*	W2MYN	90*	W5AWT	117	KØUWZ	2775*	WA2CUZ	9680*
K1OKC	5344*	K6EXV	5031*	KØHEU	8342*	WA2RDU	81	K6CJF	1485*	KØRFX	1705	K2PMR	4557
K1EIC	5064*	K6KCI	3848	KØGIC	8116*	W2JB	44*	K6GHU	1410	WAØASU	1137*	K2JYZ	1112
K1GSF	3442*	K6OQD	37*	KØHQD	1281*	W2BWW	37	W6FKH	1027*	KØIIO	498*	K3PKI	28,297*
K2OEW	6122*	K7MRX	37,286*	KL7ALZ	17,040	W2CVW	20*	W6ANB	910	WAØDCQ	385*	W3TSC	21,888
K2ETC	4668	K7KSF	17,110	VE3BBL	9497*	WA2FNO	1*	W6BWG	399	KØGSV	374*	W3SLS	11,500*
K2OWL	1417*	K7IVK	14,862*	VE4PE	5754	W3BVL	2640	WA6AJF	330*	WØALA	360	K3TVH	3094*
WA2WHE	1020*	K7SKR	12,540*	VE6RP	18,330*	W3QLW	608	W7SFK	2112	KØJPL	72	K4ZNK	22,365*
K2JYZ	299	K7RAM	6727*	VE7BBB	925*	K3RXK	61*	W7NPV	825*	WØVFE	26	W4NGE	21,097*
K3ESD	21,505*	K7ADI	4632*	F9WY	250	K4JIG	5757*	W8AJW	4200*	K5IQA/Ø	5*	WA2WBA/4	
K3PKI	7200*	W7GGV	4580*	G3LWY	2464*	K4GLA	1800	W8BMX	858	KH6BLX	546		15,190*
WA4DPB	31,600	K7PYG	2800	KP4CL	109,061	W4JUJ	700*	W8WT	770	KL7MF	195*	K4LMB	14,782*
W4WYR	25,560*	K8ONV	33,306	ZL1LD	902*	K4MYO	192	W8BNF	180	VE1AFP	247*	K4TFL	8004
WA4FJF	23,925*	W8GJX	780*	***OM Phone***		K5MDX	9419*	WA8DGE	79*	VE2IL	1*	W4UF	6157
WA4FEY	10,065*	K9QGR	26,901	K1POA	2565*	W5WZQ	6615*	W8CXS	1*	VE3CBY	1837*	WA4FEY	431*
W4UF	9750	WA9ENB	25,988	K1HTK/1	2066*	K5FLD	3230*	K9EAB	2516	VE3EVK	80	W4UTO	210*
W4KYI	5595	K9WUA	17,394*	W1BNS	962*	W5USA	2698	K9DDB	1586*	VE4ZX	114*	K5TXQ	21,760*
WA4BVE	5330	K9LTQ	3762	W1BAB	630*	W5HKU	1937*	W9LNQ	1320*	VE6UP	617*	K5FXX	14,408*
W5DVV	84,456	K9TRP	3640	W1UOT	197*	WA5EXB	1715*	K9LVK	1250*	VE7AKB	990*	W5DCB	13,780*
K5SBN	10,800	K9ZWV	625*	K1DII	175*	W5PJW	1687*	W9CMC	1008*	G3NFV	37*	WA6OET	22,129*
K5TXQ	1820	K9BWJ	581*	K1UZK	25*	K5FXW	1620	W9OKM	1000	***YL CW***		W6PCA	5060*
WA6OET	35,587*	K9IWR	315*	W2QKJ	960	K5FMY	1450*	W9SZR	930*	W1RLQ	41,615*	WA6WFZ	807*
W6YZV	15,930	K9CCO	130	W2ASV	650*	K5TCG	990	W9UTQ	770	K1IJV	30,796*	K7EQM	26,202
WA6PQI	14,687*	K9FHM	12*	K2PBU	489*	W5LXI	486	K9ECE	765*	K1UOR	26,370*	K7HSB	12,814*
W6WDL	12,000*	K9TLZ	9	K2JTU	320	W5NXF	323	W9WGQ	761*	K1LCI	10,335*	K7ADI	1552*
								K9WLKI	652*	K1WZY	8875*	W8DUV	32,581*
								K9VIE	607*	K1QFD	7841	K8ONV	20,358
								W9BGX	431*	KN1YFD	1100*	K8VFR	12,822*
								W9CRN	315*	K1UZG	112*	W8NAL	10,920*
								W9BLQ	195*	WA2WHE		W8WUT	8625*
								K9WZL	165*		25,001*	K8NGR	2850*
								K9PEN	79*	W2EBW	17,040	W8KLZ	1125*

* YL Editor, *QST*: Please send all news notes to K1IJV's home address: 139 Cooley St., Springfield, Mass.

** Special thanks to Blanche Randles, K1IZT, V. Pres., YLRL, and chief log checker.


(left) Grace "Chata" Swenson, W1RLQ, a top DXer (holding DXCC endorsement for 212 countries), and always one of the leading contestants in the YL/OM contest, is this year's first place winner for the c.w. portion. (center) Alicia Rodriguez, KP4CL, an A-1 Op and DXCC member, thanks all OMs who made it possible for her top place honors in the phone portion. (right) Dave Thompson, K5MDX, of DX and SS Contest fame, again has shown what his 4-125A homebrew rig can do as he is first place winner for OMs in phone portion.

W9KSE	26,650*	K1AEG	1156*	WA2PDU	585*	K4UYY	137*	K7SQD	165*	W9UTQ	1410
W9MLE	16,886*	W1EXD	1035*	W2WL	510	W5WZQ	5347*	K8GWK	3099*	K9DDB	1384*
K9TLZ	10,670	K1WJD	1008	W2NIY	480*	K5OCX	2337*	W8RQ	3006*	K9ZQW	1170*
WA9CCP	7877*	K1MHQ	999	K2DEM	340	W5USA	2257	K8KFP	2800*	W9YDQ	1094*
K9BJW	6047*	W1ZNM	919*	W2IP	15	W5AWT	2128	K8YCM	2436*	W9AEM	1040
K9IUR	2300*	W1UOT	825	W3VTT	2351*	W5WW	1980	W8NAN	2124	W9CXY	999
KØGIC	20,809*	W1EPE	680	W3AYS	1039*	WA5ALI	1440	W8YGR	1595*	K9VIE	960*
KØZSQ	13,865*	W1OPZ	630*	W3QQL	906	W5LXI	1260	W8CXS	1365*	K9QKY	736*
KH6BTX	23,688	K1DFC	315	W3MGP	825*	W5BUK	1170	K8HVT	1235*	W9SFM	589
KL7ALZ	29,857	K1LSW	105*	W3AIZ	800*	K5TGG	1137*	K8RUC	1094*	K9UCG	380*
VE3BBL	29,920*	K1SXX	96	W3QLW	754	K5WME	618*	W8GSP	782	W9DYG	225*
VE3EZI	23,550*	K1VII	20*	K3NEZ	276*	K5MCV	495*	WA8DGE	700*	W9WGQ	137
VE5DZ	1950*	W2CVW	2165*	W3MUT	260	W5GFT	379	W8DM	560	W9TCU	100*
VE6ABV	13,395*	K2PXX	2186*	W3MSR	120	W5JFB	150*	W8AJW	553*	KØBPO	2880
VE7BBB	8861*	W2SQT	1870	K4BAI	3500*	WA6KNE	2640	W8RGF	375*	WØEMG	2080*
G3ORU	997*	W2BWW	1800*	W4CHA	2516	K6CJF	2363*	W8KYD	260*	KØCVI	1821*
G3NQD	574*	W2AAU	1650	K4GLA	2170*	WA6AJF	570*	W8WRO	99	WØVFE	1800*
SP5YL	735*	W2UAP	1518*	W4JUJ	2131*	W6PTF	475	W8PS	36	WØCUC	675*
VK3KS	4015*	WA2ZKO	1281*	WA4FAT	1650	W6ISQ	336	K9LVK	3372*	WØQWS	460*
YU1BKL	1812*	K2IQH	1200*	W4ZQK	825*	K6ISQ	288	W9LNQ	2847*	KØVSH	460
		W2CUE	988	W4HOS	609	K7VMJ	2425*	W9LKI	2475*	KØSLD	300*
OM CW		W2NCG	787*	K4GSX	625*	W7POU	1611*	W9WCE	1976*	KØJPL	208
W1HOZ	1836	W2LYO	775*	W4ZOK	572	K7NFU	1344	W9RKP	1736	WØCDL	60*
W1BGA	1519*	WA2OJN	697*	W4YDL	432	K7NHV	696	K9WZL	1610*	W7UXP/KH6	594*
W1EQV	1406*	WB2DEP	637*	WA4IKU	356*	W7RGL	598	K9DWG	1598		

VE1DB	79*
VE2IL	720*
VE3DXD	2337*
VE3EMA	1890*
VE3EVK	374
VE4ZX	570*
VE4ED	60
VE6UP	1218
VE6AJC	735*
DL4FT	292*
DL6MK	150*
G3WP	15*
HK7ZT	225*
IT1AGA	150*
JA1DFQ	8*
KP4CC	44*
LA6U	11*
OH5UQ	15*
PAØVB	75*
SP8HR	20*
TF3AB	61*

* Low Power Multiplier

1963 YL VHF Contest Results

K1EAV, Belle Bunney, received the WRONE award (an engraved Paul Revere Bowl) for top score in YLVHF Contest held April 10–11. Runners-up are Helen Harris, W1HOY, second place, and Frances DeJager, K1MGP. Others participating: K5ZBM, K8VMY, K8SOU, W8EFB, WA8DSJ, K8PXX, K8CEN, W8LGY, K8YFB, and WA8CJP.

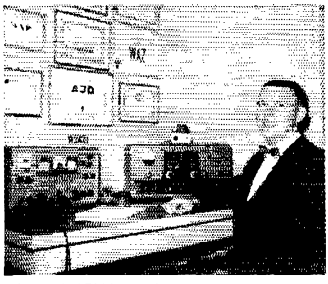
YL BPL Honors

Another YL to be congratulated and included for 1962 BPL honors (see January YL column) is Big Mike, WA4BMC, from Lake Worth, Florida.

The holder of nineteen BPL awards, Big Mike earned eleven of them in 1962, representing more than 6000 messages handled. She also holds almost the equivalent of a doctor's degree in ARRL appointments, being an OPS, OBS, and OES. A very active YL, the mother of six, whom you will hear on all bands, but mostly 80, 40, and 2 meters — a.m., s.s.b., and c.w.

Need A Crying Towel?

If it's a crying towel you need, just visit Upper Darby, Pa. and see Carol Johnson, K3RSL, daughter of Jane, K3RIH, and Walt, K3RII.



Dave Blaschke, W5WZQ, headlines the c.w. portion as first place winner, and also placed second in the phone portion. He is already looking forward to next year when he hopes to hear more YLs on c.w.

Two in a Row!
Belle Bunney, K1EAV. Winner of WRONE Week in March, followed through in April to take top honors in YL VHF Contest.

Is that what's troubling you? Contact Carol, K3RSL.

What Carol, 16, began as a joke on the 10-meter band gained momentum and is now a stock phrase. After listening to the constant laments about rigs, antennas, and TVI from friends on the band, Carol would counter with, "I'll lend you my crying towel." The comment caught on, and soon was the answer to any complaints.

Carol decided to make the popular towel a reality, purchased twelve yards of toweling, entitled it "Ye Old Crying Towel," decorated the edges with large tear drops, and invited all friends to sign it. To date more than ninety hams have signed their problems away, using Carol's towel.

Having antenna trouble, QRM, your pet band in rough shape? Give K3RSL a call, and she'll lend you her crying towel.

Coming Events

AWTAR — July 13-17. See May column for details.
ARRL Atlantic Div. Conv. — August 30-Sept. 1, at the Sheraton-Park Hotel, Washington, D.C. Registration Friday. YL Forum 2-3 p.m., evening banquet for OMs-YLs Sat. YL luncheon Sunday.

YL Clubs and Nets

WRONE — K1ZOH, Sister Loretto Thomas, was warmly welcomed as guest speaker at the N. E. Div. Convention's WRONE meeting, April 28th, at Swampscott, Mass.

A teacher of physics, mechanical and engineering drawing at Cathedral High School, Springfield, Mass., Sister Loretto Thomas has helped many interested boys discover the wonders of amateur radio through their studies of electronics. In February, 1962, the school formed a radio club station, licensed K1CHA. All club members have since earned amateur radio licenses.

K1ZOH, Sister Loretto Thomas, guest speaker at WRONE meeting.

Her numerous activities limit her operating time, but Sister Loretto Thomas follows the club rules of operating at least once a week, and may be heard on most any band enjoying DXing and ragchewing.

YL Florida International Sidebanders (FINS) — a new YL Club with 120 members; dues $1.00. Pres., K4RIIL; 1st V. Pres., K4RNS; Secy/Treas/Certificates Custodian, K4ICA; Public Relations, KP4CL. Conducts two weekly nets: Tuesday and Thursday, 1800 GMT, 14,333 kc.

Floridora YLS — New officers elected at 4th anniversary. Pres., K4RDX; V. Pres., K4PPX; Secy., WA4FJF; Treas., K4HSC. SSB Net frequency changed to 3933 kc., Tuesday at 1400 GMT.

YL SSB Net — Wednesday, 1900 GMT, has changed frequency to 14,288 kc. K6KCI and WA4FJF NCS.

YL Chapter 4 Net — Tuesday, 1800 GMT, 14,240 kc. W6YZV and K1OYM NCS.

Loaded Clothes Line Net — New officers elected at 6th anniversary. Pres., KØZRI/7; V. Pres., WØJUV; Secy., W7GGV; Treas., KØWZN; Publicity, KØEVG; Certificate Custodian, K5GYZ. Nets conducted Monday, 1700 GMT, 7235 kc.; C.w. Wednesday, 1600 GMT, 7100 kc.

LARK — Contest results (held in conjunction with YL/OM Contest). Winners receiving engraved plaques. Resident CW, WA9CCP, Yolanda Weisshappel; Non-resident CW, W6PCA, Opal Jones; Resident Phone, K9TRP, Diane Price; Non-resident Phone, K9QGR, Hazel Cain. Contest was open to resident and non-resident members of the LARKS.

Annual YL California Get-together — Los Angeles YLRC hostessed over fifty licensed YLs on April 6th at Santa Monica, Calif. at a luncheon and fashion show. A funfest was had by all. QST

It is with sincere regret that we bid adieu in these pages to Eleanor Wilson, W1QON, who has worked with us on each month's issue of *QST* since January, 1952. Increasing family and civic responsibilities have finally put so many demands on her time that she very reluctantly had to give up an assignment which she had carried on with the greatest enthusiasm and devotion for over eleven years. When *QST*'s YL column was inaugurated, Eleanor was chosen to be its first conductor. It would be difficult to measure the number of hours and the amount of energy she has devoted to the job. She wrote a total of 138 monthly columns, she corresponded with hundreds of YLs all over the world, and she visited dozens of hamfests and conventions. It was a real privilege and pleasure to have her as a member of *QST*'s staff.

Now, perhaps, she'll have a little more time to ragchew on 75. — *J.H.*

Eleanor Wilson, W1QON

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

Now and then we like to join the thinking DX man, the guy who occasionally stops to ponder on the wonder of it all, for ruminations on some whys and wherefores and how it all began. This gives us a little perspective, for one thing; for another, the research is downright fascinating. *Signaling*, a booklet in the wonderful Boy Scouts of America Merit Badge series, has an introduction made to order for this purpose. *Boys' Life* editor W2GND, a competent DX man himself, gives us permission to excerpt from

A Brief History of Signaling

Maybe it all began when some Old Stone savage sat down on a rock, tired of yelling and thoroughly exasperated because he could see his companion on the trail below him moving in the wrong direction, and there was no way of calling his attention without going all the way down again. Suddenly he banged on the tree beside him with the head of his stone axe, and the tree was hollow and gave forth a dull booming sound which rolled down the valley. He was pleased and kept it up. His friend heard and looked towards him. He beckoned and the friend changed direction. The Old Stone savage had signaled! He had made his mind conquer space, and his idea had been received. Crude, perhaps, but in simple form and with simple instruments, do the fundamentals differ very greatly from radio which circles the world in a fraction of a second? Does it differ very much from the hand signals of those of you who drive automobiles, or the swinging lantern of the railroadman, or the mysterious wiggles of a scorecard from within the cavern of a baseball dugout?

Let's stop for a minute and look back at a few of the steps that were necessary before the magic of radio could grow out of the booming of a tree trunk drum.

The first efforts occurred before the dawn of history and we can only guess what they were. Probably they were without instruments of any kind, merely the movement of a hand or an arm, beckoning someone to approach or go to the right. These were, of course, limited in the distance over which they could be observed. Then man discovered the secret of fire, and making it do his will, and with this the whole realm of light signaling was opened. A fire suddenly bursting forth on a hillside became a prearranged signal of danger. Man soon found that sound could be utilized, and from a hollow tree trunk the whole technique of drum signaling evolved, just as we know it today in the African Congo or wherever primitive men still beat out a call to assembly or to eat or to war.

All these methods were limited to the range of the human eye or ear, and man had need to cover greater distances. We know that by the time Greek civilization was flourishing, man had developed a crude method of crossing that barrier. Both the Greeks and the Persians had arranged systems of signal fires over long distances by which simple messages could be sent. In 429 B.C., when the Spartan confederacy made a night attack on Salamis, we know that the warning was flashed to Athens by a long chain of beacons, each signal crew lighting its flame as soon as a flicker was seen on the other horizon. The Greek armies also discovered that the brightly polished surface of their shields blazed with a glare that could be seen for tens of miles, when the rays of the sun were caught at the proper angle, and thus the heliograph sprang into being. There were countless other forms — the huge mirror heliograph on the island of Capri by which the Emperor Tiberius governed Rome in the last years of his life; the unique voice telegraph of Julius Caesar where an endless relay of sentinels shouted messages for hundreds of miles.

Think of our own United States, with the elaborate smoke signal code of the Indians, the smoke caught in a blanket and sent into the air in definite puffs; their tomtoms; and the unique method with which news of the opening of the Erie Canal was sent from Buffalo to New York in eighty minutes, by a booming line of cannon spaced within hearing distance of each other.

It was not until the 18th century, shortly after the outbreak of the French Revolution, that any signal code as we know it today, was devised. Until this time, with the exception of shouting the message, everything had been done by means of a prearranged code. "One light means to attack. Two lights will mean to turn back and wait." There had been many attempts to work out a suitable code, starting as far back as the early days of Greece. Many great minds had toyed with the idea, but nothing of a practical nature was accomplished until the widespread use of the telescope again focused attention on the possibilities of visual signaling.

It remained for three French schoolboys to hit upon the next big step in signaling, the semaphore system. We'll continue the story as Part Two in a future "How's."

Banned Countries

U.S. amateurs may not work amateurs in the following countries:

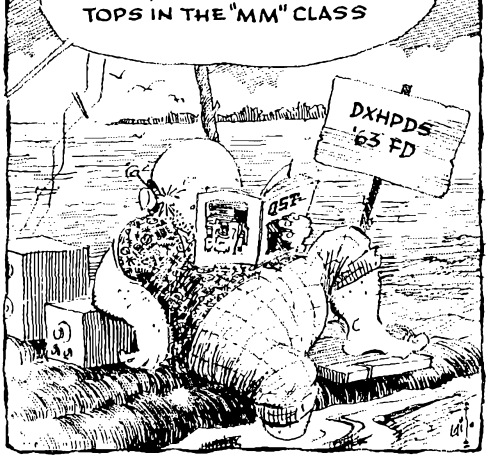
Cambodia, Viet Nam, Indonesia, and *Thailand.*

Canadian amateurs may not work the following:

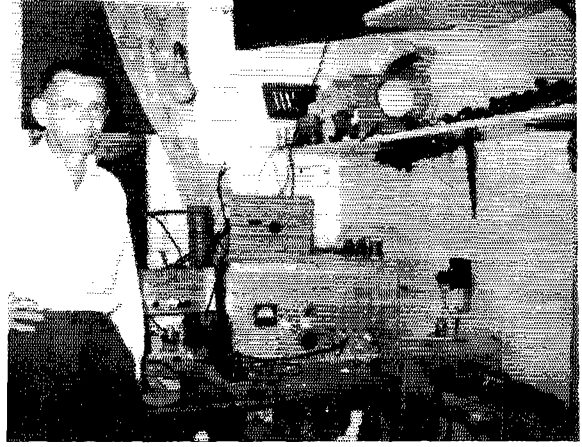
Cambodia, Viet Nam, Indonesia, Thailand, Laos, Roumania, and *Jordan.*

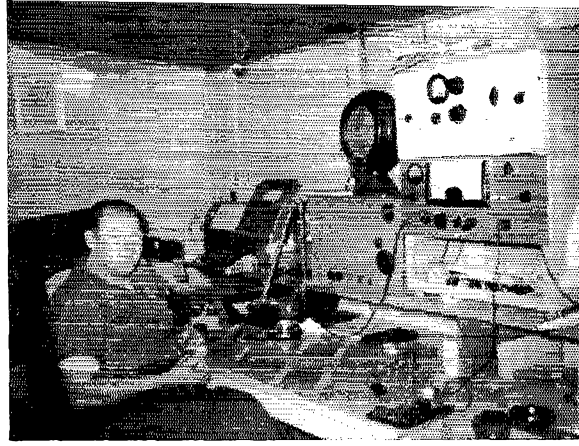
What:

Good spells do come along but we have, generally speaking, a real case of DX doldrums on our hands. A few random confirming opinions: "Boy, the bands sure have been poor the past month. Don't know if it's my antenna or strictly conditions." — *K9CZU* . . . "Spring demonstrated an upward trend in 14-Mc. conditions but nothing like the previous two years. I guess the sunspot scare is not to be taken lightly! Forty seems to be going downhill for summer already but it could be our best DX band by fall."



*7862-B West Lawrence Ave., Chicago 31, Ill.





ZL1NC (left) and VK4CC are a well known pair of Down Under DX men. Tom, in Auckland, likes the c.w. and homebrew approach with a 3-element beam and 40-meter dipole. Clive also prefers c.w., mostly on 14 Mc., with a quad radiator in Brisbane. (Photos by W7QYA)

K6TZX. . . . "Fifteen has been in a real slump here in Alabama. VKs and ZLs are okay, but not much DX from Europe, even on week ends." — *W4AAYX*. . . . "Not much DX for me in April. It was there, all right, but I just couldn't raise it." — *WA4CZM*. . . . "Recent disturbed conditions have kept 21 Mc. bottled up, but 9U5JH seems to break through all right." — *W8KML*. . . . "Gosh, but conditions were bad this past month. But I keep in there with glazed eyes and pounding heart, wildly flipping the dial for rare ones." — *K5FSU*. . . . "Twenty has been opening up to JA, VK and ZL in the evenings, but Europe has been very poor." — *W7DJU*. . . . "Conditions in Memphis are very crummy compared to last year at this time." — *K4OGV*.

Gee, maybe the Project Oscar gang can arrange to orbit some 28-, 21- and 14-Mc. dipole reflectors to keep that m.u.f. from slipping out of sight. While the sunspot count continues its inexorable decline we do find a few "How's" correspondents with fresh DX in their logs. Let's have a look. . . .

15 phone results are anything but discouraging to W2DY, K5FSU, K9CZV, WA4AYX, KH6EJM and VE7BBB who report 21-Mc. voice success with **CEs** 1GX 2AW 4CE, **COs** 5CN 8RA, **CRs** 6DQ 6EG 6JA 7IZ, **CT1QF**, EA5CS, **EL2S**, **Fs** 2SI 3OH 9IB, **GM2MG**, **GWs** 3KZF 5XN, **HC1EG**, **HIs** 3NRP 8NSL, **HKs** 1XX 2WC 3AKB 3AO, **HP1LB**, **HRs** 3DW 8SM, **Is** CXD JV NAL OZG, JA7UJ, **Ks** 1WXP/VO1 4CQK/KP4 5DYR/VO2 ØDID/VP9, **KG4BW**, **KH6DFT**, **KP4s** AXU BDA BKT USA, **KZ5s** CL MC. LU9MAO, **LZ1UF**, **OAs** 3M 4DG 4FR 4OG 8B, **PYs** 2BFL 2CFL 3AJZ 3AQY 5LQ 7WD, **TGs** 5WF 6PR 9MP, **TIs** 2AMC 2JCL 2OVA 2RAG 3CL 5KW 8IIMD, **VKs** 2ADE 3FX 5BQ 5ZI, VO1FC, **VPs 1TA** 1WS 2GAQ 2LS 4TR 6JC 6WR, **VQ4GT**, **VS9ARC**, WA5CYZ/**VP9**, XE2PLI, **YNs** 1GS 1WG 9BJM, **YSIs** EM JO, **YU3FC**, **YVs** 1AC 2AS 2BA 2DW 4BG 5AMF 5BPE 5BRO 6AV/2, **ZB1VJ**, ZE2JA, **ZK1AR**, **ZLs** 1BE 1CA 1RJ 2AAG (s.s.b.), 2AQA 2BE 3JO, **ZP5BC**, **ZSs** 1AB 1AI 1BV 4KT 4MZ. **5As** 1TK 1TW 2TS 4TW 5TW, **9G1DF** and **9U5JH**. . . . . **Ten phone's** only mention this month comes from WA2RJZ reference **HC1DC**.

15 c.w. gleanings are tabulated by **Ws** 2DY 8YGR, **Ks** 1VWL 4OGV, **WAs** 4AYX 9AUM, **WN2DDA** and **KH6EJM** as follows: **CEs** 1AD 3AG 16-17 hours GMT, CP3CN, **FO8AA**, **G4s** CM CP 16-17, **GI3s** KYP 18, OTY 17, HC1DC 17, **HK7s** UL ZT, **HP1IE** 16, **JAs** 1DFQ 1ERB 1HGY 1JQG 3APL 5ADR 6AKW 7BDW 8AAC 8ZO 8SU, **KCs** 4USA 4USB 4USX 6BK, **KG4AM**, **KL7DYK**, **KP4s** BJU CC, **KV4CF** 17, **KZ5GI**, **LU6PK**, **PA0LV** 17, PY5ASN, PZ1AQ, **ST2AR** 17-18, **UA0KFG**, **VKs** 2GW 2RA 3AXK 5NO 7SM, **VP7CX** (21,070 kc.) 20, VQ1IZ, VR2AP, **VS4RS**, W6ZDF/**KM6**, **WH6FAU**, **XEs** 1VT 2OK, **YV5s** AGD ANT 18-19, **ZK1AR**, **ZL1AH**, ZP9AY, **5As** 1TW 16 and 4TN . . . . . WA2RJZ keeps **10 c.w.** on the DX map thanks to **HC1DC** and **YV5AGD**.

20 phone should be better than our correspondents indicate, but **Ws** 2DY 8KML, **Ks** 6TZX 9CZV, **WA2s** PJL RJZ, C. Ehrhardt (call omitted from report) **KH6EJM** and VE7BBB give us the word on **CN8s** FD* MZ*, **DL5QS**, **EL2E**, **ET3s** TK* USA (280), **FY7YI**, **HC1WA** (300) 19, **HL9KH** (310) 7, **JA1DM**, **KB6CQ**, **KGs** 4BII* 6AKS (344) 7, **KM6BI** (320) 7, **OAs** 1W 4JK*, TG5FA, **VP7NX**, **VRs** 2EK 3R, **VS9MB*** (123) 20, **W4s** EIL/**KM6** KXY/mm, XE5FL, YN1LB* and **YV1LA***, the asterisks representing non-s.s.b. entrants.

20 c.w. has the support of **Ws** 1ECH 2DY 6WLY 7DJU 8KML 8YGR, **Ks** 1VWL 6TZX (110/99 countries claimed worked/confirmed), 8IUZ 9CZV, **WAs** 2PJL 2RJZ (40/26), 2ZVJ 4CZM 5EEM 6VAT, 11ER, **KH6EJM** and VE7BBB who knocked off **AP2AR**, **BV1s** USB USG (9) 7, **CE3AG**, **CPs** 3CD 3CN 5EZ (36) 6, **DM2s** AGJ AZM, **EAØAB**, **EL2S**, **ET3USA** (30), **FG7XJ**, **FK8AS**, **FO8s** AA AK, **FR7s** ZC ZI (34) 19, **FY7YJ**, **GC8KS**, **GD5GH/a**, **HAs** 3KG 6NI (10), ØIHH ØHN (80), **HLs** 5X 9KH 9KK 9KO (26) 5, 9KP (9) 6, 9TF, **HM3BYJ**, **HP1IE**, some HKs, JA1EEB/**KG6** of Marcus isle, **JAs** 1BDI 1BZS 1FL 1VX 2ADH 2CR 2HO 2SO 3OV 4NV 5ACF 6ACG 7OD ØEM, **JT1s** AG KAA, **Ks** 2QGC/**KG6** 3KLC/VO1, KA2KS, **KC6BK**, **KGs** 4AM 4BQ 6AIG (48) 5, **KL7s** AIZ ALZ, **KP4s** galore, **KR6s** BQ ED MO, **KV4AA**, **KX6NB**, **KZ5s** CU BN EM MQ, **LZs** 1KSV (60), 2AW 2KSS 9HR, **OA4s** FN PZ, **OEs** 5KE 8KI, **OX3AY**, OY1R, **SPs** 1HU 2BF 6AAT 7KAA 8AAH 8YA (25), **TF2WHY**, **UA9s** AA FV FW KDP (21) 4, KQA OI SH US VB WJ (11) 5, WS, **UAØs** AG BI EV EW (40) 5, FI FK FM IF KBA KCA (30) 4, KCO (49) 7, KFG (40) 6, KFR (18) 6, KJA KQB KZA (37) 6, KZB LP LT TD TQ, **UB5s** CD KDA KGA MZ UX (28) 5, WO, **UC2s** AF AX BB KAR, **UD6BE**, **UI8AM**, **UL7s** KBK NI, **UQ2KAR**, **UR2BU**, **UT5s** CC (53) 5, EH (18), PK, **UWs** 3NE 9AM ØFB (2) 10, ØIN ØIT, **VE8s** CN TU, VK6RU, VO2NA, **VPs** 5DB 5GT 6LJ 7NQ 7NX 8HK 9CX 9DL 9FK, **VRs** 2DK (52) 6, 2EH 3E (24) 3, 3L 6TC, VU2LNV, **Ws** 4WQQ/**VP9** 6ZDF/**KM6** 7FNK/**KW6** (61) 6, XEs 1FN 2JS (40), 5FL (60) 2, YN1LB, **YOs** 2IS 5FT 5KAU 9IA, YU2NJF, **YVs** 1AA 1DP 2CJ 5ACP 5AXA 5AXP 5BAA 5BMY 5BO, **YS1O**, **ZDs** 6OL 8DW, **ZK1BV** (30) 7, **4X4s** HO LG ON, **4U1ITU**, **5As** 1TW 3CJ, **5R8CM** (35) 23, **6O1ND** (5) 22, **9M2s** GJ (44) 16 and UF (30) 16. A decline in quantity, perhaps, but the quality holds up nicely.

40 c.w. has supplanted 15 in the hearts of many a DX contest hound. We wonder if 7 Mc. has a chance to give 14 Mc. a real run for over-all DX preference in this sunspot minimum. Forty was DX king in the early '30s, as old-timers will recall, but that was before the rotary beam and the 7-Mc. s.w.b.c. bombardment. Anyway, **Ws** 2DY 6WLY 7DJU 9NN, **Ks** 1VWL 5JVF 6TZX, **WAs** 2RJZ 2ZVJ 6VAT 9AUM, **WN2DDA** and **KH6EJM** recommend such 40-meter material as **CM2BB** (25) 8, **CO7AI**, **DL4BV**, **FB8ZZ**, **FR7ZI**, **HAs** 3KG 23-0, 5KFR, **HH4RD**, **HKs** 3AFB (8) 5, 3RQ (8) 7, 7AJF (2) 5, **HL9s** KH TF, **HP1JG**, **HR2FG** (1) 4, **JAs** 1EEB/**KG6** 1CG 1CMN 1CO 1DDG 1EBP 1EQM 1EZP 1FBW 1GXY 1HLR 1HPH 1ILC 1IMG 1ISB 1JCE 1JCQ 1JCY 1JEE 1KRU 1KUK 1LGC 1LGH 1LRO 1LWI 1LYK 1LZA 1XS 1YDO 1YL 2AGP 2AWB 2BTF 2CEZ 2DCN 2YL 3BKP 3BQH 3DAZ 3DDG 3DPA 3EP 3FCV 3FFD 3FIP 3FMP 5ADR 5AKC/mm 5PL 5XL 6AK 6AKW 6BEE 6BZJ 7ARZ 7BDW 7UJ 8AFM 8ACX 8FC/Ø 9ZT 0CP, **KG4AM**, **KM6CI**, **KP4BJU**, **KV4s** CF CI/CR7/5II3, **KZ5MQ**, **LZs** 2KRZ 9HR, **OH2UQ**, **SP3WU**, **ST2AR** 1, **UAs** 2AT 9DA ØEW ØKCA ØKCO ØKDA ØKJA ØKZB ØKZO, **UL7LA**, a dozen VK-ZLs, **VPs** 2AC (8) 5, 7BC 8HK 9CX 9DL, **VS1LP**, W4WQQ, **VP9**, XE1SS, **YOs** 3JU 3KSD 5LC 9IA and a batch of YUs and YVs.

80 c.w. now features enough atmospheric QRN to bust a speaker cone but K5JVF, **WN2s** DDA and GHI still have fun with folk like HB3PC, **KG4AM**, **KL7AUG** (11) 6, **KV4AA**, **KZ5FC** and **WP4BJI** (3705) 3 . . . . . **KH6EJM** keeps **75 phone** topical through chats with W6ZDF/**KM6** on s.s.b.

160 estivates noisily with snores of scratchy QRN but 1.8-Mc. enthusiasts, flushed with success in the season past, are hard at work planning for fall. W1BB, a 160-meter DX ringleader for many years, gives us a few top-band antenna hints: "In my opinion, based on many years of experience and tests with all types of radiators, a good antenna for 160 should have both horizontal and vertical polarization in its radiated wave — neither solely

horizontal nor vertical. Thus the inverted V or radiating T will give good all-around performance, although pure horizontals and verticals will certainly be FB at times." Stew will spark a Windom revival with that kind of talk . . . . . W1BB names December 1st and 15th, January 5th and 19th, February 2nd and 16th as tentative dates for next season's 160-Meter Transatlantic and DX Tests . . . . . W6MIL (ex-W6KIP) pulled an April coup by working ZS2FM. W1BB lists these Africa actives for your 1.8-Mc. stalk list: ZE3JO, ZSs 1DJ 2CB 2CD 2DD 2E 2FF 2FM 2KA 2LC 2ML 2OL 2OQ 2OR 2OW 2PT 4F 4BJ 4PB 5RU 6ASV 6EU and 6KO . . . . . 'Twas a year ago that VP8GQ began working W/K/VEs on 160 c.w., so we're curious about what this July will bring forth. Keep Jeeves posted!

Where:

Asia — "Many W/Ks report that they have worked a 4W1AA," writes SU1IM. "Others say they have heard that station working me, giving me lists of QSOs with the understanding that I am his QSL manager. I was abroad for four months, so on my return I found much mail to this effect. My station, of course, was not active. After much investigation I can say there is no legitimate 4W1AA." This clincher via ARRL Assistant Secretary W1ECH . . . . . Gee, a DX editor's life is fraught with perils, real and imaginary. For example, K2LSX operates HL9KO and has W2LSX as QSL manager. "Bud already has logs and QSLs. Send stamped self-addressed envelopes for direct reply." . . . . . "As QSL aide for 4X4DH things look black," reports W5VSQ. "I received one batch of cards from him several months ago and dispatched them at my expense. Nothing since then, no logs or info of any kind from Bruno, and no answers to my letters. Please ask the fellows to bear with me; all s.a.s.e. are on file and all blank fill-in cards are awaiting data." . . . . . JA1EEB/KG6 of Marcus Isle tells K6TZX that QSLs will begin going next month . . . . . "I still have spare QSLs for my QSOs as AP5B, AP5B/YA, SU1HS and VU2HS," advises G3HS-VK2XL. "I'll be glad to send necessary duplicates from my G3HS address." David will be away in the U.S. this month and next, however . . . . . NNRC's Roy Waite of the SWL/QSL Bureau, 39 Hannum St., Ballston Spa, N. Y., learns that YK1s AB DK, YK2s AL BC and KET are declared unsavory by the Syria bureau . . . . . VU2AJ is quoted by the *DXer* of NCDXC: "So far I have worked nearly 3000 W/Ks and have QSLd 100 per cent. I want to make it 10,000 but lately the same old gang keep coming back to me — hi!" . . . . . WGDXC says don't forget those s.a.s.e., or s.a.e. with IRCs, when petitioning W2JXH for Rundy's TC3ZA pasteboards.

Africa — "As of April 22, 1963, I am QSL manager for VQ4ERR," states KØLFY. "S.a.s.e.s are a must, as well as Greenwich Mean Time reference." . . . . . Another DX editorial peril: "I will be QSL manager for EL8C," writes VE3DGX. "All those who send me s.a.e. with International Reply Coupons (or loose U.S. postage) can bank on direct QSLs." What's so perilous about this? Well, W4GJY wrote us last month that *he* is EL8C's QSL aide. Perhaps they'll divide the task some way. We'll keep you posted . . . . . VE3AU comments, "ZD3A sent me his card airmail with 'please QSL' on it. For my address he used merely 'VE3AU, Ottawa, Canada.' Apart from justifying my faith in the efficiency of our postal department in this city of 300,000, Bob's card was a delightful breath of spring after my spewing forth IRCs in vain on many less-rare DX stations. I had already sent him a card without a Coupon, but on receipt of his QSL I promptly wrote again to show my appreciation. This time I enclosed a CRC for him to use on his next VE QSL. What's a CRC? Why, a Commonwealth Reply Coupon, of course. Costs only six cents as against an IRC's fifteen cents. See what you W/Ks threw away in 1776?" . . . . . WGDXC's *DX Bulletin* has it that log transcripts for W4BPD's Assumption Island VQ9A/AN contacts of a year or so ago were lost in transit. Gus will send duplicate data to W4ECI as soon as possible . . . . . The new Algeria prefix is 7X2, a boon to local printers. W4UWC confirms that he handles QSL chores for 7X2VX.

Oceania — VR4CU tells K7SVO that he and neighbor VR4CB can be reached via the New Zealand bureau. They comprise the entire Guadalcanal ham population at this time. Incidentally, W3AYS says he does *not* do QSL business for a VR4AI . . . . . Florida DX Club indicates that WA6-HOH no longer has QSL connections with KJ6BV . . . . . WGDXC learns that K5ADQ won't receive logs for VKØVK QSOs until Steve returns to civilization in 1964 — patience, please. The Gulfers also mention KH6FBJ's willingness to tie up any loose QSL strings for his HS5OSQ and XW8AS operations, and that 5W1 supersedes the ZM6 label for Samoa.

Europe — "All QSOs will be confirmed via bureaus," assures G3PIT of the GD6UW team concerning Cambridge U. Wireless Society's springtime I. o. M. outing. "If an International Reply Coupon is enclosed with QSL to G6-UW's address a direct card will be sent." . . . . . SVØWL communicates, "I don't want the guys to be mad at me, so maybe you will tell them why some of them won't be getting QSLs from me. It seems that a character in Athens is bootlegging my call. You should see the stack of QSLs I've received for his operations. He's apparently called 'Jimmy' whereas I'm Charlie, and he likes 20-meter a.m. and c.w. whereas I've stuck to s.s.b. for almost five years. I keep a careful log and will gladly QSL my own contacts but I can't confirm his. By the way, QSL bureaus work too slowly for me so I do not use them. I do not often send out cards but I do answer those received, always direct to the address given on each card. On-the-air pleas for QSLs leave me cold, for only one in a hundred replies with his card. Anyone who wants my confirmation can send me his first. As for my address, the APO listing in the *Call Book* is okay for U.S. hams but others will get faster service via P.O. Box 134, Salonika, Greece. I don't need IRCs but I don't throw them away when received." . . . . . W4HUE laments, "Have not received logs from SV1AB in more than a year, and no answers to my letters for six months, so I hereby resign as his QSL manager." . . . . . DXCPR's *D'Xer* specifies G3LPF's home QTH as the new address for International Short Wave League's QSL bureau . . . . . KP4RK bagged F2CB/Corsica's QSL after a four-year wait. *Never* give up!

South America — "OA3M and HR3DW have accepted my offer to act as QSL manager," informs WA4AYX. "They've sent me several hundred QSLs for the gang." Pete points out that mailing expenses in Peru have recently doubled, further enhancing the value of overseas QSL managers . . . . . "What's gone wrong with W/Ks?" asks HK3LX in an ARRL DX Test log excerpted for us by W1YYM of ARRL Hq. Seems he's been QSLing 100 per cent lately with scant response . . . . . K5JVF opines, "HK3RQ really *is* something. Only 82 hours after our QSO the postman dropped a nice sharp QSL into my mailbox, a new record here for intercontinental DX. I notice HK3RQ has made your 'QSLers of the Month' listings several times — now I know why!" . . . . . PJ2AF notifies W1YYM, "After August 1, 1963, my address will be 1232 W. Queen St., Hampton, Va."

Hereabouts — Fine selection of "QSLers of the Month" this trip: CO8RA, DJ6PI, DLs 1TA 3LL, ET3USA, Fs 7AA 8P1, FB8ZZ, FO8AA, FW8DW, Gs 2FFO 3DO 3FTQ 3PRP, GCs 8KS, GD6UW, HH2CE, HIs 3NRP 8NSL, HK3RQ, HL9KH, I5GO, IT1AGA, JA1CYV, KB6CA, KC6s BK BO, KGs 1BR 6AKS 6SZ, KP4s AQQ RK, KX6DB, LA9CE, LU1DAB, OH2BAC, PAØFAB, PJ2AE, PY2BGO, TG9MP, TI5KW, VKs 4KO 9LA, VP6LJ, VQ8AI, VR3s L O, VS4RS, XE1WF, YS1s EMI JO, YV5s ACP AXA, ZDs 3A 6JJ, ZK1AY, ZLs 2MZ 3QK, ZS1XR, 5As 1TW 5TW, 5T5AD and 9M2UF. QSL managers Ws 2CTN 2MES 3AYD 4OPM 8EWS 9VZP, K8TBR, WA6-MAZ and 5R8BC likewise are applauded for prompt attention to confirmational correspondence. The preceding nominations come from "How's" communicants Ws 1OHA 5VSQ ØGER, Ks 4WJI 5JVF 6TZX 8IUZ 8RXD 9CZV, WAs 2RJZ 4AYX 6VAT 8AJZ, KA7DR and VE3AU. Any fast

VU2AK seems equally at home on c.w. or phone in Delhi. Les had just finished building a sideband sender when W7QYA happened along with her camera.

VU2AK is another quad antenna fan.

QSLers in *your* archives lately? Advise Jeeves and we'll commend them in these listings . . . . . QSL managerial assistance to needful DX operators is hereby offered by W3HNK, K9CZV, WAs 2RJZ and 9AUM . . . . . Help! W6WLY wants a hint toward garnering YS4RA's verification of a 1959 QSO, K9CZV ditto re 4X4KK, and VE7BBB seeks the word on KA2VO and DL5PF worked in '61 . . . . . We regularly receive comment on the appearance of obviously bogus calls on DX bands. If we attempted to list 'em all, or even just the ones that show misdirected originality, they'd make quite a space-consuming paragraph in these monthly pages. We'd rather omit such wasted publicity in favor of more attention to legitimate DX operations so please bear with us if we skip mention of the XM2 or ZB8 or AC7 misfits heard cluttering up good frequencies. We do appreciate the observations, however, for they can conceivably be of value in running down the miscreants . . . . . VP2MV writes, "To bring the boys up to date on Montserrat, the only legitimate calls here are VP2s MC ML and my own. VP2MC is now in England on a long leave. I recently worked a station signing *my* call who QRTd immediately upon realizing he was working the 'real McCoy' — hi! Please note that VP2MY no longer is QSL manager for Montserrat. He's residing in Antigua with no interest in amateur radio at present." . . . . . Former VP5s are using the 6YA prefix now, suffixes remaining the same (6YAAH for VP5AH, for example) . . . . . YL VE7BBB worriedly muses, "It's amazing how many 1961 QSOs have not yet QSLd. The lads in Alaska and Hawaii seem to be hardest to pry cards from. I have only thirteen QSLs from 100 KH6s worked, eleven from 35 KL7s." That's no way to treat a lady. Eva has an over-all 1163/859 QSLs sent/received tally, not too bad considering the normal inevitable time lag involved . . . . . Time to inspect our monthly crop of individual recommendations, a catalog reflecting the usual seasonal slump:

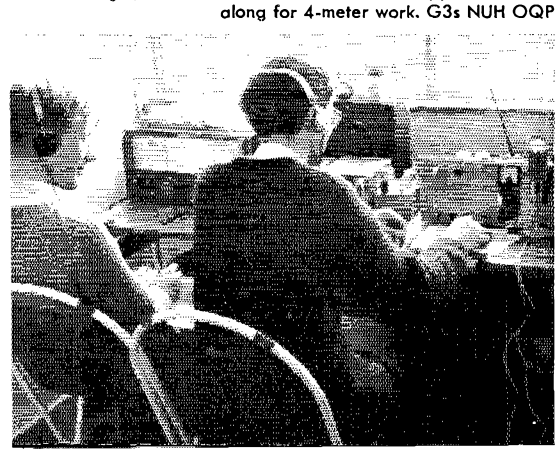
ex-AP5B-AP5B/YA-SU1HS-VU2HS (to G3HG)
CE8AO (via CE8AG)
CM2BB (via FARAC)
EA7URE, P.O. Box 479, Sevilla, Spain
EL8G (via VE3DGX — see text preceding)
ex-FF8AD-5A3BC (to G3NMQ)
GC3PAI/a (to G3PAI)
HH2CE (via K8TBR)
HI8AKU, Box 1213, Santo Donimgo, D.R.
HL9KO (via W2LSX)
HR3DW (via WA4AYX)
JA2CEZ (via JARL)
K1KSH/KG6/VK9 (via W1ETF)
K4PUJ/KP4, R. Mayer, Condominio el Escorial 9-C, Hato Rey, P.R.
K9HHF/VP9, F. Supan, USN Underwater Sound Lab., Box 138, FPO, New York, N.Y.
KB6EPN, U.S. Post Office, Canton Island
KG6SA, USCG Loran Stn., Saipan, Marianas
KH6EYT/KX6 (to KH6EYT)
KV4CI/CR7/5H3 (via W2CTN)
OA3M (via WA4AYX)
OD5AX (via RSGB)
OH1AD/OH0 (to OH1AD or via SRAL)
PJ2AF (see text preceding)
PX1OAC (to F7OAC)
PY1MCC (W/K/VE/VOs via WA6UZA)
SM7IARU (via SSA % SM5KV)
SV1AB (see text preceding)
TC3ZA (via W2JXH)
UP2ADK, K. Tautvipas, Mikopas, Vito 9-15, Vilnius 24, Lithuanian S.S.R., U.S.S.R.
VE8ZA, Resolution Island, via Frobisher Bay, N.W.T., Canada
VK2XL (to G3HG)
VK6ZS/4/9 (via KV4AA)
VP2MV (via W2CTN)
VP7BC (to W4CNS)
VP8HK, H. O'Gorman (via RSGB)
VQ4ERR (W/Ks via KØLFY)
VR3R, M. Rouch, BFPO 170, % Postmaster, Honolulu, Hawaii
VR4CU (via ZL2LB)
VS9ADV, D. Payne, P.O. Box 4297, Aden, Aden
W3ZQ/KS4 (to W3ZQ)
W8VQM/VE8 (via W8NGW)
W9GLT/KL7, C. Thompson, CMR-1, P.O. Box 2538, APO 942, Seattle, Washington
ex-XE1CCB, E. Blizzard, Island Poultry Co., % Primco, Box 595, Caguas, P.R.
XE5FL (to XE2FL)
ZB1CR, C. Burchell, Officers Mess, RAF, Luqa, Malta
4U1SU, Box 11, Geneva, Switzerland
4X4IX (via WA2KNC)
6O2HH (via DL3BK)
6YAAH (same as VP5AH)
6YABL (same as VP5BL)
7X2VX (via W4UWC)
9M2JJ, J. Jellema (W8SWN), Secondary Trade School, Ipoh, Perak, Malaya
9N1DD, Lt. Col. W. Gresham, %, U.S. Embassy, Kathmandu, Nepal; or Box KAT, APO 959, San Francisco, Calif.
9N1ME, Mt. Everest Expedition Hq., 514 Latimer Rd., Santa Monica, Calif.
9Q5TJ (via DJ4OP)

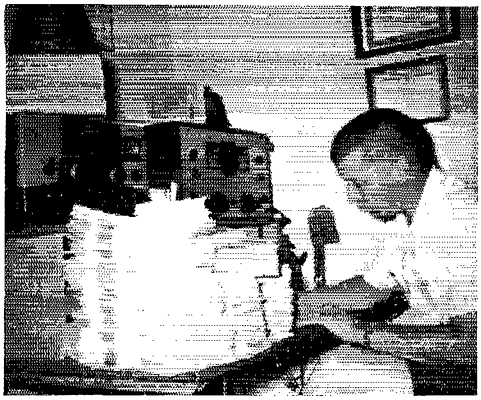
Contributors of the preceding rundown are **Ws** 1ECH 1FPS 1WPO 1YYM 2IDY 2GT 6WLY 8KML 8YGR 9EET 9GAS 9NN 9QFC, **Ks** 5JVF 6TZX 7SVO 8IUZ 9UNY, **WAs** 2RJZ 4EDY 6VAT, **WN2GHI**, **VEs** 3AU 7BBB, **SM7CKJ**, **SP5AFL**, American SWL Club *SWL* (6204 E. 109th Ter., Kansas City, Mo.), DARC *DX-MB* (DLs 3RK 9PF), DX Club of Puerto Rico *DXer* (KP4RK), Far East Auxiliary Radio League *News* (KA2EB), Florida DX Club *DX Report* (K4HF), International Short Wave League *Monitor* (12 Gladwell Rd., London N.8, England), Newark News Radio Club *Bulletin* (L.Waite, 39 Hannum St., Ballston Spa, N.Y.), Northern California DX Club *DXer* (WA6TGY) and West Gulf DX Club *DX Bulletin* (W5ICJ). Kindly pass along any fresh postal hints in *your* recent loggings for the benefit of the brethren, if you will.

Whence:

Asia — 9M2JJ (W8SWN) briefs us on the ham picture out Ipoh way. "At present many 9M2s operate below 7100 kc. evenings and Sunday mornings for local 40-meter rag chews. At other times we go our separate ways for DX on 15 and 20 meters, mostly c.w., usually operating between 1330 and 1630 GMT. A few of us who get up at 2130 or shortly thereafter are active at this hour but most 9M2 operation occurs during the evening, a.m. or c.w. Generally, the radio gear used by 9M2s is converted or revived war-surplus material. Old HROs or AR-88s are typical receivers, and the TCS is a popular transmitter. Dipoles and quads are standard antennas, rotary beams being scarce, and some 9M2s are getting fine DX results with ground-planes. Of the few who have up-to-date equipment most brought it with them into the country or bought it from departing amateurs, for the import duty is prohibitive here. The 6DQ5 tube, for example, lately a favorite in *QST* constructional articles, just isn't available. Some of the 9M2s you're likely to find on the bands are CL CR DQ DW DX FK FR FX FZ GA GH GJ GV and JJ. Singapore actives include VS1s CW EJ GC JC and LX. Ham hospitality, renowned throughout the world, is especially noteworthy in Malaya. I've gained many friends here since meeting my first 9M2 neighbor in September, 1962." 9M2JJ is an instructor of radio servicing in Ipoh . . . . . W2NXS and WA2KNC offer advisement on amateur licensing and operating in Israel to 4X4-bound tourists (also see p. 67, Nov. '62 *QST*). To ensure ample Israeli ham hospitality write WA2KNC or call him in Brooklyn (EV5-6770) for the latest information . . . . . KZ5MS writes from Box 1396,

GD6UW, operated this spring under the auspices of Cambridge University Wireless Society, scored 900 contacts on 160 through 10 meters, half these QSOs going to W/K customers. At lower left s.w.l. P. Burden logs for operator G3RSE; at right, G3RSE handles the S-640 with support from G3MZM. The lads had an HX-50, KW-77 and some v.h.f. gear along for 4-meter work. G3s NUH OQP OYW PIT PKB and PWT also participated.





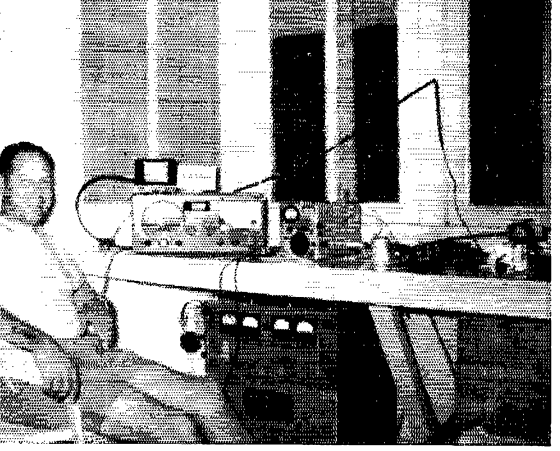
Ex-VP9EP, now active as W4GMM/3, demonstrates the fate that inevitably befalls prolific DX operators or their QSL managers. There are 17,000 QSLs in that pile, the result of a Bermuda "DXpedition" that lasted four years. (Photo via W3INH)

TUSLOG Det. 63, APO 324, New York, N.Y., in the Istanbul region: "I once wondered where amateurs go when they pass on. Now I think I know; they all congregate in Turkey! I think this country has more 'hams in exile' per square inch than there are active hams in California. I'm with the Air Force and there are at least two dozen hams in this immediate vicinity. Some of us have hearing aids, and I've been doing a lot of listening on 40 c.w. and 20 sideband. The quality and quantity of band openings lately has taken us by surprise. Old 20 is not as dead as it is cracked up to be. Most of our listening is done in the evening but we've noted fine daytime DX as well. This seems to be one of the best DX locations I've ever run across; with the proper equipment one could have a real ball. We are trying our best to get licensed, but no luck so far. It is understood that a few tickets are being issued now, however, so we have renewed hope. By the way, 40 is also hot here with and SP-600 and short piece of wire. We intend to try some serious v.h.f. DXing before the year is out." . . . . . Do you have trouble working Asia? Well, W7DJU seems to have trouble *not* working Asia. Dale's records disclose QSOs with 902 JA stations . . . . . HL9KO (K2LSX) was QRT for a spell awaiting S-line repairs. John prefers 14-Mc. c.w., and you may have worked him as HL9KT between June, 1961, and August of '62. He returned to Korea with the army this February . . . . . Now more Eastern items via the clubs press: Try BV1USF for Formosa, 14,275-14,300-kc. sideband at 1100-1300 GMT. . . . UA0RV's 14,290-kc. s.s.b. is sometimes catchable at 1300-1400 GMT. . . . JT1KAA is a breakfast tidbit of late, 14,040-14,060-kc. c.w., 1200-1330 GMT. . . . OM-XYL team ex-5N2AMS-5N2DMS depart London for rare DX points in Asia about now. They've joined forces with W2GHK's "DXpedition of the Month" enterprise and may get an early chance to dispense JY YK 4W1 AC and MP1 QSOs. . . . Nepal's 9N1DD is audible on 14,270-14,280-kc. single-sideband at times, 1500-1600 GMT. W0NFA schedules 9N1MM Mon., Wed. and Fri. at 1330 on 14,263 kc., the rare one using QRP a.m. The call 9N1ME was assigned to the communications unit of the successful springtime U.S. Mt. Everest Expedition with QSOs reported on 20 c.w. . . . YA1AW was temporarily deactivated by a 50-volt a.c. line surge. Near-by YA1AK does all right DXwise using battery-powered a.m. from his auto. . . . VS9ADV (G3NCP-ZL4DV) is saving up for his own KWM-1 and more DXpeditionary work in such regions as VS9K and VS90. A severe sandstorm plagued his Yemen venture earlier this year. Cohort VS9AA keeps busy on 14,115-14,125-kc. sideband, tuning 14,270 around 1900-2000 GMT.

Africa — "ZS1O is the only amateur geomagnetic-seismic ionospheric-meteorological research station in South Africa," says WA4EDY. That's a rather wide range of research! . . . . . Club sources offer Africa addenda: 7X2VX displays the new Algeria prefix on 14,340-14,350-kc. voice, 2100-2200 GMT. . . . W4BPD took a well-earned breather in Kenya with VQ4ERR after completing his Europa isle and Comoros DX campaigns of mid-May. Gus requests each of us to refrain from seeking more than two QSOs per band per mode at each one of his stops in order to give more folks fair shots at him. The second QSO is permitted if it will eliminate doubts about the first. FL8 4WI and MP4 areas may come next on Orangeburg's-answer-to-Marco Polo's itinerary. . . . 3V8CA may close down soon in favor of TL8-land, a move that will leave Tunisia tough to tune.

Oceania — WG6ALS reports, "KG6RD, Father Canise, is now QRV on Rota. Another priest, Fr. Sylvan, runs low power on Saipan as KG6SE and hopes to have a DX-100, SB-10 and TH-4 beam to supplement his 60-watt 65-A soon. The Saipan Coast Guard station also has ham activity in prospect." WG6ALS enjoyed Saipan DXpeditionary sport with Ks 7GCD 9IOZ and KG6ALD in late March . . . . . KH6EJM (ex-W0ABV) is livin' it up DXwise with a 32S-3, 2A/2AQ and TA-33 whirligig. "As far as I can tell, I'm receiving the full benefit of a mountain 'antenna tower' 535 feet high." . . . . . In January KH6EYT accompanied a detachment to Mili atoll for the removal of hazardous ordnance materiel. Hence, KH6EYT/KX6 action with an HT-37, 2B, 14-Mc. dipole, 21-Mc. cube quad and 2.5-kw. a.c. generator. "We operated from a little grass shack in true DXpeditionary fashion and scored many world-wide contacts." W1WPO notes that Mili is an anchor atoll in the Ratek chain about 400 miles southeast of Kwajalein and counts as Marshalls . . . . . KZ5LC writes that VR6AC is in the Canal Zone area for hospitalization and surgery. "Floyd's XYL is with him and we have arranged schedules with the Pitcairn people and their VE7 friends." KZ5LC likes to greet amateurs passing through the Canal and he invites advance notice from imminent visitors. "The more advance the notice, the better the reception," guarantees Len . . . . . "VR4CU will be on Guadalcanal another twelve months or so," learns K7SVO. "He works 20 exclusively with a ground-plane and 70 watts. VR4CB is a permanent resident there who operates 15 and 20." . . . . . From W7QYA, recently returned from global journeys: "KM6DC, licensed in March, uses a DX-60, SX-40 and is becoming interested in single-sideband. He's a Navy technician at Midway's radio-TV broadcast station." . . . . . W1ECH advises that K1KSH will be touring Pacific areas for six months or so with a Globe Scout and crystal for 7010-14,020 kc. Gary's wanderings commence next month, possibly beginning with Guam, the Marianas, some VK9 spots and thence to southeast Asia, perhaps . . . . . Club journals provide more Pacific patter: VK9LA, who should go strong till December with his HT-37, 2A and TH-4, reports a new Cocos local readying for a DX debut. . . . KH6FBJ (ex-HS5OSQ-XW8AS) gets over to Chichi Jima and Saipan (KG6SX) now and then. . . . KB6s CB and EPN audit 14,275-kc. s.s.b. signals consistently at 0300-0600 GMT. . . . FU8AC likes 14,001- and 14,100-kc. c.w. at 0800. If you speak French you might catch four other FU8s on 7-Mc. phone. . . . ZL2WS gets into the U.S. handily on 3805-kc. sideband with a 15-ft.-high dipole Down Under.

Europe — SV0WL defends the use of "CQ DX" by the W/K gang. "Some feel that calling CQ DX is stupid. True, it may not have much meaning from places where almost any return call would be DX anyway, but for U.S. hams I think it's a good idea. From my end at SV0WL I then know that the caller is listening for weak signals rather than any Joe Blow across town." Oh, Jeeves doesn't frown on *all* CQ-DXing. We heartily recommend it in some circumstances such as dormant periods on DX bands. We'll even cast a vote for automatic W/K CQ-DX machines on 28 Mc. these sunspotless days. But we do hold that the Statesider who habitually generates large QRM with CQ-DXs on a crowded band with plenty of DX already coming through is a lid with a capital "L." And this is no subjective opinion — it's the consensus of years of mailbag comment on the subject . . . . . Don't panic about signals from SM7IARU on c.w. and s.s.b., 80 through 15 meters, June 9th-16th. It's a special call assigned to a station at the Region I International Amateur Radio Union Conference in Malmo where Sweden's SSA was host . . . . . QSOs with 20 SM6s will qualify W/K/VE/VOs for the PRONTO certification issued by Otterhallans DX Klubb. Consult SM6CLU for details . . . . . Say, the 1963 WAEDC (Worked All Europe DX Contest) comes off on the 10th-11th (c.w.) and 17th-18th (phone) of next month. It's usually a lively affair, so mark your calendars accordingly and we'll supply a condensation of participation particulars in August's "How's". Meanwhile you might rush three International Reply Coupons to DARC (Germany) for an airmail batch of WAEDC log and summary sheets. . . . . K9UNY of the F7OAC brigade is awaiting his own F7 suffix, and W3AZR tells us that K0ELD soon will sign DL5MY with 500 watts and a Super Pro on 20 and 40 c.w. . . . . SP5AFL relays UP2ADK's request for U.S. correspondence in Lithuanian and/or Russian on the subject of amateur radio (see "Where") . . . . . VE2BAG, visiting G3CQV in March, was delighted to have a solid QSO with his XYL and kiddies who modulated VE2LY . . . . . The Dame of Sark has given G3PAI & Co. permission to operate GC3PAI/a on Sark isle from August 17th to September 1st. John specifies c.w. and a.m. intentions on 10 through 80 meters. Ten watts also will be available for 160-meter DX openings, if any . . . . . "I shall be visiting Canada and the U.S.A. in July and August," notifies G3HS-VK2XL, formerly AP5B-AP5B/YA-SU1HS-VU2HS. "I will be traveling alone and would very much like to meet some American hams during my holiday." David expects to hit Buffalo around July 29th, then New Jersey, New York City and ARRL Hq. . . . . Those GD6UW chaps from Cambridge U. scored almost a thousand QSOs this spring but failed to flag down any



VR2DK's c.w. and a.m. signals, already familiar to the DX gang, are now to be supplemented by s.s.b. output. Owen runs 150 watts to a 3-element rotary. (Photo by W7QYA)

of the many W/Ks they heard on 160. That U.K. 1.8-Mc. 10-watt power limit is a toughie . . . . . Club bulletins add Continental notes: G2RO is said to be slating a San Marino thrust for September. . . . Guernsey's GC5ZC has a sideband outfit on 14,270-14,280 kc., 1130-1230 GMT. . . . OY1R lurks on 14,010-14,020-kc. c.w. around 1130-1230 GMT. . . . Roumanian DXers are reportedly contemplating a ZA DXcursion. . . . EA7URE was exhibited by the Spanish society at the Seville Fair this spring. . . . LA1LG/p anticipates another DX-laden year on Jan Mayen . . . GC2AAO of Jersey schedules W4NJF, 14,110 to 14,300 kc., on Wednesdays at 1215 GMT. . . . The first European QSO for W6ERS was U1AP 'way back in 1936. Vern recently worked Alex again, a quarter century later, as UA4IF.

South America — PJ2AF, who piled up some 1000 contacts in this year's ARRL DX Contest, tells Hq. staffer W1YYM, "This was probably my last contest as PJ2AF. In the fall I return to Virginia and retirement." His mainland address appears in our "Where" commentary . . . . . W6AM liked visiting the DX gang in Quito where amateur radio enjoys a good press. Guayaquil's *El Telegrafico* gave a recent picture-prose spread concerning QSOs between HC2-LF and W2VZQ . . . . . WA4AYX is spending the summer polishing up his high school Spanish on 15 phone. "Many of the South Americans I work say I'm their first U.S. QSO, for they speak no English. Needless to say, QSL returns for such QSOs are excellent." . . . . . CEØs AB, 14,040 kc. at 0100-0200 GMT, and AC, 14,053 at 0200-0300, are delicious Easter morsels communicable.

Hereabouts — VE7BBB responds to our recent query about Mexico's Cozumel island, pointing out that XE5FL (XE2FL) was on 20 phone from there in April . . . . . Ex-VP1AA gave us interesting thoughts on Utila, an island off Honduras, in a past "How's." W1IKE forwards information that HR9EB, a Methodist missionary, now is active there. G3NJB quotes Eric, "My only worry is the effect of such a rare prefix when I open up! Another problem just solved — the Synod just bought us a power plant." . . . . . "I will be operating for eighteen months as VP7BC," states W4CNS. "Mostly 15 and 20." . . . . . W9GLT becomes W9GLT/KL7 for a few months while engaging in Alaskan survey work. Tommie hopes to squeeze in some flights as far afield as Tokyo . . . . . W8YGR wrapped up all 88 Ohio counties during spells of poor DX conditions . . . . . Ws 4WHN 6THN and 9AMF can fill you in on details concerning the International Ham Hop Club, an organization dedicated to fostering exchange of personal contacts and hospitality among hams visiting and visited . . . . . W3HNK, at least temporarily, has swapped traffic skeds for DX digging. "After being on the air for years I've finally been bitten by that DX bug!" When those Europeans and Africans break through on 80-meter traffic nets, many a traffic hound grabs for his DXCC Countries List . . . . . K5JVF wisely prepares well in advance for the autumnal 160-meter season. His new vertical is spraying nicely on 80 and 40, too . . . . . VP2MV enjoys the loan of VP2MC's Globe Scout while the latter vacations in England . . . . . Now local dispatches via the club journalists: 6YABL, formerly VP5BL, likes a daily dally on 14,270-kc. s.s.b., 1100-1200 GMT. . . . FM7WQ, 14,125-kc. sideband, schedules W4-OPM, 14,260, around 2000 GMT several days per week. . . . KP4s AET AYI BBI WD YT, K4PUJ/KP4 and W3-KID are new members of DXCPR but heavy outside business caused KP4AQQ's resignation as secretary. . . . K4IIF gamely follows fireball W4CKB as editor of Florida DX Club's *DX Report*, assisted by W4QVJ and K4GRD. W4LVV is club chairman, K4TML vice-chairman, and W4GQS activities manager. . . . *QST* Contributing Editors W1s FZJ and HOY spell their v.h.f. pursuit with spectacular 160-meter DX sorties. . . . NCDXC brass now includes W6FYM pres., K6OHJ veep, W6CBE secy.-treas., W6s SC and ERS directors, WA6TGY ed., and W6KG QSL mgr. The club's monthly *DXer* editorially protests DXpeditionary use of phone under marginal conditions for sparse QSOs when use of c.w. would really move things in high gear. The gripe makes sense. Even astronaut Cooper had c.w. working aboard *Faith 7* — just in case. . . . W6s AM SIA BYB and K6VVA head the NCDXC band-countries listings with 1018, 988, 899 and 808, respectively. . . . Good to see Western Washington DX Association's *D X Northwest* back in print under W7JPC's wing. . . . If you've been ignoring straight a.m. DX lately you may have missed convenient QSOs with HL9KH, UAs 9KTF ØKFG, UB5LV, UW2BV, VS4RS, VU2PP, ZD9AB, ZK1AR, 9M2s GH and UF, all declared workable by W9RBI.

Ten Years Ago in "How's DX?" — The distasteful subject of DXCC "cheating" comes up for discussion in the July '53 leadoff commentary. Crime sometimes pays — but only temporarily . . . . Reports from 14-Mc. c.w. correspondents deal with HE9LAA, Trieste's 11BLF, KT1UX, LBs 6XD 8YB, M1AB, MD5GO, MF2AG, MI3s AT JV US, OQ5GU, SUs 1GG 1SS 2SS, VK1s BA HM RL, VS2-DH, ZC5VS, ZS8MK and 9S4AR . . . . Twenty's phone favorites appear to be EA6AR, KF3AA, KJ6FAA, MI3KE, OQ5FV, VS2DF, YI2AM, ZD1SW and ZM6AA . . . . The best on 15 c.w. are FU8AA, VS9AP, ZD9AA and 9S4AX, while 21-Mc. voice specialists specify MP4BBD, ZS7C and others . . . . Forty-c.w. morsels include KC6QY, KW6BB, LUs 3ZO 4ZO 5ZO, VK1AF and W7PLI/KG6 . . . . The gang is discovering how tough it is to compete with the SWBC bedlam on 40 phone, but CN8FS, KA8AB and KM6-BG manage to work into North America notwithstanding . . . . Eighty c.w. produces CN8EG, FF8AG, HB1AG/HE and ZS3K, mainly because of the 3.5-Mc. missionary efforts of Ws 2QHH and 4BRB . . . . Not much on 10 phone these days (or is there?) but VP1GG and ZP5AX are new countries for many 28-Mc. holdouts . . . . . Miscellaneously, the Eritrean prefix changes from MI3 to ET2, and SV5UN of Rhodes becomes SVØWG. . . . AC4 AC5 and ACØ prefixes for MARS usage create exciting confusion off the low edges of our DX bands. . . . KF3AA of Fletcher's Ice Island, operated in the arctic by Ws 2PGG and 6HIK, does lots of DX and traffic business these days . . . . Jeeves really flips while trying to dig a Quist Quiz answer, and the "How's" picture parade is joined by shots of kingpin phone DXer PY2CK, YV5FL, ZL2AV, W2AOS/KG6 and DX queen W1MCW. QST

Strays

NOTICE

Change of address

Effective July 1, 1963, our address will be

The American Radio Relay League, Inc.

225 Main Street

Newington 11, Connecticut

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The radio store referred to in the Stray on page 26 of June *QST* (This is True) is getting back at us! It is directing people who come into the store looking for CB applications over to the American Radio Relay League headquarters.

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Mert Sayre, W5ZU/W5BUO, retired last month with 35 years' service with the New Mexico Military Institute. Mert unhappily points out that the NMMI Club station, W5ZM, may have to close up shop now that he is leaving, unless someone in the Roswell area would like to pick up the duties of trusteeship. The cadet operators of W5ZM have consistently earned traffic, emergency, and other public service awards over many years of operation.

The World Above 50 Mc.

CONDUCTED BY SAM HARRIS,* W1FZJ

I WAS talking with Hal (W1DDF) the other day. In addition to the sideband problem, the sporadic *E* problem, the meteor-scatter problem, the moonbounce problem, and the state of the band problem, we spent some considerable time on the "states worked" problem. Now this may not appear to be much of a problem except for one thing — most of the listings which purport to chronicle the accomplishments of the fraternity do so on a "from-the-day-one basis." That is to say, if you are a country worker on the low frequencies your accomplishments since the end of the last war are listed. You may not even have been on the air in the last few months and it may be that your next-door neighbor has accomplished miracles in comparison to what you have done in the last year, but due to your aggregate total, his listing would appear to be the result of considerably less effort than yours. Or it is quite possible that you have operated on the 50-Mc. band and have worked a total of forty-seven and one half states in the last six months. You will not be listed as a great DX worker on 50 Mc. because during the last ten years, your buddy managed to amass a total of 48 and got his name in the "States Worked" box.

Truly, the listing of the states worked over a period of time does represent accomplishment but it also represents the unassailable wall to the newcomers. Hal suggested that a listing of the top operators in the current year would be of considerable interest to the currently active members of the v.h.f. fraternity. At least, a compilation of such a list would indicate where the optimum activity was and where the best openings and propagation paths have been for the past six months.

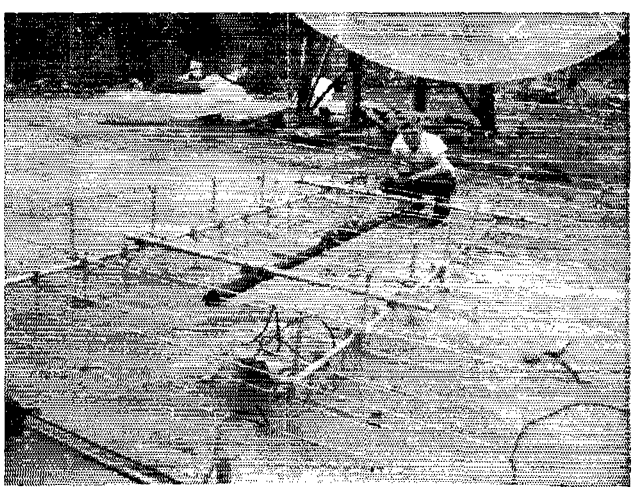
*P. O. Box 334, Medfield, Mass.

After pointing out to Hal the extreme difficulty in processing information of this sort and receiving assurances that he would be perfectly willing to aid in the horrendous task, we decided that the best approach was to ask you if you would be interested in such a program. Naturally we cannot publish a list of every operator in the country who has worked more than two states since the first of January. We would undertake, however, to process the information to the point where we could determine if it was in fact an unpublishable list and would then cut it down to a maximum of one hundred stations or the equivalent of the two top operators per state.

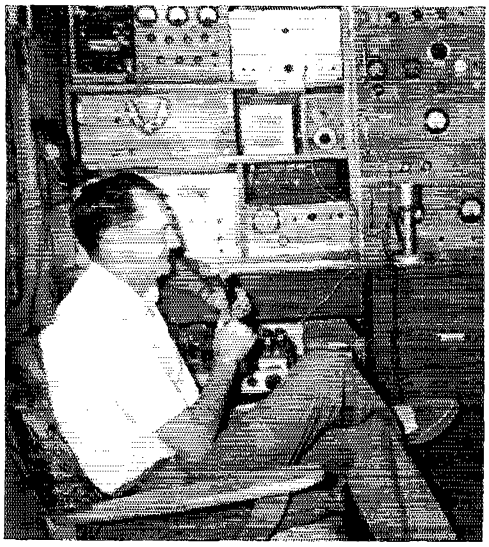
We cannot publish any list at all, of course, unless you are willing to send in your accomplishments since January 1, 1963. The first list of states worked should include all states contacted in the first six months, including those worked on the last day of June this year. Bear in mind that this list should only include those states which you have worked and can get confirmed for the first six months of this year. We are also interested in your grand total of states worked and would appreciate it if you would include that information also. Please be sure to state what frequency band your list is for. Please pass all information to P.O. Box 334, Medfield, Massachusetts, or include it on your OES report form.

Attention VE1 Visitors!

Late word of interest to 2-meter tourists in VE1 this summer comes from VE1WB. A relay station has been installed on Lutz Mountain, near Moncton, New Brunswick, giving 2-meter coverage over a wide area. The station monitors 144.4 Mc. (8022-kc. crystal times 18) and repeats what it picks up on 146.69 Mc. The relay receiver tunes fairly broadly, so anyone close to 144.4 should be able to



W1HIV assembling the combination 128-element 420-Mc. beam/64-element 220-Mc. beam at the R.S.V.H.F. Society.



VK2ZCF, highly active VHFer. Equipment includes home-brew 1296-Mc. gear which to date has worked 60 miles groundwave.

trigger the system. Though primarily intended to extend local operating range, the relay station may be pressed into service when the 2-meter band is open to the States. Remember, you transmit on 144.1 and listen on 146.69 Mc.

Paramps for 420 Mc.

If you have been waiting for information on how to build a parametric amplifier for the 420-Mc. band, you have not been waiting in vain. Three groups are presently working on their different approaches. K2CBA and company have one going which looks like a winner. Jud is using a converted Western Electric TD-2 for the pump source at approximately 4 kMc. This device provides a crystal-controlled pump signal with excellent gain stability, and can be purchased for a modest sum. Jud and Wayne (W1WID) are preparing an article on the conversion details of the TD-2 and on the construction of the paramp. This group also has a kw. final amplifier using 4-4X250's under construction, on which they promise an article in the near future.

W1FRR and the Sudbury Radio Club have a 420-Mc. paramp running which utilizes a solid-state pump source. This pump source is home brew and is crystal controlled for maximum stability. Construction details for this unit are *promised* but a few letters to Freddy, W1FRR, might stimulate some action. Both units are showing noise figures in the 1.5 to 3 db. area and are giving on the air improvements of from 6 to 10 db. in signal noise.

The third amplifier group is headed by Frank Vernon (W1EHF). His approach is to use an X-band klystron pump source. This is the simplest approach if you have access to X-band waveguide components. All three amplifiers use a quarter-wave coaxial tank circuit loaded by a varactor as the basic amplifier. They differ only in the method employed to excite the varactor. More details next month.

50 Mc.

Lima, Peru, is on 50 Mc.! OA4DE writes us that he and four other hams in Lima (namely OA4FM, OA4PZ, OA4HC, and OA4NKO), operate six meters almost every evening. Because they work during the daytime hours these fellows can get on the air only nights and week-ends. Average power input is 40 watts, although Marcelo, OA4DE, is working on a 90-watt transmitter, hoping to have it on the air by mid-May. Marcelo also sez: "We will in the future listen on 50 Mc. at noon and afternoon hours when possible, and hope to work some real DX. Probably will have to wait some years more but we will be trying." From the looks of the reports following yours, Marcelo, I don't think you'll have to wait too long to work DX. Thanks for the information. I know all of the v.h.f. gang will appreciate having the information.

VP7CX is getting to be a regular on six meters and the other day, during a QSO between VP7CX and W1BU, he told Sam that on May 8 he worked VE4MA and VE4GX making a "first" between VP7 and VE4 lands. Hal also mentioned that at that time he had already sent out more than six hundred QSLs since his first appearance on six meters. As Les, K4RNG, sez: "FG7XT, John Wegimont, broke the ice on Saturday, May 4, "making contact with dozens of 50-Mc. enthusiasts and giving out Guadeloupe, French West Indies, for the first time on six meters." Les (K4RNG) sez he's still looking for KV4CQ out of the Virgin Islands but "no soap" as yet; and he mentions wild band openings on May 1 when twenty-two states were in, May 2 when 18 states were in, and May 3 when 14 states were coming through. A report from WA2SAZ sez that he copied a CX in Uruguay who was testing in the phone portion of 50 Mc. Also reports of activity from VP5 land from WA2PWI.

Birmingham, Alabama reports through Nan, K4NGD, that the "miracle has happened on six meters." First opening there was on April 26 into 3 land, then on the 27th into 2 and 3 lands. On May 1 the band was open into Birmingham for twelve hours with all call areas except 6-land heard. May 2 the band was open for about 18 hours with 1, 2, 3, 4, 5, 9, 0 lands heard and worked. May 9 once again it opened up, and for locals who needed it, the hard to work state of Louisiana was available. Nan sez that everyone is getting their rigs in good working order, the old timers are coming back to six meters and activity has never been so good, even for local rag-chews.

Mobiles are also gathering force in the area with W4OGT, K4NGD, WA4AWS, WA4INS, WA4CCV, K4CTB, WA4-EEE, WA4HMM, WA4IQP, K4DJR and WA4BQK all mobile at the present time. Los Gatos, California and W6YKS report openings on May 2, 3, 4, and 5. On the 5th, ole Ike, VE7AQQ and VE7AGZ were heard and worked by the 6s, as were Colorado, Iowa, Nebraska, New Mexico, Arizona, Pennsylvania and Massachusetts. K6HCP worked W9HGE for state number 47 and W6YKS worked K7OFH and K7VAE in Arizona for a new state. Both worked with 30 watts n.b.f.m. from the California end. K6QHC got W9HGE and K1PBE on s.s.b. John mentions that both c.w. and s.s.b. are growing in his area, and that when the band is not open the boys are working on their rigs.

Delaware, K3KEO that is, reports openings on April 24 and 27 and 28 with 4s, 8s, 9s, 5s, VE1, VE4 and VP7 coming through. Sam has completed his 6 and 2 s.s.b. rig running 180 watts p.e.p., so there's another one for the sidebanders to watch for on each band. Florida experienced a number of openings and those heard by Kris, WA4GDC occurred on April 16, 24 and 28, and on May 1 through the 6th. On April 24, KP4s stole the show. On May 2, 14 states and Puerto Rico were worked and ten others were heard. May 4 a number of KP4s were worked and Kris heard VP5BB working the Miami gang. He also heard VP7CX. A side note from Kris mentions that on May 6 he watched TGBOL TV from Guatemala for two solid hours. At Fort Walton Beach, Florida, W4ZGS worked XE1OE on April 24 (that's the first we've heard of Rusty this season) and on the 27th worked VE3CVX of Toronto.

In Glen Ellyn, Illinois, K9CNN and K9YEN had their share of openings from May 1 through the 9th, the 4th and 5th being the only days with no openings. During this period Joan and Dave worked Maine, Florida, Colorado, South Dakota, Montana, New Jersey, Massachusetts, Rhode Island, New Hampshire, Vermont, Oklahoma, Mississippi, Texas, Georgia, Tennessee, North Carolina, Virginia, West Virginia, Maryland, Wyoming, plus two Puerto Rico stations and a VE1. They heard but did not work, Alabama, Iowa, New Mexico, Kansas, Louisiana, New York, South Carolina, Connecticut and Washington, D.C. In Evanston, Illinois, K9YTH and WA9DKM in Oak Park noted the opening of May 1. Gerry, K9TYH, sez that s.s.b. seems to be doing best, although strong a.m. and c.w. are holding their own. He heard and copied 100% K5AKY on RTTY al-

2-METER STANDINGS

W1REZ	32	8	1300	W5YYO	7	4	1330
W1AKZ	28	8	1205	W5UNH	6	3	1209
W1KCS	24	7	1150	W6QSQ	15	5	1390
W1RFU	24	7	1120	W6NLZ	12	5	2540
W1AJR	23	7	1130	W6DNG	9	5	1040
W1MMN	22	8	1200	W6AJF	6	3	800
W1HDQ	22	6	1020	W6ZL	5	3	1400
W1IZY	20	7	1080	K6HMS	4	3	850
K1CRQ	19	6	800	K6GTG	4	2	800
W1MEH	18	6	1000	W6MMU	3	2	950
W1AFO	18	6	920				
K1AFR	17	5	450	W7JRG	17	6	1280
				K7HKD	15	5	1150
W2NLY	37	8	1300	W7LHD	7	3	1050
W2UXY	37	8	1360	W7CJM	5	2	670
W2ORL	37	8	1320	W7JIP	4	2	900
W2BLY	36	8	1020	W7JU	4	2	235
K2GQI	35	8	1365				
K2LMG	30	8	1290	W8PT	39	9	1260
W2AZL	29	8	1050	W8KAY	38	8	1245
K2IEJ	27	8	1060	W8SSDJ	37	8	1220
K2CEH	25	8	1200	W8IFX	35	8	980
W2AMJ	25	6	960	W8SFG	34	8	1040
W2ALR	24	8	1100	W8LOF	32	8	1060
W2RXG	28	8	1200	W8GGH	32	8	1180
W2SMX	23	7	1090	W8BAX	32	8	980
K2HOD	23	7	950	W8RAIH	32	6	910
W2DWJ	22	6	860	W8NOH	31	8	1093
W2PAU	23	6	753	W8SVL	30	8	1080
W2LWL	22	6	1050	K8AXU	29	8	1050
K2KIB	21	5	700	W8EHW	30	8	880
W2ESX	21	6	750	W8LPD	29	8	850
W2UTH	20		880	W8WRN	28	8	680
W2WZK	19	7	1040	W8DX	26	8	720
W2RGV	19	8	720	W8ILC	25	8	803
WA2EMA	19	6	1010	W8JWV	25	8	940
W2RLG	17	6	980	W8WNM	25	8	940
K2JWT	16	6	550	K1CRQ/8	25	8	690
				W8GFN	23	8	540
W3RUE	33	8	1100	W8LCY	22	7	680
W3EPH	33	8	1000	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
W3LNA	21	7	720	W9AAG	35	9	1050
W3TST	21	6	800	W9GAB	34	9	1075
W3NKM	20	7	730	K9AAJ	33	8	1070
W3LZD	20	7	650	W9REM	31	8	850
K3HDW	12	6	1015	K9DIF	30	9	970
				W9ZIH	30	8	830
W4HJQ	39	8	1150	W9PBP	28	8	820
W4HHK	37	9	1280	W9LVC	27	8	950
W4UTU	34	8	1160	W9OJI	27	9	910
W4ZX1	34	8	954	K9SGD	26	8	1100
W4WNH	33	9	1050	W9ZHL	25	8	700
W4MJK	34	8	1149	W9BPV	25	7	1030
W4AO	30	8	1120	W9CUX	24	7	
W4LVA	26	8	1000	K9AQF	24	7	900
K4CUS	26	7	1130	W9LF	22	7	825
W4BQM	25	8	1040	W9KPS	22	7	690
W4AIB	25	8	900	W9ALU	18	7	890
W4PLV	23	7	1000	W9WDD	16	5	600
W4JC	23	6	725				
W4VVE	23	6	724	W0BFB	39	9	1350
W4RMU	21	7	1080	W0IHD	31	8	1030
W4IKZ	20	6	720	W0LFE	30	7	970
W4OLK	20	6	720	W0SMJ	29	9	1075
W4LNG	19	7	1080	W0QDG	27	9	1300
W4RFR	18	9	820	W0RUF	23	7	900
K4YUX	18	8	830	W0MOX	23	6	1150
W4CPZ	18	6	650	W0IC	22	7	1360
K4VWH	18	6	590	W0ENC	22	6	1100
W4MDA	17	6	757	K0ITF	21	6	940
				W0INI	21	6	830
W5RCI	38	9	1280	W0TQC	21	7	870
W5FYZ	33	9	1275	W0RVG	20	8	925
W5AJG	32	9	1360	W0DQY	20	7	700
W5JWL	29	7	1150	W0JAS	19	7	1130
W5DFU	29	9	1300	W0AZT	18	7	1100
W5PZ	27	8	1300	K0AQI	16	6	1120
W5LPG	25	7	1000	W0IFS	16	6	1100
W5KTD	23	8	1200				
W5SWV	20		960	VE1CL	8	4	800
W5ML	16	6	700	VE3DIR	36	9	1330
W5KFU	13	4	1300	VE3AIB	29	8	1340
W5UGO	13	4	635	VE3BPR	24	7	950
W5FSC	12	5	1390	VE3BQN	21	7	790
W5HBZ	12	5	1250	VE3AQG	18	8	1300
W5CVW	11	5	1180	VE3DER	17	8	1340
W5NDE	11	5	620	VE3HW	17	7	1350
W5WAX	10	5	735	VE6HO	1	1	915
W5VY	10	3	1200	VE7FJ	2	1	365
W5HEP	9	3	1000				
W5KDZ	8	5		KH6UK	2	2	2540

The figures after each call refer to states, call areas and mileage of best DX.

though he could not get through by that method to K5AKY. Two watts just wasn't enough to push the RTTY through. However, he did make it on s.s.b. and received a good signal report. Gerry also noted an aurora on the night of April 30 when he heard and worked a number of Ohio stations and KØDTA (heard on s.s.b.) in Minneapolis. K9FNB, WA9-CWZ and K9BDJ all report openings beginning on May 1. Out in West Baden Spring, Indiana, WA9GRK, who has been listening recently on 50 Mc. on a transceiver, sez that 50 Mc. must have been open on May 1 and 2 because "I heard something!" After hearing nothing since Easter, the first stations he did hear were in South Dakota, Nebraska, Florida and Texas.

Iowa is represented by reports from WØDRE and WØPFP. John, WØDRE, sez that on April 27 the band opened up with New Jersey, Pennsylvania, a few 8s and 4s coming through. Band was very erratic and only two stations were worked. Jim, WØPFP reports the opening of April 28 when he worked 2s, 3s, 4s and 8s plus VE3AGU. First opening he's heard this season. On May 2 he worked KP4AAN two way s.s.b., and has two new states now on s.s.b., Delaware and Montana. And out in Pittsburg, Kansas, Dave, KØRWC, sez that "the spring rush is here — worked 4s, 5s, 9s and 3s since the first of April."

An interesting letter received from W5JFB in Louisiana concerning his maritime mobile operation. John comments: "Wanted to let you know that the low-power gang has fun too! My job as a Raydist operator aboard ship leaves much to be desired in what idle time I occasionally have. Therefore, on the last trip out into the Gulf I decided to do some hamming. Grabbed my battered Sixer, the collapsible 3-element beam and 25 feet of coax. I lashed the beam to a boathook and installed it atop the galley (all of 15 feet high). Fired up the Sixer on May 1 just in time to hear the end of a beautiful band opening. One contact was made with K9UYK. The next day (May 2) brought a large surprise. The peanut whistle got out like great guns, provided we could hang on to them with the regen receiver. We called on 50.490 and listened above 51 Mc. for any calls and to my astonishment that system worked very well. By May 8 we had made over 50 solid contacts in 14 states and 6 call areas with some poor reports and some excellent reports and had a hang-up time to boot." Thanks for the interesting letter and information, John. Let us know how you progress along the same lines.

K3LIR, K3PRN and K3QOM all report from Maryland concerning the openings of April 27, 28 and 29. K3QOY heard 4s and 5s on the 27th; K3LIR noted the opening of April 28 to the West; K3PRN caught the tail end of this same opening but heard VE1YN and VE1IB. Massachusetts is represented by K1VPT and W1HGT. Bruce, K1VPT, sez that a W5 was heard calling CQ on April 21 but "that was it"; and on the 27th he reports an opening into Michigan. Ralph, W1HGT, reports that with his 4 elements 14 feet high he heard all U.S. call areas, VO, KP4, VP7 and FG7 during the first week of May. (Pretty good from the East Coast sez I.)

Out in Detroit, Michigan, WA8DZP heard his first opening of the season on April 18 when he copied New York, Illinois, Indiana, Ohio, Tennessee and VE3s. In Oak Park WA8BYL heard Florida and Texas on April 28, but May 1 was the big day for Larry when he copied ten states with the beam pointed south. W8HFA of Bloomfield Hills reports that during the May 1 opening he managed to work Kansas and Missouri with a Halo antenna, and that 5 watts provided an S6 or better signal report. KØJWN and KØFPC in Harrisonville, Missouri, noted openings on April 20, 21, 23 and 27. Larry heard New Jersey, Pennsylvania, Virginia, North Carolina and Delaware on the 20th, and Florida on the 21st. Bob, KØFPC, noted good groundwave on the 21st, a few W2s on the 23rd; and on the 27th, Rhode Island, New York, New Jersey, Pennsylvania, Delaware, Virginia and North Carolina were coming through. Also heard West Virginia, Ontario, Virginia, New York, New Jersey and Pennsylvania on April 28. Bob sez that none of these openings could be described as solid as all signals were rapidly in and out. In Buffalo, New York, Tony, WB2FPZ heard his first touch of six-meter skip on May 1 when he heard every call area except 6 and 7. During the first few days of May, Tony worked Kansas, Florida, Alabama and South Carolina with 7 watts to a 5 element beam. WA2VOK reports six meters in good shape during the last week of April and an opening on April 30 to VE4 land. Pennsylvania received its portion of "skip" according to W3BWU and K3PFE. Ed, W3BWU, sez that 50 Mc. has had its best start ever. On April 28 it started out with VE4MA. Then on May 4, Ed got FG7XT for country number 15 on six and on May 5 he worked VP9WB for country #16. In between these contacts were others with VP7CX and KP4AAN, KP4ABN, KP4AGN, KP4ASN, KP4AST, KP4BIC and KP4BIU. Ed sez he has heard rumors of KV4, VP2 and VP5 on 50 Mc., but nothing definite. K3PFE reports numerous 4s and 5s on May 1. In Sioux Falls, South Dakota, Bill Smith, KØCER, noted

220- and 420-Mc. STANDINGS

220 Mc.

W1AJR	10	4	480
W1AZK	9	3	412
W1HDQ	11	5	450
K1JIX	10	3	450
W1OOP	1	4	400
W1RFU	15	5	480
W2AOC	13	5	450
K2AXQ	9	3	240
WA2BAH	4	2	167
K2CBA	13	6	650
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
W2LWT	12	4	400
W2NTY	12	5	300
K2PPZ	11	4	190
K2QJQ	13	5	540
W2SEU	9	3	225
K2UUR	5	3	172
W3AHQ	4	3	180
W3FEY	11	5	350
K3IUV	8	3	310
W3JYY	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
W4UYR	7	5	320
W5AJG	0	2	1050
W5RCI	8	5	700
K6GTG	2	1	240
W6MMU	2	2	225
W6NLZ	3	2	2540
K7ICW	1	1	250
K8AXU	10	5	1050
W8IJG	9	5	475
W8LPD	8	4	480
W8RNM	8	4	390
W8PT	10	5	660
W8SVI	6	4	520
W9AAG	9	4	660
W9EQC	11	5	740
W9JCS	6	2	340
W9JEP	9	4	540
W9OWL	6	3	475
W9UBD	4	4	605
W9ZIH	10	5	500
KØDGU	5	3	425
KØITF	6	3	515
KH6UK	1	1	2540
VE3AIR	7	4	450
VE3BPR	3	3	300

420 Mc.

W1AJR	11	4	410
W1HDQ	8	3	210
W1MFT	8	3	170
W1OOP	11	3	390
W1QWJ	10	3	
W1RFU	7	4	410
W1UHE	6	4	430
W2AOD	6	4	290
W2BLV	12	5	360
K2CBA	7	4	225
WA2DTZ	6	3	200
W2DWJ	10	4	198
W2DZA	5	3	130
K2DZM	10	4	390
WA2HQE	8	4	280
K2KIB	4	2	100
W2NTY	3	2	100
W2OTA	10	4	300
K2UUR	9	3	280
W2VCG	9	4	280
K3CLK	9	4	
K3EOF	6	3	250
W3FEY	8	4	296
K3IUV	7	3	310
W3LCC	3	2	
W3RUE	3	2	270
W3UJG	2	4	350
W4HHK	8	4	550
W4VVE	7	4	430
W4TLV	4	2	500
W5AJG	5	1	425
W5HTZ	5	3	440
W5RCI	12	3	660
W5SWV	7	3	525
K6GTG	1	1	180
W7LHL	2	1	180
K8AXU	3	3	660
W8HCC	3	2	355
W8HRC	3	2	250
W8JLQ	6	3	275
W8NRM	3	2	390
W8PT	6	3	310
W8RQI	6	3	270
W8TYY	9	5	580
W8UST	3		25
W9AAG	8	4	525
K9AAJ	7	3	425
W9GAB	9	4	608
W9OJI	6	3	330
K9UIF	6	3	240
KØITF	3	2	158

The figures after each call refer to states, call areas and mileage of best DX.

skip on May 1 to North and South Carolina and Georgia; May 3 to the east coast; May 5 to eleven different states; May 6 to the east; May 7 a very slight opening; May 8 to Michigan, New York and Tennessee. Bill is open for skeds any night or early Sunday mornings, so if you're interested in working South Dakota get in touch with him.

Tennessee Joe, K4PZT reports working CO2XA on May 1 and having a contact with W4MMP/mobile in North Carolina for about 20 minutes on the same opening, followed by a contact with VE1HB later in the day. Other openings on May 2, 5, 6, 7, 8, and 9 netted Joe contacts into about fourteen states plus VE4MA and VP7CX. K9HBT in Wisconsin noted the auroral opening of April 30 when 8s, 9s and Øs were being copied and also mentions that on April 28, six meters opened up for him to 1, 2, 3, 4, 8 and Ø lands. An opening that lasted for several hours.

"Ever since October 1962, K4GRY and W4KXQ have been active on 52.6 a.f.s.k. RTTY and we know that for sure this was the first real activity on 52.6 in Virginia. The result was a two-way QSO night after night. We would be glad to sked anyone interested in working some RTTY DX on either 52.6 a.f.s.k./f.m. or 50 Mc. a.f.s.k./a.m., as we have both modes. At present, activity has grown to a total of over a dozen RTTY f.m. stations on 52.6 Mc. throughout the state. Equipment at K4GRY is a model 15 page printer, a model 14 t.d. and reperforator, W2JAV t.u. and s.f.o. regenerator, a link transmitter-receiver for f.m. using a beam, and a 5894 in the final. W4KWX has somewhat similar equipment." Nice to get a report concerning RTTY from George, K4GRY, and hope he continues to report progress.

144 Mc. & Up

Two-meter operators are slowly and consistently building up their states worked total on that band with the aid of meteor showers, aurora, tropo openings and what have you. Our good neighbor Ted, VE3BQN, made it with K4IXC in Melbourne, Florida for state number twenty-one and the first Canada/Florida contact on 144 Mc. John, K4IXC, sez that Ted had a fine signal in Florida during Lyrids. Heard in Florida but not worked during the Lyrids were W8SDJ, WØBFB, W9OLL, W4FJ, W3GKP. During Aquarids John worked W1JSM, W1MEH, W9OLL and W8PT; heard but not worked were W1MMN, WØBFB, W9AAG and W4FJ. Some good tropo openings into the Gulf states were noted at K4IXC during April; and in early May, an opening into Georgia and South Carolina. John sez "lots of state-wide activity here in Florida; mostly phone, some c.w." The May 4 contact with W1MEH brought his (W1MEH) states-worked total up to 18 states, including 6 call areas and a distance of 1000 miles. This is the farthest contact to date for Ken, W1MEH. He is anxious to hold skeds for the August shower with states to the south and west, so those of you who would like Connecticut on 144 Mc. get in touch with him at his home QTH. Ken's rig consists of a pair of 4CS300A's running a full kw. into a Telrex 8 over 8. Converter uses nuvistors into receiver with crystal filter. Dallas, W9AAG, reports: "Yours truly has one of the coveted K4IXC QSL cards now, due to the good graces of John, my first meteor scatter attempt and the little ole 100 watts. That takes care of the south east quadrant of the U.S.A. and makes state #35 for me. Guess I'd better get busy with the north east area and try to pick up the four I need up there, Delaware, Vermont, Maine and Massachusetts." All right, you schedulers, get in touch with Dallas, Cedar Rapids will soon show some 432 Mc. activity according to W9AAG. Seems that WAØDZH (ex-W9OEV) has a rig in construction ending up with a 4X250 driven by a 3CX100A5, and is using a 13-element yagi. Antenna at W9AAG is a 40-element configuration, and he is using a pair of Motorola cavities, 2C39A doubler from 216 into 2C39A straight through. Converter starts out with 416B into 6AM4 and IN82A mixer.

WØBFB sez: "Not much activity in this area (Mitchellville, Iowa) on 144 Mc. during the past several months. It has been so long since I have heard a good tropo or aurora opening that I have almost forgotten what they sound like." (Aurora openings in particular have been scarce recently.) John goes on to relate his activities of the past year on 144 Mc. and heading the list is meteor scatter skeds. He has heard "pings" from W3LMIL, pings and calls from K5TQP, W7LEE, W7FGG and K4IXC and almost made it with W4VHH. On August 12, 1962, after a sked with W4VHH, John pointed the beam west to see if W7JRG was on and he was "tearing up the pea patch here with pings and calls on almost every transmission." The boys made contact the following morning making state #38 for WØBFB. A sked was kept with K7IDD May 2 through 5 of this year and contact was made on the 5th for state number 39 for John. He would like to make Maine state # 40 on 144 Mc., so you interested Mainiacs get in touch with him.

W8ZGW of Bay City, Michigan, reports a two-meter opening on April 18 when W8PHJ, running 100 watts, worked W1DAY in Maine and received a report of 4-6. He also worked K3ANU in Erie, Pennsylvania, and W2-AOO/2 near Buffalo, New York. On April 19, W8QLO of Detroit copied a number of 2s and 3s. From Ypsilanti, K8PBA sends news that two meters was open into the far reaches of 9 land on April 1 and was quite good to the west on April 2. On the 18th a number of stations in 2 and 3 lands were worked. Bob also tells us that VE3AMF and K8EJU are now on two meter s.s.b. along with W8STX. News from Nevada and K7ICW notes that the two meter s.s.b. "half jug" of K7RKH is on the air and that K7TDQ will be on two meters shortly. Al sez that tropospheric scatter has been better than average during the past month (April) with 144-Mc. signals (s.s.b.) from W6CDB in Torrance, California, being almost as good as his 75-meter signals. A sked with W6DGO was heard by K6GBB in Ukiah, California, a distance of about 405 miles. Joe Courcelle, K3OBU notes that on April 18 activity was good on two meters with many c.w. and s.s.b. stations being heard, in-

(Continued on page 148)

Hamfest Calendar

Colorado — The Estes Park Hamfest will be held at the Estes Park Masonic Hall, July 6 and 7.

Idaho — The 31st Annual Wyoming-Idaho-Montana-Utah (WIMIU) Hamfest will be held August 2, 3 and 4 at Macks Inn, Idaho. There'll be transmitter hunts, treasure hunts, mobile installations, homebrew equipment contests, swap shop, code contest and special activities for the XYLs and kiddies. Free breakfast-in-the-pines for all registrants. Cabins and camping facilities will be available. Monitoring frequencies will be 3935 kc. and 145.44 Mc. Contact Helen Maillet, W7GGV, RR #1 South, Box 353, Pocatello, Idaho.

Indiana — The Indiana Radio Club Council will sponsor a hamfest on July 14th at the Fairground in Lafayette, Indiana. Pre-registration tickets $1.50; $1.75 at the gate. XYL and kids' activities. Check with Jay Strom, K9BSL, RFD #6, Indiana.

Indiana — The Wabash Valley ARA will sponsor the Turkey Run VHF Picnic on July 28. No other info available, so contact Carl Rogers, W9YBN, 2801 South 11½ St., Terre Haute, Ind.

Illinois — The 6-Meter Club of Chicago will hold its annual picnic and hamfest at Picnic Grove in Frankfort, Illinois, on Sunday, August 4. Location is on U.S. Rt. 45, one mile north of U.S. Rt. 30 and five miles south of U.S. Rt. 6. Pre-registration $1.50 via Bowen Finfrock, K9PIZ, 1909 West 67th Street, Chicago 36.

Illinois — The Quad-Co. Radio Club, Box 323, Chatham, Illinois, is again host for the annual Breakfast Club Hamfest July 20 and 21. Transmitter hunts, games, contests, dancing, movies, and more, all at Terry Park in Palmyra, Illinois. Sponsors expect a crowd even larger than last year's 1600.

Nebraska — The Central Nebraska Amateur Radio Club will sponsor the annual steak fry on July 28 at Victoria State Park. Mobile frequencies for "talk-in" will be 3983 kc. and 145.35 Mc. Make reservations with WØDLM before July 14.

New York State — The annual ham picnic of the North Country Radio Club will be held Sunday, July 14, at the Norfolk Rod and Gun Club in Norfolk, New York. Work your way in on 2, 6, and 75 meters. Admission is a piece of junk for the auction. Speakers, auction and swap shop will be featured. Contact Emerson W. Babcock, WA2HEC, Box 475, Norfolk, New York.

New Jersey — The Gloucester County ARC will hold its annual hamfest on Sunday, August 4, at Crystal Birch Lake in Chapel Heights, New Jersey. Location is 3 miles northeast of Glassboro and 2 miles southwest of Turnersville. Watch for GCARC signs. Games, transmitter hunt, swap shop, refreshments and more, from 1000 to dark. Check with E. L. Garside, W1KUJ/WA2TDI, 31 Barclay Drive, Blackwood, N. J.

Virginia — Bonnies Lake in Lynchburg, Virginia, will be the scene of the 8th Annual Graveyard Net Picnic on Saturday and Sunday, July 6 and 7. A flyer with full information is available from W1WHL, 40 Amos Street, Mt. Carmel 18, Connecticut.

Strays

W6BMM claims a record for operating portable. He has been licensed for over 15 years, and yet has *never* operated from his licensed QTH. He has operated portable in several U.S. districts, including KL7, aeronautical mobile, maritime mobile — all the time maintaining his original call. And his company is about to move him again.

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Just like the good old days! K1VDO, WØOAF, and WA6BZK, who used to be hams and neighbors back in Luverne, Minnesota, recently had a roundtable QSO, their first such get-together in 40 years.

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A convention of Catholic priests, brothers, and seminarians who are hams will be held at St. Anthony Friary in Hudson, N. H., on July 23 and 24. The Hudson Capuchins operate K1QFT, and a call book has been published listing over 1000 priests and brothers who are hams.

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Amateurs in Ellsworth, Maine are pitching right into their town's bicentennial celebration planned for July 20–27. The Ellsworth Amateur Wireless Association will operate W1CX portable during the festivities. They'll work 2, 6 and 75-meter phone. They've even arranged for a total eclipse of the sun for opening day, Saturday the 20th. Ellsworth is directly in the totality path of the eclipse predicted for that day. The EAWA and W1TU remind us that choice sites for observing the eclipse will be available in and around Ellsworth during the height of the bicentennial fun. Club members there will welcome all visitors and will handle as much visitors' traffic as possible through W1CX/1.

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FEEDBACK

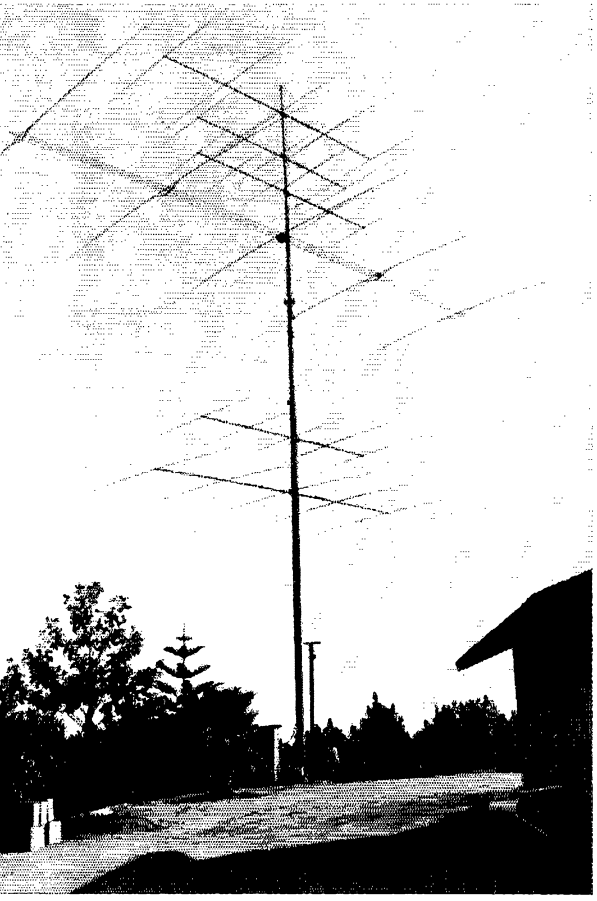
In K2VVL's article, "AM for Collins," June *QST*, connection point "A" should go to turret E20A, not E40A as given on page 49, top of second column.

Ham radio means a great deal to this young fellow. Dennis Holter, WN6BZL, is 11 years old, totally blind, and partially crippled by cerebral palsy. He copies 20 w.p.m. and soon will be going after his Conditional Class license. He worked 55 stations in 16 sections during the Novice Roundup, keeping his log on a Braille writer. He has been getting help with theory and equipment from W6LZK, WA6GWM, WA6HNW, WA6LCK, and WA6KUL.

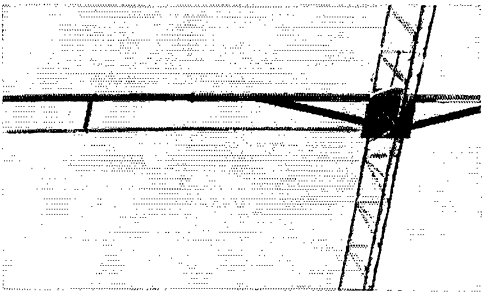
Our Cover

There is probably just a tinge of envy when some of us easterners make cracks about how big they do things in the west, but, by golly, this antenna system *is* big! It was originally erected by W6HJT, but was recently purchased by W6VSS when W6HJT decided to move to Hawaii. The 123-foot Telrex Big Bertha mast supports stacked 5-element 20-meter beams, stacked 5-element 15-meter beams, a lonely 6-element 10-meter beam, and the pièce de résistance — a 5-element, wide-spaced, 40-meter beam. The design and fabrication supervision was by W6JPM, who can be seen at the 83-foot level on the cover picture.

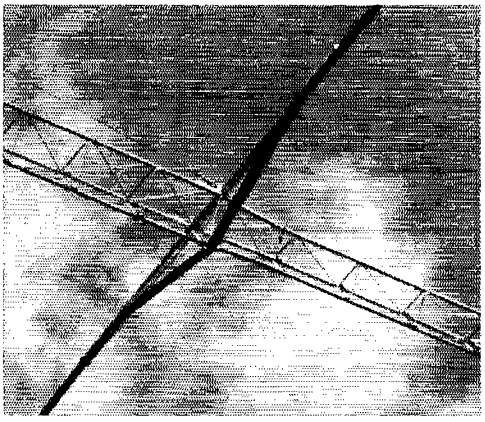
Those of you on the east coast who have heard the 40-meter W6HJT/W6VSS signal know now why it is so potent!



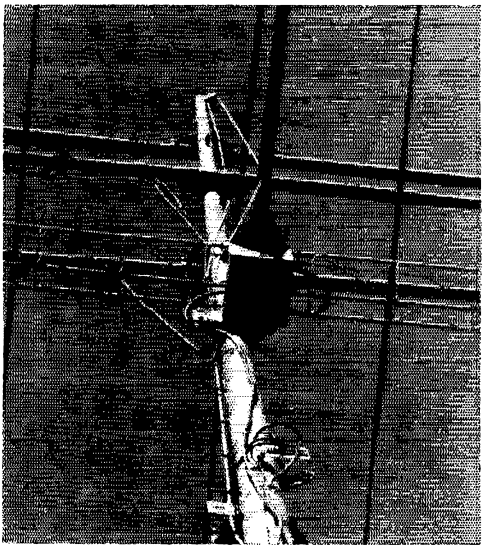
Standing in the shadow above is W6HJT. The base of the rotating pole is anchored in 40 tons of concrete, 12 feet deep. Not visible in these photographs are other masts which rounded out the W6HJT antenna farm.



The driven element is fed with a gamma match, with the tuning capacitor of 300 pf. mounted in an aluminum box. The gamma-match rod is 7 feet 6 inches long, 1-inch diameter, mounted 1 foot from the driven element.



The 100-foot boom of the 40-meter beam consists of a couple of aluminum towers placed butt to butt and supported with wire stays. At each element the construction is as above. Struts are aluminum arc-welded, with no additional wire stays being required on the elements themselves. The element brackets are made of aluminum electrical conduit welded to the boom.



Looking up the tower, you can see the RG-17AU feedline, the box which supports the butt ends of the towers which serve as the 40-meter boom, and a host of other hardware. Individual elements on the 40-meter beam range in length from 72 feet for the reflector to 62 feet for the directors. Their center sections are 40-foot lengths of 2-inch .050-inch aluminum tubing.

Correspondence From Members-

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

STILL MORE ON INCENTIVES

¶ I have been a strong supporter of ARRL and all the fine things that it in the past has stood for. However, your proposal to restrict voice bands on 20 and 75 meters to licenses above the General Class under the disguise of incentive licensing is the most underhanded thing that you can do to the people that you have been sworn to represent. It is us that pay the way of League, and return I expect to have the interest of my class license appreciated and defended if necessary. You have failed to do this in your proposal to take me and the many hundreds of thousands other fine amateurs off 20 and 75 meters with this disguise of incentive licensing . . . — *K9SFA/5*.

¶ It seems that a bunch of stuck-up snobs are trying to control privileges that we Generals and Conditionals worked so hard to earn. Have the so called bigshots forgotten about us and looking for good times or have these nuts said to their buddies (FCC) that we don't deserve some privileges? It seems that you must have to be an electrical engineer or a professed electrical genius. Why did you have to mess things up? . . . — *W1SBQ*.

¶ The Milton Amateur Radio Club unanimously voted disapproval of the proposed restrictive licensing bill the directors have sanctioned. The membership wish to strongly oppose any changes in the current licensing. In our opinion, the proposed restrictive bill sets up a caste system which is undemocratic and does not conform to the spirit of hamdom. . . . — *Milton Amateur Radio Club (Mass.)*.

¶ I am opposed to any change in our licensing. I've been a ham since 1916 and hold a Class A ticket . . . — *W8QIZ*.

¶ Incentive licensing wouldn't be unAmerican. America has given us the privilege to be a ham. Let's see what we can do for ham radio and not for ourselves. — *W1SDVT*.

¶ Personally, I shall resign if your present advanced license promotion continues. I am happy and satisfied with the status quo. I believe that the amateur should be allowed to advance and learn as he wishes and not be penalized for being an amateur and not an electronic engineer. Your membership better be opened up to CB as you are going to need them. . . — *K4ZSZ*.

¶ . . . How often we hear the shouts of "discrimination" and "prestige class" from the advocates of a single license class. The inference always is that these are evil and should not be tolerated. Well, *they are not!* It is time to set the record straight: discrimination and privileged classes are a necessity of life in our society! The whole concept of our civilization is based on its inhabitants being individuals — each different from the others. Man may be created equal, but he very quickly shows these differences in talents, thinking, dexterity and physical abilities. This is a fact that cannot be denied. To live in a world of nondiscrimination is inconceivable. It would be sheer chaos. Total equality would mean no Einsteins or Van Cliburns, no U.S. presidents, no leaders, no followers, no incentive. Without reward, which is in reality discrimination, there would be no progress. There would be no pay scale; in fact no pay, since the concept of money connotes unequal distribution of material things — again discrimination. This is not the good life we all seek.

So it is plain that we must have discrimination — discrimination in the light that all men are not created equal in all things. This discrimination should not be confused with the discrimination against man's rights. It is the latter type that has given an aura of evil to the word. As individuals we all have the same rights, and as we learned in our civics classes, every right has its duty. To neglect the duty revokes the right. Basically, all inhabitants of this earth, including the Generals, Techs, Novices, CBers, commercials, maritime and even non-license holders have rights to the radio frequency spectrum from d.c. to the decimillimetric waves of gamma rays. We have seen fit, as free thinking individuals, to use our rights of self determination in electing members to a freely chosen form of government. This government, for the good of the people, has set up regulations controlling our basic rights to the airways and in so doing, effected a necessary and desirable privileged class. Therefore, is it wrong to further grant special privileges to the privileged ones? — *K8ZQE*.

¶ Since reading your February editorial, I find I have no "incentive" for renewing my membership. — *K8PTE*.

¶ The proposal of ARRL, which is supposed to be representing their numbers, is utter nonsense. I am not a professional electronics technician, so it was hard enough for me to secure my present amateur license. It would not be practical for me or many more of the present amateurs to even try for a higher class license . . . — *W5JCP*.

¶ As I see it this advanced class license proposal is purely a case of the League fighting the hand that feeds it . . . — *W1ZUDX*.

¶ In my opinion, it took a great deal of moral courage on the part of the Board of Directors to make the suggestion at a time when the ARRL is soliciting money for its Building Fund, and having other controversial ideas about amateur radio. I am convinced that the League has no choice but to make the decision that it did. The small sacrifices made now will pay large future dividends. Progress is always made at the expense of someone or something, and usually that someone or something objects, preferring a status quo. — *K1KSH/4*.

¶ Your June editorial and the indicated aims of ARRL certainly are stimulating discussion! Few should have any quarrel with the basic principles involved but please hasten to clarify the very sensitive region of frequency use by the General Class operators. Since you do not say what reductions of

(Continued on page 152)

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.

ARRL Activities Calendar 97
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Official Observers Activity Praised. Two hundred sixty eight different Official Observers had a hand in the 1962 card-sending operations. The year-end count of cooperative notices sent, based on the monthly reports received and sent in by SCMs shows a total of 22,612 for the year.

That's a *lot* of help to brother amateurs, and no mistake. There's an extensive file of the friendly correspondence OOs received to document this outstanding record. No telling exactly how many FCC notices were beaten to the punch by an OO report but we know the effort is in the right direction. In our annual report to the Board of Directors we gave honorable mention to all these League Official Observers. Also we identified those mailing-and-reporting three hundred or more friendly advisory notices to amateurs having signal defects or whose operations were found non-conforming to FCC regulatory requirements.

W8EMD turned in the top performance with 1011 notices. ARRL's thanks to all who helped and for the ready cooperation of those getting the word for bettering their signals and procedures too.

SCMs to Appoint Additional OOs; Interested? Your Section Communications Manager, see his address, page 6, *QST*, gladly will send *you* the detailed information in the League's Operating booklet concerning Observer work, also the application form to be filled out and returned (to your SCM) if you are qualified for an Observer post and willing to help in the program working toward good signal quality and operating practices. Four years experience as an amateur now is prerequisite to making application. There are questions on the back of the application to be answered indicating one's know-how in tackling Observer responsibilities. ARRL provides a detailed lithograph "Standing Information for Official Observers" to those SCM-appointed. This is a guide to system functioning and use of the forms. The printed cards supplied for notices are pre-stamped by the League for United States use. Postage reimbursements are claimed through SCMs in the case of Canadian Observers. It's required for U.S. OOs to hold an FCC General Class ticket or higher grade since all those observed expect a superior grade of knowledge and broad operating background of those who engage in this activity.

There's space on our application form to show the applicant's radio equipment available for observing. There are classifications of work for specializing in phone-observing and c.w.-observing, and the two classifications of precision in the frequency-measuring OO group. These latter posts are only open to those who have proved themselves as to ability to measure W1AW in scheduled Frequency Measuring Test runs, set up to test OO capabilities in this particular.

An OO's work is confined to no particular amateur band and extends to all W/VE-land. Operators specializing in v.h.f. OO coverage, active workers for two and six meters, are especially needed. Observations are needed throughout the 73 W/VE sections of the field organization. It takes more manpower to do this coverage on v.h.f.s, due to their more limited range. Consequently more OOs among those working two, six and ten meters are welcomed. Even with respect to our h.f.s, the Section Communications Managers are authorized to more than *double* the number of their qualified Observers active in notice-sending in the next few months, and will welcome your application if qualified. —*F. E. H.*

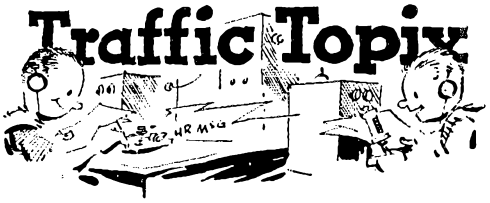
OFFICIAL OBSERVER HONOR ROLL

Here are the calls of those amateurs who contributed *most substantially* to their fellow amateurs in the year 1962 through the medium of careful observation and the sending of helpful ARRL-advisory notices.

The 10 high: W8EMD W3NNC W4VWL W2BLP W9VSO K9GDF K4IWI W1JNV K8EEB W0KLG.

Above the 300-Notice Mark: W8HZJ W1NF W9NPC W9GFF W8VPC W2TPJ W9ZWN W3BFF K4YSP W3ZAQ W1AUQ W4FOR W8RMH K8LOS.

Traffic Topix



In connection with the gradual transition and merger of traffic and emergency facilities into the ARPSC, let it be understood that so-called "independent" nets *can* be a part of the ARPSC (about which more at a later date) and *all* traffic handling will be affected. While we are making some basic changes in the structure of things, we want also to consider changing some of the details of traffic handling as they have always been recommended by the League. Here are a few f'rinstances:

(1) Adoption of a standard precedence system for use in all amateur traffic handling as an integral part of the message preamble.

(2) Adoption of optional prosigns to indicate routing or delivery instructions to handling stations.

(3) Set up an equitable (but simple) system of counting "book" messages, to eliminate unfairness and encourage more use of this form.

(4) Adopt the symbol X (X-ray) in place of STOP in message texts, taking the place of periods.

(5) Promulgate standards of procedure for operating "break in" on both phone and c.w.

These are just a few. There are more, and more will come. Many of our standard operating procedures through the years have become obsolete through lack of use, yet they remain on the books. How about the phonetic alphabet? How about the distress call? How about the NCEFs as general traffic frequencies? This all has to be thought about and brought into line with standard modern practices and thought. We old shellbacks yearn for the good old days, drag our feet at making changes, and plead "What was the matter with the old way?" But progress will out, the majority will rule, if you can't lick 'em, join 'em, and all that baloney. No use having standards and procedures that hardly anybody uses; let's get with it and bring ourselves up to date. — *W1NJM.*

April Net Reports.

Net	*Sessions*	*Check-ins*	*Traffic*
North American Sideband....	21	385	462
Eastern Region Traffic.....	18	65	25
Eastern Area Slow.....	30	95	32
75 Meter Interstate SSB.....	30	1162	578
All Service.....	4	29	17
Early Bird Transcon.....	30	...	86
Northeastern Area Barnyard..	..	840	8

National Traffic System. Last year's statistics on NTS showed that we had a 100% reporting record at region and area level. This is something of which we might well be proud, except for one deterring factor — quite a few of these reports were late, and were credited after the copy deadline and listed in the tabulation below as "late reports." This is a privilege we grant to region and area nets and TCC, but not to section or local nets. The latter, if received late, never do see the light of the *QST* printed page, except under special circumstances such as your reporter taking off early for a vacation.

This "ain't fair." Section and local nets are as much a part of NTS as are region and area nets. If we late-list the latter, then by golly we ought to late-list the section and local nets too. Conversely, if we don't late-list section and local nets, then we ought not do so for the others either.

It is convenient for us to use the *QST* tables at the end of the year when we gather these statistics, but having to refer back and forth to pick up "late" listings is a dad-burned nuisance. If a net manager is on the ball, he should

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for April Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W3CUL	139	2034	1562	472	4207
K6BPI	98	2030	1721	309	4158
W9JOZ	5	1275	1225	2	2507
W0LGG	308	875	813	33	2029
W0SCA	21	1016	980	0	2017
K9NBH	1808	31	1	0	1840
K0ONK	172	798	766	42	1778
W6YDK	842	446	368	78	1734
W9IDA	7	807	760	7	1581
K6EPT	56	738	508	230	1532
W9MM	24	703	703	0	1430
WA2GPT	45	640	603	26	1314
WA4BMC	69	598	582	41	1290
K1BCS	860	218	171	26	1275
W3EML	21	636	546	16	1219
W6RSY	37	554	458	102	1151
W7DZX	8	575	530	14	1127
W4ZJY	27	549	540	9	1125
W1PEX	39	544	494	26	1103
W8UPH	12	521	447	72	1052
W7BA	6	511	486	23	1026
W3VR	37	491	473	8	1009
K5QXV	20	455	444	11	930
K4VFY	115	375	375	21	886
W1TXL	94	390	359	11	854
W6GYH	173	318	305	8	804
W2RUF	14	414	311	59	798
K4WJI	23	384	370	6	783
W6FOT	4	384	375	5	768
K1LOM	40	357	338	14	747
K3MVO	27	364	336	20	747
W9DYG	41	352	274	38	705
WA2EXP	16	351	317	18	702
K9DHN	21	357	298	14	690
K5DLP	15	331	317	14	677
K3OOU	25	302	228	68	623
K9KZB	19	302	276	26	623
K4MCL	14	297	216	80	607
K5VNJ	21	300	286	0	607
K8LGA	16	279	277	14	586
WB6BBO	70	254	224	18	566
WA2JSG	295	134	114	20	563
K5TEY	7	278	275	3	563
K8YUZ	6	277	268	9	560
W4NTR	6	276	13	263	558
K6MDD	0	267	247	20	534
K1RYT	7	263	254	9	533
K0ZTN	14	247	236	29	526
W5PPE	8	259	230	27	524
W2EW	88	215	74	135	512
K5ANS	68	241	194	8	511
K4SJH	29	242	225	12	508
K7TWD	32	254	217	5	508
WA6WTK	7	248	201	47	503
Late Reports:					
W3VR (Mar.)	31	439	406	21	897
WA2JSG (Feb.)	194	171	132	32	529
WA2JSG (Mar.)	62	285	120	40	507

More-Than-One-Operator Stations

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W6IAB	343	2692	2549	138	5722
W4PFC	37	776	705	37	1555
KR6GF	728	176	46	130	1080
KR6MD	253	297	260	37	847
K5VOZ	832	0	0	0	832
KR6DI	488	35	3	32	558
KR6MB	214	156	109	47	526

BPL for 100 or more *originations-plus-deliveries*

	WN4KKW 128		
K6GZ 314	K8KMQ 128	WA2CCF 106	
W5FFC 293	K3APM 127	WA2UOO 104	
W9NZZ 264	K9IMR 120	W0BDR 104	
K3QOO 228	WB2FWA 115	W9BUQ 103	
K1TMD 203	WA6YLZ 113	W8DAE 102	
K8BIT/8 200	W0AKV 113	WA0BYO 102	
WA4JMP 186	W0PZO 112	K9CYZ 100	
W7APS 171	K1KSH/4 111	Late Reports:	
K7WBC 165	WA6TWS 111	K7WBC (Mar.)	189
K6GMU 146	WA9CCP 111	W7FKK (Mar.)	147
K6HIT 129	K4PXY 110	WA4GFE (Mar.)	126
W7GUH 129	K8GOU 107	W7GUH (Mar.)	113

More-Than-One-Operator Stations

K6FCT 126

BPL medallions (see Aug. 1954 *QST*, p. 64) have been awarded to the following amateurs since last month's listing: K3QOO, WA4IJH, W4ZJY, K5TEY, WA6YLZ, W9BUQ, K9KZB, W0WHE.

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.

Here is the Lee County (Fla.) C.D. Communications bus and a few of its operators. EC/RO W4KOB, George Williams is the 7th from the right, others not identified. George says all hands turned out to put the bus in operation on all RACES frequencies.

Officers of the University of Wisconsin Badger Amateur Radio Society received a commendation on Feb. 13, 1963 for their participation in the Selective Service Emergency Network, from Col. Bentley Courtenay (left), director of Selective Service Headquarters in Madison, Wis. Others in the picture are (l. to r.) K9ABP, K9ANJ, K9ELT, W9OKN, Club Advisor Major Hamann. Photo courtesy *The Capital Times*, Madison, Wis.

be able to get his report in to us by the fifteenth of the month, which is the latest date we can guarantee the report for the current issue. Some of our more conscientious net managers beat their NCS over the head to get their reports and air mail the summary to us to make sure we get it on time. It just isn't fair to them when we give laggards the same credit despite their tardiness. It even encourages them to continue their procrastinating ways.

So beware, you late reporters! Starting next month, late reports will be treated as *no* reports. You have 15 days from the end of the month to collect your NCS reports and get the summary in to us. If we are late getting our copy in (as we are usually, but *not* always), you have a few days grace. Otherwise — *zilch!* — *W1NJM*.

April reports:

Net	*Sessions*	*Traffic*	*Rate*	*Average*	*Representation (%)*
1RN	58	806	.380	13.9	72.7
2RN	60	957	.768	15.9	99.6
4RN	60	747	.382	12.5	85.8
RN5	59	1266	.595	21.5	90.0
RN6	57	637	.492	11.2	73.7
8RN	60	481	.242	8.0	89.0
9RN	30	872	.704	29.1	90.0[1]
TEN	59	695	.438	11.7	67.8
ECN	25	93	.187	3.7	70.7[1]
EAN	30	1762	1.013	58.8	99.4
CAN	30	1836	1.061	61.2	98.9
PAN	30	1515	.859	50.5	100.0
Section[2]	1146	6743		5.9	
TCC Eastern	97[3]	841			
TCC Central	90[3]	297			
TCC Pacific	117[3]	1154			
Summary	1714	19702	CAN	10.2	PAN
Record	2075	27780	1.057	17.8	100.0
Late Reports:					
3RN (Mar.)	62	930	.494	15.0	98.9

[1] Region Net representation based on one session or less per day. Others are based on two sessions or more per day.

[2] Section nets reporting: VN & VFN (Va.); SCS, SCVSN & SCN (Calif.); KSN & EPA (Pa.); MDDS & MDD (Md.-Del.-D.C.); BEN & WIN (Wis.); 50th State (Hawaii); NCN & NCSN (N.C.); MSN & MSPN Noon (Minn.); BUN (Utah); GBN (Ont.); NTTN & TEX (Texas); SCN (S.C.); NEB (Nebr.); AEND, AENB, AENT, AENS, AENR, AENO, AENM, AENH & AENP (Ala.); QFN (Fla.); W. Fla. Phone; NJ6-2 & NJN (N.J.); Tenn. SSB, Tenn. CW; & E. Tenn. Phone; CAEN (Ill.); RISPN (R.I.).

[3] TCC functions reported, not counted as net sessions.

Still three region net reports missing as we write this (hope they come in before we button up), so no general remarks regarding the totals are in order — except you will note that CAN broke the record for "rate" for the month of April. It isn't too likely that any other records will be broken. We'll continue to run "late reports" in the August issue of *QST* (for any late April reports). After that, a late report is the same as no report. Remember, the 15th of the month is the deadline: after that, it's up to Lady Luck.

W1BVR conducted a fine 1RN meeting at the New England Division Convention in Swampscott, Mass., Apr. 28, and put out a very informative and helpful 1RN "guide." W4SHJ announces that 4RN will continue regular sessions at 0045 and 0230 GMT throughout the summer. WA2GQZ's "Traffic Lines" has the makings of a popular traffic bulletin. RN5 continues its improvement; the new manager is W4ZJY; we expect K4AKP will show up as a WB6 soon. The "daylight saving" mess is confusing the issue on RN6. West Virginia is showing up more regularly on 8RN, with WA8CPY doing most of it; W8QFO qualifies for an 8RN certificate. W9ZYK wants "out" as 9RN manager, so the dragnet is out. CAN Manager W9DYG writes a newsy letter which only shows how routinely the turnover of functionaries in an area net are handled out there. W6RSY sends in the PAN report in the temporary absence of WA6ROF.

Transcontinental Corps. W3EML has issued TCC certificates to *W1s* EMG NJM, K1TSD, W2MTA, W3IVC, K3MVO, W4DLA, *W8s* BZX CHT ELW — an imposing list of operators (except for one lid) if we ever saw one. W9JOZ says that heavy QRN resulted in too many unsuccessful TCC-C functions. W7DZX sent his report in with a few missing TCC reports, rather than have it arrive here late. Attaboy!

April reports:

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	97	70.0	1661	841
Central	90	91.1	1530	297
Pacific	117	90.0	2304	1154
Summary	304	83.0	5495	2292

The TCC roster: Eastern Area (W3EML, Dir.) — K1TSD, *W1s* NJM EMG, W2MTA, WA2VAT, K3MVO, *W3s* EML IVC, K4EHY, W4DLA, *W8s* CHT BZX. Central Area (W9JOZ, Acting Dir.) — W4JZY, K9DHN, *W9s* ZYK JOZ DYG CXY VAY, KØZPN, WØSCA. Pacific Area (W7DZX, Dir.) — KøGID, *W6s* EOT HC, WA6ROF, WB6BBO, K7NWP, *W7s* DZX ZB, KØEDK, WØKQD.

DXCC Notes

Discussions concerning the ARRL's Countries List with regard to country status and the associated criteria have appeared in *QST* in July 1959 (page 84); April 1960 (page 80); and August 1962 (page 88). These discussions have been presented for the interest that some may have in such matters. For the benefit of those who may not have access to the issues mentioned, we present again a summary of the factors given consideration when requests are made for some specific addition to our Countries List.

The ARRL Countries List is a result of some 26 years of progressive changes in DXing. The full list will not necessarily conform completely with the criteria since some of the listings were set up and recognized from pre-war. The general policy has, however, remained substantially the same in the make up of the list and only specific mileages have been added. The specific mileages in Point 2(a) and Point 3, mentioned in the following, have been used in considerations made April 1960, and after. The specific mileage in Point 2(b) is being used in considerations made in and after April, 1963.

Any land area in the world can be placed in one or more of the following categories. Where the area in question meets at least one of the points in the criteria it may be considered as a separate entity, i.e. a country, for our Countries List;

1. *Government/Administration:* An area by reason of Government or a distinctively separate administration constitutes a separate entity.
2. *Separation by water:* An island, or a group of islands, not having its own government or distinctively separate administration, is considered as a separate entity under the following conditions;

   2(a). Islands situated off shore from their governing or administrative area, must be geographically separated by a minimum of 225 miles of open water. This point is concerned with islands off shore from the main land *only*. This point *is not* concerned with islands which are part of an island group or are geographically located adjacent to an island group.

   2(b). Islands forming part of an island group or which are geographically located adjacent to an island,

or island group, which have a common government or administration, will be considered as separate entities provided there is at least 500 miles of open water separation between the two areas in question.

3. *Separation by foreign land:* In the case of a Country, such as that covered by Point 1, which has a common government or administration but which is geographically separated by land which is foreign to that Country, if there is a complete separation of the Country in question by a minimum of 75 miles of foreign land, the Country is considered as two separate entities. This 75 miles of land is a requirement which is applicable to land areas *only*. In cases of areas made up of a chain of islands, there is no minimum requirement concerned with the separation by foreign land.

It is hoped that this information will be of assistance. However, should there be a question on some particular area we will be glad to give an opinion.

Announcement is hereby made of one addition and five deletions to the ARRL Countries List. The deletions are JZ0 Netherlands New Guinea, PK1–2–3 Java, PK4 Sumatra, PK5 Netherlands Borneo, and PK6 Celebes & Molucca Islands. These deletions are effective as of May 1, 1963.

The addition to the ARRL Countries List is *PK. . . . Indonesia*. This listing will encompass the entire territory of Indonesia. Confirmations for creditable contacts with Indonesian stations made May 1, 1963 or later may be submitted for DXCC credit starting September 1, 1963.

While the May 1, 1963 date of these deletions and addition does have factual significance with regard to the deletion from the list of JZ0, Netherlands New Guinea, the deletion from our list of the four PK listings and the replacement of these listings by the single listing of Indonesia is simply a reflection and adjustment to a reality.

Attention is called to the fact that at the time of writing, Indonesia is on the ITU "Banned List".

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 credits 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 April 1, thru April 30, 1963.

W1FH....311/327	W9NDA....308/322	W7GUV....307/321	W3JNN....305/319	W1JYH....304/318
W6CUO....310/325	G3AAM....308/322	W1ME.....307/321	W2HMJ....305/318	CX2CO....304/318
W2AGW....310/324	W3KT.....307/321	W2HUQ....306/320	VE7ZM....305/319	W0AIW....303/316
W1GKK....310/325	W8BKP....307/320	W5ADZ....306/319	W0DU.....304/317	W9LNM....303/318
PY2CK....310/324	W6AM.....307/322	W6EBG....306/321	W5MMK....304/317	W8LKH....303/316
W4DQH....309/323	LU6DJX...307/321	W8BF.....306/319	W6GPB....304/317	W3LMA....302/315
W3GHD....309/323	W5ASG....307/321	W9YFV....306/320	W6YY.....304/318	W2LPE....302/316
W8KIA....309/323	4X4DK....307/319	CE3AG....306/320	W9HUZ....304/317	W4TM.....302/316
KV4AA....309/324	G4CP.....307/321	W0QVZ....306/318	W8KML....304/317	W8DAW....302/316
W8BRA....309/323	G2PL.....307/320	W7PHO....306/318	W4GD.....304/318	W0ELA....302/315
W8JIN....309/324	W8UAS....307/320	W1CLX....306/319	K2GFQ....304/318	W4QCW....302/314
W9RBI....308/323	W8DMD....307/320	HB9J.....305/320	W1BIH....304/318	W2TQC....302/315
		W2BXA....305/319		

Radiotelephone

W3RIS....311/326	W8GZ.....308/321	4X4DK....305/317	W8PQQ....303/315	W8KML....302/315
PY2CK....310/324	W1FH.....306/319	VQ4ERR...305/319	W6YY.....303/317	W6AM.....300/314
W9RBI....308/321	W8BF.....305/318	W7PHO....304/316	W4DQH....302/314	W3JNN....299/312
		CX2CO....304/318		

New Members

From April 1, through April 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.

YO3RD.....192	W4GJY.....110	VE8RG.....104	VE6AAV....102	K1NFP.....100	W8CQN....100
UA3AN....175	K6FWU.....110	UL7GP.....104	OK1AFC....102	K2BJR.....100	W9CLH....100
FA8CR.....138	CH8HO.....109	K8NMG.....102	UA2BD.....102	WA2JWV....100	DJ2VKC....100
K1MGA.....130	DJ6RX.....107	G2DF.....103	W1ATP.....101	K2KXW....100	DL5DQ....100
DL9VN.....114	W8GIU.....106	YU1DO.....103	W2KXL....101	K3GKF.....100	DJ5JH.....100
DL1AD.....111	SP5AFL.....105	ZS1VT.....103	K2QEY.....101	K3LXN.....100	UA4SM.....100
YU2AKL....111	W1CWU.....104	W1GOG.....102	K9BJM.....101	K6BOB.....100	4X4MZ.....100
			SP8KBM....101		

Radiotelephone

G3HCU.....178	EA8CR.....136	VR1G.....105	W2QNE....101	VE3DGX...101	W8FGS.....100
DL1PM....136	ZL1AAS....112	K1OLT.....103	K4PXY.....101		

Endorsements

K4LNM....304	DJ3JZ.....252	W3AFM....211	K4ZKZ.....182	W2ADQ....150	W7HLU....120
W6CYI....303	W1RAN....250	W9AZP....211	W6JKJ.....180	K2YMO....150	VE3DGX...120
W7YQN....301	ZS6FN.....246	K5UXP....210	ON4TX.....180	W4FUI....150	VE4XJ.....120
W2SAW....300	WA6AMZ...242	W6PHF....210	F8TM.....178	WA2LWJ....141	PJ3AO.....120
W2PCJ....290	W7BA.....242	W3JW.....204	OA3CT.....173	K1CDN....137	K2SKZ.....118
W2EQS....285	K4TEA.....241	K6HOR.....201	K6ANP.....171	WA6HRS...132	5A3CJ.....118
W6IBD....283	W4AVY....240	W8JRG.....201	W6TCQ.....167	K4YXJ.....130	DJ5LA.....115
OH2NB....281	W9RCJ....237	WA2CBB....200	OE3RE.....164	WA2GFE....130	K1ANV.....114
W2CTN....280	DL6MK....231	W2QDY....200	W3SW.....163	K8GJD.....130	K8RDE.....114
W4EEE....277	K4EDF....230	W4QVJ....200	W6UDR.....161	OZ5DX.....130	K9KVS.....111
W8ZCQ....272	W6LGZ....230	W3ICQ....200	VE2DK.....161	TN8AF.....130	W3BKK.....110
SM7QY....268	SP9KJ....230	W3GUV....200	W8VVD.....160	ZS6UP.....125	WA2JBV....110
W9WFS....264	W6GRX....228	K5AAD....199	K8WOT.....160	W4ZQK.....122	W9WGQ....110
W1ORV....263	K3DCP....220	K4GXK....198	ZS6J.....153	W1ETF.....121	W9YTF.....110
W9RQM....260	W8TTN....220	W8KAK....190	W2GHK.....152	K2KGS.....120	K6RSY.....110
VE6JR....260	UFO.....220	W9NLJ....190	W1EZD.....151	K3MNJ.....120	K8ZPK.....110
W9ERU....252	W3KDF....213	W7TML....183	K7BJE.....151		

Radiotelephone

ZL1HY.....300	CX2AX.....250	W4VZU.....203	YV5AQS....180	SP9KJ.....145	EP3RO.....130
W8UAS....290	W1ORV.....248	PJ2AF.....200	WA6MAZ....165	W2QWL....142	PA0UC.....124
W2HTI....280	WØMLY....240	W1FAB.....194	JICBZ.....162	W2GHK....135	W8VVD.....122
W4EEE....275	G3AIZ.....240	W2YTH....192	K1JNE.....160	K4BMS....130	W5LDH....121
W1CLX....272	ZS6FN.....233	W4FPS.....190	CN8EU.....152	W4LLV....130	W1ETF.....120
W8PUD....268	W1GKK....230	W8CUO....190	W2MOF....150	W7DQM....130	K1INO.....120
OE1ME....260	W2GBC....210	W2FGD....180	W3QIR.....150	WØYZQ.....130	DJ5LA.....113
W2BQM....251					

While the ARRL Board of Directors was engaged in its annual policy-making session which included making official the establishment of the Amateur Radio Public Service Corps, the undersigned was diligently (well, sporadically) compiling statistics from EC year-end reports to ascertain *how we are doing, and perhaps to serve as a basis, or springboard* if you prefer, from which to launch the new AREC-NTS concept.

We received a total of 579 reports, not including a small handful received too late to be included in the analysis. *These reports cover areas embracing an estimated amateur* population of over eighty-thousand, of which 13,000 are AREC members. We are well pleased with this record, which exceeds all previous years, even 1960 when we "bribed" ECs with AREC decals to get their reports in. The complete analysis will be presented in the annual ARPSC (replacing former Emergency and Traffic) Bulletin which we hope to have ready late this summer.

One statistic which we found of interest, considering the impending merger of AREC and NTS, was the total amateurs in the AREC who can handle c.w. at a speed of 25 w.p.m. or higher. Some of the reporters left this blank, one asked "Are you kidding?", as though *this is an unheard-of* speed. But when all 579 reported were totted, it seems that 1871 AREC members can handle code at this tremendous speed or higher. This is not an estimate, these are actual AREC members. Well, this isn't a very high percentage of 13 thousands, but it's still quite a few c.w. men and they could do us a world of good in performing liaison functions with the NTS c.w. nets, especially those operating at levels above section.

For this purpose, a mere proficiency at c.w. is just a basic requirement. From that point, progress can be made toward proficiency at message-handling by c.w. Once a certain amount of proficiency is attained, the rest is a matter of practice. The important point we wish to make is that the EC who uses good c.w. men on voice circuits only is wasting a most valuable skill in his organization — a skill that could be used to excellent advantage linking his local AREC group with the National Traffic System, our nationwide traffic handling service with which all ECs and AREC members should be familiar. Ask for CD-24 if you want the full dope. We'll be revising this circular one of these days to include *more details of the* ARPSC concept, but meanwhile t ie present version adequately describes the system's operation.

Proficient c.w. operators in the local AREC group can be used to link the local net (usually phone) with the section c.w. net, and also the section phone net with the section c.w. net for nationwide coverage. Representation of the section in the NTS region net is a function of the section nets and is best achieved by highly skilled c.w. operators. Such representation should be provided by collaboration between the section phone (PAM) and c.w. (RM) net managers to assure that the section is always represented.

The AREC is being tied to the NTS for nationwide coverage. Both are part of the ARPSC. Therefore, all AREC members should be familiar with NTS operation. — *W1NJM.*

This is the operating room of the Lost Pines Radio Club, W5KPI, at the Radio and Electronics Display Show installed at the Smithville, Texas, jamboree, April 19 and 20. W5KCO is on the left, K5HRR on the right. Club members took turns operating to keep the station active.

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Some time ago, we introduced a new Communications Department form (Form 35) for reporting emergency items for possible use in this column. The principal reason for this was so that information reported to us would be complete, without in any way detracting from the author's style in writing it up. Just now, while going through material for this column, we found five (count 'em) items submitted for possible use which contained no hint of the date on which the event took place. One of them said "recently," but the *rest could have happened in 1885. The date on which the* emergency or activity occurred is an essential and *must be included*, and items submitted which do not include the date will be omitted. We'll write to ask for a date (grumbling as we do so) on communications emergency items, but others will simply be filed without action.

How about using Form 35? We'll be glad to send you a supply of them for your convenience.

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Correction: Page 80, April *QST*, second column, in the squib about Madison County, we incorrectly referred to K4WSU as K4SWU. The former is the correct call.

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We continue with the "Diary of the AREC" (see May 1963 *QST* for last installment):

Nov. 20–21: The Michigan 6-Meter Club conducted "Operation Hospital" at the Dearborn Veteran's Hospital inviting patients to send and receive Thanksgiving Day greetings. The Ford Radio Club, the Met. RC Club and the Tin Lizzie Club cooperated by keeping the frequency cleared.

Nov. 28: Assistant EC K8LOS conducted a hidden transmitter hunt in Western Detroit (Mich.). However, this differed from the usual exercise in that the hunt was conducted in team fashion, with mobiles following instructions from a net control station rather than proceeding on their own. Bearings were plotted and the hidden transmitter spotted at the control station, using readings supplied by the mobiles.

Dec. 2: The Decatur (Ind.) Amateur Radio Society provided communications for the Sabin Oral Polio Mass Immunization Program in Greensburg, Ind. The base station in the headquarters building maintained contact with portables at the six centers to enable a smooth and successful operation.

Dec. 17, 19, 21: "Operation Hospital" was repeated, with K8LUY/8 set up at the Dearborn (Mich.) Veterans Hospital, with five operators taking shifts handling 71 messages with approximately 15 amateurs during the three evenings.

Jan. 13: The R.I. towns of West Warwick and Coventry had a combined AREC/RACES drill designed to test the set up linking AREC mobiles with AREC control to RACES headquarters, and to test mutual aid response. C.D. officials were very much impressed with the efficiency of the AREC units. Thirteen amateurs took part.

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On April 3 a severe snow and sleet storm hit the entire state of North Dakota, downing power, telephone and telegraph lines and isolating a number of communities. Amateurs entered the scene at 0700 CST when WØHNR came on the air calling for assistance in informing the power company of a line outage. WØVBE in Moorhead answered and contacted the power company, and the North Dakota RACES Net was activated with State RO WØPQW in charge. At 1000 WØCAQ, North Dakota SEC, took over the net and traffic was handled for the Soo Line Railroad, whose lines were nearly all down. WØKTZ and KØATK at Hankinson went into operation and with the help of *WØs* AOX CGM and KØPZN attempted to contact the station agent

at Fordville, KØYAF/mobile en route from Minot to Jamestown and Fargo reported in the net and said that over 30 cars were stalled along the highway because of the heavy snowfall. Highway crews were dispatched from the highway patrol at Minot and contact was maintained with the situation through KØYAF during the rest of the trip. WØHNR and WØRGT, with the cooperation of WØLUP, handled some emergency traffic for the R.E.A. and the Ottertail Power Co. in Fergus Falls, Minn. Amateurs received much publicity on their efforts, largely through the efforts of WØBVE. This s.s.b. net operated on 3996 kc.

The a.m. net on 3845 kc. was also active, with *WØs* YCL and RRW in charge, with liaison between the two nets being conducted by *WØs* HSC and RRW. Between the two nets and the statewide coverage they afforded, communications were pretty well restored by 1800 CST on April 3. The following list of calls is submitted of additional participating stations: *WØs* AZV CPS CZL DM DPT DWX DIV ECX EQS FCA GNS GGQ GZO HBR HAT HSC HOZ JRE JDH KZL NVK OEL PQW PMZ PHH QKP SPA SRH TWG UIW VCQ YMU, *KØs* ABC ALP GBR GGL ITZ ITP JOA KAG KLU LXS LRO MHC SPH TWH TWP URT VWG WXL YDM ZVG, *WAØs* AAD BJV CWX. — *WØCAQ, SEC North Dakota.*

A supplementary report on this same emergency from KØHOZ, EC for Pembina County, N. Dak., tells us that the Pembina County RACES net was in operation on 1990 kc., liaison being maintained with the state phone net on 3845 kc., through WØPMZ. Emergency communications were conducted for The Great Northern Railroad and the Ottertail Power Company. The operation lasted from April 2 to 1900 CST April 5. Additional participants include *WØs* IAS ORC HNV, *KØs* KLI ABC.

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Amateurs in Nova Scotia assisted in handling some election returns on April 8 when ice collecting on power and telephone lines caused a number of communications outages. VE1US, VE1ACU and VE1VN set up a circuit to handle returns between Liverpool and Lunenburg. VE1WL and VE1PX handled traffic between Halifax and Annapolis. VE1AGH handled traffic with VE1DW at Yarmouth, as did *VE1s* FQ ABB and PX. Others involved in the emergency operation were *VE1s* AEJ GX and LZ.

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On April 10, WB6ABI and some friends were camping on Mt. Tamalpais when one of the members of the group was severely burned while servicing a gasoline heater. WB6ABI contacted WN6DBN in San Anselmo, who summoned an ambulance which was waiting for the victim when he was transported to the nearest road, a mile from the camp. — *WN6DBN.*

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Amateurs of the Southern Counties Amateur Radio Association (N. J.) assisted, on April 20, in rendering emergency communications for local police and forest fire fighters. The c.d. control center at Atlantic City was activated and the control station operated by *K2s* HBA LZB and *WA2s* AWD SNN and QQA for three days. Atlantic County EC WA2OZQ handled traffic from the Northfield C.D. Headquarters while WA2WKF operated from Somers Point. Others who took part were K2RXB and *WA2s* QOS and TOS in the Ventnor, Egg Harbor and Hammonton areas. K2SOX went mobile to the Elwood area and established contact with control from that point. WA2QOG set up a station in the Elwood firehouse. W2TUR operated the SCARA's mobile unit on 2 and 6 meters, handling traffic for the Elwood and Bargaintown areas. W2PJD made an aerial reconnaisance over the entire affected area and transmitted his observations to WA2SNN who was operating a fixed station in Atlantic City. Much favorable publicity was reaped by the amateurs for this emergency, including a taped rebroadcast of W2PJD's aerial reconnaissance over WFPG in Atlantic City. — *WA2OZQ, EC, Atlantic County, N. J.*

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On April 29, the northern and central sections of Mississippi experienced several tornadoes. SEC K5SQS set up an emergency net on 3987 kc. and reports of four tornadoes were received. Emergency communications were handled for civil defense, Red Cross, the highway patrol, radar installations and municipal police departments. The following stations participated: *K5s* KCH UTE PPI GEI APX JXB TFD OTV, *W5s* IZS RF GTN EPT CQJ EMM LJH SVT

Speaking of communications buses, here is the Southern Counties Amateur Radio Assn.'s mobile unit in action during the Southern N.J. forest fire emergency. That's W2TUR holding the mike.

DNV WUU, *WA5s* CAO CKN EFL AWC, W4VBH/5. Some of these were operating portable and some mobile. — *K5SQS, SEC Mississippi.*

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On the afternoon of April 30, while looking over the storm damage in the Moon Lake, Miss., area, WA5CKN came upon a highway accident in which people were injured. Because telephone lines in the area were still out of service, WA5CKN rendered excellent service with his mobile by contacting WA5CAO and K5SQS, who summoned an ambulance and notified authorities. — *K5SQS, SEC Mississippi.*

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A tornado struck Tuscola, Ill., on April 22. Ten minutes later, the RACES organization of Douglas County was in action. Radio Officer W9UHD headed up the operation as 20 amateurs moved equipment into the area and provided communication where all other means were out. Among the first to be on the air was WA9BFJ of Murdock, where all power had been knocked out; power was supplied by generator. Minutes later, WA9GJN and WN9HHR of Newman were on the air representing that area. Then mobile units from Mattoon were directed into the area by K9FTJ; these were *K9s* LRN DYY HEZ and W9PHD. K9RBW helped direct the mobiles and K9BIX also went out to assist. WA9EMP helped in message relaying. Amateurs throughout Illinois and Indiana, and the Illinois and Indiana Emergency Nets, were also on deck helping out. Service was rendered for radio and TV stations and for individuals covering seven states. Aside from hundreds of personal messages handled, 35 messages were of an "official" character.

A.R.R.L. ACTIVITIES CALENDAR

(Dates shown are per GMT)

July 5: CP Qualifying Run — W6OWP
July 13–15: CD Party (c.w.)
July 18: CP Qualifying Run — W1AW
July 20–22: CD Party (phone).
Aug. 1: CP Qualifying Run — W6OWP
Aug. 16: CP Qualifying Run — W1AW
Sept. 6: CP Qualifying Run — W6OWP
Sept. 12: Frequency Measuring Test
Sept. 14–15: V.H.F. QSO Party
Sept. 21: CP Qualifying Run — W1AW
Nov. 9–11, 16–18: Sweepstakes Contest

OTHER ACTIVITIES

The following lists date, name, sponsor, and page reference of *QST* issue in which more details appear.

Aug. 10–11: WAE DX Contest (c.w.), DARC (next issue).
Aug. 17–18: WAE DX Contest (phone), DARC (next issue).

On May 3 and 4 the Story County (Iowa) AREC rendered emergency communications in an attempt to find the body of a drowning victim in Skunk River north of Ames. WØLSF led the attempt, and the group provided emergency lighting as well as communication; unfortunately, the victim's body was not found. — *WØNTB, SCM Iowa.*

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EC K3ENF of Armstrong County, Pa., advises us in an excellent report of a network of amateurs formed along the Allegheny River on March 16 thru 19 to keep a watch on a flood threat as heavy rains and ice conditions posed an emergency possibility. A "River Warning Net" was formed by W3SIY and W3BRC with the latter as net control, participated in by stations from the extreme headwaters all the way down to Pittsburgh. Daily reports were received throughout March, but when the weather turned warm and snow and ice began to melt and ice began to flow down the river reports were received several times a day. In several places large "ice gorges" formed and the water started backing up; these spots were monitored closely. Fortunately, all broke up and the ice moved down the river before the water became dangerously high. No real emergency developed, but a serious one could have, and these amateurs were ready for it.

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The AREC group of Butler, Dunklin and Pemiscott Counties, Mo., had an excellent chance to use the training gained in their weekly AREC net when a tornado warning was issued on Mar. 16 and the net was activated, remaining on the air for eight hours. WØYHT maintained liaison between the net and the Weather Bureau at St. Louis during this period, but no tornadoes developed in the area. — *KØWNZ, SEC Missouri.*

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The Hudson AREC nets were on alert for the Staten Island (N.Y) fire on April 20, but were informed that they were not needed. During the alert period the net was informed of the need for 12 pints of type B positive blood for an emergency open heart surgery, and the net occupied itself obtaining donors. — *WA2QAO, EC Bronx, N.Y.*

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Tornadic conditions in Southern Michigan had several AREC groups in the area on alert in middle and late April. The amateur groups followed storm fronts and kept officials supplied with complete information regarding exact weather conditions throughout the area. Groups reporting as having participated were the Southern Michigan 6 Meter Net and the AREC groups of Calhoun and Oakland Counties, Mich. About 50 AREC members were active under ECs K8AEM and K8YRV, respectively.

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The terrific improvement in SEC reporting continues to make itself evident, as *forty-three* (43) SECs reported for March, representing 17,618 AREC members, an increase of twelve reports and over 3,000 members from March of 1962. Only 30 reports to go and we'll be 100%. March reports were received from the SECs of Ill., Del., E. Mass., S. Texas, N.Y.C.-L.I., Nevada, Alberta, Kans., Minn., Mich., Ohio, E. Bay, S.J.V., N.C., S.C., Wyo., Ala., E. Fla., Mo., Maine, Mont., Ore., Wash., New Mex., Los A., Ariz., N. Texas, Tenn., Ga., E. Pa., N.N.J., So. Dak., Utah, W. Pa., W. Mass., Ind., Iowa, S.C.V., R.I., Okla., B.C., N. Dak., Miss.

Pacific Division Bulletin Schedule

The following stations send scheduled Pacific Division Bulletins. W6ZF and W6CUA additionally make weekly OBS Transmissions.

W6ZF	2nd & 4th Mondays	0300 GMT	3540 kc.	A-1 tape
W6NRM	2nd & 4th Wednesdays	0300 GMT	3610 kc.	F-1 RTTY 60 w.p.m. 850 cycle shift, also NBFM
W6CUA	Tues., Thurs., Sat.	0115 GMT	3915 kc.	A-3 LS Band AM
K6DYX	Mon., Thurs., Fri.	0400 GMT	3625 kc.	RTTY

SS Corrections

In the *May QST* Sweepstakes report, the phone winner for the Nittany Amateur Radio Club of Pennsylvania should be K3BLG, with a club aggregate of 133,623. The Tusco Radio Club of Ohio should have been shown with a total score of 503,029 — *sorry, fellas!*

APRIL CD PARTIES

On the surface some of the scores shown below are pretty startling but let's not have any hasty assumptions fellas', these are just *high-claimed scores!* Preliminary checking is turning up some unusually careless record keeping, duplicate QSOs, etc. The *July CD Bulletin* will have complete results.

One of the c.w. regulars, K8MTI, regrets to say this might be his last appearance for quite awhile. Bill will be pounding books at Duke instead of brass at K8MTI. W7WJB who aided W6CUF in compiling that elegant total at WA6GFY pleads for a go on 15 at a convenient time, say 1800 GMT. Care to try it for July?

KØLGZ, opr. WØEEE, put his phone crystal ball to excellent use and "guesses" this phone party to show WA2NCE W1NJL K9MAN W9AQW and K2QDT in the first five places. How right can you get?

The following are the high claimed scores, number of QSOs and sections. Final results will appear in the *July CD Bulletin.*

— *W1YYM*

C.W.

K4HSB	236,155-640-73
K5HRR[1]	167,700-554-60
W9AQW	160,735-523-61
W4DVT	144,770-460-62
W6ISQ	141,980-451-62
K8MTI	141,670-450-62
W4JJ[2]	140,725-430-65
K4BAI	139,190-442-62
W1MX[3]	135,700-453-59
K5OCX	134,225-449-59
WA2NCE	120,280-384-62
K1WJD	119,255-384-61
W9LNQ	111,935-362-61
W9YYG	111,215-372-59
WA2WLN	111,000-365-60
K9ZLA	108,500-345-62
W8VPC	104,310-335-61
W4WHK	104,135-348-59
W1SWX/1	104,110-352-58
K9DHN	103,600-365-56
W2GKZ	102,080-345-58
K7CTI	100,800-356-56
W9NLJ	100,650-360-55
WA6GFY[4]	192,780-605-63

PHONE

WA2NCE	21,000-116-35
W1NJL	20,095-107-37
K9MAN	18,375-105-35
W9AQW	18,180- 97-36
K2QDT	15,190- 98-31
WØEEE[5]	8700- 58-30
WA4ELB	8500- 85-25
K5MDX	8400- 56-30
W1PYM	6720- 51-24
W1ZM	6555- 50-23
W1AW[6]	6480- 47-24
W9NLJ	6250- 44-25
KØKKQ	5760- 43-24
W2ZVW	5750- 43-23

[1] K5ABV, opr. [2] K4VFY, opr. [3] K4RNH, opr. [4] W6CUF, W7WJB, oprs. [5] KØLGZ opr., [6] W1WPR, opr.

K5ABV put K5HRR's station through the paces in the Apr. CD Party to the tune of 554 QSOs in 60 sections. Marv thanks Doc for allowing him the use of his fine gear. Some of the antennas at this interesting station are: Telrex tribander, 12-L 2-meter beam on a 100' tower, 40-meter 2-L beam and a 10-L 6-meter beam on an 80' tower, and various dipoles from 60 to 100' high.

NATIONAL CALLING AND EMERGENCY FREQUENCIES (kc.)

3550	3875	7100	7,250
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 FM 52.525 146.94

GMT CONVERSION

To convert to local times subtract the following hours:

ADST −3, AST −4, EDST −4, EST −5, CDST −5, CST −6, MDST −6, MST −7, PDST −7, PST −8, Hawaiian −10, Central Alaska −10.

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 July 18 at 0130 GMT. Identical tests will be sent simultaneously by automatic transmitters on 3555, 7080, 14,100, 21,075, 28,080, 50,700, and 145,800 kc. The next qualifying run from W6OWP only will be transmitted July 5 at 0400 Greenwich Mean Time on 3590 and 7129 kc. *CAUTION:* Note that since the dates are given per Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. *Example:* in converting, 0130 GMT July 18 becomes 2130 EDST July 17.

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.

W1AW conducts code practice daily at 0130 GMT on all frequencies listed above with speeds of 15, 20, 30, and 35 w.p.m. on Tuesday, Thursday, and Saturday, and at 5, 7½, 10, and 13 w.p.m. on other days. Approximately 10 minutes' practice is given at each speed. To check your copy, the texts used on several transmissions are listed below. The order of words in each line of *QST* text is sometimes reversed. To improve your fist, try to send in step with W1AW.

Date Subject of Practice Text from May *QST*.

July 1: *Eighty-Meter BCI*, p. 17
July 9: *A Crystal V.F.O.*, p. 45
July 18: *Pulse: A Practical Technique . . .*, p. 58
July 23: "ZZZZZZZZZZZZZZZZZZZZ", p. 86
July 29: *Senator Gets Amateur License*, p. 93

Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition

July 17: *Setting Up a Station*, p. 7
July 26: *The Operating Table*, p. 7

W1AW SCHEDULES

(July 1963)

Operating-Visiting Hours

Monday through Friday: 1 P.M.-1 A.M. EDST.
Saturday: 7 P.M.-2:30 A.M. EDST.
Sunday: 3 P.M.-10:30 P.M. EDST.

The ARRL Maxim Memorial Station welcomes visitors. The station address is 225 Main St., Newington, Conn., about 4 miles south of West Hartford. A map showing local street detail will be sent on request. The station will be closed July 4, Independence Day.

Operating Frequencies

C.w.; 1820, 3555, 7080, 14,100, 21,075, 28,080, 50,700, 145,800 kc.

Voice; 1820, 3945, 7255, 14,280 (s.s.b.), 21,330, 29,000, 50,700, 145,800 kc.

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 Greenwich Mean Time.

C.w.; Monday through Saturday, 0000; Tuesday through Sunday, 0400.
Voice; Monday throug Saturday, 0100; Tuesday through Sunday, 0330.

Caution. Note that in the U. S. and Canada, because times are GMT, bulletin hours actually fall on the evening of the previous day.

W1AW CONTACT SCHEDULE

Would you like to work W1AW? W1AW welcomes calls from *any* amateur station in accordance with the following schedule:

Time (GMT)	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000–0030[1]	.....	14,280	3555[3]	14,100	14,100	7080[3]	14,100
0030–0100	.....	14,280	3555	14,100	14,100	7080	.....
0100–0130[1]	.....	145.8 Mc.	21,330	145.8 Mc.	50.7 Mc.	21,330	.....
0230–0300	.....	.....	.....	1820	.....	1820	.....
0300–0330	.....	.....	.....	3555	.....	3945	.....
0330–0400[1]	.....	.....	3945	7255*	3945	7255*	3945
0400–0500[1]	.....	.....	3555[3]	.....	3945	7080[3]	.....
1700–1800[2]	.....	21/28 Mc.	21/28 Mc.	21/28 Mc.	21/28 Mc.	21/28Mc.	.....
1900–2000	.....	7080	14,100	7255	14,100	7080	.....
2000–2100	.....	14,280	7080	14,100	14,280	14,100	.....
2200–2300	.....	14,280	14,280	14,280	14,100	7255	.....
2300–2330	.....	7255*	.....	21,075[3]	.....	14,280	.....
2330–2400	.....	14,100	.....	3555	.....	14,280	.....

[1] Starting time is approximate. General-contact period on stated frequency begins immediately following transmission of Official Bulletin, on c.w. at 0000 and 0400, on phone at 0100 and 0330.
[2] Operation will be on 21,075, 21,330, 28,080 or 29,000, depending on band and other conditions.
[3] W1AW will listen for Novice Class licensees on the Novice portion of this band before looking for other contacts.
* Operation may be on s.s.b. as announced at the beginning of the period.

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, PAM: K3BHU, RM: W3EML, V.H.F. PAMs: W3SAO and W3SGI. The EPA C.W. Net had a QNI of 416 and a QTC of 505. The Philadelphia AREC got off to a start at a meeting attended by ECs K3QJU, W3AHZ, W3FLP, K3GLL, W3ELI, V.H.F. PAM W3SAO and your editor. The new EC for Delaware County is W3FLP. Philadelphia AREC nets are on 50.2 and 145.2 Mc. Thurs. evening. Lackawana County EC W3QDW appointed W3VAP and K3VVY Asst. ECs. New Gear Dept.: To W3SGI an HT-37, a DB-23 preselector to W3HNK, K3SME added a DSB-100, W3PDJ added an Apache and an SB-10, K3NLW a Comanche receiver. K3DLA changed QTH to Philadelphia. New General Class licensees are K3SUZ, K3WMH and K3UUY. A Novice newcomer is KN3YGO. The Chester County AREC Emergency Net is planning traffic control for the 100th Anniversary Parade in West Chester. The Adams Co. AREC Net moved from 3865 kc. to 28.8 Mc. K3SFW and K3TYE, along with many others, have been working the 6-meter band openings for DX. W3RV celebrated his 66th birthday. New club officers: ARTICS Club—K3OMP, pres.; K3NTD, vice-pres.; K3RZM, secy; K3WAK, treas. Bucks County ARC—K3HHS, pres.; K3MIJ, vice-pres.; K3ODM, secy.; K3UWH, treas. Ivyridge ARC—W3MIC, pres.; K3OQD, vice-pres.; K3UNU, secy.; K3LJZ, treas. The Knuckleheads' annual picnic will be held Aug. 11 at Coopersburg. K3MVO was awarded the TCC certificate. K3RFH was QRT because of parasitics in the final. K3DSM is attending Valparaiso Technical Institute in Indiana. W3EU acquired a 1-kw. generator and operated Field Day from his veranda. The Germantown ARC visited WCAU-TV and picked up a few used bottles as souvenirs. K3MPN and W3ZRQ braved the wilds of the Poconos via an expedition and handed out 6-meter confirmations from Carbon County to 146 stations in 9 states. Look for more counties via this team in the future. I wish to thank all who sponsored our nomination for SCM and hope we can serve you as well as in the past. Traffic: (Apr.) W3CUL 4207, W3EML 1219, W3VR 1009, K3MVO 747, K3JSX 374, K6GMU 344, K3MQF 284, K3CAH 201, W3RV 89, W3ZRQ 88, K3HNP 72, K3BHU 69, W3LC 47, K3KTH 31, W3CHU 30, W3JKX 30, W3OWE 29, W3SGI 28, W3BKF 24, W3ELI 24, W3OY 22, W3QDW 20, W3SAO 20, W3BFF 19, K3ARR 16, W3GJA 14, W3HNK 13, K3SME 12, K3MDG 10, W3PDJ 10, W3ADE 8, K3EMA 6, W3JYL 6, K3LTI 6, K3ANU 5, W3FAF 5, K3NLW 5, W3DUI 4, K3HTZ 4, K3MNT 4, K3AKN 3, W3EEN 3, W3LXN 2, K3RZM 2, K3TYE 1. (Mar.) W3VR 897.

MARYLAND—DISTRICT OF COLUMBIA—SCM, Andrew H. Abraham, W3JZY—SEC: W3CVE. RMs: K3JYZ and W3TN for the MDD Traffic Net, which meets on 3649 kc. daily at 0000Z. RM: W3ZNW for the MDDS (slow) Net on 28.1 Mc. and 3649 kc. at 0130Z. PAM: W3EQK. MEPN meets on 3820 kc. M-W-F at 2300Z and on Sat. and Sun. at 1800Z. K3APM is very busy with traffic and made the BPL in April. W3RKE helped at Naval Station NSS during the Armed Services Day activities. W3CDQ is going on a trip overseas. W3ECP has been busy visiting out-of-town clubs. K3DNO sends in a very good OES report. W3IVC had a very low (216) traffic count as he was off the air for seventeen days. However, Red was presented with one of those well-earned and hard-to-get TCC Net certificates. K3JYZ is back in the swing of the net again. K3LFD is quite busy with various skeds on the nets. K3LLR has moved into the basement where he has built his new station. He has a Novice, KN3YBK, as a neighbor. W3PQ says that the static is building up on the low frequencies and he will try v.h.f. on 6 and 2 meters. K3PRN sends in a very fine OES report. K3QDD got his 25-w.p.m. certificate. Rick also enjoyed the April CD Party. K3QFG lost his antenna and had to get a new one. K3QOO made the BPL. Mike will be busy at Northwestern University for eight weeks this summer. K3QOY is a new OES in the Hagerstown area. W3RKK has been working in the traffic nets and soon will be checking in on the MDD Net. Lee has passed the Extra Class exam and will be operating s.s.b. with an HX-20. W3TN reports that the MDD handled 377 messages for a new traffic high. Dave, I (your SCM) have received several excellent comments on the ORS bulletin that you sent out to all ORSs. K3OAE has been checking into the MDD from Cambridge, Mass. W3YKQ has his new 300-watt linear final working; he worked seven new DX stations. W3ZAQ has been off the air. W3ZNW reports that the MDDS (slow) Traffic Net will use 28.1 Mc. and 3649 kc. at 0130Z until this fall. KN3VSS has acquired his General Class ticket and is using a DX-60. W3HWZ is chairman of the new Chapter of the QCWA in the Baltimore area. Traffic: K3QOO 331, K3QDD 259, W3TN 252, K3APM 233, K3QFG 233, W3IVC 216, W3BKE 73, K3JYZ 68, W3HQE 60, K3WBJ 38, W3PQ 33, W3ATQ 25, W3ECP 16, W3ZNW 15, W3RKK 14, W3GZK 12, K3LLR 5, K3NCM 2, K3QOY 1.

DELAWARE—SCM, M. F. Nelson, K3GKF—PAM: K3LEC. RM: W3EEB. DEPN meets on 3905 kc. Sat. at 1830 local time, DSMN on 50.4 Mc. Tue. at 2100 local time. Renewals: K3BYJ as ORS. An amateur station was placed in operation at the Delaware State Science Fair at the University of Delaware Apr. 4-6. Easter messages from the general public were accepted and among those who helped maintain the station or who handled the traffic were W3s CFA, EEB, EKO, HKS and K3s AZH, GKF, MCY, MVR/3, OBU, OZM, QPD, SXA and KN3VYL. Some DEPN members also stood by. K3CNI is back on the air after his bout with TVI. K3KEO sent in a nice v.h.f. propagation report. K3PZL had a project in the State Science Fair. K3SXA now is on 10 meters. Traffic: K3AZH 261, K3SXA 33, K3PZL 19, W3EKO 18, W3EEB 13, K3EWK 6, K3KAJ 5, K3GKF 4, K3AXW 2.

SOUTHERN NEW JERSEY—SCM, Herbert C. Brooks, K2BG—SEC: K2ARY. PAM: W2ZI. RM: WA2VAT. New appointments: W2MMD, Monroeville, as OPS and K2JKA, Woodbury, as Gloucester County EC. Jack expects to appoint 3 Asst. ECs to help with the work. Mail AREC Form 7 to him for Gloucester Co. WA2WLN, Linwood, is doing an outstanding job traffic-handling, N.J. Emerg. Phone & Tfc. Net totals for April: QNI 337, sessions 30, traffic 74. WA2NXV, Gloucester, expects to be fixed portable 2 this summer from Ocean City. W2BEI, Audubon, reports DXCC totals are now 120/112. W2YNR and his XYL have gone to the Island of Saba in the Carribean. The Gloucester Co. ARC Hamfest is scheduled for Aug. 12. NJN's April totals were 30 sessions, traffic 522. QNI 576. SNJ regulars in the net are W2RG, WA2BLV, WA2VAT and WA2WLN. Those helping with Southern Counties ARA's Field Day plans were K2SOX, W2TUR, K2BKG, WA2AWD, WA2QOG and WA2OZQ. K2CIR received the Amateur Extra Class license. WA2POX/5 is located at Kessler Field, Miss. K2BZK, Somerdale, was SJRA's Field Day chairman. W2BV, Minotola, has a new crank-up tower, probably for 220. W2BLV, Haddon Heights, has been making improvements to his Model 15 RTTY machine. The Burlington Co. Radio Club has renewed its affiliation with the League. W2HBE, SJRA's president, is spearheading a drive in the club to promote greater activity on v.h.f., especially on 220. WA2EMB, Haddon Heights, has worked 9 states on 432 Mc.; greatest distance 260 miles. No reports of activities were received from the Delaware Valley Radio Assn. or the Cumberland Radio Club. Traffic: (Apr.) WA2WLN 340, W2RG 258, WA2VAT 189, WA2BLV 102, W2ZI 29, K2RXB 22, WA2NXV 14, W2MMD 5, W2BEI 4, WA2KAP 3, W2IU 1. (Mar.) WA2BLV 74.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2ICZ. RMs: W2RUF, W2EZB and 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. A BPL certificate for April traffic goes to W2RUF. Congratulations. W2PZI has been appointed OO. K2ADX has become a Silent Key.

(Continued on page 108)

THE INTERNATIONAL HAM-HOP

WHAT is it? A new kind of dance? No! It is an organization, and a remarkable idea. It is a chance for radio amateurs to meet their overseas buddies in person, and to complete the personal contact that was started by air.

THE International Ham-Hop Club has nearly 600 members in 50 countries, and exists for the purpose of making it easier for them to visit each other. Each member agrees to put up other visiting members for not more than two nights per year (although a longer stay is possible if the host agrees). In return, he gets to use the facilities of the Club anywhere in the whole world where there are members, as often as he wishes. Thus:

1) The traveler obtains insights into the life of the society visited by sharing life in the homes of its people. The well-known commercial tour only shows one the inside of hotels, and these are the same all over.
2) The traveler has contact with others having common interests. His personal needs and particular interests are often catered for in advance, and special meetings of radio amateurs and visits of special interest are arranged for his benefit.
If the visitor wants to see the 'sights of the city', his hosts can show him choice restaurants, non tourist-plagued spots, and other points of interest. His hosts can give him a feeling for the land and people which would be difficult to obtain otherwise.
3) There is a considerable reduction of travel expenses. If a car or hitch-hiking is used, it costs even less. Hitch-hiking is a practical form of transportation in many countries outside of North America, particularly in Europe.

HOW did this all begin? G3CED and numerous radio contacts in Germany agreed that it ought to be possible for a ham to travel the length of that country, using only radio amateur facilities for accommodations. Was it practical? In the summer of 1956, G3CED tried it, and toured the Rhine Valley and Black Forest, all on a 49 cc 'Moped' Motor Scooter! It was a tremendous success, and they decided to formalize it; the Club was the result, with G3CED as General Secretary. The Club met with enthusiastic support in Great Britain, Germany, and Northern Europe; less so in Southern Europe, and now there is a sprinkling of members all over the world. A few years ago W1DMD started it in the U.S.A. and Canada, and recently XE1Z has taken it up in Mexico. In 1962 the North American Division adopted the name: North American Ham-Hop Association, so as better to suit its identity.

THE North American membership is approaching 100, which isn't much, but we are fairly well distributed. We have not yet had many visitors from abroad, but we are now sufficiently numerous to make an organized program of Ham-Hopping practical here. We expect to welcome the visitors to our homes, beginning in 1963.

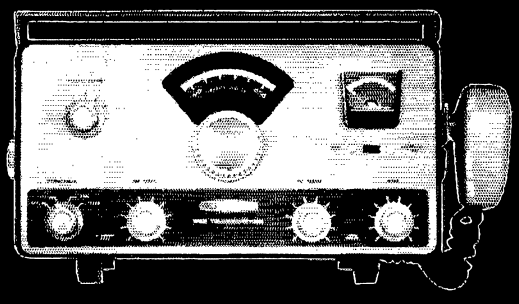
IN the summer of 1960, W6THN and his XYL took a typical Ham-Hop abroad, and members from North America have been doing it ever since. W6THN traveled through England, France, Belgium, and Germany, using IHHC facilities all the way. They went as far as Rome, and then back up through France to England again. They hitch-hiked all the way, and the trip cost $2.80 each, per day (some people can do it on $1.50 each per day, but that does not allow for occasional luxuries and souvenirs). They were able to get directly into the homes of the people they visited, and pitied the tourists they saw who glimpsed only the superficial aspect of the visits. To the surprise of W6THN and wife, they were even hosted by people who had no intention themselves of traveling, but who enjoyed seeing the world come to their own doorsteps.

THE facilities of the Ham-Hop Club make travel not only more possible, but far more enjoyable. Whether you like to travel or/and entertain, you can benefit. The more members we get, the better the system will work. Will you join us??

R. LEE GUNTHER, W6THN
G. A. PARTRIDGE, G3CED

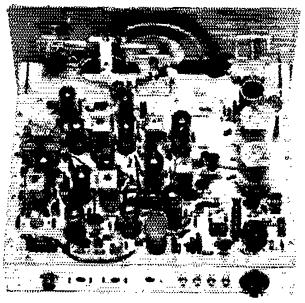
PICK A BAND . . .

SINGLE BAND SSB . . .



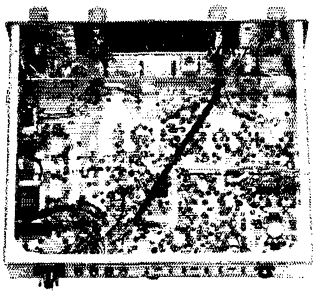
TAKE YOUR CHOICE . . .

...PICK A NEW HEATHKIT



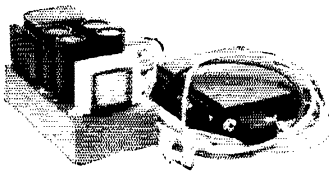
80, 40 & 20 METER SSB TRANSCEIVERS—Brand new! More features . . . better performance . . . at one-third the cost of three-band units. Save by buying only the bands you need • True Transceiver for one band, one sideband operation • Crystal filter type SSB generator • Automatic level control • PTT and VOX circuits built-in • Low frequency VFO (1.5—1.7 mc) for greater stability than comparable units • 2KC dial calibration; 6" of bandspread; vernier tuning • Provision for operation with linear amplifier • Easy assembly with heavy-duty circuit board, rugged steel chassis and wiring harness • Welded and braced one-piece steel chassis & cabinet, gimbal mounting bracket • Accepts Heathkit HRA-10-1 100 KC Crystal Calibrator as plug-in accessory • Uses GH-12 push-to-talk microphone • Operates with new Heathkit HP-13 (DC) or HP-23 (AC) power supplies; also Heathkit HP-10 (DC) or HP-20 (AC) supplies **HW-12, 80 meters,** available June, no money dn., $11 mo. **$119.95. HW-22, 40 meters,** available July. **HW-32, 20 meters,** available August.

...TRANSCEIVERS JUST $119.95 EACH



SPECIFICATIONS—RF Input: 200 watts PEP, **Tube Complement:** Fourteen tube heterodyne circuit; (3) 6EA8 mic. amp., VOX relay amp., IF amp., RF amp., Rcvr. mixer; (5) 6AU6's, VFO, VOX amp., IF amps., Xmtr. mixer; (1) 6BE6, VFO isolator (HW-12), Het. osc and mixer (HW-22 & HW-32); (1) 12BY7, Driver; (1) 12AU7, Xtal osc., product det.; (1) 6EB8, Audio amp. and output; (2) 6GE5 R.F. output. **Sideband Generation:** Crystal lattice bandpass filter method. **Stability:** 100 cps overall after warm-up. **Carrier & Unwanted Sideband Suppression:** 45 db. **Frequency Coverage:** HW-12, 3.8—4.0 mc; HW-22, 7.2—7.3 mc; HW-32, 14.2—14.35 mc. **Receiver Sensitivity:** 1 uv for 15 db S+N/N ratio. **Receiver Selectivity:** 2.7 kc @ 6 db, 6.0 kc @ 50 db. **Output:** 50 ohm fixed (unbalanced). **Operation:** HW-12 & HW-22, LSB; HW-32 USB. **Audio output:** 1 watt @ 8 ohms. **Mike Input:** Hi-Z. **Panel Controls:** Frequency, final tune, function (OFF-PTT-VOX-TUNE), RF gain, AF gain, (pull for crystal calibrator), VOX gain, meter. Front panel screwdriver adjust for S-meter and VOX delay. **Rear Panel Controls:** Mike gain, tune level, final bias. **Power requirements:** 800 VDC @ 250 MA peak, 250 VDC @ 100 MA, —125 VDC @ 5 MA, 12 VAC or VDC @ 3.75 amperes. **Cabinet Dimensions:** 6" H x 12" W x 10" D.

...80, 40 or 20 METERS



POWER SUPPLIES FOR ABOVE: Specially designed for SSB operation with emphasis on maximum dynamic regulation . . . may be used with most other popular SSB transceivers. Dependable solid-state circuitry is used throughout with long-life silicon rectifiers in both units and rugged power transistors in the HP-13 "mobile" supply. Both units provide output at: (HV) 800 VDC @ up to 300 ma, SSB duty cycle; (LV) 325 or 240 VDC @ 150 ma (selected by transformer tap), continuous duty to 175 ma; (Bias) —130 VDC and adjustable —40 to —80 VDC. The HP-23 AC supply also furnishes filament voltages of 12.6 VAC @ 5 amps or 6.3 VAC @ 10 amps. Extensive filtering assures low AC ripple content for smooth DC output. Input voltage requirements are 12-14 VDC for HP-13 DC "mobile" supply and 120 VAC, 50-60 cycle for HP-23 AC supply.

Kit HP-13. DC "Mobile Supply", available August, Price To Be Announced
Kit HP-23, AC Power Supply, available June, $5 mo.....**$39.95**

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THE FATE OF A NATION

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THE ULTIMATE PROOF OF THE FINE PERFORMANCE OF THE GOTHAM VERTICAL ANTENNAS IS IN THE ACTUAL FIELD RESULTS, BY HAMS ALL OVER THE WORLD.

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 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.

CASE HISTORY #407

"I recently purchased a Gotham V80 vertical antenna and I am very pleased with the results. Up until now my home brew antenna has had a very high SWR, but with the V80 the SWR is 1:1." J. D. R., Virginia.

BEAMS	Rugged Yagi design, full half-wave, Gamma-matched
6 Meters, 4 Element	$25.95
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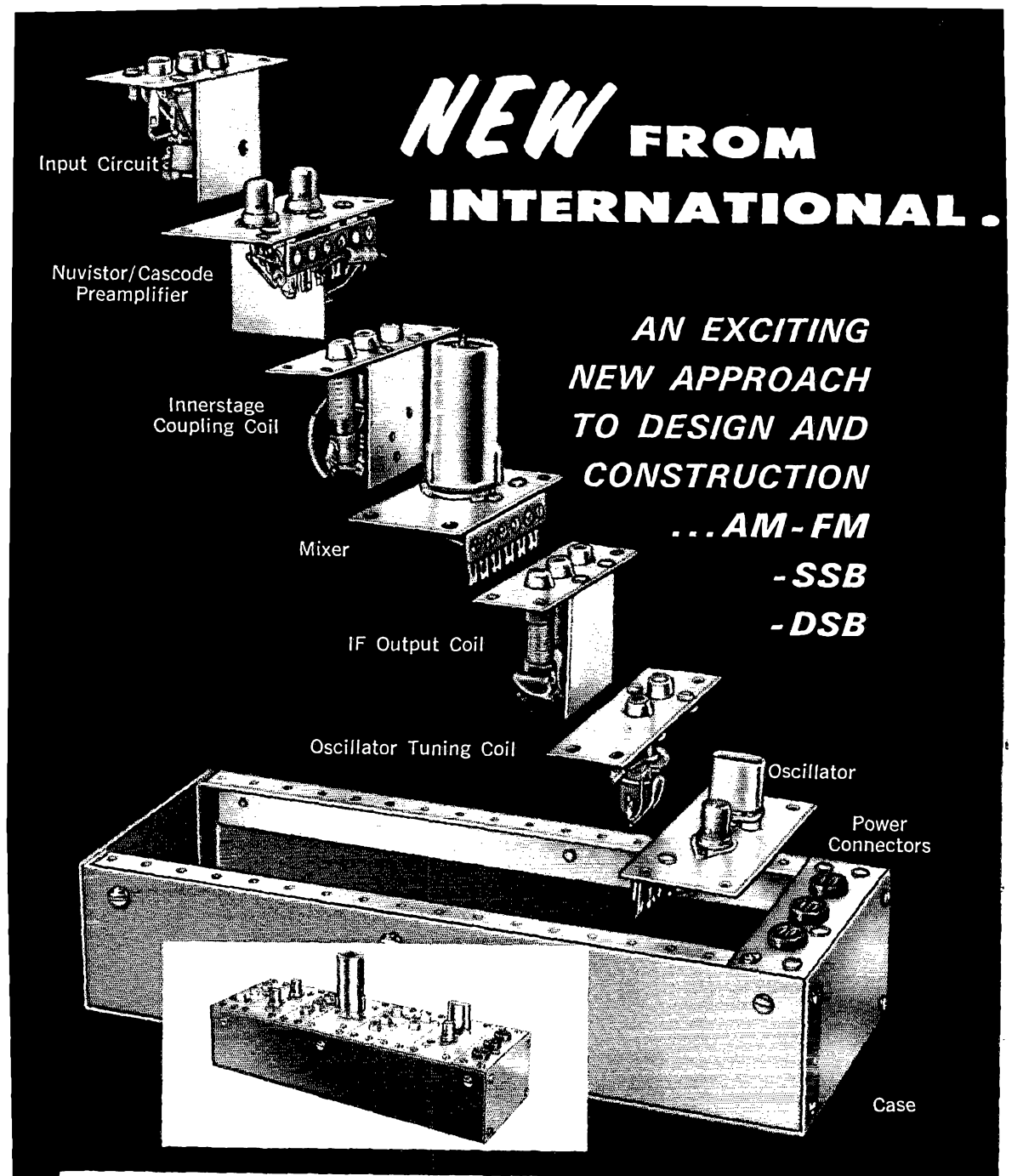

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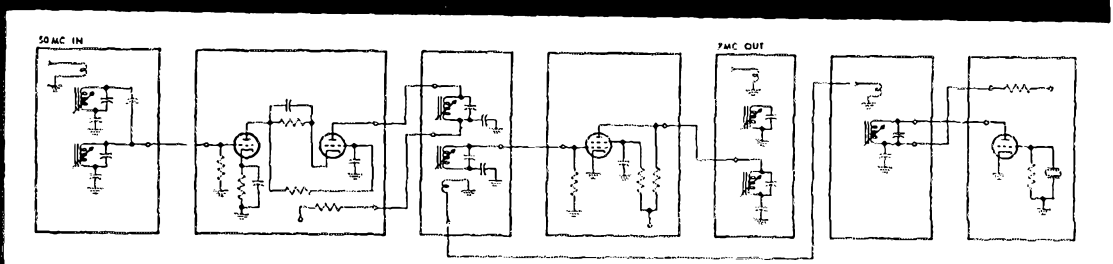

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City_____ Zone____ State_____

Station Activities

(*Continued from page 100*)

He will be remembered by RAWNY and fellow hams in the Erie County area. WA2VZA has a Viking Challenger. W2QHQ should be back on NYS c.w. by now. The ARATS has appointed a radio noise location committee consisting of WA2ETP, K2RUM and W2EYE. Auburn ARA held its Annual Dinner and a week later sponsored a Central N.Y. transmitter hunt and picnic. It sounds like a real active group with a lot of activity. W2ICE and W2QY shared the program with W6ZH and W9AC at Old Timers Night at the Ford Museum at Dearborn, Mich. They represented the Antique Wireless Assn. This is quite an honor and we are lucky to have this club in our section. The group is always ready to help out on the program for hamfests and banquets. You are missing an interesting experience if you've never visited the Historical Radio Museum maintained by the club at Holcomb, N.Y. The long-awaited arrival of spring has seemed to diminish reporting activity this month. I guess everyone went fishing or golfing. Traffic: W2RUF 798, W2EZB 286, W2GVH 175, W2FEB 161, WA2LKW 81, K2JPM 74, K2HOH 71, WA2KZQ 69, WA2HEC 53, W2QHH 52, W2FCG 46, W2ANE 45, K2OFV 43, WA2HSB 29, W2RQF 27, K2JBX 26, K2IMI 25, K2AYQ 20, WA2DAC 18, K2RYH 18, WA2WEE 14, K2TDG 4, WA2GLA 2.

WESTERN PENNSYLVANIA—SCM, Anthony J. Mroczka, W3UHN—SEC: W3LIV. RMs: W3KUN and W3NUG. The WPA Traffic Net meets Mon. through Fri. at 2400 GMT on 3585 kc. The Keystone Slow Speed Net (KSSN) will not operate during the summer months. The WPA Net will continue through the summer and also take in Sat. and Sun. for a seven-day weekly coverage. Congratulations to K3OOU on making another BPL and earning his medallion. Congratulations to K3PYS for perfect attendance on WPA in April. W3YA is getting a station set up at home. The Fort Venango Key Club recently held operation "Snow Flake." K3SCM has a homebrew quad on 6 meters. The Etna RC reports via *Oscillator*: W3MTY is recovering from a recent heart attack; W3GST has a new tilt tower; K3RQV lost his tower in a recent storm. K3DKE let his license expire. The Butler County amateurs recently held their first AREC drill under the supervision of the EC, K3DKH. K3BWI and K3CTN are getting their diplomas from Penn State. W3FRQ is entering her senior year at the Butler Hospital Nursing School. Up Erie way: the annual R.A.E. Hamquet was well attended by members and their wives. W3KPJ was toastmaster and was attired in clothing becoming the Perry Sesqui-Centennial which is being held there this year. The Foothills Radio Club now is the proud owner of an HT-37 and an SX-115. The Coke Center RC reports: K3VIQ has a new Valiant and a tri-bander beam; K3LQK has his modulator fixed; K3NGY is home from the hospital. The Western Pa. Mobileers have been conducting tests with the local Civil Air Patrol in regard to locating lost aircraft. The Horseshoe RC reports via *Hamateur News*: W3LQD has been appointed as Asst. EC; K3PCE is constructing a 2-meter receiver; W3LIV made DXCC, WBE and WAC. The Indiana County ARC is incorporating and elected K3HHI, pres.; K3TOM, vice-pres.; W3IYI, secy.-treas. K3EDO is moving to Irwin, Pa. K3AKR is working on a 220-Mc. rig. The Nittany ARC reports via *QST de K3HKK*: The Centre County AREC will supply mobile communications for the Fourth of July Firemen's Parade; K3CNZ and K3AHY have new jr. operators. Traffic: K3OOU 623, W3MFB 180, K3PYS 174, W3KUN 113, W3NEM 112, W3YA 76, W3IYI 50, W3OEO 44, W3UIN 31, W3DKN 30, K3OWN 26, K3DKE 19, W3LOD 12, K3SMB 10, K3EXE 8, K3COT 5, K3BWI 1.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—Asst. SCM: Grace V. Ryden, W9GME. SEC: W9RYU. RM: W9USR. PAM: W9VWJ. EC of Cook County: W9HPG. Section net: ILN: 3515 kc. Mon. through Sat. at 1900 CDT. All ECs are asked to check into the new EC net every Sun. at 1600 GMT on 3840 kc. W1LVQ, WØTSN, W9HPG and W9PRN were among the League Officials who attended the testimonial for former Central Division Director John G. Doyle in Milwaukee Apr. 20. Many Central Illinois amateurs were active immediately following the tornado which hit Apr. 22 and provided communications for relief agencies and clean-up crews. New appointments: K9GRC and WA9DOC as OBSs. W9ABI as OO. W9FLQ, W9REC, W9TZN, K9VLV, W9WYB, K9ZSE, W9YTQ, W9UA, W9HPG, W9IMN, W9JUV and W9KCR participated in the recent ARRL Frequency Measuring Test. K9EBA is using a sixteen-element array for bringing in the DX on 2 meters. The new officers of the Wheaton Community Radio Amateurs are W9GOX, K9BHI, K9MHP, W9RFS and W9SKX. The Starved Rock Radio Club's annual hamfest was well attended and, according to W9MKS, it broke all existing records. WA9ENW is now QTHing from Germany with the call DC4CW on 20 meters. The 6-meter gang reports some FB openings during April with some long skips taking place. K9IEB is now on with a twelve-element beam and working s.s.b. on 6 meters. W9RHV is now employed as a sales engineer for Eimac and will work out of Chicago. W9UCY has moved back to Rockford from Boise, Idaho. WA9DTK, WA9FHZ, WN9HTZ, WN9HUA, WN9HUB, WN9HUC, WN9HUD and WN9HUE are new licensees in the northern part of the state. The Skokie Six Meter Indians have taken over the Skokie, Ill., civil defense with K9AMG as communications officer. K9ZOO is working a kilowatt on s.s.b. 6 meters. K9TYH, K9EWV and W9BEP are on RTTY. K9AAD received his General Class ticket. The Montgomery County AREC Club, Inc., held its annual Hamscramble and a good time was had by all. The Interstate Single Sideband Net had a traffic count of 578; the North Central Phone Net's count was 263; the noon North Central Phone Net's was 228. WA9CWZ has acquired a new Seneca transmitter. W9LNQ has joined the ranks of the QCWA. W9OKI received the WVCA award from the West Virginia Mountain State Radio Club. K9YMO has added a new Hallicrafters HT-41 to his station. Hams in the Cicero area deeply regret the passing away of Bill Frey, K9PFO. This column's sympathy to his immediate family and friends. The officers of the newly-formed Wabash County Amateur Radio Club are K9LXG, K9AHO, W9FJP and W9FAK. K9NBH, W9IDA, K9KZB, W9AKV, WA9CCP and K9CYZ are recipients of BPL certificates for April traffic. Traffic: (Apr.): K9NBH 1840, W9IDA 1581, K9KZB 623, W9AKV 298, WA9AJF 291, WA9CCP 260, K9CYZ 178, K9GMZ 139, W9EET 104, W9JXV 87, K9LXG 33, K9DRS 32, K9GSD 32, K9ZQT 31, K9LRN 19, W9PRN 14, W9OKI 13, K9CRT 8, K9RAS 6, W9YYG 4, K9CGO 2, W9LNQ 2. (Mar.) W9JXV 38, W9KQX 2.

INDIANA—SCM, Donald L. Holt, W9FWH—Asst. SCM: Clifford M. Singer, W9SND. SEC: W9SNQ. PAMs: K9KTL, K9CRS, K9GLL. RMs: W9TT, K9DHN. Net skeds (all times in GMT): IFN, 1300 daily except Sun. at 1330 and 2300 M-F on 3910 kc. ISN (s.s.b.), 0030 daily on 3920 kc. QIN (training), 0000 M-W-F on 3745 kc. QIN, daily at 0000 and RFN, at 1200 Sun. on 3656 kc. New appointments: K9ZDO as EC of Wells County, W9RSL as EC of Shelby County, K9YAP as EC of Elkhart Co., WA9EED as ORS. The Indiana Radio Club Council will hold its Annual Hamfest Picnic at Tippecanoe County Fairgrounds, Lafayette, Ind. July 14, 1963. WA9BLK is a new General Class licensee in the Leavenworth area. W9RVM, business manager of the *Bison*, is awarding a certificate for working 25 Bison subscribers and has an honor roll started for those obtaining 10 or more subscriptions to your Indiana amateur paper. QIN Honor Roll: K9DHN, K9HYV, WA9ELY, W9TT, W9BFB, WA9QLW, K9INF, K9KTL, K9WWJ and K9SGZ. Those making BPL: W9NZZ, W9RUQ, W9JOZ, W9MM and K9DHN. *Amateur radio exists as a hobby because of the service it renders.* April net reports: IFN 268, ISB 3015, QIN 245, QIN (training) 1, RFN 64, Hoosier V.H.F. 115. Late March net report: 9RN 704 messages. Indiana is represented 100 per cent. Traffic: (Apr.) W9JOZ 2507, W9MM 1430, K9DHN 690, K9IVG 451, W9NZZ 420, K9INF 371, W9QLW 366, W9ZYK 261, W9RUQ 230, W9TT 201, K9KTL 198, W9VAY 125, W9FWH 81, K9ZLB 76, K9CRS 60, K9RWQ 56, WA9EED 48, W9BDG 46, K9FUA 38, K9SGZ 38, K9HYV 35, K9MWC 34, W9QYQ 34, W9RTH 34, W9SNQ 34, W9OG 27, K9WJR 27, K9OXA 26, WA9BFB 22, K9BSL 19, W9CC 19, K9ILK 19, W9EJW 15, WA9ELY 15, W9BTZ 14, K9ZLA 13, W9RVM 12, W9MIU 11, K9VHY 11, K9CIE 10, W9ENU 10, K9WWJ 10, K9YIC 10, W9DZC 8, K9YXK 8, W9YYX 8, W9ETJJ 7, K9AUI 6, W9WET 6, WA9BLK 5, W9RE 5, W9BDP 4, W9FYM 4, W9JSV 4. (Mar.) K9SGZ 97.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: W9RCC. RM: W9VHP. PAMs: W9SAA, W9NGT and W9NRP. Nets: WSBN, on 3985 kc. at 2245Z daily; BEN, on 3950 kc. at 2300Z daily; WIN, on 3535 kc. at 0045Z daily. New appointments: K9FPM as OES. Renewed appointments: W9IQW, W9KQB and K9JVP as OOs; W9HDV, W9ONI, K9UTN and W9DYB as ECs; K9ELT as OPS; W9NRP as PAM; W9VHP and W9VIK as ORSs. W9YT is now operating with a 75A-3 and has the beam back up. K9HBT and W9JOT have new 6-meter converters. K9FPM has a new Communicator. W9BLZ is doing an FB job as NCS on 2 meters. W9FSP reports good DX on 40 meters. New WNA officers are W9VHP, chairman; K9BLN, secy.; W9NRP, treas. The WNA picnic will be held in Hartford on July 14. EMT results: K9ZYA 13.3, W9AIW 58.3, W9VSO 60.4 and K9GDF 127.9 p.p.m. We need more Wisconsin stations to help out on 9RN. K9YPT has received a 20-w.p.m. Code Proficiency certificate. Jefferson County ARC officers are W9SCM, pres.; W9DIG, vice-pres.; K9DID, secy.-treas. W9VSO led the Wisconsin OOs with 175 notices sent in April. K9KLM was FD chairman for the MRAC. Net reports: WIN, 111 offered and 92 cleared; WSBN, 670 and 578; BEN, 181 and 343. BPL

(*Continued on page 110*)

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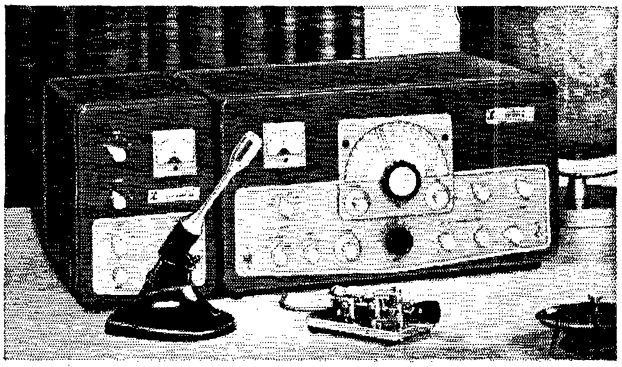

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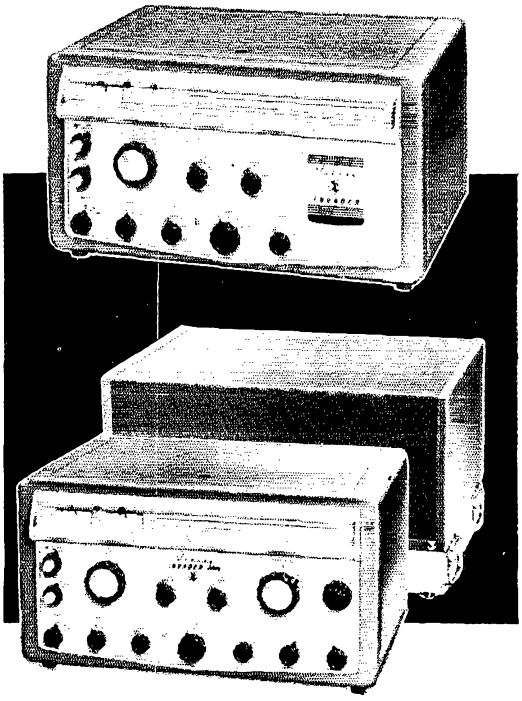

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®

(*Continued from page 108*)
was made by W9DYG (his 52nd with 48 consecutively) and K9IMR. Traffic: (Apr.) W9DYG 705, K9IMR 454, W9CXY 252, W9AOW 103, W9VHP 99, K9GSC 86, K9IME 47, K9DOL 42, WA9CDY 40, W9CBE 32, K9YPT 26, W9FSP 25, W9HPC 24, K9BLN 22, K9DTK 22, K9GDF 17, W9OTL 17, W9YT 16, WN9EOF 10, K9LGU 9, W9VIK 9, W9KQB 4, W9UEB 4, K9AZQ 3, K9FPM 2, K9ELT 1. (Mar.) WA9EUA 16, K9YPT 5.

DAKOTA DIVISION

NORTH DAKOTA—SCM, Harold A. Wengel, WØHVA—SEC: WØCAQ. PAM: KØTYY. New officers elected by the Forx Amateur Radio Club are WAØAYL, pres.; WØHUM, vice-pres.; KØQWY, act. mgr. 167 hams and 28 non-hams attended the hamfest at N.D.S.U. Apr. 28. The N. Dak. 75-Meter Phone Net reports for April: 20 sessions, 514 check-ins, 35 formal and 79 informal messages handled with 9 relays. One NCS failed to report in time. Traffic: KØITP 108, KØGGI 22, WØCAQ 16, KØFRP 16, WØYCL 11, WAØAYL 9, KØQWY 6, KØTYY 6, WAØAAD 4, KØFCA 4, KØRSA 4, WØIHM 1.

SOUTH DAKOTA—SCM, J. W. Sikorski, WØRRN—SEC: WØSCT. KØBMQ has started a daily net on 3870 kc. at 0750 (CST). This net will operate until the Weather Net resumes in the fall. WØCST has received the CAN certificate. Wedding bells rang for WØOH on Apr. 6. New calls: At Sioux Falls, WAØFPQ, WNØFPM and WNØFPN; at Brookings, WAØFJX (second call for KØYWB). WØCUC received CHC No. 895 and is a member of the Flying Hams Club. He reports working 38 states on 3.5-Mc.c.w. in the April CD party. KØZTV purchased a new HQ-110. KØCJT received his General Class license. The Sioux Falls ARC has moved back to its old quarters in South Sioux Falls and changed the meeting night from Mon. to Tue. KØALU is general chairman of the Dakota Division Convention, to be held in Sioux Falls, Sept. 14-15. Traffic: (Apr.) WØSCT 268, WØZWL 265, WAØACY 171, WØDVB 120, KØVYY 48, WAØCWX 45, KØGSY 37, WØOFP 15, KØAIE 14, KØTXW 12, WØGWD 11, KØBSW 10, KØZBJ 10, KØYGZ 9, KØDXL 8, WØFJZ 8, KØHQD 7, WØBQS 5, KØKOY 4, KØYJF 4, WØZLS 4, KØZTV 3, KØJGM 2. (Mar.) WØBSC 20.

MINNESOTA—SCM, Mrs. Helen Mejdrich, WØOPX—Asst. SCM; Emerson Mejdrich, WØRIQ. SEC: KØKKQ. RMs: KØUXQ and KØZRD. PAMs: WØGCR, WØYHR and for MSSB WØHEN. The North Star YL Net meets at 3820 kc. Tue. at 9:30 A.M. The Minnesota Teen Age Net meets Mon. through Fri. at 2200Z on 3820 kc. Scheduled picnics: St. Cloud Radio Club, Aug. 18; Rochester Area Radio Club, July 21. At the April meeting of the Rochester Club, home-brew equipment was demonstrated and explained by WØPQS and WØURQ, who had the enthusiastic support of XYL WØKJZ. New officers of the Lake Region Amateur Radio Club are: KØWXL, pres.; KØZEC, vice-pres.; and act. mgr.; WØLUP, secy.-treas. They report a growing club. Good luck! Outstanding Minnesota ham WØKLG placed in the 10 high OO Honor Roll. WØs HEN, TIV, KØs IDV, JFV and GKU placed in Class 1 in the recent FMT. New Elysian ham WNØFAM anxiously awaits his General Class license. Our best wishes go to WØTOF who is recuperating from a heart attack. KØYOF helps KØALL, who is stationed in Greece, to contact his folks in Mankato. WØOJG is reported home and well after a long stay in Vet's Hospital. WAØCAH has added a home-brew preamplifier for his receiver and a vertical antenna. WNØDGW passed the General Class exam and is wiring an Apache to be used with a Drake 2B. Congrats to the following new appointees: PAM WØYHR, RM KØZRD, OBS WAØDIE and OES WAØCAG. KØRCF has transferred appointments as OO, ORS, OBS and OES from Wisconsin to Minnesota. WØHPS, OES, worked K9HBT (Wis.) on 50-Mc. c.w. for the first DX ground wave, 200 miles! Traffic: WAØBYO 197, WAØARA 151, WAØABU 123, KØGCJ 112, KØJFJ 100, WØHEN 86, WØOPX 63, WØRIQ 60, WØKJZ 34, KØMIZ 34, WØKLG 33, KØIHD 32, KØIKU 30, KØIJU 28, KØVPJ 26, WØGCR 21, WØUMX 21, KØJYJ 19, KØLWK 19, KØICG 18, KØZRD 18, WØKYG 17, WØBUO 16, KØMGT 16, KØFLT 15, KØMIA 15, KØWWY 13, WØALW 11, WØEQO 11, KØKNL 9, KØZOH 9, WAØCAI 7, KØSXA 6, KØZRC 2.

DELTA DIVISION

ARKANSAS—Acting SCM, Curtis R. Williams, W5DTR—SEC: W5KRO. PAM: W5DYL. RM: K5TYW. The Arkansas C.W. Net (OZK) meets on 3790 kc. at 1900 CST. All amateurs in this area are invited to report into the OZK. The size of the Arkansas Emergency Fone Net continues to increase, with 1146 reporting in in April. AEFN meets on 3885 kc. at 0600 CST. The Arkansas Traveler certificate is available for working a certain number of counties (full details next month). K5GKQ reports a statewide RACES Simulated Emergency Test was held June 16 from 1345 to 1630 CST. WA5BDM is handling traffic for a Cerebral Palsy Telethon. The Amateur Radio Club of the Univ. of Ark. relayed traffic for the American Red Cross in a recent drill at Dutch Mills, Ark. WA5CAG has a new beam in operation and W5DTR has a new 75A-4 receiver. Anyone interested in forming an Arkansas Traffic Net to meet on 3885 kc. at 1715 CST should contact me and indicate an interest. Traffic: W5DTR 116, K5SGG 100, WA5AVO 38, WA5BDM 24, K5UEK 19, W5CUK 8, K5GKQ 8, K5EEF 7, K5ABE 4, K5IPS 4, WA5BRB 3, K5KAC 3, W5YM 3.

LOUISIANA—SCM, Thomas J. Morgavi, W5FMO—Congrats to W5KC and W5RUK on the fine scores in the ARRL Sweepstakes Phone and C.W. Contests. The Westside Club had 7 c.w. entries and one phone. K5QXV made BPL again in April. Your SCM had an eyeball QSO with Rick on the way back from the Lake Charles Hamfest. Incidentally about 300 congregated at Lake Prien Park for one of the best fish-frys and gabfests this year. W5AAMwon the receiver. W5JZO reports that K5YBT won the RACES transmitter hunt recently on 147.3 Mc. W5GIX is NC for the Baton Rouge 145.3-Mc. Net which meets at 8 P.M. Mon. Twelve units of W5AVT, W5QQU and W5WDG stood weather watch on 2 meters from 13:05-22:30 Apr. 28 during a severe weather alert. The first report to the weather bureau of a tornado near Clarksville, Tex., and on-the-spot-condition reports from surrounding towns were handled on this net. K5CDC, after 3 years hamming, finally has worked all continents. K5AGJ and W5JGW had their appointments endorsed. A recent visit by the SCM and SEC to the Baton Rouge ARC became very lively during a discussion on incentive licensing. K5FYI helped W5FMO build a Mercury barometer. The Loyola University ARC is now on a.m., c.w. and s.s.b., all bands, with K5PGS as spark-plug. Mark your calendar for the Delta Division ARRL Convention which will be held in Lafayette, La., in November. W5VAR holds court each morning on about 3911 kc. with W5KKT, W5VOZ, and a steady stream of visitors checking in and out. Traffic: K5QXV 930, W5CEZ 269, W5LJY 44, K5CDC 41, K5KMG 38, W5EA 18, K5FQN 16, K5FYI 8, K5KQG 8, K5TJG 6, K5OKR 5, K5MOJ 4.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: K5SQS got lots of help from his wife, WA5GDV, a new licensee, in handling emergency tornado traffic. Congratulations and thanks for state-wide coverage that night by K5GVV, K5MFY, W5JDF, K5AFO, K5AFM on a.m. and on s.s.b. W5IZS, WA5CAO, W5RF, W5GTN, K5KCH, W5EPT, W5CQJ, W5EMM, K5UTE, K5IJH, K5PPI, K5EGI, WA5OKN, W5SVT, K5JXB, WA5EFL, W5DNY/5, W5WUU, WA5AWC, K5TFD, W4VBH/5 and K5OTV. A new Novice in Starkville is WN5GAL. K5DZE is going s.s.b. W5DIX is moving to Picayune and now is running an SR-150. His son is WA5DBH. Sorry to lose from Biloxi W4CDJ/5 and K6DGW/5. W5JDF is doing a fine job as RM but needs alternate net controls for the Miss. C.W. Net. Anyone interested in the Certificate Hunter's Club, contact K5BQS, 723 Washington Ave., Pascagoula, who is running a DX-100B and an HQ-110 and chases DX. K5YGT has gone s.s.b. with an SB-10 and an Apache. The Hattiesburg Club is reorganizing. WA5CKN reported a wreck by amateur radio and was helped by WA5CAO and K5SQS. Traffic: W5JDF 322, W4CJD/5 75, K5GVV 25, K5CKY 21, K5HHQ 18, K5YTA 16, K5AFM 14, K5AFO 13, K5PPI 13, K5RUO 11, WA5BMC 7, K5GAD 7, K5DZE 3.

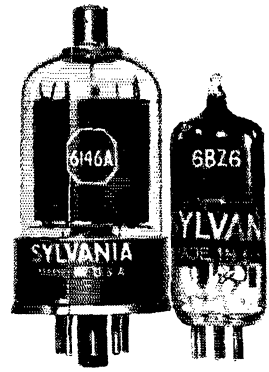
TENNESSEE—SCM, David C. Coggio, W4OGG—SEC: W4WBK. RM: W4OQG. PAM: K4WWQ. April net reports:

Net	*Freq*	*Time*	*Days*	*Sessions*	*QTC*	*QNI*	*Average*
TN	3635	1900C	M-Sat	26	193	245	9
TSSN	3980	1830C	M-Sat	26	68	750	29
ETPN	3980	0640E	M-Fri	22	35	500	23

New appointments: K4RQP as ORS, K4SIR as Hawkins County EC. The MARA sponsors a radio school and Field Day activities were held on Hoyt B. Wooten's estate with a $150,000 bomb shelter. New officers of the Loudon County ARC are K4UFD, pres.; K4DAA, vice-pres.; WA4CUQ, secy.-treas. Club member K4YLS was elected vice-pres. of the Tenn. Beta Club. The RAC of Knoxville graduated 35 future hams and contributed $25 to the ARRL Bldg. Fund. Navy MARS State Coordinator, W4ZNV, enrolled 80 net members. The Oak Ridge ROC added a generator to its Field Day equipment. Your SCM is very pleased to report that the Tennessee section was 7th nationwide in traffic activity for 1962, registering the largest gain of the first 10 sections. Hamfests: Crossville—tentative date July 21, DELTA—Aug. 4 in Whitehaven. W4HDG, W4BBL, W4AZD, W4CVG, W4PER, W4BXG and W4TDW work Tromelin Island (Gus Browning Expedition). W4ZZ, on LeConte Peak in the Smokies, is the highest AF MARS member east of

(*Continued on page 112*)

Not a cliff-hanger in a carload...



Detergent ads always remind us of our own efforts to produce tubes that are "whiter than white and clean clear through." We exercise this care because the things uncontrolled impurities can do to an otherwise fine tube are just plain murder.

Take cathodes, for instance. The structure is nickel with a few additives. In fabricating the nickel, impurities are introduced from such oddball places as the heating crucible, the forging hammer and the hot-rolling equipment. The contaminants cause cathode-to-heater and grid-to-cathode leakage, excessive grid emission and a lack of uniformity in established characteristics. All of which is no fun in a final, a high-frequency oscillator or a TR tube.

What we've needed is ten-cent nickel, not five-cent nickel---but how to come by it? Sylvania took on the problem some time ago, and recently came up with a solution that has all the technical beauty of a crystal lattice filter.

The answer is powder metallurgy. This is the comparatively new art of taking pure metal powder---in this case nickel---and cold-rolling it at such extreme pressures that the particles virtually fuse together. Through this process, we obtain a dense nickel strip with a mechanical strength some 25% greater than ordinary nickel strip---and free of unwanted impurities!

What does all this do for you? It offers you tubes that have virtually no end-point failures due to insulation breakdown... tubes that continue to operate over longer periods with no development of leakage paths, and no change in accepted values of grid emission. All nice things to have working for you in the middle of a contest.

We call this the "LIFE-BOOST* Cathode," and we're putting it into more and more Sylvania types as fast as we can. Notable examples are the Sylvania 6146A and 6BZ6. If you'd like a list of the power and receiving types available now, just drop a line to the Electronic Tubes Division, Sylvania Electric Products Inc., 1100 Main Street, Buffalo 9, New York.

*Trademark

73

Bob Lynch

K2RMN

SYLVANIA

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the Rockies. W4BQG, Carroll County EC was winner of the state SET held in March. W4JVM, Hamilton County EC, activated the AREC for flooding conditions and local election returns. The Frye ARC can help you remember when to renew your license. Congratulations to K4LPW, winner of the SS C.W. Contest. See page 31 May QST for a picture. Also congratulations to WA4FJH on winning the phone portion. Enter the July CD party. See you at Crossville. Traffic: (Apr.) W4ZJY 1125, W4PQP 256, W4ODR 102, W4MNF 89, W4OGG 82, K4WWQ 68, K4JIG 61, W4RMJ 61, W4CVG 57, W4KAT 55, W4WBK 45, K4EJQ 44, W4OQG 41, W4SZE 34, W4SZI 28, WA4BNF 27, W4VTS 22, K4JXG 16, K4LPW 14, WA4IRX 13, W4LLJ 13, W4BQG 12, W4HBZ 9, WA4AIS 8, W4UTO 8, W4BVP 7, WA4BXH 6, W4CBN 6, W4HPN 6, WA4KGX 6, WA4GBA 4, W4JVM 4, WA4LAX 4, W4SGI 4, W4TYV 4, W4WXN 4, W4FYD 3, K4RQP 3, K4TAX 3, K4WUH 3, K4ZZO 3, W4CAT 2, W4DQK 2, WA4IZB 2, K4ZYL 2, K4TTA 1. (Mar.) WA4MCC 19, WA4CRH 18, K4JIG 6, W4TYV 3.

GREAT LAKES DIVISION

KENTUCKY—SCM, Elmer G. Leachman, W4BEW—SEC, W4TFK. PAMs: W4SZB, K4ECJ, W4BEJ. V.H.F. PAM: K4LOA. RM: W4CDA. Asst. RM: K4NYO. RM (KNN): WA4APU. No news is good news, they say, so it is this month, practically. Anyway the SCM doesn't make news, he just edits it. So you guys and gals send it in if you want to make this column interesting reading. That is what the Form 1 card is for. It has space to pass on comments and happenings. MKPN reports 432 check-ins, 65 messages cleared with three stations in 100 per cent. The EMKPN, now a separate net, W4BEJ mgr., reports 22 sessions, 309 check-ins, 20 messages cleared, 51 stations participating during April. W4SZB has been Emergency Coordinator since 1955. Hope he isn't getting tired. W4SYE is moving, so will be missed on MKPN. The Louisville RACES/AREC Net is on 53.6-Mc. f.m. now and has 32 stations on the air. Correction of item in the May column: K4ZQR should have been K4ZQQ. K4HTO is graduating from M.I.T. Good going. K4HSB now owns a 75A-4 and is remodeling antennas as usual. He scored high in the CD Party. Watch for results. Traffic: K4WJI 783, W4BYG 115, K4QCQ 103, K4KWQ 100, W4CDA 68, WA4ELK 43, W4USE 42, W4RHZ 33, K4HSB 32, K4HOE 29, W4KJP 27, K4ZQQ 20, K4VDO 19, K4QIO 18, W4BEW 17, WA4JQR 9, WA4ELB 8, K4LOA 8, K4HHG 5, K4SWL 2.

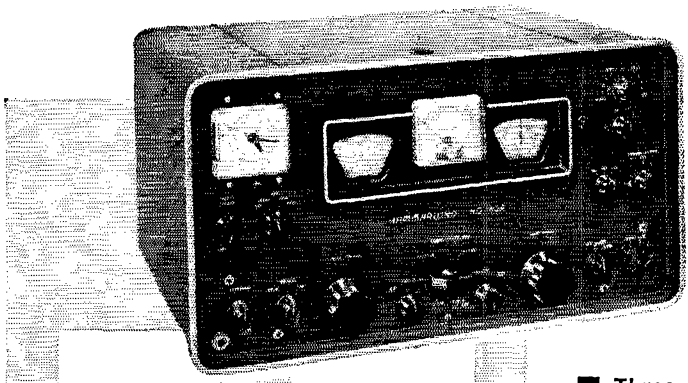
MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: W8LOX. RMs: W8EGI, W8IXJ, W8FWQ, K8KMQ. PAMs: W8CQU, V.H.F. PAM: W8PT. Appointments: K8AEM, W8ALG, K8GSW, K8JZP, W8QQO, K8YRV, K2PVB/8 as ECs; K8EXE, K8HLR, W8YAN as ORSs; W8ALG, W8CQU, K8GOU, W8IWF, K8LZF, W8YAN as OPSs; W8NWW as OBS; K8RDE as OO. New officers of the Ford ARL are K8LIB, pres.; K8UBV, vice-pres.; K8ZKA, treas.; K8SUK and K8KHZ, secy. OT Nite, at Henry Ford Museum, was another annual success with talks by W8CVQ, W6ZH, W9AC and W2ICE. Hillsdale ARC officers are K8HKQ, pres.; K8GKX, vice-pres./treas.; WA8ANO, secy.; WA8FDH, act. mgr. W8CVQ received the Calkins award. Congrats. W8RLT is doing fine after a serious operation. WA8DSA fell and injured his back. Hope he is OK now. New officers of the Kent RC are WA8ALV, pres.; K8BPT, vice-pres.; WA8??? secy.; K8GQG, treas. WA8ASV (Flint) has started a c.w. net on 29,400. K8EFG says that 5 out of 11 made the code as a result of classes held by the Lake Huron RC. K8BGZ has a new SR-150. K8LOY/8, Michigan 6-Meter Club, again handled Easter messages from the VA Hospital, Dearborn. W8ILP is recovering from a stroke. K8TFE has resigned as Michigan PON manager. W8ZHB made 3rd-class commercial phone. K8GJD and K8RDE got WAC No. 44 and 45 on s.s.b. W8EMD still is working on "Aurora Acres" antenna farm. W8PT is next; he just bought 40 acres. During July, Aug. and Sept. the Tawas RC will week-end in Alcona County. A self-addressed stamped envelope to W8GZF will bring information on this rare one. Mrs. K8PBA is now WN8IAQ. W8CQU is now Wolverine S.S.B. Net manager, and K8PVC is secy.-treas. W8RLT, K8YQE and K8YQF got a big photo write-up in the *Detroit News* May 5 on their ham TV activities. Congrats. K8GOU and K8KMQ make BPL on originations/deliveries. W8FWQ will be RM for the QMN Summer Net. W8NOH/6 will retire from the USN in 19 months, and will be back in Michigan. Traffic: (Apr.) K8GOU 334, K8KMQ 282, K8NJW 160, W8BEZ 130, W8QFO 106, W8DSW 98, K8LOY 91, K8WQV 85, K8QLL 79, W8YNY 71, W8FWQ 70, WA8ASV 62, WA8ENO 56, W8IXJ 56, W8ELW 54, W8FX 43, K8TFE 42, W8AUD 40, W8EOI 34, K8LNE 32, VE3CYG/W8 32, W8TBP 30, W8HKT 22, K8YDA 21, W8ZHB 19, W8YAN 16, K8BYX 15, W8SWF 13, W8RTN 12, W8ZLK 12, K8HLR 10, K8TJH 9, W8DSE 7, W8UFS 6, W8WVL 5, K8GJD 4, K8JED 4, K8MEG 2. (Mar.) W8ELW 140, W8IBB 80, WA8ENO 54, W8EOI 29, W8ZLK 26, K8RNN 18, WA8CPH 15, K8YAY 14, W8OQH 9, K8ORY 6, W8UFS 5, W8YAN 3.

(*Continued on page 114*)

CHALLENGE!

PROBLEM: TO IMPROVE THE WORLD-RECOGNIZED HAMMARLUND HQ-180 GENERAL COVERAGE (540 KC/S TO 30 MC/S) RECEIVER.

SOLUTION: ADD THE EXTRA FEATURES LISTED BELOW TO CREATE



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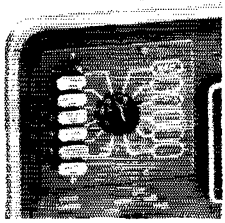

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And there is more! ☐ A separate filament transformer connected to the HF oscillator and 1st mixer drastically reduces warm-up time. ☐ Microfine vernier tuning (1260 degrees knob rotation) provides constant tuning over a ± 3 KC/S range on all bands. ☐ Built-in 100 KC/S crystal calibrator permits quick dial settings on all bands and optimum use of amateur bandspread. ☐ Three AVC time constants provide optimum CW, SSB and AM reception.

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AMATEUR RADIO EQUIPMENT • COMMERCIAL COMMUNICATIONS EQUIPMENT
VARIABLE AIR CAPACITORS . . . AND . . . THE OUTERCOM 2-WAY RADIO

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8HNP. RMs: W8BZX, W8DAE; W8IEP and K8ONQ. PAMs: W8VZ, W8BAP and K8UBK. It appears the Ohio QSO Party was the largest yet on c.w. The Greater Cincinnati ARA's *The Mike and Key* tells us Philip Ohmart, ex-W8ODS, spoke on the relationship between amateur radio and industrial instrumentation and that K8QYV is suffering from multiple sclerosis. Ohio Traffic Nets:

Net	*Time*	*Freq.*	*Mode*	*Mgr.*
Buckeye Net (BN)	0000Z	3580 kc.	c.w.	W8BZX
Ohio Slow Net (OSN)	2330Z	3580 kc.	c.w.	W8IEP
Ohio Phone Net (OPN)	2200Z	3860 kc.	a.m.	K8BAP
Ohio Single Side Band	2345Z	3974 kc.	s.s.b.	K8UBK

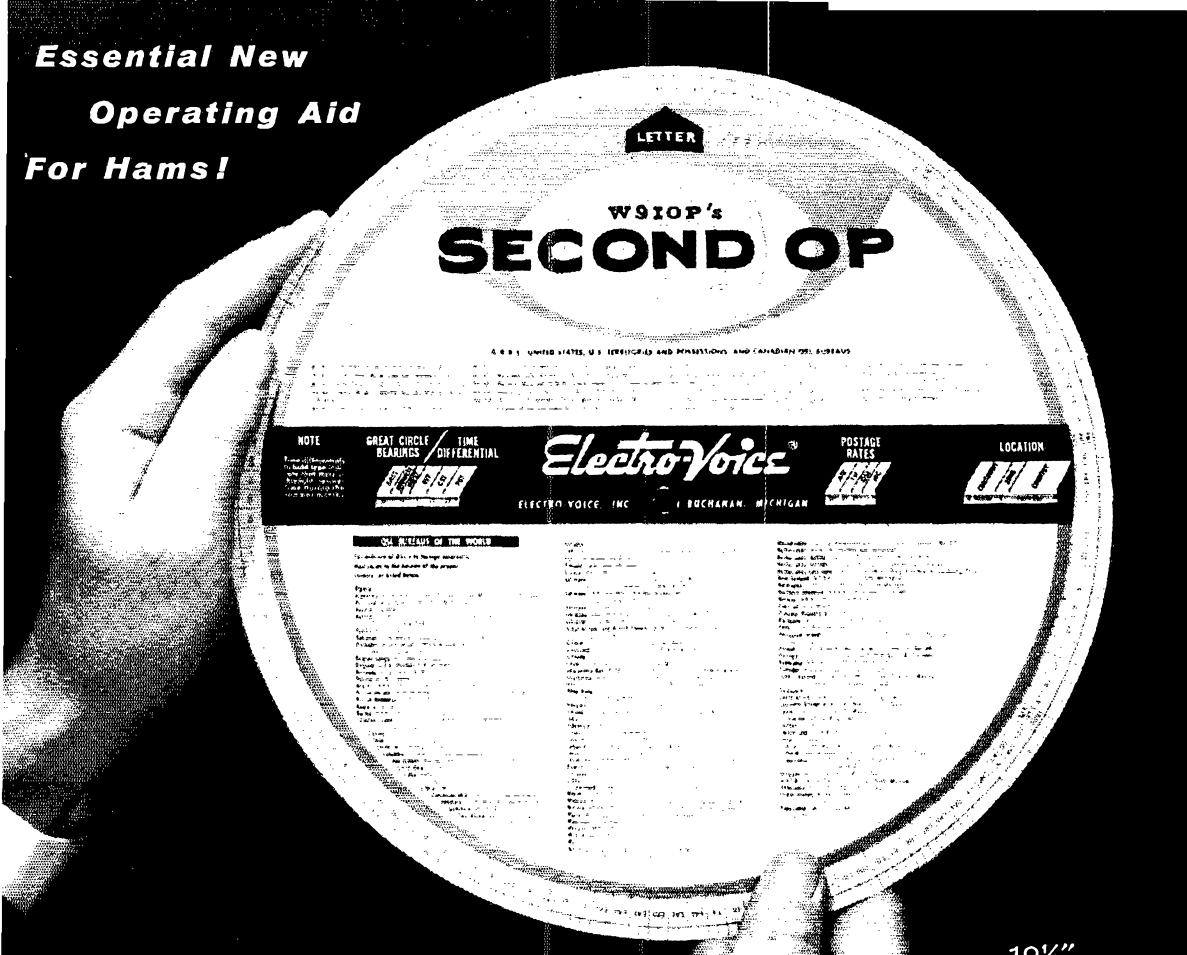
All of these nets need outlets all over Ohio, so listen to them in operation, then join the one of your choice. *The Rag Chewer*, put out by Lancaster-Fairfield RC, tells us WA8CVC's son is now WN8HTX. WN8HWT is another new ham and W8PGC and WA8CVC furnished communications when parts of Lancaster were flooded. How about the club getting someone to be the EC for Fairfield County? Massillon ARC's *MARC News* informs us that W8NWR has a new Apache, K8BZI has a new Drake 2B and W8VYU has a new SX-88. New appointments made in April: K8DIU and WA8AJD as ORS, WA8BOV as OPS and K8TKG as OBS. Canton ARC's *Feedline* has a picture of HR2HA sitting with W8FSM and his wife and it says W8HR has a new TA-33. K8-DJF is a new ham in Canton after serving a hitch in the Air Force. WA8EEX and WA8FKJ received their General Class licenses and W8AL received his HTH. The Six-Meter Nomads' *The Amateur Extra* informs us that K8YPV has a new HQ-150. Senaca RC held its first hidden transmitter hunt of the season. The Ohio Council of Amateur Radio Clubs' 1963 officers are W8OUU, chairman; W8DN, vice-chairman; K8DJM, secy.; and W8AL, treas. Babcock & Wilcox RC saw the Bell Telephone color movie on Telstar. Queen City Emergency Net's *The Listening Post* says W8HQK reported on this year's flood. K8HKU received her 50-w.p.m. CP award. South East ARC's *Ham Fax* says K8TOL and W8TQR spoke on single sideband. WA8AYL is home after a trick in the Air Force and the club's 1963 officers are K8ZFD, pres.; K8TOL, vice-pres.; K8SVN, rec. secy.; K8ONA, corr. secy.; K8TSI, treas.; W8CTZ and W8TQR, exec. board. K8ZFS vacationed in Florida. Toledo's *Ham Shack Gossip* names W8MBI, its editor, as its Ham of the Month. K8CYF received his General Class license. Those who made BPL in April were W8UPH, W8DAE, K8GLA and K8YUZ. Better check your license expiration date several times a year to make sure it does not expire without your knowledge. ARRL President W6ZH, Great Lakes Division Director W8UPB, your SEC and SCM attended the Dayton Hamvention along with 3017 others who registered. Auto license plates were issued to 4715 Ohio amateurs. The outstanding Ohio amateur award was presented to K8EUF and 173 took the General Class license exams with 57 passing the code. The XYL of W8ALW won the Hallicrafters SR-150. K8MHO the Drake TR-3, WA8EGP the National NCX-3, K8-BAX the WRL Galaxy 300 and W8BCG the HQ-100. WA8DXN received his General Class license. WA8AJZ has a new tower and quad for 15 and 20 meters. Columbus ARA's *Carascope* says that Mr. Ray Copeland, from Ohio State University Antenna Laboratories, spoke on the entirely new concept of transmitter and antenna design. Traffic: (Apr.) W8UPH 1052, K8LGA 586, K8YUZ 560, W8CHT 414, W8DAE 406, W8BZX 215, K8SQK 200, W8MGA 148, WA8AJZ 120, K8HVT/8 119, K8UBK 119, W8ECB 115, W8CXY 79, K8DIU 55, W8IEP 45, K8KXD 42, W8QCU 40, K8ZMN 37, W8AZF 29, W8LZE 22, K8-LGB 15, K8PBE 14, W8AL 13, WA8AWV 11, K8KLA 10, W8DIH 9, W8DQD 9, WA8AJD 8, WA8BOV 8, W8YGR 6, WA8ADB 4, W8PZS 4, K8RFU 3, K8AOP 2. (Mar.) W8DHG 78.

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; MHT (Novice) on 3716 kc. Sat. at 1800 GMT; Interclub on 28,600 kc. Mon. at 0130 GMT; Emergency Coordinators on 146.550 kc. Fri. at 0015 GMT. Appointments: WA2DQO and WA2DRP as OESs. Endorsements: W2URP as OO and WA2MHY as OES. Hudson Division Director W2KR was guest of the Schenectady Club. In New Rochelle the speaker was Nick Marshall, who described the Oscar I and II projects as a participant. The State Civil Defense office has moved to its new underground campus on Washington Ave. in Albany and radio gear soon will be relocated. Those handling 2-meter rigs during the Art Show in New Rochelle were WA2FCR, W2RAE, WB2FNR, WA2USM, K2SJN, WA2QMP, WA2OBZ.

(Continued on page 116)

Essential New Operating Aid For Hams!



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Complete DX operating information at your finger tips assures better results faster. Here, on a single ingenious calculator, you can instantly read data on *every* country and amateur-recognized subdivision covering: prefix; great circle beam heading*; time and date at DX location*; air mail, first class and QSL card postage rates; international reply coupon exchange table; continent; DX zone; prefix-to-country translation; and QSL bureau addresses. Included, also, is a log to indicate contact and receipt of QSL card for each country.

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NET PRICE
$1.00

**Based on average centers of population for East, Midwest, and West Coast. Amateurs in Mountain Standard time zone must do simple interpolation.*

Electro-Voice®
SETTING NEW STANDARDS IN SOUND

WA2OCA and WA2NRJ, with an able assist from Tom Ritzcovan. W2WGE reports 2-meter activity declining in Greene County; John is on 40 meters with 15 watts to a new antenna. AREC members in Westchester are reminded of their net on 146.556 Mc. each Fri. at 0115 GMT. WB2DQO has a new HQ-110 with a 2-meter nuvistor converter; Tom has two new states on 6 meters. The son of W2URP is WB2FYP, among our ham families. Trafficker WA2HGB has a new antenna to replace one that blew down. Technician WA2MHY passed the General class exam during the Easter holidays. Congrats. WA2LJAL, WA2VYS and WB2FZC received their NYS Net certificates from Manager W2RUF. Traffic: K2TXP 451, W2THE 204, K2SJN 136, WA2VYS 129, WB2FZC 86, W2PKY 80, WA2HGB 55, WA2PUM 27, WB2CPU 22, W2OGH 22, W2URP 15, K2MPK 9, W2EFU 4, WB2DQP 3, K2HNW 2.

NEW YORK CITY AND LONG ISLAND—SCM, George V. Cooke, jr., W2OBU—SEC: 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. 145.8 Mc. at 0100Z and Fri. through Mon. 146.25 Mc. at 0000Z; Mike Farad on 7238 kc at 1700Z; All Service Net at 1900Z on 3925 kc.; Q5 Net on 3935 kc. at 2100Z daily. WA2GPT, WA2EXP, WA2JSG, W2EW and WB2FWA have received BP certificates for high traffic counts for the month of April. The Mike Farad Net has added a 75-meter section operating on 3925 kc. at 1:15 P.M. EDST. K2KYS received notice from the IARU that he has made WAC. WA2IUQ has gotten the AZ5 Award. WA2VKK passed the General Class exam and now is operating as K1ESV for the summer. WA2IZV is now CHC Nr. 906. W2PF is busy assisting in reorganization of the SSBARA into a philanthropic-technical type of group to help the handicapped in our hobby. WA2UVK is on again after 6 months, has a new Tribander and is working plenty of 15-meter DX. WA2VIM, WA2SYD and WA2FUL are going to CCNY and operating W2HJ, the college club station, after saying farewell to WB2AAM at the Lincoln HSRC. WA2DSL passed the General Class exam and now is using a Ranger 1. The new officers of the Columbia Univ. Amateur Radio Club are K2AHS, pres.; WB2CKU, vice-pres.; W2KZL, secy.; K2TNF, communications director. In July K2DGT will take unto himself an XYL. W2DBQ put in considerable time in the Nassau Hospital and returned home to put to use his new multi-band doublet. WA2KSP thinks very highly of his new W2CJN-designed flatband mobile antenna. WB2DQB and XYL welcomed a new harmonic—it's a boy, WN2-HQX, the XYL of W2VKS, is a new licensee in Massapequa. The latest slate of officers of the Polytechnic RC is K2PAR, pres.; WA2QPE, vice-pres.; WA2GUR, secy.; K2IBI, treas. The club's call is W2BXK. WA2-TAQ has been appointed EC for the Queens Borough 2-Meter AREC Net. WA2BIT now is operating mobile with a new G77. WB2ESZ, running an APX-6, is seeking ¼-meter contacts. W2JU wishes to add more operators in the monthly transmitter hunt in Nassau County on 145.680 Mc. and solicits inquiries. WA2RKK is operating his newest station, K1CGZ in Maine, for the summer. W2MNX, W2QPQ and K2BBO are instructors in the Novice course classes that the Jamaica Amateur U.H.F. Club is giving in cooperation with the N.Y.C. C.D. WB2ADT and WA2UKI have formed the new City Line V.H.F. Club. W2AEV has been busy flying to the Orient and found some good surplus gear on the West Coast. WB2AGJ and WB2AFT held a 48-hour QSO between them on 6 meters. WA2KRN, WA2HXR, WN2-DFP and WN2GWU are very active using m.c.w. on 2 meters. WA2LJS is maintaining many skeds in Navy MARS nets. WA2PMW received QRP 25 and QRP 10 (v.h.f.) and Mr. Airy V.H.F. Award No. 73. The Suffolk County Disaster Net is operating on 29.560 kc. at 0100Z Mon. with good attendance. All OES appointees are reminded that Form 18 is to be used for reporting and not the card Form 1. Form 18 can be obtained from ARRL or the SCM. Traffic: (Apr.) WA2GPT 1314, WA2EXP 702, WA2JSG 563, W2EW 512, K2UBG 420, WB2FWA 404, WA2VLK 391, WB2CAV 203, WA2QJU 152, K2KYS 123, W2MTA 123, WA2LJS 116, WA2IUQ 103, WA2RZJ 95, K2THY 64, WA2GAB 61, WA2GKZ 59, WA2-VKK 58, KUFT 49, WA2SIV 25, WA2IZV 21, WA2WAO 19, WA2GFP 18, WA2JIS 18, W2GP 12, W2EC 9, W2PF 7, K2KHK 5, WA2EFN 4, W2OME 4, WA2UVK 4, WA2-FRW 3, WA2RAQ 3, WA2VZN 3, WA2FUL 2, K2AHS 1, WB2DSL 1, WA2TYF 1. (Mar.) WA2JSG 507, K2UBG 439, WA2PSL 15. (Feb.) WA2JSG 529.

NORTHERN NEW JERSEY—Acting SCM, Edward F. Erickson, W2CVW—SEC: K2ZFI. RM: W2QNL. PAM: K2SLG. V.H.F. PAM: K2VNL. Names, times, and frequencies of NNJ NTS nets: NJN, 2300Z 3695 kc. daily; NJ Phone E&T, 2200Z daily except Sun. 1300Z on 3900 kc.; NJ 6&2, Mon., Thurs. and Sun. at 0200Z on 51.15 Mc., Tue. and Sat. at 2100Z on 146.70 Mc. Sessions, attendance and traffic for April: NJN-30-576-522, NJP-TN-30-337-74, NJ 6&2-21-163-106. A vote of thanks is due

(*Continued on page 118*)

Ask the man who has one...

Ask Tom Branch, W8MRL/5, San Angelo, Tex, how he likes his Hy-Tower . . . he'll tell you:

"In all my 30 plus years of being a licensed amateur, I have never received more satisfaction from a purchased product than I have from my Hy-Gain Model 18HT Hy-Tower. I am consistently receiving better reports, both D-X and Stateside, on all bands than I ever did with any other type of antenna (beams excepted). The SWR's on all bands are even better than the engineering reports stated and the ease with which the antenna was assembled and raised proved to be a very pleasant surprise. Hy-Gain's engineering staff certainly deserves commendation for the excellent mechanical and electrical design of the Hy-Tower—it fills a long wanted need of Radio Amateurs everywhere."

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Designed for 80 through 10 Meter Operation

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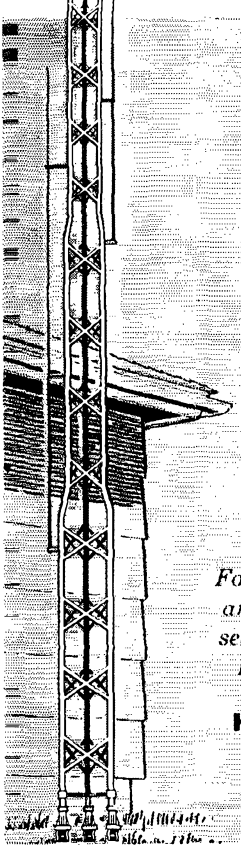

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8407 N. E. Highway 6
Lincoln, Nebraska

WA2APY for a bang-up job as SCM. This is the first column by your Acting SCM. New appointments: W2JDH as OO, WA2SRV as OBS, W2FNX and WA2SRV as OPSs, WA2CCE, as ORS. WN2CJP received his General Class license and is going on 160 meters. WA2EDG has been busy keeping W2BSC on the air and has been building "brief case" portables. Your Acting SCM was pleased to meet K2UKQ at the Swampscott Convention. Kay now has "Top Honors" among the CHC'ers. W2FNX and gang have been DXing on 20 meters sideband. W2EWZ received the USA-CA award. WA2MYB received the Essex Co. award in the NJ QSO Party. WB2AGJ and WB2AET had a 48-hour marathon QSO on 6 meters. WB2CRS is working on 144- and 420-Mc. equipment. WA2ZKT has a shiny new 10-D mike. WA2QPX has a new HQ-100. K2SLG added a Warrior. WA2ZRR put up a TA-31 and is building a kw for that elusive DX. The Belleville Club's new officers are WA2BNF, pres.; WA2JGE, vice-pres.; K2UCY, secy.; WA2SID, treas.; W2HNA and K2ORI, trustees. WA2UOO has a new 2-meter converter. John met W2RUF in Buffalo. WN2DDA is working hard for a Novice WAS. Bob was Novice winner of the 1962 SS. W2NIY met the hams from Albany, N.Y., at a banquet. W2BBR is moving to Clifton. WA2VCQ has a 35-w.p.m. code award. Larry has 45 states, 27 countries and is building a beer-can vertical. WA2PWI reports good conditions on 6 meters the last week in April. WB2CWG is building a new 6-meter transmitter and wants to go d.s.b. WB2COZ has a brand-new shiny Challenger. WA2OQP is active on NJN and NJPN. W2JDH has a chirp-free ARC-5 for 80-meter DX. K2IBC continues code practice on 3675 kc. at 6 P.M. week nights and invites reports. K2DSW got married and then the Army sent him to Japan. W2VAV wants to start a club in Cedar Grove. Contact Bill at 23 Harper Terrace. WA2EJZ was in the April CD Party. WA2ONH needs Ocean and Salem Counties on c.w. W2LQP is treasurer of the Telco Amateur Radio Club. NJ 6&2 certificates go to WA2KVQ, WA2TTC and WA2ZKT. W2TPJ sends in a good quota of 50 official observations. K2KFE, W2NLQ, WA2CHN and WA2YBT operate on 146.790-Mc. t.m. Good idea for an AREC net. Traffic: WA2UOO 310, K2UCY 282, K2VNL 259, WA2WSB 211, WA2SRK 191, WA2JTZ 168, K2SBS 161, W2QNL 153, WA2GQZ 139, WB2DEP 128, WA2CCF 118, WA2WAJ 71, W2CVW 65, WA2ZRR 56, K2SLG 50, WA2QPX 45, WA2ZKT 40, WA2LUD 25, W2SJB 22, WB2CRS 20, WB2HBC 20, W2TFM 18, WA2MYB 15, W2ABL 14, K2EQP 14, W2EWZ 14, W2FNX 10, WA2OQP 8, K2UKQ 8, WA2ZQH 8, K2MFX 7, W2CFB 5, W2OXL 5, WA2TWG 4, WA2EDG 3, WN2CJP 2.

MIDWEST DIVISION

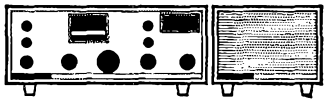
IOWA—SCM, Dennis Burke, WØNTB—SEC: KØEXN. PAMs: WØLSF, WØPZO. RMs: WØLGG, WØSCA. New appointments: KØSGE as EC for Madison County; KØUJJ as OBS; WAØDXZ as OES; WØNLF as OO. WØPFP and his XYL, Ardis, are the proud parents of a son. Congratulations! KØVDY reports good activity on 6 meters in N.W. Iowa. Now to get something going in N.E. Iowa on this band. With 66 per cent of the licensed amateurs in this section inactive in ARRL it behooves the 34 per cent who are active to be vigilant for opportunities to spread the gospel while there is still time for it to be effective. April activities: 160-Meter Net, QNI 817, QTC 39, sessions 30; 75 Meter Net, QNI 1158, QTC 352, average 13.5, sessions 26; Hamilton County, QNI 142, QTC 5; Webster County, combined QTC 101, sessions 30. Traffic: (Apr.) WØLGG 2029, WØSCA 2017, WØPZO 251, WØBDR 106, WØNTB 99, KØQKD 83, WØGQ 54, KØKAQ 33, KØGXP 26, WØBLH 24, KØZCQ 20, WØQVA 17, KØGID 15, KØTDO 13, KØAFG 12, WØYDV 12, WØLJW 11, KØEVC 10, KØHGH 7, WØQVZ 6, WØDIB 4, KØMYU 4, KØVBM 4, WØDRE 3, WØIO 3. (Mar.) KØVBM 3.

KANSAS—SCM, C. Leland Cheney, WØALA—Asst. SCM: *Richard G. Caspari*, WØYZB. SEC: KØBXF. PAMs: KØEFL and WØBOR. RMs: WØQGG and WØPFG. V.H.F. PAMs: WØHAJ and KØVHP. New appointments: WØBMW as EC, OPS and OO; WNØDZI as OES. April net reports:

Net	*Freq.*	*Time*	*Days*	*Sessions*	*QTC*	*QNI*	*Average*
KPN	3920	1245Z	M-W-F	17	53	256	15
QKS	3610	0030Z	Daily	28	139	137	4.85
HBN	7280	1800Z	M-F				
SCAN	7070	1900C	Mon				
SCAR	7205	1900C	Tue				

Currently the following stations hold OPS appointment: WØBOR, KØEFL, WØIFR, WØWFD, KØJID, WØAXZ, WØRLS, KØYBV, KØYWG, WØALA, KØLHF, KØHGI, KØGH and WØBMW. Is your call missing? Contact your SCM for appointment. Your help is needed to put the section over the top. WØBMW has accepted the job of Emergency Coordinator for Sedg-

(*Continued on page 120*)



WE STILL CAN'T get used to the frequent comment from our customers that the receiver section of the NCX-3 transceiver sounds as good as or better than their regular station receiver — or the receiver they traded in on the NCX-3 . . . After all, the NCX-3 *was* designed for duty in the shack as well as mobile, and so it has the goodies needed for fixed station work — full CW coverage, SSB/CW AGC, an AM detector as well as a product detector, an S-meter, etc. That "etc." covers quite a bit — we have yet to measure sensitivity of an NCX-3 worse than .75 microvolt for 10 db S/N, and the gain of the mixer and IF stages is purposely controlled for quietness. The tuning dial is driven through a miniature Velvet Vernier to provide a smooth 45:1 reduction for optimum SSB tuning with zero backlash. Calibration is direct to 5 kc on each band, and interpolation is easy to a couple of kc or less. The National crystal lattice transmitting filter is used for receiving, of course, and so selectivity is really remarkable — 2.5 kc at the 6 db point, with a shape factor of 2.8:1 — better than found in most expensive receivers. The fast attack, slow decay AGC is RF derived, and the best indication of its effectiveness is the fact that it is completely unobtrusive with the RF gain wide open on strong signals — no pops, thumps, clicks, snorts or groans. In fact, except for the bandwidth, a good SSB signal is indistinguishable from AM. Mechanical and electrical stability is unusual — total warm-up drift on 20 meters, for example, is 500 cycles or less in 10 or 12 minutes. Thereafter, drift is 30 to 50 *cycles* per 30–45 minute period.

SOUNDS LIKE a lot of receiver, doesn't it? Even more so when you consider that we're confining our discussion to the receiver portion of the NCX-3 only — and that we haven't even mentioned the transmitter, or its 200 watt PEP sock on SSB, or the break-in CW keying, or the built-in VOX. The NCX-3 is *not* perfect, however. The S-meter is scotch.

MIKE FERBER, W1GKX

wick County. This will allow WØYZB more time for taking care of the c.w. activities in the section. Which reminds me, we are in need of more c.w. operators for the *QKS Net* evenings at 6:30 CST, 3610 kc. Why not try your hand and give the boys much needed help. Traffic: KØZTN 526, WØBYV 166, KØYTA 93, WØQGG 48, KØGII 37, KØEFL 19, KØQKS 11, WØERQ 8, KØLHF 6, WØIFR 5, WØFHU 4, KØTGR 4, KØVQC 4, WØBMW 1.

MISSOURI—SCM, Alfred E. Schwaneke, WØTPK—SEC: KØWNZ. RMs: WØOUD, KØONK. PAMs: WØBVL, WØBUL, WØLFE (v.h.f.), KØONK. I'm sorry to report that KØSYW is a Silent Key. WØAIM is the new EC for Barton, Jasper, Newton and McDonald Counties. WAØCWV is a new General Class licensee. ORS appointments went to KØVIP, WAØCWV and School of Mines Club station WØEEE with KØLGZ as appointment trustee. New AREC members in Sweet Springs: WAØAPA, WAØASQ, WAØAPC. Officers of the Mo. University ARC are KØGOB, pres.; WAØBUT, vice-pres.; Alan Thrasher, secy.-treas. KØONK has succeeded in getting the net directory published in Braille. WØRTW is back on MON after prolonged receiver trouble. WØOUD has a new Ranger. WØHHG worked W2, W3 and W4 on 6 meters with a new beam up 50 feet! KØFPC and KØJWN report a 6-meter opening to the east during April but no QSOs. WAØBUC and WØDDL both have new rigs on 2 meters. Net reports: MEN (3885 kc. 2400 GMT, M-W-F) QNI 396; QTC 219; NCSs: KØVPH 5, KØONK 4, WØTPK 4. MO SSB (3963 kc. 2100 GMT, T-Th) QNI 173; QTC 33; NCSs: WØECA 5, WØOMM 4. PON (3810 kc. 2100 GMT, M-F) QNI 282; QTC 176; NCSs: WØHVJ 10, KØBWE 7, KØONK 3, KØVIQ 2. MSN (3715 kc. 0200 GMT M-F & 1300 GMT Sat.) QNI 152; QTC 133; NCSs: WAØCWV 7, KØONK 9, KØFPC 4, WAØCXG 4. MON (3580 kc. 0100 GMT, T-Sat.) QNI 181; QTC 115; NCSs: WØOUD 8, KØFPC 7, WØKIK 5. KØVPH 3, KØGFA 2, KØVIP 1. SMN (3580 kc. 2200 GMT, Sn.) QNI 24; QTC 21; NCSs: WØKIK, KØGFA, KØFPC, WØOUD. Traffic: KØONK 1778, KØVPH 167, KØFPC 165, KØVIP 147, WØAYB 140, KØVNB 136, WØTPK 92, WØMKJ 67, KØRKW 66, WØBVL 61, WØOUD 60, KØVIQ 50, WAØCWV 38, WØKIK 38, WØOMM 36, WØHVJ 35, WAØCXG 27, KØBWE 24, WØEOJ 15, WØPXE 14, WØEEE 9, KØWNZ 8, WØRTW 5, WØRDJ 4, WØBUL 3.

NEBRASKA—SCM, Charles E. McNeel, WØEXP—SEC: KØTSU. Morning Phone Net, KØDWG NC, reports QNI 560, QTC 130. WØNIK, NC for the Western Nebraska Net, reports QNI 625, QTC 69, 100 per cent reporting WØAES, WØNIK, KØCYN, KØAIE, KØBMQ, WØDVB, WØFJZ. Nebraska Storm Net, 3983 kc. at 1930 CST, KØJKN NC, reports QNI 526, QTC 3. The Nebraska Emergency Phone Net, WØFGQ NC, WAØBES reporting had QNI 844, QTC 115, new member WAØCBK. The Central Nebraska Amateur Radio Club will sponsor the annual steak fry on July 28 at Victoria State Park. Everyone is invited. Make your reservations with WØDLM by July 14. Mobile frequencies will be 3983 kc and 145.35 Mc. The Estes Park Hamfest will be held at the Masonic Hall in Estes Park July 6 and 7. This will be my last report as your SCM and I have enjoyed the cooperation of all in the Nebraska section for the last three terms. Congratulations to Frank Allen, WØGGP, who is your new SCM. Thanks a lot to all of you and good luck, Frank. Traffic: KØBRS 547, WØLOD 128, KØBID 97, WAØBES 56, WØYFR 54, WØFIG 48, WØVEA 44, WØNOW/Ø 37, WØZJF 35, WØEGQ 32, KØKJP 29, WØNIK 24, WAØBYK 19, WØCCD 19, WØCZO 18, WØVZJ 18, KØJFN 16, WØZEO 16, KØSCN 15, KØDGW 14, WAØCDQ 10, KØFJU/Ø 10, WØBOQ 9, WØJFN 9, WAØAES 8, WAØDFS 7, WAØAIJ 6, KØFBD 6, WØHOP 6, WØWKP 4, KØBRG 3, WØAHB 2, KØHNW 2, WØPQP 2, KØYZP 2, WØZHV 2, KØDVI 1, KØRRL 1.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, Robert J. O'Neil, W1FHP—SEC: W1EKJ. RM: W1KYQ. H.F. PAM: W1YBH. V.H.F. PAM: W1FPH. Traffic nets: CPN, Mon.-Sat. 1800 3880 kc. CN, daily 1845, 3640 kc. CVN, Mon.-Wed.-Fri. 2030 145.980 Mc. Net control tunes 147 down to 144 Mc. on all call-ups.

Elmer P. Balcom, W1KYQ

The Connecticut Section mourns the loss of an enthusiastic leader, an operator who set the example of top dependability in our traffic nets. The key of a fine Connecticut RM is silent.

Certificates and awards: SNC to W1DAV, W1FXS, W1VOV and K1NTR for their continued traffic and reporting activities on the Conn. Phone Net. April CPN report by Bill: 30 sessions, with 199 messages,

(*Continued on page 122*)

Q.C.

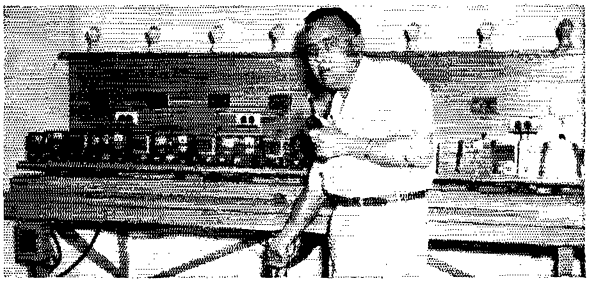
UALITY ONTROL

at

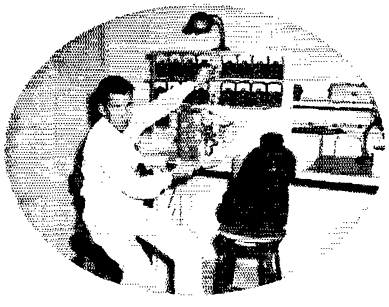
SBE

NEW CONCEPTS IN RELIABILITY AND DEPENDABILITY FOR AMATEUR EQUIPMENT

New space age designs now on the laboratory benches, as well as the history-making SB-33 Transceiver, have resulted in new concepts of production and quality control at SBE. As a result, we at SBE have evolved new ideas in quality, new methods in production, to bring you the most dependable, most reliable, highest quality equipment available today. New production and test equipment has been designed and constructed, new methods for checkout and acceptance have evolved. Acceptance criteria based on standards developed in the space and missile industry have been established.



SHAKE TABLE, shown with Faust R. Gonsett W6VR, is capable of simulating the vibration encountered in mobile operation or in shipment by rail or truck. Each unit is vibrated for one hour without power applied prior to any other checkout or operation. After complete checkout, each unit is operated for one hour at full carrier output while vibration tested.



GONSETT'S OCTOPUS, shown here with Bob Gonsett, WA6QQQ and mascot K9-CINDY, simultaneously makes seventeen resistance measurements to check over 170 individual components prior to power checks. This has eliminated the familiar "60 cycle smoke signal test" and assures that there are no marginal components in the unit.

In addition, each solder connection, each rivet, each bolt and nut, are checked individually in final inspection. All personnel in the checkout and final acceptance departments are active licensed amateurs. Final acceptance is made by staff personnel, responsible to Mr. Gonsett, personally.

Designed with the same components, processes, and care that is used in the space and missile industry — made by hams, checked out by hams, personally accepted and warranted by hams, SBE equipment will continue to lead the field of amateur-commercial radio equipment.

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Ask for the QC at SBE brochure at your SBE dealer for the complete story on Quality Control at Sideband Engineers Inc.

Faust Gonsett, W6VR
President

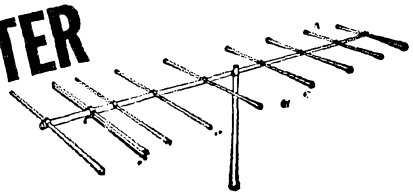
average attendance 21 stations, with average time 40 minutes. CVN reports 9 sessions, 39 stations, with 16 traffic. K1LOM made BPL again with an overall total of 747 points. K1WPQ has turned in his Official Experimental Station certificate as he is heading for the Navy. It was nice to see many Connecticut winners at the New England Division Convention. New ARRL affiliated clubs are the Forestville Amateur Radio Assn. and the Central Conn. Amateur Radio Club. Experimental stations W1NGR, K1RTS and K1WPQ report good openings on 50 Mc. with new gear coming along on frequencies above 432 Mc. *Key Klix* has two new Novices, KN1EUX and KN1ETU. K1JMV writes a good DX column for the Meriden ARC. K1WJL has little birds tell him of local news, which he passes on in his column of *Key Klix*. K1OJZ, Old Saybrook, has been named Emergency Coordinator. Send him a list of gear and bands covered for his file and possible use in an emergency. Note: No QSL cards from outer space; Mercury Control Center reported some hams tried working Major Cooper on May 15. The Conn. Emergency Coordinator Net will hold sessions the 1st Sun. of each month during the summer. Traffic: K1LOM 747, K1WKK 272, W1RZG 257, W1AW 198, K1QPN 179, W1KYQ 156, W1EFW 137, W1LUH 107, W1EKJ 77, W1BDI 68, W1MPW 44, K1NTR 41, W1FHP 38, K1SRF 35, K1DGK 27, K1PUG 27, K1QPM 16, W1YBH 16, K1OJZ 14, K1AQE 11, W1BNB 8.

MAINE—Acting SCM, Robert R. Beaulieu, W1YYW—SEC: K1DYG. PAM: K1ADY. RM: K1MZB. 2-meter activity is increasing in the state and 6 shows signs of becoming a popular band here also. W1RLK recently worked K8WOK, who was running 1½-watt, on 10 meters. His XYL K1KRB worked W8IYB. W8IYB's power was 2 watts, same band. K1SFX recently was appointed Asst. SEC. for Kennebec Co. Your Acting SCM attended the ARRL convention at Swampscott, had a wonderful time, saw quite a few Maine hams and heard talks by ARRL President Hoover and others. W1YYW wishes to thank all for the excellent cooperation during his short term as Acting SCM, and to extend his heartiest best wishes to the new SCM, W1AHM, of Portland. W1PNM did an FB job in the Frequency Measuring Test. Traffic: K4BSS/1 54, K1MDM 53, K1MZB 43, K1SZC 43, W1YYW 20, K1VEQ 17, K1GSF 15.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, jr., W1ALP—W1AOG, our SEC, received reports from only 3 ECs in April. K1s ICJ, PNB and W1FON. K1VPJ is a new OES. K1WJD is a new OO. W1DOM is our new PAM for 2 meters. I would like to thank W1OFK for a fine job done. Another fine New England Division Convention has come and gone and the committee is to be congratulated on a very nice time. It was a pleasure to meet our ARRL President, W6ZH, and he seemed to enjoy himself talking with everyone. Congrats to W1WCI on winning the John Mansfield Memorial Award. W1WCI also won a prize. W1MCR gets on 2 meters some. W1OUP now is in Abington. K1IJV, our new YL Editor, is W1GAG's daughter-in-law and we wish her the best of luck. W1BGW is a member of FOC. The T-9 Radio Club held a dinner meeting. W1IIB is the new secy. Bob Waters spoke at the Middlesex ARC. W1LJO donated a Harvey Wells Bandmaster. W1EAE and W1ALP presented the charter of affiliation to Tufts ARS. W1KN. W1MII is pres.; K1MCF, vice-pres.; K1TCD, secy.-treas. K1CZO is moving to Burlington. W1CCG is a Silent Key. K1RNQ is in with the Winthrop c.d. group. W1s BGW, RHN, AYG, BB, PXH, TZ, PLJ and K1CCL took part in the Feb. EMT. W1BGW worked SV0WT, Crete, on RTTY. W1s CMW and WDD were on the jury together. W1KQJ, RO and EC for Quincy, reports they had a c.d. week with W1WFQ, W1WK and W1DXQ manning their truck and says they need some new recruits. EM2MN had 22 sessions, 195 QNIs, 285 traffic. Heard on 2 meters: KN1s ZQQ, ZOE, K1QJT, K1TWI. W1OFK won an Ameco converter for 2 meters at the Convention. K1TXF gets on the air some. K1UGO is on the air with a joint net. K1VPJ will be on 6 meters. KN1ESG, Woburn, is on the air. W1FMW had the cold bug. W1ALP spoke at the Framingham Club on SCM duties. W1AKN and his XYL had their car smashed up but they are coming along OK. Appointments endorsed: W1AKN Sandwich and W1DWY Beverly as ECs; K1JIU as OBS. W1AWA says that the Western Mass. Phone Net and the Eastern Mass. are going to combine into one net. They had 22 sessions, 384 QNIs, 102 traffic. The 6-Meter Net had 22 sessions, 341 QNIs, 96 traffic. WB6BZR, ex-1QOI, wants to hear from any of the gang. K1MTT is mobile on 6 meters. Our 10-Meter Net needs some stations in the Lowell-Lawrence area, also near the Western Mass. line. It meets on 28,950 kc. at 2000 Mon. through Fri. W1WU has a Johnson KW and has been on 75 meters. K1VLB has a new 20-meter dipole. K1WJD has a TA-33 tri-bander. W1NJ is moving to Randolph. W1DIY is a new OBS. W1AUQ renewed his ORS ap-

(Continued on page 124)

NEW
SCORCH! MASTER



2 & 6 Meter Antennas

MOSLEY Model A-92-S

An introduction to the New MOSLEY SCOTCH-MASTER two meter beam. This nine element antenna may be mounted vertically or horizontally, providing excellent front-to-back ratio, handling maximum legal power, amplitude modulated or 2,000 watts P.E.P. SSB. Mounting bracket fits masts up to 1½ inch OD. Antenna is matched for 300 ohm balanced line. Boom is made of sturdy medium weight wall 1¼ inch OD aluminum tubing to achieve maximum strength with minimum weight and wind loading characteristics. Stacked arrays feature 300 or 75 ohm balanced feed.

SPECIFICATIONS AND PERFORMANCE DATA: Forward gain, 14 DB. Front-to-back, 20 DB. SWR, 1.5 to 1 or less at resonant frequencies. Maximum element length, 41 inches. Boom length, 12 feet. Turning radius, 6.5 feet. Assembled weight, 4 pounds. Maximum wind surface area, 1.25 square feet. Wind load, 25 pounds. Antenna is shipped in kit form. **Amateur Net $16.40**

MOSLEY Model A-76-S

Also introducing for the first time, the MOSLEY SCOTCH-MASTER six meter beam. This seven element array provides maximum forward gain with excellent directivity. SCOTCH-MASTER will handle the full legal power, amplitude modulated. Mounting bracket fits up to 1½ inch OD mast. Antenna is "Gamma" matched for 52 ohm unbalanced line. Boom is of heavy guage 1¼ inch OD aluminum. Easily rotated with TV rotor and can be mounted vertically or horizontally.

SPECIFICATIONS AND PERFORMANCE DATA: Forward gain, 12 DB. Front-to-back, 20 DB. Boom length, 24 feet. Turning radius, 13 feet. Assembled weight, 12.5 pounds. Maximum wind surface area, 2.5 square feet. Wind load, 51 pounds. Antenna is shipped in kit form, complete with detailed instructions. **Amateur Net $35.10**

MOSLEY Model A-56-S

The New MOSLEY SCOTCH-MASTER six meter beam features five elements, maximum forward gain and excellent directivity. This gamma matched beam will handle the full legal power amplitude modulated. Can be mounted vertically or horizontally. Feed with 52 or 75 ohm line.

SPECIFICATIONS AND PERFORMANCE DATA: Forward gain, 10 DB. Front-to-back, 20 DB or better. SWR, 1.5 to 1 or less at resonant frequencies. Maximum element length, 118 inches. Boom length, 12 feet. Turning radius, 7 feet 8¾ inches. Assembled weight, 6.5 pounds. Wind load, 32 pounds horizontally, 56 pounds vertically. Antenna is shipped in kit form, complete with detailed instructions. **Amateur Net $ 28.16**

••Mosley SCOTCH·MASTER Stacking Kits••

MOSLEY Model A-92-S-SK1

A kit for stacking two horizontally polarized A-92 SCOTCH-MASTER beams, one above the other. Comes complete with matching transformer, insulator, complete instructions and phasing line. Feed point impedance - 300 ohm balanced line. This stacked array will attain 3 Db additional gain over a single horizontally mounted beam. **Amateur Net $3.15**

MOSLEY Model A-92-S-SK2H

A kit for stacking four horizontally polarized A-92 SCOTCH-MASTER beams, two over two. Complete with support members, mounting plates, phasing line, insulators, hardware and instructions. Feed point impedance - 75 ohm balanced line. This stacked array will attain 6 Db additional gain over a single horizontally mounted beam. **Amateur Net $44.35**

MOSLEY Model A-92-S-SK2V

A kit for stacking four A-92 SCOTCH-MASTER beams, two over two, in the vertical plane. Comes complete with support members, mounting plates, insulators, phasing line, hardware and instructions. Feed point impedance - 75 ohm balanced line. This stacked array will attain 6 Db additional gain over a single vertically mounted beam. **Amateur Net $44.35**

Mosley Electronics, Inc. 4610 North Lindbergh Blvd. Bridgeton, Mo.

pointment and is working on DXCC. W1FON is making a stacked "Big Wheel" for 2 meters. K1ONW is helping a ham-to-be, K1ZYW has his General Class license. The Yankee Radio Club held a meeting. Many of the clubs are holding elections so please send in reports of results. KN1EVY is new in Marblehead. K1EKO and K1GUU have a new baby girl. Traffic: (Apr.) W1PEX 1103, W1OFK 405, K1ONW 387, W1EMG 328, W1LES 242, W1ZSS 219, W1AWA 169, K1PNB 154, K1MYN 148, K1GKA 71, W1DOM 50, W1FON 48, K1OFV 29, W1AUQ 25, W1SIV 23, K1CMS 21, W1DIY 19, W1VYS 19, K1BGK 16, K1WJD 14, K1LCQ 13, W1BKI 12, K1DGI 8, W1ZFQ 7, KN1ESG 6, W1GEK 6, K1PQG 4, K1OWK 3. (Mar.) W1DEL 28, K1WJD 16, K1LCQ 9, K1VLB 2.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—SEC: K1APR/W1BYH. RM: K1IJV. PAM: K1RYT. A goodly crowd from our section attended the New England Division Convention at Swampscott. New England Division Director W1EFW was the main speaker at the April meeting of the Berkshire County Amateur Radio Association. April saw the greatest activity on WMN (3560 kc. daily at 7 P.M.) in the past couple of years, according to RM K1IJV. East Mass. and West. Mass. have combined to form one phone net, according to PAM K1RYT (3842 kc. Mon. through Fri. at 1730 EDT). We welcome you on either of these nets. EC K1SSH is adding members gradually to the Worcester AREC. W1ZPB has a new SX-111 receiver. W1AJX is using an HA-1 keyer. K1LBB has a new Valiant II. W1DWA's XYL is now KN1EUU. W1EUB and W1EFN are active on 160 meters. W1UUK increased power to 300 watts. KN1-YMS has dropped the "N." W1FOX has a new tower. The Hampden County Radio Association is having great luck with its annual auction. New officers nominated for the HCRA are W1IC, pres.; K1IJU vice-pres.; K1PMK, secy.; W1LRE, treas.; K1RPD, W1-ZER, W1GIV and K1IYT, directors. W1MOK is now a member of the Old Old Timers Club. Traffic: K1RYT 533, K1SSH 277, K1IJV 109, W1BVR 96, W1ZPB 63, W1DVW 61, K1ZBN 61, K1LBB 50, W1DWA 12, KN1-ZVJ 2, W1AJX 1.

NEW HAMPSHIRE—SCM, Albert F. Haworth, W1YHI—SEC: W1TNO. PAM: K1NXV. RM: K1BCS. GSPN meets Mon. through Fri. at 2330Z and Sun. at 1430Z on 3842 kc. CNEN meets Mon. through Sat. at 1130Z on 3842 kc. NHN (c.w.) meets Mon. through Sat. at 2345Z on 3685 kc. Appointments and endorsements: K1UHE as ORS and W1TFS as OO Class I. Cancellations: KN1TGZ as OES, W1KVG as OPS, W1RMH as OO. Congratulations to W1JWJ, W1SWX/1, W1TFS and W1UBH on their fine record in the Frequency Measuring Test of Feb. '63. I enjoyed the fine meetings of Nashua Mike & Key Club, Concord Brass-pounders and Souhegan Amateur Radio Assn. and look forward to meeting with other clubs in the near future. K1RTB was the first K/W1 c.w. all bands in the VK/ZL/ Oceania DX Contest. The Mid-State Amateur Radio Club is to be congratulated on its recent affiliation. Attention of Belknap, Grafton and Carroll Counties is called to new AREC net operation on 28.5 and 145.8 Mc. under W1FOG, net manager. Traffic: K1BCS 1275, K1TMD 318, W1CUE 44, K1UHE 43, W1SWX/1 24, W1ET 10, K1AEG 2, K1BGI 2, K1WPM 2, K1ECU 1.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: W1YNE. RM: W1SMU. PAM: W1TXL. New appointments: W1BTV as OO and K1STB as OES. Section Net certificates were issued to the following: K1s ZIA, VYC, STB, RRK, VPK, YUV, QEA, SSL, NII and ROX, W1s BTV and ZRO. RISPN report: 30 sessions, 669 QNI, 161 traffic. The NCRC of Newport operated a station at a hobby show sponsored by the R.I. Council for the Blind and the Newport Jaycees. Gov. Chafee spoke from W1SYE/1 to W1JFF at his home QTH. W1WLG was in charge of the station, assisted by W1s LUO, JFF and TXL, K1s PTV, VPK and KN1YQP. The club also has a class for beginners who want to get their Novice Class tickets. K1LPL recently passed the Amateur Extra Class exam. He also worked 6YAAAA, a new call for Jamaica, and received his DXCC certificate. K1TPK worked W3JZY on ground wave. If you would like appointments as OES, ORS, OPS or OO contact the SCM. Traffic: W1TXL 854, K1TPK 194, K1DZX 29, K1OZI 29, W1-BTV 26, K1NJT 24.

VERMONT—Acting SCM, E. Reginald Murray, K1-MPN—SEC: K1DQB. Welcome back to W1BD, former SCM, who is moving back to Barre. W1IDM and K1HKI are new SS signals. We all regret that W1VZE has become a Silent Key. New officers of the CVARC are W1PMH, pres.; K1MPN, vice-pres.; K1OAJ, secy.; K1OMO, treas. The club made over 100 contacts in the Vt. QSO Party. W1JLF is back on the air. W1EXZ is moving to Burlington. Franklin Co. ARC set up an exhibit with two rigs at a local hobby show.

(*Continued on page 126*)

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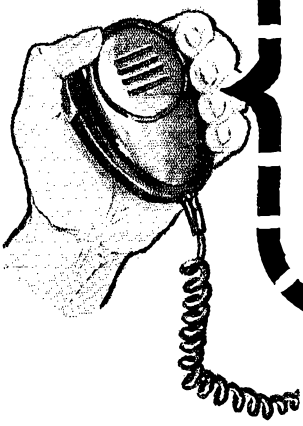

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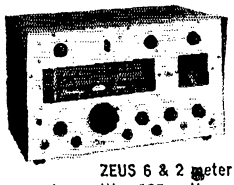
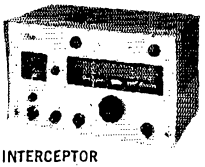


ZEUS 6 & 2 meter transmitter 185 watts AM & CW . . . $695.00 amateur net



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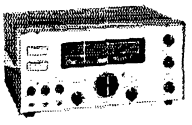
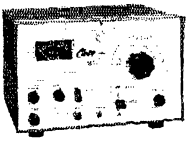


VENUS 6 SSB transceiver 185 watts PEP coming soon.



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W1KJG and his XYL visited W1JRU and his XYL, K1BUR, of Massachusetts, visited W1EIB.Traffic: (Apr.) K1SLU16, W1KJG 2. (Mar.) K1YID 14, W1KJG 7.

NORTHWESTERN DIVISION

ALASKA—SCM, Kenneth E. Koestler, KL7BZO—SEC: KL7DGA. EC: KL7CUK. OOs: KL7BJW, KL7-DQD, KL7AQU. OBS: KL7CAH. KL7DGA has been appointed RACES Officer for the State of Alaska. KL7AQU has been appointed Asst. RACES Officer. They have some very good ideas in developing the RACES and AREC program for Alaska. KL7CUK is the new Chief Engineer of the FCC monitoring station in Anchorage. RACES and AREC now have contact between Anchorage and Fairbanks on 2 meters via KL7IS at Lake Minchumina. KL7ENT has been holding classes at his home and we understand some have obtained their General Class licenses through Dan's effort. KL7EKB and his XYL, WL7EKC have his S/Line on the air with a new beam and tower. Dell received his General Class license in April. KL7CQS has a new twenty-element telrex on 2 meters. Your SCM would appreciate receiving news from you hams outside of Anchorage. Please write him.

IDAHO—SCM, Mrs. Helen M. Maillet, W7GGV—The FARM Net meets at 1900 MST on 3935 kc. M-F. The Gem State Net meets daily at 2000 MST on 3580 kc. TEN meets Sun. at 0900 MST on 3910 kc. The Boise Valley Net meets Sun. at 1930 MST on 145.44 Mc. The Early-bird Contact Net meets at 0700 on 3990 kc. M-F. K7SKR, custodian of Centennial QSLs, moved to Washington and W7ZLO, certificate custodian, will now handle orders for QSLs. Boise Valley 2-meter hams assisted with the distribution of Sabin oral vaccine and maintained communications between dispensing centers. Twenty hams worked with Bessie, W7CRE, net control at Clinic Headquarters. New calls are KN7WLC and WA6TXE and WA6TXM, who are awaiting new 7 calls. W7IAF and XYL W7AOU, of Utah, visited the SCM's hamshack. The Magic Valley area has 15 stations on 145.44 Mc. CU all at the WIMU Hamfest Aug. 2, 3 and 4. FARM Net Traffic: 50. Traffic: K7KXJ 38, W7GGV 23, K7OAB 10, K7KBX 4, W7SLY 4.

MONTANA—SCM, Walter R. Marten, W7KUH—Asst. SCM: Dr. Marvin F. Hash, W7YHS. SEC: K7AEZ. L.F. PAM: W7YHS. V.H.F. PAM: W7TYN. Appointments: W7YHS as Asst. SCM; K7AEZ as SEC; W7TYN as V.H.F. PAM; W7FUM as Valley County (Glasgow) EC; W7SEW as Phillips County (Malta) EC. Endorsement: W7EWR as EC Malta. The Montana Phone Net meets Mon., Wed., Fri. on 3910 kc. at 1800 M. Code practice is conducted Mon., Wed., Fri. on 3825 kc. at 1900 M by K7OGF. W7CJN completed a new Nuvistor 6-meter converter. W7EWR made WAS in the CD Party. K7NHV put up two new poles and an antenna. K7EWZ is very busy on RN7. K7VMJ has skeds with his Dad, WØASO. K7OGF's recent Frequency Measuring Test was 7 parts per million, and an average accuracy over the past 4 years better than 10 parts per million. W7ZPT moved to Great Falls from Bozeman. W7FLC won first place in the technical paper contest at M.S.C. on the 3rd method of generating s.s.b. W7CLB and W7CLC moved from Bozeman to Gardiner. K7NIP has a new 2B. KN7VRH has a new Apache. K7OZY moved to Livingston and is attending M.S.C. W7BUT graduated from M.S.C. with a degree in Industrial Arts. K7OEG constructed a 6-meter mobile rig. K7RFI was elected act. mgr. of the Capital City Radio Club. KØVIG/7 has a new call, K7VRY. KØYAB/7 has a new call, K7WAY. The Capital City Radio Club holds Novice Class instructions. The Big Sky Radio Club held a transmitter hunt with the following mobiles: W7KGM, W7BOZ, W7AU, K7PQM, K7DGR, W7FGZ, W7KUH and co-pilots W7OYI, K7SIL, K7JXL and K7DGQ. First in was W7KUH, second K7DGR, third W7FGZ. The hidden transmitter was operated by K7PKW and K7PKV. W7WIF is operating on the FAA Net on 3977 kc. K7UAX is now on phone. W7DEO is now living in Choteau. K7MEG has a new Heath scope. There are 1150 amateurs in Mont. (Apr.) There are 275 ARRL members as of Sept. 1962. 210 amateurs have their Montana amateur license plates. The following stations are on 6 meters in Great Falls: W7KDP, K7MOJ, K7IOA, W8KNC/7, W4NON/7, K8KGI/7, W7AYH, KØCNS, W7WYG, W7IJI, K7BBE, K7BBR, W7GHE and WA4CMF/7. The Big Sky Radio Club (Great Falls) provide communications for the annual Jaycee fish derby. Net control station was operated by K7PKV, K7IOA and K8KGI. Mobiles participating were W7-FGZ, W7WYG, K7DGR ,W4WNY, K7BYB, K7INR and W7HGM. Town link stations were K7JXL and K7EGJ. We regret to report W7CIK as a Silent Key. Traffic: K7EWZ 90, K7DCI 43, K7OGF 31, K7DCH 10, W7FIS 8.

(*Continued on page 128*)

C-P COMMUNICATION ANTENNA SYSTEMS

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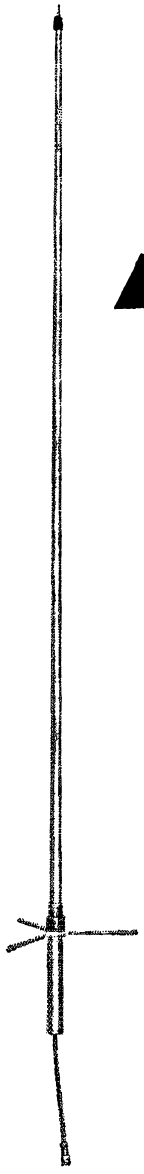
BASE STATION STATIONMASTER ADVANCED DESIGN ANTENNA (4X-Omnidirectional Gain)
U.S. PATENT NO. 3,031,668



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.

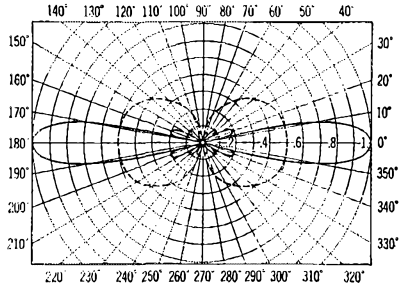
*Exact frequency must be specified

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	2¾" 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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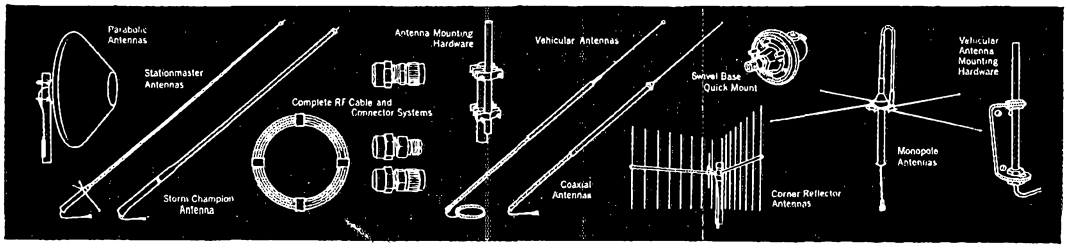

OREGON—SCM, Everett H. France, W7AJN—SEC: W7WKP, RM: W7ZFH. Certificate endorsements: W7SO as EC, K7IWD as ORS, W7RVN, Multonomah County EC, reports 6 new AREC members, making a total of 65. AREC membership in Oregon at present totals 463. W7GUH has received his BPL medallion and K7IWD made his first BPL. K7CLL reports he will graduate from law school in June and plans to take the Bar examination in Washington. K7WSW a new ham in Grants Pass, will be using a Valiant and an HQ-180. K7VMP now is working mobile. K7DVK is remodeling his ham shack. The Portland area AREC held its monthly meeting at the c.d. headquarters. The guest speakers were Stanley Sharp, Director of Emergency Service, and Wayne Thayer, Director of Communications, who told of the activities of the Civil Air Patrol in relation to communications. W7ZFH, OSN mgr., reports net sessions 21, total attendance 179, traffic 93. BRAT (Brotherhood of Amateur Radio Traffickers) awards went to W7AJN, W7BVH, W7ZFH and K7IWD. OAREC (Oregon AREC) reports net sessions 8, attendance (by counties) Clackamas 4, Columbia 4, Lane 8, Marion 2, Multnomah 18, King County, Washington 5, total attendance 41. Traffic: (Apr.) K7IWD 508, W7GUH 305, W7ZFH 123, W7AJN 47, W7MAO 16, W7BVH 14, W7DEM 6, K7TFS 5. (Mar.) W7GUH 276.

WASHINGTON—SCM, Robert B. Thurston, W7PGY—Asst. SCM/SEC: Everett E. Young, W7HMQ. RM: W7AIB. PAM, W7LFA. Some 220 attended the Skagit Amateur Radio Banquet held at Bryant Grange Hall Apr. 20. The Sammaish Amateur Radio Club received the club call K7WPD. New appointees are W7EVW as OPS and K7JZT as OPS. W7BDK is a Silent Key. Ozzie was an OO in the Seattle area. The Northwest Slow Speed Net (NSN) had 423 QNIs and 93 QTCs from 30 sessions during April. Net time is 2000 PDST on 3700 kc. W7RDL is QRL fixing up the old QTH. W7RGL, now transmits Official Bulletins on 3520 kc. at 2000 PDST Tue., Wed. and Thurs. The ARCS of Kitsap County held Field Day on Mt. Walker. W7IST and W7AGJ hold regular skeds on 220 Mc. W7CZY transmits Official Bulletins at 0500Z on 3637 kc. RTTY. W7JII has acquired an NC-300. The Richland 10-Meter Net has an average of 18 QNIs on 29.51 each net session. W7NNF is moving to a new QTH in Seattle. K7UDG now is in DL4-Land. W7OEB has received a USA-CA 500 certificate. K7VNV is active on 6 meters. W7BTB turned in a good traffic report. Ivy has been getting his traffic via the YMCA in Bremerton. W7AIB reports he is in full operation on 160 meters and the bands are on the upswing now. W7LFA vacationed in W4-Land. W7QMF is assisting W7DAH to get on air. K7JRE has a 20-meter ground-plane. K7PZQ and K7JRE have been doing a little horse-trading to the satisfaction of both parties? The Walla Walla Club will hold code practice Sat. nights on 29 Mc. New calls in the Walla Walla area are K7SYL, K7WTA and K7WTK. We understand that K7WTA is on the air with a Viking rig. K7KEG moved to a new QTH. K7LWP operates mobile from a scooter. The Northwest YL Amateur Net held a picnic at Lewis and Clark Park near Dayton May 19. The net now has some fifty members. The North Seattle Amateur Radio held a white elephant sale with all proceeds going to the ARRL Building Fund. W7PGY recently went operational on 6 meters. W7JPH finally is finishing his power supply for the big rig. W7CAM spends weekends on sunny Whiby Island. W7HRC (Hot-Rod Charlie) is recuperating from major surgery. We all wish you a speedy recovery, OM. K7RSM is looking forward to a new three-element rotary for 20 meters. W7JC is chasing a bad case of klix. How about some news from the Spokane area, also the Wenatchee and Columbia Basin areas? Traffic: W7DZX 1127, W7BA 1026, K7JHA 301, W7APS 227, W7GIP 166, W7OEB 148, W7BTB 88, K7CTP 84, K7-QMF 44, W7AIB 35, W7AMC 30, K7JRE 27, W7EU 15, W7JC 9, K7PZQ 9.

PACIFIC DIVISION

NEVADA—SCM, Leonard M. Norman, W7PBV—K7QPK and K7JPC are out of high school and on to college together this fall in California. K7VPQ and KN7WTX are new members of the Las Vegas High School Amateur Radio Club. W7MWF is putting up a new beam and reports good DX on 40- and 20-meter c.w. The Las Vegas Amateur Radio Club was host to Orange County Mobile Cade, who conducted the mobile field trials and convention in Las Vegas this year. The Las Vegas Amateur Radio Club's s.s.b. station is on the air daily and will provide communications for the Powder Puff Derby this year. Anyone desiring a schedule should write to Room 202 Thunderbird Hotel, Las Vegas, Nev. W7HQS has an HB-11 under construction. W7TGK has an HB-16 under construction. K7ICW reports v.h.f. and u.h.f. conditions very poor so he has his gear out for modifications and repair. W6NLN/7, of Bakersfield, is now active in Las Vegas on 6 meters. Reno Amateur Radio Association's officers are K7-NKF, pres.; K7TAO, vice-pres.; Al Chin, act. mgr.;

(*Continued on page 130*)

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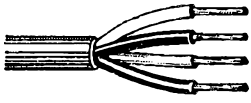

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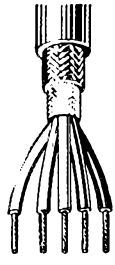
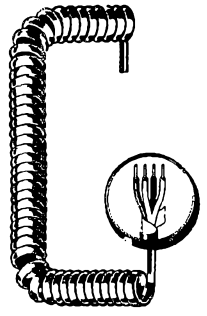


Power Supply Cables. Provide dependable service as power supply cords, interconnecting cables on electronic equipment, remote control circuits, special press-to-talk microphone circuits, and other ham applications. Designed for long service life with excellent mechanical and electrical characteristics, and uniform quality. Special jacket offers maximum resistance to abrasion and ozone.



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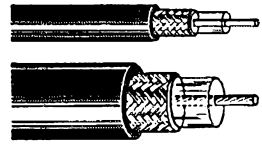

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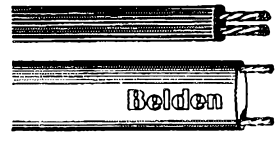

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8-2-3

K7QPX, secy.-treas. K7JPC has been appointed OBS. Traffic: K7GQD 49, K7QPK 22, W7PBV 5.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM, Edward T. Turner, W6NVO. SEC: WA6EIC. RM: K6KCB. PAM: WA6HVN. V.H.F. PAM: WA6RRH. The Santa Clara Valley Two Meter Section Net reports 18 sessions, with 125 check-ins and traffic of 29. Net Manager WA6RRH is now V.H.F. PAM. New ECs are W6PLS in Half Moon Bay and W6IBW in Palo Alto. Our sincerest thanks to K6BBF, who was forced to resign because of ill health, for a job well done. He never missed a report. W6WX changed from ORS to OO. A new OBS is WA6YDF. OPS-ORS W6AUC now also is handling OO activity in the Redwood City area. New OESs are WA6QHB in Watsonville and K6UHZ in San Jose. WB6AFE joins WA6RXM in OO activity in Monterey County. Your SCM and SEC made several trips during the month and spent very enjoyable evenings at the Monterey Bay Radio Club in Salinas and the South County Amateur Radio Society in Redwood City. The new section 35-mm slide lecture was presented at both meetings and was well received. Redwood City Area EC W6DEF conducted the SCM and SEC on a tour of three emergency communications facilities in his area, including Redwood City C.D. Headquarters RACES station, Red Cross station and Menlo Park RACES station. The SCM also visited San Jose RACES headquarters during the month and presented the slide lecture. San Mateo EC K6PJW reports that the group is holding net sessions on 10 meters. W6RSY is Asst. mgr. of PAN and acted in place of WA6ROF for a month. Both W6RSY and K6GZ made the BPL and report signal conditions much better on the nets. ORS W6JXK reports that to keep net interest, more traffic should be generated. W6DEF says that NCN sessions are holding high with relatively large check-ins and traffic counts. OES W6SHK reports that stations in the San Jose area are working into Paso Robles on 2-meter s.s.b. Elmer is busy converting equipment over to 2-meter s.s.b. and still is active on 220 and 432 Mc. K6YKG has a new inverted "V." WA6UAM will attend Carnegie Institute in Pittsburgh on a scholarship. W6CBX continues as OO Class I and is concentrating on Novice harmonics. Members of the SCCARA in San Jose enjoyed a talk and demonstration on laser but no holes were burned in the walls. K6MTX and K6DYX are active on the new NAVY MARS RATT Net. W6CYL attended the IEEE National Convention. A dinner was held in San Jose by a local defense firm honoring the work of Oscar, with K6LFH working up the program. Oscar, Inc., is now OES. W6ASH is working on the flyable Oscar III package and reports working KL7JDO on 160 meters regularly., WA6HRS continues active in OBS skeds and worked HC, MI and UL. Traffic: (Apr.) W6RSY 1151, K6GZ 363, W6JXK 139, W6DEF 114, W6AIT 101, W6AUC 62, W6PLS 62, W6YBV 56, W6PLG 44, W6ZRJ 40, W6RFF 28, K6VQK 26, K6YKG 21, W6OIH 15, W6WX 9, W8OCU/6 6, W6CBX 5, WA6UAM 5, K6MTX 2, K6TEH 2. (Mar.) W6ASH 14, W6WX 6.

EAST BAY—SCM, B. W. Southwell, W6OJW—SEC: WA6MHE. W6BB reports a 2-meter net on 145.2 Mc. Wed. at 2100 PST. WA6RGD is on NCN and RN6. A new novice in the Richmond Area is WN6CUD. The RARC has given 3 Novice tests and all passed. WA6VAT has a DX score of 62 with WAC. K6GK is punching traffic on UTL on 3565 kc. WA6WLE has a new bug. W7QOH/6 has a long wire on 80-meter c.w. and reports the MDARC Mobile Dinner was FB. WA6KJZ finally got Africa for WAC and WBE, and is QRL after school work. WA6ECF got in the CD Party but the U. of Santa Clara forces QRL. WA6UQM is debugging a 300-watt linear and got WAS and has a DX score of 23/14. The MDARC had an auction night Apr. 19 with a big turnout. W7YPD is now WB6EKX in the Walnut Creek area. K8SJZ was a recent visitor at WA6BZA/WA6NEL. WA6IHZ is in Castro Valley and is on 6 meters. WA6AHF is the new president of the HARC. WA6SXM is out of the hospital. WA6SQV's XYL passed the Technician Class test. Congrats. WA6SCO is Net Control on 145.35 Mc. at 2100 for the SARS. K7DZJ was a visitor at WA6BZA. WA6HKD has his new shack built. WA6NPC is sporting a new mobile rig. WV6ZXM's DX-60 blew up. WA6NGH got a State scholarship. Congrats. WV6ZXS and WV6YXP are studying for the General Class exam. W6VOM is on a carrier in the Coral Sea. K6LKX, W6CIR and W6IIF are doing an FB job teaching would-be hams. WA6JCS and her OM expect their fifth harmonic in September. K5VOE/6 is a new ham in Hayward. WA6ECF has been burning a hole in the DX bands from 3.5 to 21 Mc. KQONK reports via a Radiogram that the Braille Edition of the 1963 Net Directory is available. W6EMA is a Silent Key. WA6GUM is mobile/7, Seattle. K7KXQ was in the Bay area recently. The NCARTS had an FB turnout at its dinner. Traffic: (Apr.) WA6RGD 255,

(*Continued on page 132*)

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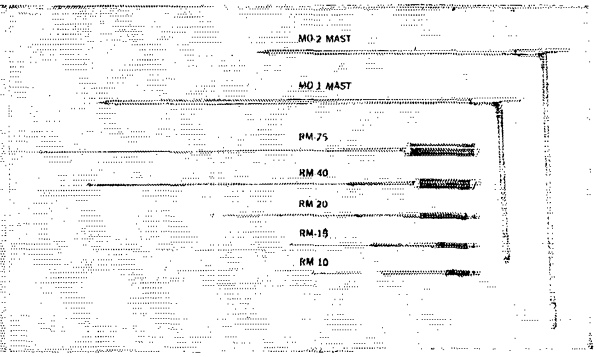

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Part No.	Description	Total Height of Antenna	Amateur Net
MO-1	54" Mast folds at 15" from base	(For Rear Deck or Fender Mount)	$ 7.95
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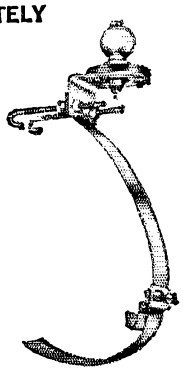

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K6GK 50, WA6MIE 36, W7QOH/6 30, WA6ECF 2, WA6KJZ 2. (Mar.) K6GK 65, W6BB 15.

SAN FRANCISCO—SCM, Wilbur E. Bachman, W6BIP—The HAMS showed a special movie on Telstar at its April meeting. W6KZF, W6BIP and W6GGC attended the Santa Rosa Club monthly meeting. Paul Kent, of Fairchild Semiconductor Co. in San Rafael, was guest speaker at the Tamalpais Radio Club. Subject: Diodes. The Marin Club started classes in code and theory the second week in May to be held 5 Friday evenings at the Red Cross, San Rafael. The CCRC meeting was held May 1 at Novato—with the Tamalpais Club as host. WB6ABI and some of his high school friends camped on Mt. Tamalpais Apr. 8-12 and held a c.d. drill of their own. San Francisco now has a 6-Meter Net AREC drill at 8 P.M. Sun. on 50.6 mc. The first drill had 20 check-ins. The San Francisco Club dealt with a technical movie. Subject: Capacitance. The area hamfest was discussed. W6UDL again is registration committee chairman. W6FAX will handle the financial end of the registration. A hamfest is scheduled for Sept. 22-23 at Edgewater. East Bay W6KZF copy: "Keep your SEC, W6KZF, informed of your local emergency and disaster preparations, frequency nets, etc. In a disaster keep a station on the traffic nets to handle incoming and outgoing welfare traffic as well as local official traffic on your local nets." W6KZF's employer, TV station KTVU, requested data on the public service activities which Bill participates in and thinks such information in the FCC reports helps the cause of the station but he's not sure. WA6ALK is on the mend after recent surgery. WA6IVM sent in a nice report on c.w., printed in SF news for May. K6TWK is one of 9 students from SF to make the Deans's Scholastic Honor Roll. He attends Calif. Polytechnic College at San Luis Obispo. K6LCF, Hamilton Air Force Base reports: "Big Armed Forces Day participation from K6AIR, using the call AG6AA. Much RTTY and s.s.b. This station duplicated AIR in Washington, D.C. May 18." San Francisco and Santa Clara Valley report space has been readjusted to reflect population shifts and ARRL membership; SCV now has 1100 and SF 654 members. Traffic: K6FCT 126, K6TWJ 20, W6JWF 12, W6GGC 10, WA6OXV 2.

SAN JOAQUIN VALLEY—SCM, Ralph Sarovan, W6JPU—The new officers of the Lodi Amateur Radio Club are WA6UYD, pres.; WA6TZN, vice-pres.; WN6BET, act. mgr.; WB6CKN, secy.-treas. WA6TZN is transferred to Atwater, and WA6YBT is now V.P. WA6UTN and WB6BHU are attending the University of California at Davis. The Falcon Amateur Radio Club (Atwater High School) operated a concession stand at the baseball games and earned $250. As a result they are establishing a club station. WN6EEE and WN6EKT are new calls in Atwater. WA6NFC is ORS in San Andreas. W6EFB is moving to Colorado. K6OZL has sold out and joined the Navy. He expects a KC4 call. The College of Sequoas has a Mosely beam and is building a final amplifier using a pair of 813s. K6SEV is building a final amplifier using a 4-125. W6QLY finally gave in to s.s.b. and blossomed out with an HT-37 and a Drake 2B. K6LKJ has a tri-band Swan. WA6YPF is having DX-100 gremlins. K6SNA is on 2-meter f.m. WA6TZJ has a tri-band Swan and is mobile. WA6RQY made General Class. W6DUD is thinking of 6-meter s.s.b. K6ODA participated in the search for a lost plane in the Sierras with the Civil Air Patrol. K6DMH also helped in the search. The San Joaquin Valley Net for April had 726 check-ins, 66 traffic, 44 contacts, 3 QSTs, 5 phone calls, and 11 bulletins. Happy Fourth of July to all. Traffic: WA6ESH 154, WA6YZA 130, W6EFB 21.

ROANOKE DIVISION

NORTH CAROLINA—SCM, N. J. Boruch, W4CH—SEC: W4MFK. RM: K4CPX. V.H.F. PAM: W4ACY. This is my final, final activities report for North Carolina. Barnett S. Dodd, K4QFV, has been elected our new SCM. Congrats, Barney! I wish you all the best of luck in your new post and I know you will do a swell job! W4BDU has received his privilege license for RACES operation. K4CDZ has his USA-CA certificate for 500 counties. WA4DAA, who operates W4ATC, is a senior in civil engineering at State College and plans for his Ph.D. K4IEX is a junior in E.E. at Clemson. K4MPE is now electronics technician and installer for Western Electric. Doc and Bertha (K4ZSR-K4ZSS) are going in for some real DXing. K4EWD, past pres. of the Alamance Radio Club, is our new Alamance County EC. It's nice to know one of our Novices, WN4IXW, is interested in traffic-handling. Sorry to learn that the husband and wife team of W4EJP-W4EJQ are inactive because of equipment trouble. W4FUI, our OO in Buncombe Co., recorded 9 violators. The following participated in ARRL's February Frequency Measuring Test: WA4FJM, WA2WBA/4, W4FUI, K4MHS and K4YYJ. W4BUZ has been extremely busy winding up the 2-meter kw. technical section for the

(Continued on page 134)

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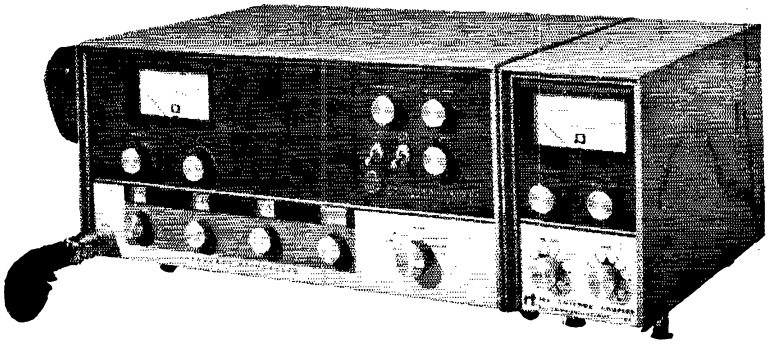

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very fine v.h.f. publication *Bugcheuer*. Best of luck, Buz! Traffic: WA2WBA/4 203, W4BDU 99, K4QFV 71, K4CDZ 42, K4TPK 41, W4ATC 38, K4MPE 37, K4YCL 36, WA4ANH 31, W4BAW 16, WA4EYA 10, K4ZSS 5, WA4DAA 1, WN4IXW 1.

SOUTH CAROLINA—SCM, Lee F. Worthington, K4HDX—SEC: W4BCZ. RM: W4PED. S.S.B. PAM: K4JOQ. A.M. PAM: K4KCO. Nets: C.W., 2400Z and 0300Z, 3795 kc; S.S.B., 0100Z, 3914 kc.; A.M., 2400Z, 3930 kc; AREC, 2400Z, 3914 kc. Wed. The Sideband Net held a very successful business and supper meeting May 4 in Greenville, S.C. Elected to office at this meeting were W4WQM as net mgr.; K4VWL, asst. mgr.; K4WJU, secy.-treas. Over 72 persons attended this bi-annual s.s.b. meeting. The Blue Ridge Radio Society sponsored a well-attended hamfest and ARRL meeting in Greenville May 5. Principal speakers were Mr. Cline of FCC, SCM, SEC and OA5C from Peru. Announcements were made concerning the State Radio Council Field Day Award, S.C. SET May 18. The Charleston hamfest will be held Aug. 10-11. For the 7th consecutive year, the Spartanburg ARC provided communications for the Betsy Rawls LPGA Golf tournament May 4-5 using its 6-meter transceivers. Net traffic: C.W. 110, S.S.B. 73, A.M. 20, AREC 3. Traffic: K4WJR 335, K4LND 83, K4WOI 32, W4BCZ 30, W4PED 22, K4VWL 16, K4OCU 12, K4PJW 12 W4NTO 5.

VIRGINIA—SCM, Robert L. Follmar, W4QDY—Asst. SCM: H. J. Hopkins, W4SHJ. PAM: W4CFX. RMs: W4LK, K4ITV, W4IA, W4SHJ, W4ADY. Nets: (c.w.) VSN, 3680 kc, 1830 EST; VN, 3680 kc, 1900 EST. (Phone) VFN, 3835 kc, 1900 EST; VSBN, 3935 kc, 2100 EST. From Winchester W4OOL reports that WN4HBO, WN4HBU and WN4HBR have passed the "General". W4DLA just missed BPL. Part of K4BAV's long wire fell down from old age so now he has a new skyrope. W4TE is back from an enjoyable Hamvention in Dayton, Ohio. K4PXY has 36 Naval ships for which he handles traffic. For information on the Roanoke Old Dominion Award write to K4WVT. K4GRZ, also in Roanoke, is becoming quite a traffic man. It looks like DST will help W4NVX get back into traffic. WA4GWD is back on the air from Hampton. W4KX still is furnishing an outlet despite a busy sked. Vera, WA4BVE, enjoys VFN activities despite the QRM. The gremlins still are houndin' W4NTR—this time the TA-33. The Globetrotter W4CVO still is trottin' with the XYL—they lost their baggage in Saudi Arabia but recovered it in Hawaii! W4JUJ got his last parish in Bermuda for the VP9 award; he also reports that the Richmond Club paper is creating lots of interest. Travelling is keeping several of our traffic men off the air. K4DCN has his 400-watter back on VFN and reports that things are looking up on that net. WA4JFY worked 34 countries in the DX Test. On the Eastern Shore the AREC is meeting the 1st Sun. night of each month according to EC W4OID, who is trying to get a 2-meter net going. WA4EUL is a new traffic outlet in Va. Beach. W4ZAU was off the air 20 days rebuilding and now is back on with an 18-watt homebrew. K4TZF completed his SB-10. Reports were received from K4-JQO, K4AL, K4MKO, K4IMF, W4CVO, W4WBC, WA4-AYP, K4EUS and W4RHC. Traffic: (Apr.) W4PFC 1555, W4NTR 558, W4DLA 451, K4PXY 218, W4LK 192, K4ITV 175, W4RHA 172, W4DVT 158, W4SHJ 79, W4ZM 74, K4FSS 62, K4WVT 60, W4QDY 51, W4IA 49, W4PTR 43, K4MXF 33, K4GRZ 27, K4SDS 26, WA4FCS 25, WA4GWD 24, W4LRN 16, WA4EUL 15, K4IIP 13, W4BZE 11, W4TE 10, K4IAN 9, W4BGP 8, WA4BVE 8, W4NVX 7, K4BAV 6, W4ZAU 6, K4LTK 5, W4OWV 5, W4JUJ 4, W4KX 4, K4SGQ 4, K4JYL 3, W4MXU 3. (Mar.) W4IA 112, WA4JFY 99, K4DCN 14, W4OOL 9, K4LTK 8, K4TZF 6, W4BZE 5, W4OID 4. (Dec.) K4CYS/P4 43.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8SSA. RM: K8HID. PAM: K8CFT. West Virginia nets: Phone, 3890 kc, at 2330; PON, 3905 kc, at 2215; C.W., 3570 kc, at 0000; S.S.B., 3903 kc, at 0100. Last call for the West Virginia State ARRL Convention, Jackson's Mill, July 6 and 7. W8DUW is a new OES. W8BKK has a new homemade superhet receiver. WN8HXA and WN8HXB are new stations in Oak Hill. WA8CPY keeps W. Va. on 8RN and has a WRL SS-3 and a new keyer. K8HIB is out of the Air Force and VO-Land and back home at White Sulphur. WA8CKN, W8QG and W8AY are running v.h.f. tests from Preston Co. New members of the WACWV Club are W8WSL, W8RXN and K8ZWM. Since 1946, the start of the Worked All Counties Contest, only 33 have qualified. Our sympathy to the family of K8ITR, fatally injured in an industrial accident, Clarksburg. K8ZNI found being in a rare county increases contacts. W8EHA is back on 75 meters and has a new mobile rig. WA8AZY finds OES work most interesting. Those interested in OO work, should make application. Don't forget your contribution to the ARRL Building Fund. Do it today. Traffic: K8BIT/8 200, K8VFK 149, WA8-

(Continued on page 136)

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ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Donald Ray Crumpton, KØTTB—SEC: WØSIN. PAMs: WØCXW, WØLJR, WØGNK. RM: KØFDH. OBSs: KØDCC, KØSLD. OOs: W2-VQS/Ø, KØIMC. ORSs: WØETT, WØMYB (CXN), WØIA (CCN), WØCWD. My sincere thanks to all the appointees in Colorado. Everyone made an effort to get his report in. This month we want to pay tribute to a great bunch of hams who are a part of the Colorado Wx Net. Under the leadership of our own WØIA they have contributed more to the public in general than any other group I know of by their consistent weather reporting. Our hat is off to you and your group, Gene, for a job well done. KØDCW and his boss, KØZSQ, of the HNN, have not missed sending in a report for two years. Can any one top this? The 1963 edition of the ARRL Directory has now been printed into Braille and is available for $1.00 bound book style or $2.30 in loose-leaf. Please tell all our blind hams about this or contact Ruth Vollrath, KØONK, Marshall, Mo. Traffic: KØ-ZSQ 140, KØDCW 111, KØWGC 86, KØTTB 47, W2-VQS/Ø 24, KØGUZ 18, WAØBBO 14, KØLCZ 10, KØCNV 8, KØWOP 7, WØMYB 4, KØQAR 3, WAØ-BXR 1.

UTAH—SCM, Thomas H. Miller, W7QWH—Asst. SCM: John H. Sampson, W7OCX. SEC: K7BLR. K7-RPA has moved from Utah and will be missed on BUN. K7TQE is now EC of Box Elder County. K7SDF has a vertical working FB on 75 and 80 meters and is back on c.w. W7BAJ is on the air RTTY and says that Utah is a scarce and popular item. W7OCX has received the BPL medallion. Conditions on BUN have been bad. W7QWH, K7MPQ, K7QEQ, K7QGWand K7QIE earned BRAT awards on BUN. There may have been other awards earned but these cannot be verified until W7OCX returns from a long overdue vacation. The Utah County AREC is helping civil defense with equipment installation. Navy MARS in Utah has a very active group headed by K7OIP. Traffic: K7NWP 365, W7OCX 54, W7-QWH 6, W7BAJ 1.

WYOMING—SCM, Lial D. Branson, W7AMU—SEC: W7HH. The Pony Express Net meets Sun. at 0800 MST on 3920 kc. The YO Net is a c.w. Net on Mon., Wed., and Fri. at 1830 on 3610 kc. The Wyoming CD Net meets Wed. at 1900 MST on 3537.5 kc. The TWN Net is a daily net at 2000 MST on 3570 kc. K7QYB is the new RM for the YO Net; he also is ORS. W7LVU, W7UFB and W7PSO are operating a 2-meter net which should be made a good-sized net soon. W7AMU has converted a 522 which he will put on the air soon on 2 meters. W7LVU put up a new beam and repaired his Horne Tribander. He also is starting an electronic course in connection with his position at the Refinery. W7AMU has been ill for fifteen months. K7MAT is "on the go" in connection with his job for the Reda Deep Well Pump Co. W7CQL spends his spare time tying fishing flies and trying to get out fishing. W7FLOs XYL passed away recently. W7QPP is in charge of the Wyoming Hamfest arrangements. W7PVN is very busy with new calves and lambs. Traffic: K7QYG 177, W7DXV 76, W7BHH 57, W7AMU 33, W7HLA 29, K7IVK 18, W7NMW 12, W7AEC 8, K7AHO 7, W7DW 6, W7CQL 2, W7HH 1.

SOUTHEASTERN DIVISION

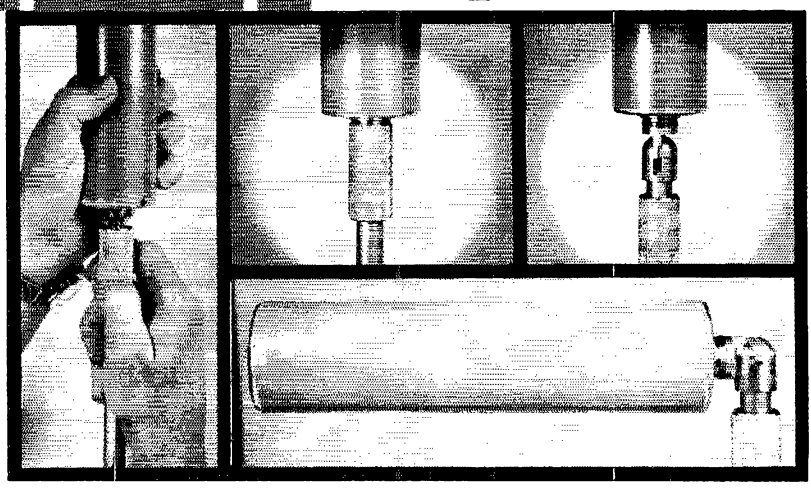
ALABAMA—SCM, William S. Crafts, K4KJD—SEC: W4NML. RM: W4USM. PAMs: K4BTO, K4DJR (v.h.f.) K4TNS and K4WHW. April reports of daily statewide nets (all times GMT):

Net	*Freq.*	*Time*	*Sessions*	*Ave. Tfc.*	*Ave. Attendance*
AENB	3575	0100	28	6.0	11.3
AEND	3725	2200	25	1.12	9.2
AENM (s.s.b.)	3965	0030	30	3.17	43.9
AENP (morn.)	3955	1230	27	1.7	18.0
AENP (eve.)	3955	0000	35	2.1	28.0
AENT (teen)	3970	2230	32	2.5	13.47

K4BSK and K4WOP have moved into a new shack. K4WHW has a new homebrew 6-meter transmitter and converter. K4FZQ has the new homebrew 813 final going. K4ANB is on with a new 811 final. K4HJM finally got his ART-13 going. WA4BAA is on 20-meter c.w. with an 813. W4IHX won an SR-150 at Montgomery and W8GKB won the KWM-2 at Birmingham. W4AUP won the county contest at Birmingham. K4LCI has a new HX-50. WA4EXE is new on s.s.b. also. W4WGI got that 2B and W4SNP an SX-115. K4GHX and WA4HFE are new owners of SB-10s. Don't forget the N. Ala. Ham-

(Continued on page 158)

webster band-spanner top-sider



New . . . streamlined, center-loaded mobile antenna gives high performance on 160-75-20-40-11 or 10 meter bands by changing high "Q" inductors. In addition to excellent electrical characteristics, "Top-sider" introduces to the amateur field, the precision-machined hinging yoke design proved in service by thousands of high quality marine antenna assemblies. This superior, mechanically sound design allows full 90° laydown of loading inductor and whip—in two directions. (See illustrations for details). The entire antenna is light in weight yet strong and durable, offers maximum resistance to rust and weather. The lower column is 9/16" D polished aluminum with 3/8-27 base fitting. Stainless steel top whip is adjustable over a 10" range, has locking set screw. Butt is threaded 3/8-27.

Top-sider is just loafing at 300W P.E.P. All inductors are high "Q", have excellent form factors. The only metallic objects in proximity to the internal coil are the top and bottom screw fittings. Inductor outer housing is high strength tenite with molded end pieces of the same material. Inductors thread-on for positive, low resistance contact, can be changed quickly.

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Please send information on "Top-sider" and other Band-spanner antennas and mounts.

Name

Number Street

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Two models:

218-R, 79" overall. 218-S, 68" overall.

Available inductors:

A-77..160 meters	A-72...20 meters
A-70...75 meters	A-73...15 meters
A-71...40 meters	A-74...11 meters

A-76...10 meters

fest at Decatur Aug. 18. If you are not an AREC member consider joining, we are shooting for 1000 members by the end of this year. Traffic: (Apr.) WA4AVM 332, K4WOP 97, WA4BDW 89, K4BSK 68, W4USM 66, K4WHW 47, K4KJO 42, K4AOZ 40, WA4CWI 40, K4FZQ 37, K4NUW 24, K4NKT 23, K4ANB 22, W4NML 19, WA4EXA 18, W4SNP 12, K4GXS 9, K4BTO 8, K4HJM 8, K4WSK 8, WA4EEC 6, WA4IHI 6, K4RIL 6, W4ZNI 6, K4KDE 5, K4RSB 5, K4DSO 4, K4PHH 4, W4WGI 3, K4WWP 3, W4DFE 2, WA4ENJ 1, WA4FWP 1. (Mar.) WA4AVM 230, W4TOI 199, K4GHX 14, WA4CCV 11, K4DJR 10, W4DS 8, W4CWF 3, W4EOH 1, K4WSS 1.

EASTERN FLORIDA—SCM, George E. Cushing, W4QVJ—SEC: W4IYT. Orlando held a full-scale e.d. communications test with participation by city and county officials plus Red Cross chapters in Brevard and Orange Counties. This type activity demonstrates the dependability of amateur radio communications to civic authorities. W4EXM, signing EP2AM for the past three months, has 100 countries and plus using an M-2 and dipole aided by that 15-db. gain call sign. He is due back in the States by the end of June. W1AGM/4 has gone back to Yaukeeland and is coming back in the fall. The Gulf Coast ARC now meets at the Port Richey City Bldg. We regret that illness forced K4BY's resignation as secy.-treas. of the Manatee Club. W4DQS ventured to N.Y.C. for the I.E.E.E. show and Sideband Dinner K4YSP made the Honor Roll of ARRL OOs. This honor roll listing is called to the attention of the ARRL Directors at their annual meeting. Hearty congratulations are in order. W4CKB and W4QVJ were speakers at the Dayton Hamvention program DX-Forum. We need reports of club and individual activities if this column is to be of interest to *you*. Send news in on the first of each month. Officers of the Fla. RTTY Society are K4KXP, pres.; W4GVK, vice-pres.; W4RWM, secy.-treas. The new editor of *Fla. DX Report* is K4IIF, Winter Haven. The 7-11 V.H.F. Net refused to die and is back in business again. Traffic: (Apr.) WA4BMC 1290, K4SJH 508, WA4DMV 488, W4KIS 442, W4TUB 377, W4MIN 256, K4KDN 247, WA4JMP 238, K4BY 184, W4TRS 177, WN4KKW 151, WA4GBM 135, K4COO 131, W4EHW 106, WA4COR 101, K4NVD 101, W8LDU/4 96 WA4AMC 78, WA4BGW 73, W4BKC 64, K4LCF 58, WA4GDS 52, W4GUJ 39, K4DAX 37, W4LMT 35, W4QVJ 33, K4DBT 30, W1AGM/4 28, WA4CJC 28, W4OGX 18, WA4FGE 16, W4ZZZ 15, WN4IXF 14, K4MTP 14, K4OAC 9, W4ZJZ 9, W4MZR 4, WA4HIN 3, W4CMK 2, W4KRC 2. (Mar.) W4TRS 208, WA4GFE 138, W4DVR 62, WA4AMC 55, WA4GDS 33, WA4LHK 27, WA4JYB 25, K4OAC 25, W4EAT 23, K6SXX/4 15, WA4CNZ 11, WN4IXI 8, WN4KGB 3.

WESTERN FLORIDA—SCM, Frank M. Butler, jr., W4RKH—SEC: W4MLE. PAM: W4WEB. V.H.F. PAM: W4ZGS. RM: W4BVE. Pensacola: Traffic men and AREC members met with the SCM and SEC to discuss plans for increased net participation and closer coordination between v.h.f. and h.f. activities during emergencies. Those attending were WA4BYI, K4DDD, W4JLW, W4OOW, K4QOJ, K4RSE, W4RWY, W4SRM, W4UUF, W4VBU and K4VND. The monitoring of 29,560 kc. led to an impromtu picnic by W4FRJ, K4DDD, W4VBU and K4HZJ. The NAS Club's new officers are WA5CVY, pres.; W3TNU, vice-pres.; K4FOG, secy.; W4SRM, trustee. The Sixth Naval District is planning a disaster setup with ham participation. The V.H.F. Club has contests going to stimulate the use of club station W4PBC. Contact W4EQR for details. K4FTI has picked up some good DX on 2 meters. Fort Walton: W4ZGS was appointed OBS and V.H.F. PAM. He found several band openings on 6 and 2, with Canada and Mexico the best DX. New 2-meter stations are W5RHE/4, W9AUQ/4 and W8DCU/4. Panama City: WA4FIJ/FJF also report good 6- and 2-meter openings. K6PSJ/4 is new on 6 meters. WA4FIJ is modifying the Heath Twoer for d.s.b. WA4GJO has a new 6-meter converter and is converting the AF-67 for 6 meters. K4LIX is on 2 meters now. During the recent tornado activity 22 stations checked into the WFPN special sessions, Port St. Joe: W4WEB has an ART-13 and a Super Pro on from the business QTH. Traffic: (Apr.) K4VFV 886, W4ZWD 180, WA4MLE 100, W4BVE 84, WA4FIJ 51, K4BDF 25, W4WEB 17, W5BJG/4 13. (Mar.) W4BVE 92.

GEORGIA—SCM, James A. Giglio, W4LG—SEC: W4YE. PAMs: W4KR, K4PKK and W4RZL. RM: W4DDY. New officers of the Georgia Teen-age Radio Assn. are K4KAZ, pres.; WA4AEL, vice-pres.; WN4IWE, secy.; WN4MFO, treas.; WA4EMV, editor. K4OSW has a new YL harmonic. WA4GPA reports good results with a 6-meter rotatable beam. WA4JSU is helping to train a new generation of hams at Griffin. WA4BET sounds better than ever after recent rig trouble. K4THC is Germany-bound. The Augusta Radio Club has graduated a radio class that produced 15 new Novices and 2 Conditionals. K4INN, K4PPR and K4TZC have nice sigs with new Swan mobiles. K4WWY has a new home-

(Continued on page 140)

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brew beam on 15 meters. W4YE now is s.s.b. with a full gallon. W4LME has retired from Turner AFB after 20 years of service and heads for W6-Land. W4FTN, in addition to c.w. work, finds time to be a variable star observer. We hear that W4LME and W4MLA are operating mobile c.w. K4VDF works both s.s.b. and a.m. from Cordele. K4GBF and XYL K4BWQ are trying to get an antenna up in a Macon trailer court. K4TJN and K4DDM have FB sigs from Albany. WA4CEI seems to work any mode any time from a real active station. K4YZE has a new 60-ft. high 2-meter array. New appointments: K1KSH/4 as Dougherty County EC. K4PKK as V.H.F. OBS. Traffic: K4MCI 607, W4RZL 294, K1KSH/4 230, W4DDY 197, K4WWY 176, W4PIM 78, W4LME 73, K4FRM 52, K4YRL 22, W4YE 8, K4DKY 5, W4BZ 4, K4ADU 3, WA4GPA 1.

WEST INDIES—SCM, William Werner, KP4DJ—C. D. Radio Officer: KP4MC. QSL Bureau Manager: KP4YT, Box 1061, San Juan 5, P.R. KP4YT renewed her OPS appointment. Her OM is now KP4BAIZ on 6 meters, whose first QSO was with grandson KP4BCW. KP4ANH, Guayama, joined the AREC and has a 5-kw. emergency power plant. KP4BCA, San Juan District EC, lost his 536-ft. "Vee" antenna in a storm. The AREC Net meets Mon. at 2330 GMT on 21,390 kc. KP4BML and XYL KP4BMR are on 146.552 Mc. with a Twoer, while daughter WP4BMS works the Novice bands. KP4CK and XYL KP4CL went on to visit movie studios in Hollywood after attending the S.S.B. Dinner in New York. They acquired a TO keyer to work the DX that is not on s.s.b. KP4ES, at Ponce, now has a 6N2 Thunderbolt on 2 meters. Visitors to KP4- and KV4-Land were W2ASI and WA2DEW/KV4CQ. KP4BJU took part in the ARRL DX Contest and contacted five new states as well as Australia and Japan. His DX is now 38/10 and WAS is 47/37 with Hawaii, Alaska and So. Dakota missing. KP4BHY joined the AREC. WP4BJG is now KP4. KP4BJU, his father KP4DV and KP4BJD went on their own Field Day. The Sacred Heart Academy RC is composed of KP4BJU, KP4BJD, KP4BLM, KP4BHY, KP4AYH, KP4AYI and WP4BJQ and three prospective hams. The club station has a Drake 2B, vertical antenna and a Geiger counter! They have ordered an HT-37 transmitter. KP4BJR and KP4AZX are active on 2 and 6 meters from Rio Piedras and plan to organize an Oscar Project group for tracking, etc. They already have a helix tracking antenna. They also are members of MARS. KP4BJR is AE6BJR. KP4BJS has installed his Clegg 99er in the Volkswagon along with the Heath MP-10 d.c. to a.c. inverter. K4CQK/KP4 and K4CQL/KP4 are active in the Navy and stationed at Roosevelt Roads Naval Station. They work 15, 40 and 20 meters. Traffic: KP4WT 66, KP4BJU 2, KP4DJ 2.

CANAL ZONE—SCM, Thomas B. DeMeis, KZ5TD—The CZARA held its May meeting in the training room of the new FAA building. KZ5BL and KZ5TD acted as guides for the group in showing the club throughout the building. The club members enjoyed the tour and were impressed with the whole operation of FAA. KZ5JD has reserved the c.d. for the next meeting where KZ5RV will show the complete setup and give a brief training lecture. Plans were laid for a transmitter hunt for some time in July. New stations activated are KZ5CL and KZ5ED from the Pacific Side. KZ5FM is talking about a 40-meter beam. KZ5JD, KZ5JW and KZ5DX are reporting good activity on 10 meters until an hour after sunset here. A few hours after that and 40 and 80 are the only things open here. Quite a few KZ5s have gone or will be going Stateside for their vacations. KZ5RJ, recently retired, left for the West Coast and expects to be operating from there within a few months.

SOUTHWESTERN DIVISION

LOS ANGELES—SCM, John A. McKowen, W6FNE—SEC: K6YCX. RMs: W6BHG, W6QAE. PAMs: W6ORS, WA6TWS, K6PZM. The traffic reports this month are something to behold. Eight stations made the BPL: K6EPT, W6GYH, WB6BBO, K6MDD, WA6WTK, WA6TWS and WA6YLZ. A very fine job, gang. W6NAA reports a very successful operation at 29 Palms for the City of Hope Motorcycle Run. Communications on 6 meters was performed by WA6s DBB, DJB, GAC, HBU, JOX, LMV, NEE, QMV, SDQ, TBH, TXB, UZK, WIZ, WTK; WB6s BZE, CAO, CIU; K6MDD and K6OZA. New officers of the Marina Club are W6EOG, pres.; WA6DII, vice-pres.; WA6ZCQ, secy.-treas. V.H.F. activity is picking up and the band openings on 6 meters raise hopes of a very hot summer on that band. W6FNE worked his first out-of-state contest on the May 5 openings. WA6KVS has his new HBR-16 going now. The 8 Ball Net now has a 6-meter session daily. Congrats to WA6WTK and WA6TWS on making their first BPL. WA6UHM got his 35-w.p.m. certificate. W6QAE has been appointed RM. I want to thank all of you for the well wishes and the large number of reports this month. The office of SCM is a real honor and I have a Class A

(*Continued on page 142*)

record to shoot at. Al Hill, W6JQB, gave six years of top service to the L.A. section. He has earned a long vacation. Support your section nets: On c.w., the Southern Calif. Net (SCN) meeting at 0300 GMT daily on 3600 kc.; on phone, the Southern California Six Net (SoCal 6) meeting at 0200 GMT daily on 50.4 Mc. Traffic: (Apr.) K6EPT 1532, W6GYH 804, WB6BBO 566, K6MDD 534, WA6WTK 503, W6WPF 439, WA6TWS 390, K6HIT 295, K6ZDL 260, WA6YLZ 224, WA6UHM 220, W6QAE 218, WA6GAG 112, W6BHG 108, K6IWV 101, WA6CFQ 50, WA6USU 47, K6PZM 34, K6SIX 34, WA6-WIZ 28, WA6TYV 18, W6FNE 17, W6USY 16, W6CK 15, K6JCT 14, WA6CXB 10, W6ORS 8, W6NAA 5, WA6-KVS 4, WA6ORS 4, W6SRE 4, W6AM 2, WA6SNK 2, W6VOZ 2. (Mar.) K6YDS 138, K6IWV 37, WA6CXB 18, W6NKR 6, W6AM 2. (Feb.) WA6CXB 12, W6NKR 8, K6QGX 1. (Jan.) WA6CXB 21.

ARIZONA—SCM, Kenneth P. Cole, W7QZH—Asst. SCM/SEC: K7NIY. PAM: W7OIF. RM: W7LND. The Copper State Net meets at 1930 MST Mon. through Fri. on 3880 kc.; the Grand Canyon Net Sun. at 0800 MST on 3880; the Tucson AREC Net Wed. at 1900 MST on 3880; the Cochise County AREC Net each Sun. at 1400 MST on 7260; the Tucson 2-Meter Net at 1000 MST on 145.35 Mc.; the Arizona Interstate Net, c.w., Mon. through Fri. at 1900 MST on 3555 kc. The Maricopa County AREC Net will meet each Thurs. at 0200 GMT (7 P.M. MST) on 29.620 kc. Ft. Huachuca is losing one of its ardent amateurs, W7AMM, who returned from Saudi Arabia about 18 months ago, soon will depart for Brazil. The Huachuca Amateur Radio Club elected KN7-WQP as secretary. Correspondence to the Huachuca Club should be directed to P.O. Box 903, Ft. Huachuca, Ariz. K7MTZ, Patagonia, Ariz., is convalescing after a successful operation. He is active on 80, 40 and 15. The Sun City Amateur Radio Club recently elected K7NIY, pres.; K7RDC, vice-pres.; K7NOA, secy.-treas. The Arizona QCWA now boasts of 21 members, including Barry Goldwater, K7RDH is building Heathkit's HR-20 and HX-20 and will be on the air soon from his new QTH in Glendale, Ariz. BPL certificates went to W7FKK and K7WBC for March traffic and to K7WBC for April traffic. Traffic: (Apr.) K7WBC 478, W7FKK 186, W7AMM 181, K7CET 6, K7RUR 6. (Mar.) K7WBC 458, W7FKK 321.

SAN DIEGO—SCM, Don Stansifer, W6LRU—The National City Amateur Radio Club has graduated four Novices from its latest course. NCS for the 2-Meter AREC Net, meeting on 145.5 Mc. at 1900 Tue., is K6-TFT. WA6UUO participated in a recent fallout shelter test and was the link to the outside world during the test. The new secy. of the American Radio Club of El Cajon is WA6WBI, new vice-pres. is WA6BVT. WA6BRG, ex-WØEOT, is now ORS and Class IV OO. The ACTORS, a new club in Orange County, lists the following officers: WA6RYW, pres.; K6JPH, vice-pres.; WA6REC, secy.-treas.; WA6ZOW, trustee. K6KMJ, in La Jolla, is now an ORS. WA6ROF, ORS in Orange County, vacationed in Iowa in May, mobiling on 75 meters en route and home. The Westminister High School Club in Orange County has a new TH-3 beam. W6QJW spoke to the Orange County Club in May on the news and developments on Oscar 3. The May San Diego DX Club meeting was held at the home of W6ID in Fallbrook. Three members of the DX Club, W6CAE, W6LRU and WA6OZL, are now on 2 meters with a "DX Monitering" net. Other members are working on the project. K6BPL, Southwestern Division Convention chairman for 1963, reports plans for this event promise to make it the convention of the decade here in San Diego Oct. 11-13. W6SK, council chairman for the San Diego Council of Amateur Radio Organizations reminds all clubs and delegates that meetings will be held throughout the summer the last Thurs. of each month, Red Cross Headquarters, at 1930. Your SCM can be reached by mail at Route 3, Box 47, Bishop, Calif., until Sept. 5. All home mail will be forwarded, too. Traffic: W6IAB 5722, K6-RPI 4158, W6YDK 1734, W6EOT 768, WA6ZOW 415, WA6-ROF 242, K6LKD 224, K6IME 128, K6TET 77, WA6-CDD 65, WA6BRG 54, WA6UUO 53, W6WRJ 28.

SANTA BARBARA—SCM, William C. Shelton, K6-AAK—SEC: WA6OKN. The SEC has been busy getting the section organized for emergency communications working with the county and municipal organizations. More EC volunteers are needed. WN6ROM is active in the Channel Cities Net. W6OUL also is active on the same net and has a new 8 over 8 slot antenna; he also is working the d.c. bands with a new v.f.o. W7-ZUY/6 ORS, is active in the SCN and reports for the first time since arriving in this section. K6KCH reports the death of his brother, K4YRP, in North Carolina Apr. 19. W6HAV has been bitten by the 2-meter bug and shows no sign of recovery in the immediate future. K6VBC, K6AEZ and W9PAE/6 have new SR-150s. I would like to see more of the gang participate in LO Nites. Traffic: K6AAK 26, W6OUL 13, WN6ROM 8, W7ZUY/6 4.

(Continued on page 144)

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. SEC: K5AEX. RM: W5LR. The rain and the wind failed to stop two ham picnics Apr. 28. The North Texas EN held its annual get-together in the City Park in Stephenville and more than 75 hams braved the storm. More than three inches of rain and some hail fell during the time of the picnic. The Kilocycle Club, Ft. Worth, had more than 100 at its swapfest near Grapevine. W5KVA won the high-power field strength contest for mobiles, K5PAW won the home-brew contest with his s.s.b. transceiver. K5AVX and K5PAW were married Apr. 13. Our congratulations and best wishes for a long QSO. K5MTS won the 10-meter transmitter hunt. You old transmitter hunters had better watch this gal; this is the third hunt she has won. The CEN TEX EN held a picnic May 5 in the Dog Wood Trails picnic area near Palestine, Tex. Some 80 hams and their XYLs and harmonies were there with picnic lunches and all the trimmings. K5RHZ is the proud owner of a new SR-150. K5ZGA reports ten members of the code and theory class conducted by the Arlington ARC have passed the Novice class test and are waiting for their licenses. Joel Dempsey won the prize for copying the fastest code. The prize was a membership in the ARRL. K5ETA has been appointed OBS. K5RBL has been appointed OO. W5BNG is trying to go s.s.b. Traffic: K5ANS 511, W5BKH 132, W5ACK 50.

OKLAHOMA—SCM, Adrian V. Rea, W5DRZ—Oklahoma amateurs are going to miss W5HFN, who is moving to New Mexico where he has a job with RCA. If W5PML ever gets through experimenting with antennas he ought to have either a whopper of a signal or be out of business altogether. W5PAA has a new Clegg Thor 6-meter transceiver. OLZ-SSZ, the c.w. nets, are now on the summer schedule, OLZ meets at 9:30 P.M. each night. The Sooner Nooner Net is closed for the summer. K5TEY, net mgr. has done an outstanding job in view of the long skip on 40 meters. The Northfork Amateur Radio Club came up with another good hamfest at Quartz Mountain. There were about 200 in attendance. The Muskogee ARC held its yearly auction; gear swapped hands again and all were happy with the addition to the club treasury. W5TKE is the new Beckham County EC. W5QAC sends his appreciation for the many expressions of sympathy in the loss of his wife. New amateurs in Enid are WN5GKP and WN5GFC. W5QMJ, who is about the fastest c.w. man in the state, is flying to the West Gulf Convention. The land ride is too slow. Traffic: (Apr.) K5VOZ 832, K5DLP 677, K5VNJ 607, K5TEY 563, W5PPE 524, W5FEC 333, K5IBZ 203, W5QMJ 118, W5PML 102, K5AUX 83, W5DRZ 74, W5JXM 53, K5OCX 51, W5JMQ 49, W5MFX 28, W5KIY 20, WA2JOC/5 19, W5CCK 18, K5FSU 16, K5LZF 16, K5OOV 14, W5WDD 13, W5PNG 11, W5GMJ/5 7, W5EHC 4, K5CBG 3. (Mar.) W5JXM 38.

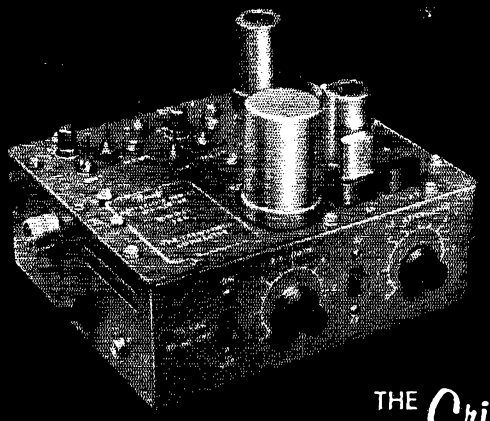
CANADIAN DIVISION

MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCMs: A. E. W. Street, VE1EK, and H. C. Hillyard, VO1CZ. Deepest sympathy is extended to the relatives and friends of VE1ABF, who has joined the ranks of Silent Keys. Members of the V.H.F. Amateurs (formerly Fundy V.H.F. Society) will hold their annual meeting and dinner in Moncton Aug. 10. VE1OZ is being posted to the VE3 district on course then transferred to Grindstone Island. Congratulations to VE1AJI, VE1AJS and their XYLs on the arrival of new harmonics. The severe storm on Apr. 8 disrupted communications in many areas. The following stations handled election returns and other emergency traffic: VE1s US, ACU, VN, WL, PX, AGH, DW, FQ, ABB, ABJ, GX and LZ. VE1QU (ex-VE2AOR) has a new Seneca on 6 and 2 meters. VE1PA has acquired a new Drake 2A receiver. VE1AAH, VE1EE and VE1XN have new towers. VE0NT has been transferred ashore, to Albro Lake. Congratulations to VE1JF and VE1ZQ on their promotions to sgt. (RCAF). 9M2RI was a recent visitor to the Halifax area. New signals on 50 Mc. include VE1AHR, VE1ZI, VE1HN, VE1SI and VE1DG. A simulated emergency exercise found VE1s AFA, PM, VC, WF, DJ and AHA active in the Bathurst area. Traffic: VE1OM 7.

ONTARIO—SCM, Richard W. Roberts, VE3NG—VE3DU has resigned as RM. VE3FGV writes nine articles for beginners for the Quinte paper. VE3BFC is up at Issachsen in the N.W.T. VE3BBW and VE3EZC are out of the hospital. VE3AYQ is back in the bodyshop at Welland. Nortown and Sarnia ARCs held very successful Ladies Night's. On the v.h.f. bands the following nets indicate a lot of local activity: London 22, Oakville 10, Chatham 25, Windsor 18, Niagara 20, Northshore 12, Metro Toronto and District 51. I would like to

(*Continued on page 146*)

THIS VHF CONVERTER



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+ **EXTENSIVE SHIELDING**—All power wiring circuits extensively shielded through L/C and R/C isolation, preventing strong localized R.F. fields from creating interference. Compartmentalized Construction.

+ **MAXIMUM GAIN**—1 μV input produces 20 db thermal noise quieting. 1/10 μV input produces 6 db signal-plus-noise to noise ratio. Wide open circuit gain, 30 db.

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hear from the rest of the nets or clubs in order to compile a list of 2- or 6-meter nets. Copies will be *mailed to all clubs for reprinting. State* times, nights, frequencies, managers, etc. Net managers can pick up appointments as PAM or EC (providing they are ARRL members). The Scarboro ARC held the usual successful dinner, as did the Oshawa ARC. The Hamilton ARC is host for the Ontario Division ARRL Convention to be held in Hamilton Sept. 28. VE3CEC is in charge. VE3AML, the SEC requests that *all* ECs report to him via radio or mail *each* month, please. VE3DPO still whacks out a good club paper. Associate Counsel for the Canadian Division, VE3RX, paid a visit to ARRL at Hartford and *met* with the *members* of the Board. VE3CWA is active on 2 and 75 meters. The Sudbury ARC is going to try 2 meters. VE3BLZ is EC. I could use more OOs. Drop me a card or message if you are interested and are an ARRL member. VE3ATU is off to Europe again for conferences. The Ottawa ARC reports 46 members. VE3BJO had a busted leg. VE3ETX is now Class AA. 9M2RI, from Malaya (Akex), was guest of the Ottawa Valley Mobile Club. VE3HG moved to Ottawa. Windsor still is on slow time, one hour difference. Traffic: VE3CYR 226, VE3CFR 174, VE3NG 126, VE3DPO 121, VE3EHL 114, VE3GP 99, VE3AML 90, VE3DMU 87, VE3BUR 65, VE3DRF 54, VE3AGG 53, VE3ETM 51, VE3BAQ 50, VE3EAM 43, VE3RN 39, VE3BLZ 34, VE3FGV 30, VE3EAT 25, VE3EYC 24, VE3BZT 22, VE3CFI 17, VE3DU 7, VE3AKQ 6, VE-3VD 6.

QUEBEC—SCM, C. W. Skarstedt, VE2DR—Asst. SCM: Jean P. Achim, VE2ATL. VE2ATU, Arvida, visited while in Montreal. He does well on 160-meter c.w. VE2AUU points out that some 24 VE2 stations are active on 26,985 kc. VE2YX was flooded out but was able to save the ham gear. VP6YB now is located at Trois Rivieres where he signs VE2BPA. VE2AQV is a new ORS and VE2SO received an OO appointment. VE2OR is interested in the Collins S/Line. VE2 participation in the Ontario-Que. C.W. Net is at an all-time high. VE2-LI is active DXing at his summer QTH at Morin Heights. VE2AX, in the same locality, prefers 2 meters. VE2ALE also is an enthusiastic 2-er but gives 10 meters a whirl. VE2GE had to take a month off from work and was on a steak diet. VE2JZ and his XYL enjoyed *two weeks in sunny* Barbados. VE2BB's XYL went to England and the OM to Wales. VE2ANY, VE2JH, VE2-JZ and VE2DR are contemplating a fishing trip. VE2-GK and VE2CJ are bosom pals at Lake Louisa. VE2ID, at Shawbridge, ventures on the air when the outdoor shack temperature is livable. VE2AZR, at Quebec, is interested in s.s.b. and chasing the States for his WAS. St. Maurice Valley (VE2MO) is well organized for emergencies and civil defence services. At a recent meeting the Red Cross, Fire and Police Dept., Nurses Assn. and the City Engineer were guests, which certainly indicates a thorough coverage. VE2EC also received prominent newspaper mention in connection with a simulated emergency. Traffic: VE2DR 92, VE2ALH 54, VE2AQV 49, VE2EC 39, VE2AJD 36, VE2CP 33, VE2BB 21, VE2-AUU 18, VE2AGQ 12, VE2BAC 11, VE2BMK 10, VE2-CBS 9, VE2UN 5, VE2ANY 3.

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FS. PAM: VE6PV. RM: VE6AEN. ECs: VE6FK, VE6SS, VE6ABS. OPSs: VE6CA, VE6PV, VE6HM, VE6SS, VE6BA. OOs: VE6HM, VE6NX, VE6PL. OBS: VE6HM. ORS: VE6BR. OESs: VE6DB, VE6HO. The APN now is on summer sked at 2130 MST Mon., Wed. and Fri. on 3770 kc. Don't forget the International Glacier-Waterton Hamfest July 20 and 21 at Waterton Lakes. All emergency group check-ins fell off because of spring work. VE6FF is leaving Edmonton to teach in Lethbridge Junior College. Canada now has third-party traffic with El Salvador. This brings it to six countries, United States, Venezuela, Costa Rica, Honduras, Mexico and Chile. This was received from the Canadian Director. Our ECs are keeping their groups interested and doing a very fine job, from the reports coming from the SEC. VE6PV would like to build another rig but can't find the time. RM VE6AEN says that he still is plugging along with not much success these days. Thanks go to the Alberta AREC for the 100 per cent reports the past two years. Traffic: VE6HM 106, VE6CA 12, VE6FS 12, VE6ABS 7, VE6ADS 5, VE6-PV 4, VE6SU 4, VE6AFJ 3, VE6HS 3, VE6SS 3, VE6BL 2, VE6CI 1, VE6CO 1, VE6US 1.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB —VE7KZ is new manager of the British Columbia Emergency Net on 3659 kc. The Chilliwack ARC meets every Thurs. at 8 P.. in the Red Cross Building. VE7BHW worked with Idaho on an emergency. VE7ALU has blown his 1616s so no word from Lillooet. We never hear from the Prince Rupert amateurs. Are they still there? VE7-BHM is leaving us and will be signing VE6. Sorry to see him go. The Royal City transmitter hunt was well hunted and the Burnaby ARC's SWLs were the *first* to find it. VE7FD is laid low with a heart attack. It ap-

(*Continued on page 148*)

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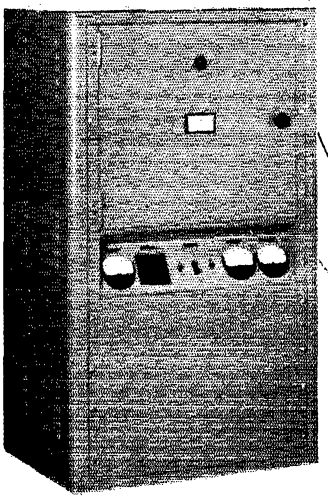

AEROCOM'S Linear Amplifier used with conventional low power SSB transceivers for excitation, provides power output of 1000 watts PEP,* continuous service. The SSB exciter should have at least an output of 65 watts PEP to obtain maximum output of the amplifier.

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Frequency range of 10LA is from 2 to 22mc, covered in 6 bands. Up to 4 independent non-simultaneous channels are provided. These four channels are selected externally by exciter channel control. One tuning unit is provided for each frequency specified up to maximum of four.

The 10LA amplifier is designed to work into a 50 ohm coaxial feed line. One output coaxial receptacle, common to all four channels, or 4 output coaxial receptacles (one for each channel) are available; each channel normally requiring its own antenna. For multi-channel operation with 1 antenna it is recommended that Aerocom Model ATU-410 antenna coupler be used.

A built-in directional coupler provides monitoring of output power and SWR. Grid current, plate current, filament voltage and high voltage are metered.

Harmonic output attenuation: second harmonic is at least 55 db down and higher harmonics are at least 70 db down. Noise level is 40 db below 1000 watts PEP output. Distortion products, in two-tone test, are at least 35 db down, depending on characteristics of exciter.

This linear amplifier, like all Aerocom equipment, is ruggedly constructed to give long trouble-free service. Additional information and technical data on request.

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*FCC permits 1KW DC input for amateur service. PEP input is twice average DC input.

pears that VE7AAF cleaned up in points in the VE/W Contest. Congrats to our RM, VE7ER has gone to Whitehorse as a teacher. VE7ALY has been in the hospital in Victoria and is now on the mend. Traffic: VE7-BDJ 237, VE7BHH 123, VE7KZ 109, VE7AKE 11, VE7-BHW 10, VE7AOV 4.

MANITOBA—SCM, M. S. Watson, VE4JY—Acting SCM: Gert Elliott, VE4GE. Our SCM VE4JY has gone on an extended vacation to Eastern Canada and principally to England to visit his daughter. VE4EG has been confined to bed because of a back injury. Through the kindness of VE3EF his station has been moved from the basement to his bedroom where he is able to continue his activities on the ham bands. VE4MN appears occasionally on 75 meters. VE4IW is back in action both on the air and around his farm. Two high schools in Winnipeg have their own radio stations. The club calls are VE4TVH, Tec. Voc. High, and VE4SHS, Sissler High School. When an emergency arose during an ice storm, the hams were able to give much assistance. The C.B.C. transmitter crew could not be contacted by telephone. Through the efforts of VE4HW, VE4QX and VE4CX, of Winnipeg, and VE4LS and VE4OS, both of Carman, contact eventually was made. The April meeting of ARLM Inc., consisted of a most interesting talk and showing of slides by VE4PP of his auto trip from Manitoba through U.S.A., Mexico, the Central American countries and some of the South American countries. Traffic: VE4EG 12, VE4JA 7, VE4QD 6, VE4SE 6, VE4-SW 6, VE4EF 5, VE4GE 3.

Transmission-Line Calculations

(Continued from page 17)

Solution

Connect 0.25 on the *d* scale with 3 on the *D* scale by a straight line. The line intersects the Z_0 scale at 380 ohms, which is the impedance.

In constructing parallel-conductor lines, spacers should be employed at intervals to maintain the separation between conductors. Any good insulator may be used, for example, glass, micarta, lucite, teflon, and similar materials that will withstand weather. The spacers may be held in place by tie wires, small beads of solder or split shot, or any of several adhesives. For minimum losses, the conductor should be copper, or copper clad, and the insulators of top quality.

QST

The World Above 50 Mc.

(Continued from page 88)

cluding W4SIB on s.s.b. Poor conditions during the rest of the month, hence poor activity. Activity has increased in the Mobile, Alabama, area on 144 Mc. sez Paul, K4SFH. He reports hearing K4ZAJ in Montgomery on the 16th but was unable to make contact. On April 28, contact was made with W8BEE in Hamilton, Michigan, who came through for about three minutes with a ten over nine signal. From Newark, Ohio, K8RXD reports excellent groundwave on two meters during April and an increase in activity on the band. C.w. band is kept active by W8QOH, W8TYY, W8RBW, W8BAX, K8AXU, W8BKI, W8LCA, W8WNM, W8KAY and K9UIF. If you're looking in the c.w. band, these are the fellows to watch for.

K4YZE sez that on April 22 from approximately 2200 to 2330 EST, a number of stations from Beaumont, Texas, were heard in the Marietta, Georgia, area. And from Westfield, New Jersey WB2CWC sez that two-meter conditions are beginning to improve, with 4s coming through and Maryland stations coming in frequently with S-9 signals. In Connecticut, K1RKT is looking for skeds on 144 Mc. with New Hampshire, Vermont and Maine, and K1RTS will operate any band opening from Bethlehem, Connecticut at an elevation of 1100 feet. Plans are being made for the installation of a 40-element beam at this location. The boys (K1RKT and K1RTS) will also be looking for Pennsylvania, Delaware and Maryland. W9JOT in Kenosha, Wisconsin, is still looking for DX on two meters and hoped to hear some during the contest. (Hope you made it, Phil.) He reports "not one local station heard during the past month." Phil is looking for s.s.b. contacts on two.

Florida has come through with several very interesting reports of two meter DX. W4AWS reports the "start of an

(Continued on page 150)

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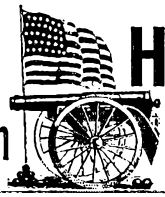

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inversion opening across the Gulf of Mexico from Florida to Texas the nearer Gulf coast on April 10. On April 11 it was still going strong and it was possible to work very low power stations in Louisiana and Texas." Signals were strong in Orlando according to Art, but were either non-existent or very weak in Jacksonville. April 17 came through with an inversion into South Carolina and North Carolina which lasted about three hours. Art sez: "During the Gulf opening I was in a 3-way s.s.b. QSO with W5UKQ in Baton Rouge, Louisiana, and W5BEP in Longview, Texas. Also worked K5TUP, W5FYZ, W5GIX and W7JCU/4 in Alabama. On the South Carolina opening, I worked K4ZAW in Charleston using s.s.b. Only one Mississippi station showed during the opening and he was only around for a short time." Art is running 100 watts s.s.b./c.w. From Lake Worth, WA4AZZ and WA4BMC (using a Clegg Interceptor and a 32-element collinear) worked W4ZRII/4 in Savannah, Georgia, who was using a communicator to a 19-inch whip. Contact was made on May 7 and the portable station, W4ZRII/4, had a 5-5 signal into Lake Worth, Florida. At Panama City, Florida, WA4FIJ also noted the openings during April, beginning on April 11 when K5PTG in Houston, K5YEU in Sunset, Louisiana, and W5GIX in Baton Rouge were worked with several more Texas contacts for a finale. Among the many contacts Dick had that evening was a five way QSO with W5UKQ, W4MBR, W4YRX, K4NTD and WA4FIJ all taking part. "Probably one of the widest spread roundtables ever held on two meters" sez Dick. (Wouldn't be surprised.) W4ZGS also took part in this opening from Fort Walton Beach, Florida. Til worked K4TSK in Alabama, K5PTG in Houston and K5YEU in Sunset, Louisiana on April 10. The most unusual thing about this opening was that two-meter stations in Florida could work just about anyone in their own state.

Final report about the two-meter opening is that received from W3HB who sez: "The April 17 144-Mc. opening will be remembered by this sojourner in the 'Southland'. Enroute home to Bethesda, Maryland from a couple of weeks at Pompano and Ormond Beaches, my XYL and I stopped over at Charleston, South Carolina. After getting the XYL comfy for the evening, I went down to the hotel parking lot to see if I could work any locals. A CQ brought forth WA4ICB on my Gonset III and halo. Soon I also worked WA4FXX, both locals. WA4FXX was hearing a Florida station and as he was running more power decided that he'd call the station, W1UWH, and see if he could hear any of us. As we waited we heard W4UWH say 'Some opening! I'm even hearing a mobile up in Charleston, South Carolina.' That did it! WA4FXX got him and soon we had a six-way in progress consisting of WA4FXX, WA4ICB, K4ZAW, W3HB/4 (mobile), all in Charleston, South Carolina, and W4UWH in Auburndale, Florida and WA4DRJ in Winter Haven, Florida. All signals were S8 and 9. On signing out of the six-way contact, I heard K4NND calling me from Ormond Beach. I had said good-bye to him the previous week, but was glad to work him from South Carolina. Had a nice chat with him, then heard WA4JKY in Jacksonville calling me. (Ain't it won'erful to be popular!) I had worked him the night before when we were in his city and at that time he said 'maybe I'll work you again tomorrow night.' Of course I replied that I'd be traveling north and would be way out of range. So Ed opened the contact with 'I thought you said I couldn't work you tonight!'

"Up to this point the band had been loud and active. I gave out with a CQ — no response. Quickly I took my folding 6-element yagi from the car and soon had it assembled and headed south. W4UWH was much louder and I called him to get a report on my beam. He said I had been S8-9 with the halo, but now was 10 over 9, even though the band was in poorer condition. Dave suggested that as he had worked Texas from his mobile rig during the last opening, he would like to go out and warm up the mobile rig again to see whether we could make mobile-to-mobile contact at that distance. Natch I was delighted to wait and soon heard him about 4-4 in QRM. He also gave me a 4-4 report. All this happened between 2105 and 2302 EST on April 17. On arriving home, I found the distance between Charleston, South Carolina and Auburndale, Florida was 340 miles. I claim this is the best possible ending to a vacation." (Can't gainsay you that, Brownie, particularly when I remember a two-week camping trip in the Adirondacks made some years ago. The object of our trip was to make two-meter contacts from the top of Mount Whiteface and the two-week trip netted just one contact for the OM. That one was W1HOM (whom we'll never forget), who was operating aeronautical mobile at the time. *Helen, W1HOY.*) QST

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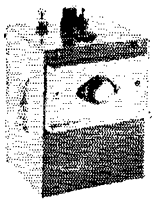

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Correspondence From Members

(*Continued from page 91*)

privileges they would experience, many are making their own conclusions and damning you without a fair trial! . . . — *Canton Amateur Radio Club, Inc. (Ohio.)* [EDITOR'S NOTE: As the June editorial points out, no specific frequency bands have been tied into the incentive program yet. Only a general course of action has been adopted.]

¶ The ARRL is finally going to do something — "light a candle rather than curse the darkness!" Congratulations and more power to you. Your June editorial is so right. Never was there a more appropriate time when something like this should be done. The critics just can't admit it is high time to improve our lot or face extinction . . . — *K2SKK.*

¶ Congratulations on the June editorial. Your big voice joins an inevitable trend if amateur radio is to survive. PICON, traffic, DX, etc., is not enough to separate us from CB . . . — *W9RBI.*

¶ . . . To me, the most important justification of amateur radio is improvement of the state of the art and thereby benefiting mankind. As an incentive to encourage experimentation and study, the few people who know how to use the radio spectrum without interference to other services should have the privilege of doing so for their own pleasure and satisfaction. I believe there should be more classes of license with increased privileges for higher classes. The competition at lower classes and the incentive to better one's position would encourage the quest for knowledge and thereby improve the state of the art . . — *K0ZGA.*

¶ The existence of amateur radio depends upon its ability to render public service and/or make contributions to the science of communications. Unless individuals are more rigorously certified as communicators we will be stripped of our privileges by commercial or government agencies which at the present time can claim that our frequencies are not being efficiently used to serve the public interest. The answer is a revamped and toughened set of FCC requirements including class, power, and frequency allocation incentives, and perhaps periodic re-examination for advanced classes of license . . . — *W3FIK.*

The Gus-Watchers

(*Continued from page 88*)

"Well, you know, little QRM from the usual guys calling 'CQ DX' on Gus's frequency, and then worse QRM from the usual policemen trying to chase the CQers away. The usual stuff ya have to tolerate . . . easy to miss a call."

"Maybe put the 5R8 call in parenthesis?"

"I vote for FR7ZC/C. All in favor . . . "

"Squeeeekk . . . yoooouupp . . . wooowww."

"Ok, ok, ok, but no foolin', I'm almost sure . . . I could swear Gus signed 5RSCE/FHS . . . just ten minutes ago too! Maybe Ack will only look at the date and time — I hope.

"Steady, old boy . . . "

"Hey, I know! I won't use a call at all. I'll just make the card real cordial — like Gus, the southern gentleman, would expect. I'll make the QSL out to 'Old Buddy Gus on the Comoros.' Maybe I'd better check the Comoro QTH with 4KVX just to make sure though . . . " QST

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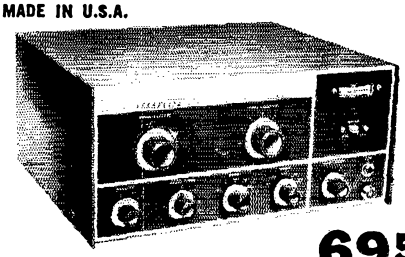

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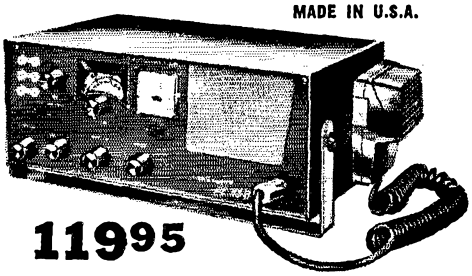

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Happenings of the Month

(Continued from page 63)

The Board appreciates the suggestion of General Cook, as outlined in his letter of March 7, 1963, to President Hoover, that the League adopt the ICAO phonetic alphabet in the interest of achieving the widest possible uniformity in operating procedures.

In view of the long-established use of other phonetic alphabets in amateur activities and the complex history of this matter, the Board does not believe it would be feasible to make a change at this time. Nevertheless, the Board recommends that, in the future, both ARRL and ICAO alphabets be made available in League publications and that the matter be reviewed again at some later date to determine their relative acceptance.

28) The Board was in recess from 3:27 P.M. until 3:44 P.M.

29) On motion of Mr. Engwicht, unanimously VOTED that the General Manager is hereby authorized to reimburse the division directors for actual expenses incurred by them during the year 1963 in the proper administration of ARRL affairs in their respective divisions, up to amounts as follows:

Canadian Division Director	$1500
Atlantic Division Director	2400
Central Division Director	2600
Dakota Division Director	800
Delta Division Director	2250
Great Lakes Division Director	2000
Hudson Division Director	2000
Midwest Division Director	900
New England Division Director	1000
Northwestern Division Director	1500
Pacific Division Director	2400
Roanoke Division Director	750
Rocky Mountain Division Director	1500
Southeastern Division Director	2300
Southwestern Division Director	2400
West Gulf Division Director	2000

30) At this point, the Chair announced the following committee appointments for the coming year:

Finance Committee:	Mr. Chaffee, *Chairman*
	Mr. Crossley
	Mr. Roberts
Planning Committee:	Mr. Anderson, *Chairman*
	Mr. Engwicht
	Mr. Teetson
Membership and Publications Committee	Mr. Meyers, *Chairman*
	Mr. Denniston
	Mr. Eaton
Public Relations Committee:	Mr. Smith, *Chairman*
	Mr. Best
	Mr. Born
Merit and Awards Committee:	Mr. Groves, *Chairman*
	Mr. Cartwright
	Mr. Haller
Housing Committee:	Mr. Kahn, *Chairman*
	Mr. Anderson
	Mr. Compton

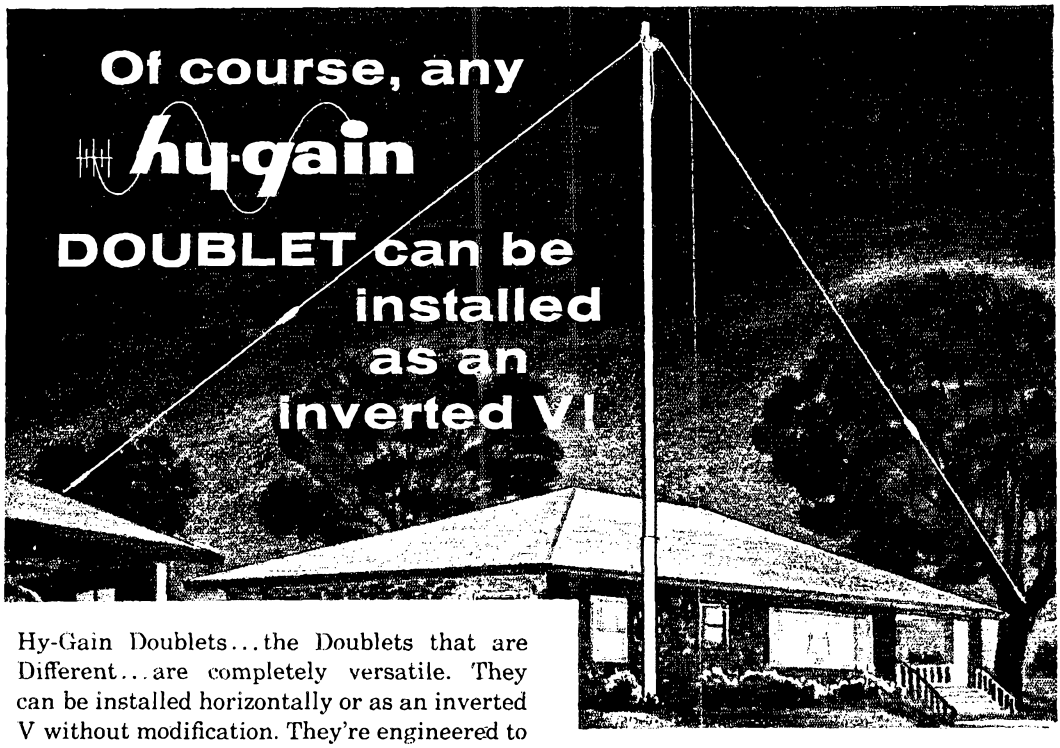
31) On motion of Mr. Compton, unanimously VOTED that the General Manager is hereby authorized to pay expenses for the operation of ARRL committees during the year 1963, but not to exceed amounts as follows:

Planning Committee	$1500
Finance Committee	500
Membership and Publications Committee	1000
Merit and Awards Committee	400
Housing Committee	250
Public Relations Committee	1000

32) On motion of Mr. Denniston, unanimously VOTED that, to continue the Board's policy of reimbursing Section Communications Managers and QSL Managers of the League for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1963 a total amount not to exceed $12,500 under terms prescribed by the Communications Manager following the general pattern established by the Board.

33) On motion of Mr. Anderson, unanimously VOTED that, to continue the Board's policy of reimbursing Section Emergency Coordinators for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1963 a total

(Continued on page 156)



Hy-Gain Doublets... the Doublets that are Different... are completely versatile. They can be installed horizontally or as an inverted V without modification. They're engineered to deliver true half-wave resonance performance on every design frequency. With a Hy-Gain Doublet, you get automatic band switching; SWR of less than 2:1 when fed with 52 ohm coax. Hy-Gain Doublets feature:

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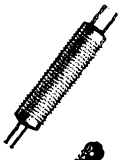

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Model 2BDP Trapless Fan Doublet for 15, 40 & 80 M..... **19.95** Net

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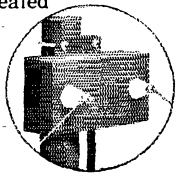

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amount not to exceed $9500, under terms prescribed by the Communications Manager following the general pattern established by the Board.

34) On motion of Mr. Roberts, unanimously VOTED that the General Manager is hereby authorized to pay, during the period between January 1, 1964, and the 1964 meeting of the Board, expenses against usual authorizations for administrative and committee operations in no greater amounts than 1963 authorized amounts.

35) On motion of Mr. Haller, unanimously VOTED that the General Manager is hereby authorized to reimburse the Southwestern Division Director $133.86 as additional expense for the year 1962.

36) On motion of Mr. Best, unanimously VOTED that the General Manager is hereby authorized to reimburse the Great Lakes Division Director $76.18 as additional expense for the year 1962.

37) On motion of Mr. Chaffee, after discussion, unanimously VOTED that the Finance Committee is directed to recommend to the Executive Committee a policy governing the expense accounts of directors, as recommended in the report of the Finance Committee.

38) On motion of Mr. Compton, after discussion, unanimously VOTED that the Finance Committee is directed to study and submit a recommendation on the request of A. L. Budlong for additional retirement benefits in an amount provided by the formula in the current League employee's pension plan.

39) On motion of Mr. Roberts, unanimously VOTED that the report of the Planning Committee is accepted and the same placed on file.

40) Mr. Born, as chairman, presented the report of the Membership and Publications Committee. On his motion, unanimously VOTED that the report of th Committee is accepted and the same placed on file.

41) At this point, Mr. Groves occupied the Chair. On motion of Mr. Smith, after discussion, unanimously VOTED that a program of club recognition through awards for active participation in ARRL-sponsored activities, as recommended in the Public Relations Committee report, be further developed by that Committee and presented to the Executive Committee for approval and implementation as soon as possible.

42) On motion of Mr. Smith, unanimously VOTED that the headquarters staff supplement present material for club programing by developing an absentee lecture series composed of color slides and tape recording on subject material that would improve general operating procedure and efficient use of equipment, etc.; such program material to be supplied without charge, other than return postage, to all affiliated clubs.

43) At this point, Mr. Hoover resumed the Chair. On motion of Mr. Groves, unanimously VOTED that the report of the Merit and Awards Committee is accepted and the same placed on file, and the work of the Committee is continued for another year.

44) On motion of Mr. Denniston, unanimously VOTED that a special Cover Plaque Award be presented to John G. Troster, W6ISQ, for his excellent series of articles in *QST*.

45) Mr. Denniston, as chairman, presented the report of the Special Committee on 14 Megacycles, stating the Committee had no recommendations.

46) On motion of Mr. Chaffee, unanimously VOTED that the League sell and convey its property at 34-40 LaSalle Road, West Hartford, Connecticut, to Pasquale Guglielmo, Michael Guglielmo, Egidio Tonucci and Anthony LaQuerre, or their nominee, at a price of $170,000; $60,000 to be in cash and the remaining $110,000 in a promissory note secured by a first mortgage at an interest rate of 5¾ per cent, to be amortized over a period of 20 years in semi-annual payments; and that the Secretary of the League is authorized to execute and deliver the deed and also to sign any and all other instruments that may be necessary or convenient in order to complete said transfer.

47) Moved, by Mr. Tectson, to amend By-Law 1 so that it would read as follows:

1. Pursuant to Article 11 of the Articles of Association, the following membership requirements are established:

(a) To be eligible for full membership, an applicant must be a resident of the United States, its possessions, the Commonwealth of Puerto Rico, or of Canada and either (1) at the time of application must be the holder of an amateur radio station license or an amateur radio operator's license, or a reciprocal operating authorization,

(*Continued on page 158*)

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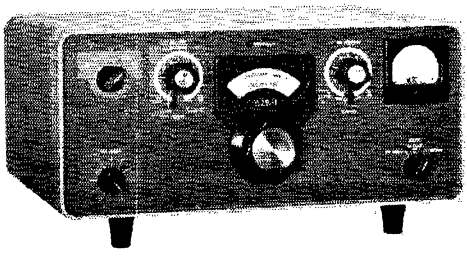

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issued by the United States or Canada; or (2) a person who has held continuous and unlapsed membership in the League since May 15, 1934.

(b) Any person interested in amateur radio shall be eligible to associate membership. Upon attaining possession of an amateur license, an associate member shall be transferred to full membership upon his application therefor, if he is otherwise eligible.

After discussion, the yeas and nays being ordered, the question was decided in the affirmative. Whole number of votes cast, 16; necessary for adoption, 12; yeas, 16; nays, 0. All the directors voted in the affirmative. So the By-Law was amended.

48) On motion of Mr. Meyers, unanimously VOTED that, pursuant to the provisions of By-Law 20, the date of the 1964 annual meeting of the Board of Directors is changed to the first Friday in May.

49) On motion of Mr. Denniston, unanimously VOTED that the Board of Directors expresses its deep appreciation and commendation to the President, the General Manager and the General Counsel for their excellent representation of the League in its relationships with the governmental agencies and officials with which the League is concerned. (Applause)

50) On motion of Mr. Meyers, the Board unanimously ROSE for a moment of silence in memory of Tilmon J. Arsenault, W1SNO, and Don R. Dundas, WØWBD, who gave their lives in the sinking of the submarine *Thresher.*

51) On motion of Mr. Teetson, unanimously VOTED that the Board commends the officers and the Executive Committee for their actions during the past year.

52) On motion of Mr. Best, unanimously VOTED that the Board extends its special thanks to the membership for many contributions to the building fund thus far received, and urges the membership's continued support until our goal is reached.

53) On motion of Mr. Born, unanimously VOTED that the Board extends its appreciation to the Field Engineering Bureau and the Amateur and Citizens Division of the Federal Communications Commission, and to the Telecommunications Division of the Department of Transport, for their continuing assistance and spirit of cooperation in administering affairs of the amateur body during the past year.

54) On motion of Mr. Kahn (Mr. Eaton abstaining), after discussion, unanimously VOTED that the League requests the Federal Communications Commission to make the entire 144-148-Megacycle band available for use by Technician Class licensees in lieu of 145-147 Mc. as at present.

55) The Board recessed for dinner at 6:25 P.M., reconvening at 8:36 P.M. with all directors and other persons hereinbefore mentioned in attendance.

56) On motion of Mr. Cartwright, after discussion, unanimously VOTED that the Board hereby authorizes the Executive Committee to take appropriate action to ensure League representation in the event a meeting or conference of international character is called, during which matters that could affect amateur radio might be considered.

57) On motion of Mr. Cartwright, affiliation was unanimously GRANTED to the following societies:

Huron County Radio Club.....Norwalk, Ohio
Wolverine Amateur Radio Society....Livonia, Michigan

58) On motion of Mr. Denniston, the following resolution was unanimously ADOPTED:

WHEREAS, in 1963 the Radio Society of Great Britain is observing the fiftieth anniversary of its founding, particularly during the period July 1 to July 5, and

WHEREAS, the progressive leadership of the Radio Society of Great Britain is recognized and appreciated throughout the International Amateur Radio Union, and

WHEREAS, the Radio Society of Great Britain has long exhibited a high degree of warm friendship toward

(Continued on page 160)

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SPECIALS OF THE MONTH

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S107	$ 59.75
S85	$ 64.50
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the American Radio Relay League, now, therefore

BE IT RESOLVED, that the American Radio Relay League, by its Board of Directors in annual meeting assembled this third day of May, 1963, does extend its hearty congratulations and cordial greeting to the Radio Society of Great Britain, with its sincere best wishes for the continued success of its older sister society.

59) Whereupon, on motion of Mr. Cartwright, the Board adjourned *sine die*, at 9:36 P.M.

60) (Time in session, as a Board, 5 hours, 23 minutes; as a Committee of the Whole, 2 hours, 47 minutes; total authorizations, $55,160.04)

JOHN HUNTOON, *Secretary*

MINUTES OF EXECUTIVE COMMITTEE MEETING

No. 293

May 2, 1963

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the headquarters office of the League in West Hartford, Connecticut, at 10:10 A.M., May 2, 1963. Present: President Herbert Hoover, Jr., in the chair; First Vice President W. M. Groves; Directors Robert W. Denniston, Noel B. Eaton and Morton B. Kahn; General Manager John Huntoon; Vice President F. E. Handy; Treasurer David H. Houghton. Directors R. O. Best, Dana E. Cartwright, Milton E. Chaffee, Charles G. Compton, Gilbert L. Crossley and Ray E. Meyers and General Counsel Robert M. Booth, Jr., were also present.

On motion of Mr. Kahn, unanimously VOTED to grant approval for the holding of a Dakota Division Convention in Sioux Falls, South Dakota, on September 14–15, 1963, and a New England Division Convention at Swampscott, Massachusetts, on May 9–10, 1964.

On motion of Mr. Denniston, affiliation was unanimously GRANTED to the following societies:

Allison Amateur Radio Club.....Indianapolis, Indiana
Armstrong County Amateur Radio Club
Manor Township, Pa.
Calvert Hall College Radio Club (H. S.)
Towson, Maryland
Conception Amateur Radio Club....Conception, Missouri
East Quadrangle Amateur Radio Club
Ann Arbor, Michigan
Forestville Amateur Radio Association
Bristol, Connecticut
Ft. Hays QSOers.....Hays, Kansas
Genesee Radio Amateurs.....Batavia, New York
Greenwood Amateur Radio Club.....Greenwood, Indiana
Highland Radio Club (H. S.).....Anderson, Indiana
Howard County Radio Club.....Ellicott City, Maryland
Knights of the Round Table Radio Club
Orange, New Jersey
Las Vegas Amateur Radio Club...Las Vegas, New Mexico
LeRoy Amateur Radio Klub.....LeRoy, Illinois
Lost Pines Radio Club.....Smithville, Texas
Marshall County Amateur Radio Club.Plymouth, Indiana
Massena Amateur Radio Club.....Massena, New York
Mid-State Amateur Radio Club of N. H.
Laconia, New Hampshire
Norwood Amateur Radio Club ..Norwood, Massachusetts
Oak Park Amateur Radio Club.....Oak Park, Michigan
Quigley Seminary Radio Club (H. S.).....Chicago, Illinois
Reynolds Amateur Radio Club.....Gregory, Texas
Seneca Drums Amateur Radio Club...Geneva, New York
The Squaw Island Amateur Radio Club
Canandaigua, New York
TIMAC Amateur Radio Club....Attleboro, Massachusetts
Tipton County Amateur Radio Club....Windfall, Indiana
Turner AFB MARS Radio Club.....Albany, Georgia
Brooklyn College Amateur Radio Society
Brooklyn 10, New York
The Port Washington Brotherhood of Radio Amateurs
Port Washington, L. I., N. Y.
Kosher Hams of Mirrer Yeshira H. S...Brooklyn 24, N. Y.
Central Connecticut Amateur Radio Club...Berlin, Conn.
Pepperell Amateur Wireless Association...Pepperell, Mass.

On motion of Mr. Eaton, unanimously VOTED that the availability of green-background ARRL emblems such as furnished RM, PAM, EC and SEC be extended to managers in the Transcontinental Corps and to the Regional and Area Net Managers and other appointees in the National Traffic System.

There being no further business, the Committee adjourned at 11:35 A.M.

JOHN HUNTOON, *Secretary*

NEW BOOKS

World Radio TV Handbook. Published by O. Lund Johansen, Ltd., Lindorffsalle 1, Hellerup, Denmark. 8½ by 6½ inches, 240 pages, paper cover. Price, $3.25. Available in the U.S. from Gilfer Associates, P. O. Box 239, Park Ridge, New Jersey, or from American Shortwave Listeners Club, 6204 East 109th Terrace, Kansas City 37, Missouri.

This 17th edition contains all available information on thousands of radio and television stations around the world; including frequencies, time schedules, programs, languages, official sign-off, musical signature, verifications by QSL cards and many other items of interest to SWLs, amateurs and other groups.

Useful Electronic Shop Hints, edited by *Electronic Technician Magazine* Staff. Published by John F. Rider Publisher, Inc., 116 West 14th St., New York 11, N. Y. Cat. No. 295. 6 by 9 inches, 120 pages, paper cover. Price, $1.95.

This book is a collection of almost 200 electronic shop hints of general nature for the electronic hobbyist or service technician. This book is divided into a number of specific areas to include tools, TV and radio, cheater cords, components and tubes, soldering, testing, aids, audio and cathode ray tubes.

Basic Principles and Applications of Relays, by Harvey Pollack. Industrial Electronics Applications Series No. 250-1. Published by John F. Rider Publisher, Inc., 116 West 14th St., New York, N. Y. 5½ by 8½ inches, 112 pages, paper cover. Price, $2.90.

This text offers a comprehensive discussion of relay construction, operation and application. The book begins with a chapter on relay construction and the various relay components. Following chapters include information on relay contact arrangements, circuits for d.c. relays, time delay relay circuits and considerations in selecting and applying relays. Information is given on the use of diodes for contact protection and for the suppression of the inductive "kick" from the relay coil.

International Transistor Substitution Guidebook, by Keats A. Pullen, jr. Published by John F. Rider Publisher, Inc., 116 West 14th St., New York, N. Y. Cat. No. 276. 64 pages, 5½ by 8½ inches, paper cover. Price, $1.50.

This guidebook contains over 4500 direct substitutions including transistors from the U. S. A., Japan, Great Britain, Holland, France, Italy and Germany. Substitutions which are doubtful, or which would work in some cases but not in all, are not included in the listings. One of the main features of the manual is the outline drawings of the various transistor case styles, including physical dimensions. The transistor substitution tables are listed by the original transistor and contain the substitution transistor (or transistors) and the original and substitution transistor case types. The tables include transistors that are no longer in general use or that have other than EIA numbers.

(Continued on page 164)

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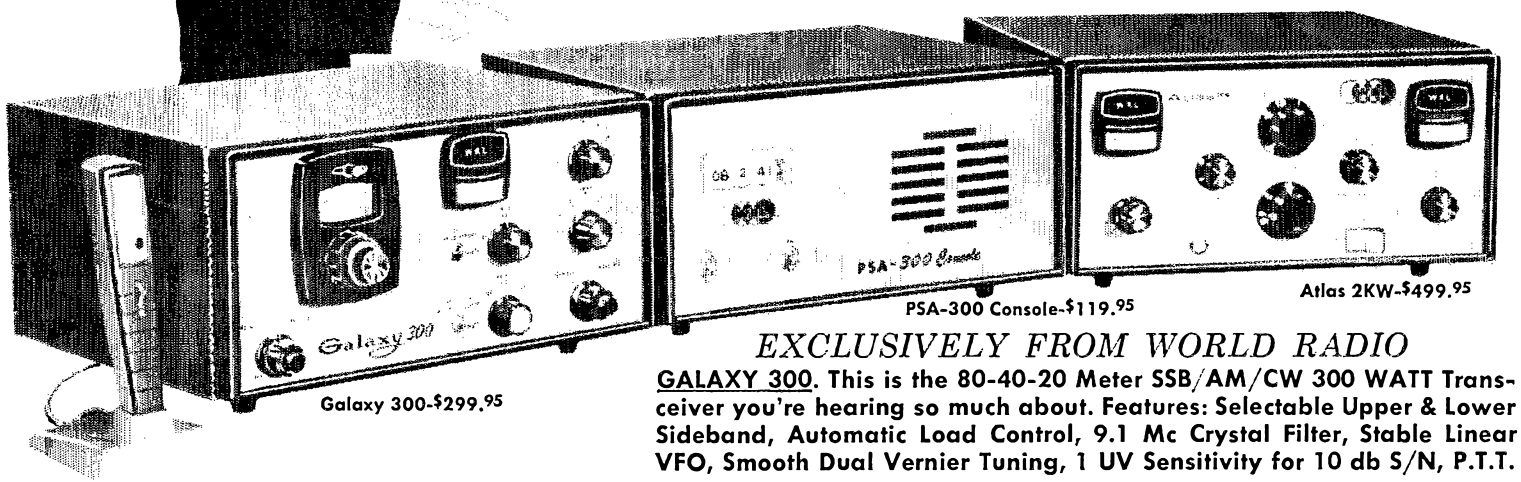

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CITY & STATE_____

How To Make More Money in Your TV Servicing Business, by John Markus. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. 340 pages, plus index, 6 by 9 inches, cloth cover. Price, $7.95.

This book could be called "Economics for the TV Serviceman." It goes into just about every phase of the subject. Typical chapters include information on the importance of charging profitable rates, recommended service charges, how to handle the money you make, how to discourage requests for credit, how to save money on your income tax and how to guarantee your work. There are many check lists, summaries, and tabulations for quick on-the-job reference. A simplified single-entry bookkeeping system for television and radio servicing businesses is shown.

Computer Arithmetic, by Henry Jacobowitz. Published by John F. Rider Publisher, Inc., 116 W. 14th St., New York 11, N. Y. 128 pages. 5½ by 8½ inches, paper cover. Cat. No. 297, Price, $3.00.

This book deals with the basic arithmetical operations of all positional number systems — the decimal, the binary, as well as other number systems that have found, or are likely to find, application in computers.

Basic TV Course, by George Kravitz. Published by Gernsback Library Inc., 154 West 14th St., New York 11, N. Y. 224 pages, including index, 5½ by 8½ inches, paper cover. Price, $4.10.

Although this book starts out with information on television transmission, it is devoted almost entirely to the fundamentals and operation of the television receiver. Each chapter finishes up with some review questions to quiz the reader on the chapter highpoints.

Electronics Drafting, by K. Karl Kuller. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. 6¼ by 9¼ inches, 286 pages, including index, cloth cover. Price, $8.00.

This book should be of interest not only to the draftsman but to the technical writer and illustrator as well. The book explores the origin and significance of symbols and their application to drafting. Next, the mechanics of drawing the symbolic equivalents of components are presented. In addition to the twelve chapters, there are five appendices with standard color codes, lists of symbols, a glossary and decimal equivalents.

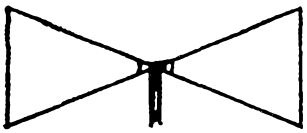
Photoelectric Control, by Harvey Pollock. Published by John F. Rider Publisher, Inc., 116 W. 14th St., New York 11, N. Y. 136 pages, 5½ by 8½ inches, paper cover. Price, $3.50. Cat. No. 250-2.

This text presents the theory and application of photoelectric devices used in the industrial electronics field. Covered are phototubes, photovoltaic, and photoconductive cells. The theory explains how they work and their electrical characteristics. Associated circuitry is then covered to show how these various photoelectric devices are connected in circuits and how they are used to count, separate, test, and control.

Using the Slide Rule in Electronic Technology, by Charles Alvarez. Published by John F. Rider Publisher, Inc., 116 West 14th St., New York 11, N. Y. 120 pages, 5½ by 8½ inches, paper cover. Price, $2.50.

The solving of basic mathematical problems often discourages the student in electronics. This self-study text is written to help the student to develop speed and accuracy

(Continued on page 166)



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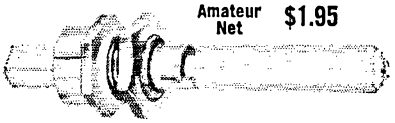

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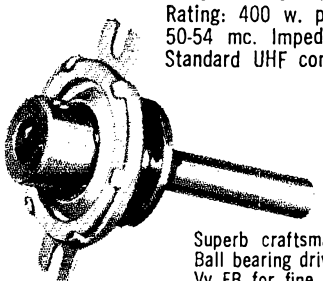

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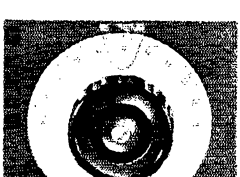

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in solving such problems with the aid of a slide rule. Each chapter contains practice problems and examples. Three basic types of slide rules are discussed in the book, the general purpose, the duplex, and the log-log types. Early chapters go into nomenclature, multiplication, division, Ohm's law, etc. More advanced material is contained in later chapters and includes rectangular to polar transformation, impedance, reactance and phase angle. In addition to the 19 chapters there are two appendices plus a section with the answers to problems.

Communications Dictionary, by James F. Holmes. Published by John F. Rider Publisher, Inc., 116 West 14th St., New York 11, N. Y. Cat. No. 301. 96 pages, 6 by 9 inches, paper cover. Price, $1.50.

This dictionary defines more than 2,500 terms in the fields of telecommunications and data-processing. It defines all the multiple-meaning terms, some with as many as seven different meanings. One difference between this dictionary and a conventional one, however, is that the *Communications Dictionary* does not contain any pronunciation information.

Several amateur radio terms were found to be included. Interestingly enough, the only Q signal listed in the dictionary is "QSL card"! The book should provide a handy reference for those who have any interest in communications and data processing.

How To Build Electronic Equipment, by J. Richard Johnson. Cat. No. 286. Published by John F. Rider Publisher, Inc., 116 West 14th St., New York, N. Y. 5½ by 8½ inches, 288 pages, cloth cover. Price, $6.95.

Here is a book chock full of practical tips and information for those who build electronic equipment. There are twelve chapters full of diagrams, sketches and pictures to supplement the text on such things as tools and equipment, layout and mounting of components, soldering techniques, wiring, testing, checking, calibrating, painting and marking. This is a good manual for anyone who is just starting to build his own electronic equipment.

Strays

The "Templeton Case" continues to get around. Technical Wire Products, Inc., 129 Dermody St., Cranford, N.J., reprinted the article from January 1963 *QST* and has been distributing it widely. (Technical Wire Products manufacturers r.f. gaskets to eliminate interference.) If you'd like a copy of this reprint, drop them a line.

—•••—

The League's new address, effective July 1, is
225 Main Street
Newington 11, Connecticut

—•••—

The first contact ever for KN3NCM, 'way back in 1960, was K8QYG in Martinsburg, West Virginia. Bill's first General class QSO the next year? Sure 'nuff, again it was George, K8QYG, this time on 75-meter phone.

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Manager Chicago Store

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25 Years Ago this month

July 1938

. . . Clifton Foss, W2OJ, wrote of the W10XDA expeditions to the Arctic. Cap'n Bob Bartlett and his exploring team, on board the schooner *Morissey*, maintained stateside contact with a 150-watt homebrew rig using an 805 final, modulated by a pair of the heavy-duty, carbon-plate 210s. Mrs. Foss, W2JZJ, kept the 300-watt homefires burning. She was principal eastern contact station operator.

. . . Results of the Cairo Conference on frequency allocation were announced. Result? American amateurs retained all their allocated frequencies, while Europeans lost heavily. For the first time, European broadcast stations were allowed into the forty-meter band.

. . . W6EQM wrote of amateur communications and rescue work during the disastrous March floods in California.

. . . Technical articles included a remote-control receiver using only one tube (a major breakthrough!), the QY-4 triode, described as "resembling a type 30, but capable of much more." Another technical item was a dissertation by Ed Tilton, W1HDQ, and Glenn Browning, defending universal exciters (now v.f.o.) against crystal control.

. . . And the annual rash of five-meter DX in May was duly reported. QST

Silent Keys

It is with deep regret that we report the passing of these amateurs:

W1CCG, Donald McDougall, Winthrop, Mass.
W1JHL, Edward J. Maciejewski, New Britain, Conn.
K2ADX, William F. Hehr, Buffalo, N. Y.
W2ASN/K2LIC, Alfred C. Haussmann, Geneva, N. Y.
WA2BUI, Earle W. Brown, Westfield, N. J.
WN2BZM, Henry H. Haenel, Gouverneur, N. Y.
W2LAC, Orlando R. Pfaltz, Queens Village, N. Y.
K2RYJ, Ralph J. Brandefine, Staten Island, N. Y.
W3KCY, Felix J. Touches, Taneytown, Md.
K4BXA, Robert A. Maxwell, Yorktown, Va.
K4JZY, D. Joseph Browne, St. Petersburg, Fla.
K4NZX, Leuroy E. Asbury, Marion, Va.
K4PQY, Robert L. Paine, Decatur, Ga.
K4TZG, Grady L. Horton, Rock Hill, S. C.
K4YRP, Oscar L. Revels, Rutherfordton, N. C.
W5FGQ, Henry M. Rhodus, San Antonio, Tex.
W5FSS, Eldridge L. Felder, Tylertown, Miss.
W5KK, Edmund F. Lancaster, Houston, Tex.
W5MAD, Beverly O. Bush, San Antonio, Tex.
K5YQO, Brann Ray, Temple, Tex.
W5ZBA, Preston B. Roemer, Port Lavaca, Tex.
W6AIR, William E. Battison, Danville, Calif.
WN6EEB, Noel E. Washabaugh, Paso Robles, Calif.
W6EMA, Garland E. Reynolds, Oakland, Calif.
K6GR, Charles P. Gruetzke, Sacramento, Calif.
W6GVV, Francis I. Sanger, Canoga Park, Calif.
K6LNF, Walter W. Marsh, Culver City, Calif.
WA6RBN, Charles S. Lamb, Los Angeles, Calif.
W7BDK, Noah C. Osborn, Seattle, Wash.
W7JGX, John F. Hilscher, Phoenix, Ariz.
K7KYV, K7LJA, ex-W9PZ, Thorne Donnelley, Scottsdale, Ariz.
W7PXK, Boyd E. Coffey, Yerington, Nev.
WA8DNL, John Olszanecky, Grand Rapids, Mich.
W8KAX, David B. Hinchman, Jr., Grosse Pointe Farms, Mich.
ex-WØJVV, K8MHX, Ray S. Huey, Elmhurst, Ill.
W8PUF, Kenneth R. Moehl, Adrian, Mich.
K8SAG, William B. Cadieu, Flint, Mich.
K9POA, Richard L. Mason, Madison, Wis.
WØRF, Melvin W. Marien, Brentwood, Mo.
W6SPJ, Justin M. Walker, Tucson, Ariz.
VE3AIN, Arnold Yates, St. Catherines, Ont., Canada
VE3CNM, V. K. Paice, Toronto, Ont., Canada

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HALLICRAFTERS S81 VHF RECEIVER. 152-173 Mcs. $55.00.

PRE-PRO XMTR. 10-160 Meters. 100 W.CW. 75 W. Phone. $85.00.

HAMMARLUND HQ105TR. Brand new. Factory warranty. $199.00.

VFO MODEL VOX. By Tech. Materiel Corp. 2-64 Mcs. Rack mtd. $195.00.

G-66 GONSET RECEIVER. 10-160 Meters plus BC band. W/6 VDC Mobile Supply. $115.00.

SP600 JX-17 HAMMARLUND RECEIVER (SSB/AM/CW) .5-54 Mcs. $475.00.

0-50 VDC MARION MODEL HS2 HERM. SLD. VOLTMETER. Takes 2¼" Hole. R/E. $2.95.

WESTON MODEL 507 R.F. AMMETER. 0-4 Amps. w/blt in thermocouple. Orig. bx. $4.95.

TRIPLETT MODEL 650-SC. Reads 0-1.5 VAC, 6 VAC, 15 VAC, 60 VAC. Used as output meter. W/test leads. orig. bx. **$8.95.**

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PL259 (83-1SP) COAXIAL PLUG for above SO239. Used with RG8/U, etc. **@ 40¢.**

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STANDARD 4-PRONG CHASSIS SOCKET for above 1616 tube @ 10¢.

38 TUBE AIRCRAFT ELECTRONIC GUN CONTROL. Unit contains many precision parts for the experimenter. Tubes include: (1) OA2, (1) 2D21, (1) 6AQ5, (2) 6AH6, (1) 6AS6, (2) 6J6, (5) 6X4W, (2) 12AT7, (5) 12AX7, (2) 5654, (4) 5670, (1) 5725, (3) 5726, (8) 6005/6AQ5W. Parts include (6) tube 30 Mc. I.F. Strip, 28 VAC or DC dual squirrel cage blower with R.F. filter, (5) hermetically sealed relays, (11) potentiometers, (5) BNC chassis connectors 5 & 10% Allen Bradley resistors. Metalized paper capacitors, silver mica capacitors, 1% precision resistors and many other parts too numerous to mention. Good used condition. Furnished complete with removable cover. Type #PP493. APG30. Size: 8⅝" H x 10⅝" W x 16½" D. Wt: 35 lbs Cat. #11-APG3. FOB, warehouse, Georgia. **Price: $11.95.** If you wish unit shipped via prepaid parcel post add **$3.95** each unit for shipping charges.

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COLLINS R-390/URR RECEIVER INSTRUCTION BOOK. 224 pages. **$10.00.**

DOW KEY DKC-RFB Coax Broadband pre-amp. **$10.75; DOW KEY COAX RELAY DK2-60,** 52 Ohms/ 1 KW/ 115 VAC/ **$19.00; DOW KEY COAX RELAY DK60-G2C, 1** KW/115 VAC/52 Ohms **$15.65.**

2.5 MILLIHENRY RF CHOKE. Good up to 500 Ma. 12¢ (ten for $1.00).

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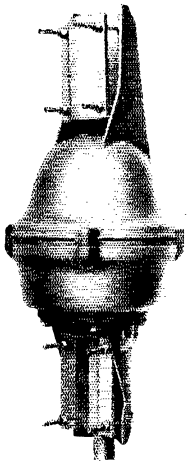
San Diego, California: "I am well pleased with the rotor to date, holds and turns stacked 40M and up beams in 50 mph winds with no difficulty."

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)

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CORNELL-DUBILIER ELECTRONICS, DIV. OF FEDERAL PACIFIC ELECTRIC CO., 118 E. JONES ST, FUQUAY SPRINGS, N. C.

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(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 or 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) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham Ads is the 20th of the second month preceding publication date.

(6) A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for. 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.

(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.

BREAKFAST Club Hamfest July 20 and 21. Terry Park, Palmyra, Ill. For tickets write K9YRP, Chatham, Ill. P.O. Box 323.

WYOMING Hamfest August 10-11. Ham vacation in Wyoming. Write Box 141, Sheridan, Wyoming.

HAMFESTERS Radio Club's 29th Hamfest to be held Sunday, August 11th at Santa Fe Park, near Chicago. See Hamfest Calendar or write Tomp Campana, K9DYW, 1209 W. 74th St., Chicago, Ill. for infor.

14 WEATHER Instrument Plans, $2.00. Saco Industries, Box 2513, South Bend, Ind.

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 Eimac, 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 So. Ashton, Millbrae, Calif.

SOUTHERN California: Transmitters 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.

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WANTED: Military or Industrial laboratory test equipment. Electronicraft, Box 399, Mt. Kisco, 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.

CHICAGOLAND Amateurs! Factory authorized service for Hallicrafters, Hammarlund, Johnson, Gonset Service all amateur equipment to factory standards. Heights Electronics, Inc., 1145 Halstead St., Chicago Heights, Ill. Tel. SKyline 5-4056.

HAM TV Equipment bought, sold, traded. Al Denson, W1BYX, Rockville, Conn.

TOROID RTTY Kit: Mark-Space discriminator and bandpass filters. Includes 4-88 Mhy and 1-44 Mhy uncased like new condx. toroids; information sheet, mounting hardware and six mylar capacitors. $5.00 ppd. Torroids: specify 88 or 44, less capactrs. $1.00 each. 5/$4.00. ppd. KCM Products, Box 88, Milwaukee 13, Wis.

WANTED: For personal collection: QSTs January through August 1916; QST supplement Index for Aug. 1922 to July 1923; ARRL Handbooks: Editions 1 and 5. W1CUT, 18 Mohawk Dr., Unionville, Conn., Box 1, West Hartford 7, Conn.

TUBES Wanted. All types, highest prices paid. Write or phone. Lou-Tronics, Inc., 131 Lawrence St., Brooklyn 1, N.Y. Tel. UL 5-2615.

WANTED: 2 to 12 304TL Tubes. Callanan, W9AU, P.O. Box 155, Barrington, Ill.

QSLS? WPE? Finest and largest variety samples 20¢ (refunded). (Religious QSL samples 25¢). Christian ham fellowship directory (undenominational) now beng compiled for future printing. Christian hams wishing to be listed free write to Christian Ham Fellowship, Sakkers, P.O. Box 218, Holland, Michigan.

QSL, SWL, cards that are different. Quality card stock. Samples 10¢. Home Print, 2416 Elmo, Hamilton, Ohio.

C. FRITZ QSLS. Highest quality consistently for a quarter century! Samples 25¢ deductible. Box 1684, Scottsdale, Ariz. (formerly Joliet, Ill.)

QSLS. Twenty exclusive designs in 3 colors. Rush $3.85 for 100 or $6.90 for 200 and get surprise of your life. 5 days' service. Satisfaction guaranteed. Constantine Press, Bladensburg, Md.

QSL Specialists. Distinctive Samples 15¢. DRJ Studios, 2114 N. Lavergne Ave., Chicago 39, Ill.

QSLS "Brownie." W3CJI, 3110 Lehigh, Allentown, Penna. Catalog with samples. 25¢.

QSLS-SHLS. Samples 10¢. Malgo Press, Box 375 M.O., Toledo 1, Ohio.

QSL-SWL-WPE. Finest. Since 1946. Largest assortment. Priced right. Send 10¢ for samples to: Glenn Print, 1103 Pine Heights Ave., Baltimore 29, Md.

DELUXE QSLS. 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 757, Kansas City 16, Mo.

QSLS: samples 25¢ (refundable). Schuch, W6CMN, Wildcat Press, 6707 Beck Ave., North Hollywood, Calif.

CREATIVE QSL Cards. Free, new catalog and samples. Personal attention given. Wilkens Creative Printing, P.O. Box 1064-1, Atascadero, Calif.

QSLS, SWLS, WPE. Samples 5¢. Nicholas & Son Printery, P.O. Box 11184, Phoenix 17, Ariz.

QSLS, SWLs, XYL-OMs (sample assortment approximately 9¾¢) covering designing, planning, printing, arranging, mailing: eye-catching, comic, sedate, fantabulous, DX-attracting, prototypal, snazzy, unparagoned cards (Wow!). Rogers, KØAAB, 961 Arcade St., St. Paul 6, Minn.

SUPERIOR QSLS, samples 10¢. Ham Specialties, Box 73, Hobbs, New Mexico (formerly Bellaire, Texas).

DON'T Buy QSLs until you see my free samples. Bolles, W5OWC, 7701 Tisdale, Austin, Texas.

QSLS 300 for $4.35. Samples 10¢. W9SKR, "George" Vesely, Rte. #1, 100 Wilson Road, Ingleside, Ill.

QSLS. Samples 25¢. Rubber stamps: name, call and address $1.55. Harry Sims, 3227 Missouri Ave., St. Louis 18, Mo.

QSLS. 3-color glossy, 100—$4.50. Rutgers VariTyping Service, 7 Fairfield Rd., Somerset, 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.

POCKET Rubber Stamps. Your call plus name and address. $1.00. Ralph, KØUMY, Box 238, New Ulm, Minn.

RUBBER STAMPS. $1.00. Call and Address. Clint's Radio, W2UDO, 32 Cumberland Ave., Verona, N.J.

QSLS, $2.50 per 100. Free samples and catalog. Garth, Jutland, N.J.

PICTURE QSL cards from your photograph of your shack, home, etc. 1000, $12. Raum's, 4154 Fifth St., Philadelphia 40, Penna.

QUALITY Rubber stamps, low prices, pocket size, 3 lines, $1.00. Sam Koury, K8TCJ, 3867 Fernleigh, Troy, Mich.

QSLs At the sign of the "Hobby Horse". Quality at uninflated price and quick delivery. Glossy, red and green, $2.00 per 100 postpaid. Free sample. Hobby Print Shop, Umatilla, Fla.

COMPARE: Deluxe rubber stamp. King-size call; name, address: $2.00. Frey, Box 296, Schwenksville, Penna.

QSLS. 100, $2.50. Samples free. Amee's Printery, W9FXQ, Box 13A, Oak Lawn, Ill.

1½" Call QSLs (2 sides printed) 100 $3.15. Sample free. Gariepy, 2624 Kroemer, Ft. Wayne, Ind.

QSLS. Sparkling, distinctive styles. Samples dime. Refunded. Filmcrafters, Box 304, Martins Ferry, Ohio.

FREE Catalog of QSLS, WPE and CB cards. New designs. Longbrook Press, Box 393-A, Quakertown, N.J.

QSLS. Samples, dime. Printer, Cornwith, Iowa.

QSLS, 100 2-color, $3.00. Samples 10¢. Brigham, 32 Colson St., North Billerica, Mass.

QSL Cards. New, kute, klever, komical designs. Some as low as $1.80 per 100. Samples 10¢. R. Hellwig, Box 425, Lakes Wales, Fla

QSLS, Stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

QSLs. Samples free. The Ink Well, Spencer, Mass.

QSLS, All kinds, free samples. W7IIZ Press, Box 183, Springfield, Ore.

QSLS, Distinctive samples, free. Volpress, Box 133, Farmingdale, N.Y.

QSLS. Eyepoppers. Samples dime. Filmcrafters, Box 304, Martins Ferry, Ohio.

RUBBER Stamps for hams, sample impressions, W9UNY, Hamm, 542 North 93, Milwaukee, Wis.

ATTRACTIVE QSLS: Large variety of styles, cartoons, colors. Samples 25¢ (deductible). Paul Levin, K2MTT, 1460 Carroll St., Brooklyn 13, N.Y.

QUALITY QSLs. New designs monthly. Samples 10¢. Giant 25¢ Savory, 172 Roosevelt, Weymouth, Mass.

CANADIANS! 1962 Johnson Valiant, in mint condx, $450.00; Mosley TA-33Jr., beam and rotator, $85.00. VE3EQO, 1539 Warland Rd. Oakville, Ont., Canada. Tel VA 7-2394.

HRO-60 with NBFM, XCU-50-2, coils, A, B, C, D, E, F, G, H, J, ad, $400; DB-22A, $25.00; Heath AT-1 with 6146 per July 1957 Pronif Popular Electronics. VF-1, QF-1, AC-1. Make offer. Ralph Falconer, VE4RD, Lynn Lake, Manitoba, Canada.

CANADIANS: For sale: SX-101A and R47. New condx, less than year old: $525.00; Cheyenne, Comanche, prw, supply, complete, perf, condx, $300.00 0165/UR VFO lab. type, 2-32 mc, continuous, new condx, $200.00. Quantity of VHF gear, transmitters, receivers, power supplies, etc. List on request. VOIEC, Box 863, St. John's, Newfoundland, Canada.

WANTED: Radio apparatus for missionary needs. CQ CQ good souls de VE2BOL, Voluntas Dei Inst. Les Forges, 3 Rivers P.Q., Canada.

SELL: In A-1 condx: Valiant, $300.00; HQ-170, $275.00; Gonset III, 2M, $200; Elmac AF-68, PMR-8, 1070 PS, Webster Band-Spanner, $380.00; Ameco Nuv, convert 144-Mc, $40.00; 50 ft, tower, $60.00; Mosley TA-33, $65.00; Hy-Gain rotobrake, $125.00; Heath tunner-dipper, $30.00; an offer on complete station considered. Delivery within 300 mile radius. K1KSS, Jericho, Vt. Tel. 899-2222.

WANTED: All types of aircraft or ground radios. 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, K2KUH, 308 Hickory, Arlington, N.J.

NEW And used ham gear. Top trades. Norm, K9HRI at Dahn Electronic Supply, 14 Jayne St., Algonquin, Ill. Mail orders welcome!

ATTENTION Mobileers! Heavy-duty Leece-Neville 6 volt 100 amp. system, $50; 12 volt amp. system, $50; 12 volt 60 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.

HAM Discount House. Write us for lowest prices on ham equipment. Factory sealed cartons. Specify equipment wanted! H D H Sales Co., 327 Greenwich Ave., Stamford, Conn.

SK-20 Tunable Preselector, calibrated 3.5-30 megacycles, boosts reception 3+"S" units. Complete kit, cabinet, built-in power supply, $18.98 postpaid. Holmstrom Associates, P.O. Box 864-T, Sacramento 22, Calif.

WANTED: Ink recorder BC1016, RD-60/D, McElroy SR-900, RPC, RAPC, RAP/S or GNT undulator 309. All for 3/8 in. (9.5 mm) tape. Also manuals and spare parts. K0JRU, Box 246, Savannah, Ga.

APACHE Transmitter, $200.00; HQ-110 receiver w/spkr $165.00. J. B. Corbly, 5 Russel Avenue, Ft. Monmouth, N.J.

ACT NOW!! Barry pays cash for tubes (unused) and equipment. Barry Electronics, 512 Broadway, NYC 12. Call 212-WAlker-5-7000.

ATTENTION: Amateur radio equipment repaired, work guaranteed. L & S Electronic Technicians, WA2OQG, Sid Levinson, 393 So. 3rd, Brooklyn 11, N.Y. Tel EV 4-7564.

LINK 500 w/6M final, $40; Meridian Lab SWR Bridge, $60, new. Measur. 65 VTVM, $30; 1296 Transmitter, G-E, new, $90. 6146-6883 tubes: 3 for $5. K2JSO, 2043 E. 52nd St., B'klyn, N.Y.

INTERESTED In two-meter linear amplifiers, transmitters, receivers, etc. If the price is reasonable, for 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.

SELL, Swap or buy ancient radio sets and parts, magazines. Laverty, 118 N. Wycombe, Landsdowne, Penna.

CHICAGO Area: For sale NC-300 serial 481-0038 and matching speaker; Gonset monitor; Stancor 202A CW xmtr 100w; Deluxe Vibroplex, vertical antenna 10-15-20 and miscellaneous: $275.00 or offer. W9RFO, 163 Maple Ave., Elmhrust, Ill.

CASH promptly paid for your ham gear. Trigger, 7361 North, River Forest, Ill. PR 1-8616.

FOR Sale: KWS-1 No. 1293 with spare final tubes. 75A4, No. 4614 with 3.1 and 1.5 filters. Make offer! W1ETF, Box 373, West Haven, Conn.

WANTED: KWM-2. Have cash. W0DVZ, Box 475, Ottumwa, Iowa.

FOR Sale: Gonset #3012 tuner; tunes police, fire, mobile telephone, etc. $35. Motorola all transistor push-button radio from 1962 Chevrolet. Also fits 1961, $33. Richard M. Jacobs, WA0AIY, 1015 Glenside Place, University City 30, Mo.

MUST Sell: SX-101A, 1 yr. old, vy gud condx. Best offer over $200.00; Heath Cheyenne xmtr, vy gud condx, best offer. Also accessories. WA2GZD, Joel Herbsman, 1510 Unionport Road, Bronx 62, N.Y. TA 2-7215.

WANTED: Collins 51J-3, 5U4, R-388, R-390A, R-391, 75A-4, SP-600, teletype, Kleinschmidt. Facsimile and test equipment. Cash or trade for new amateur equipment. Sell: 75A2A w/3kc filter, $275.00; Collins 32V xmttr, $175; P&H 400C linear ampf, $125; Boehme c.w. keyer $125. Write: Tom W1AFN, Alltronics-Howard Co., Box 19, Boston 1, Mass. Tel. Richmond 2-0048.

"HOSS-TRADER" Ed Moory is in a Small Town with Low overhead and can sell Cheaper for Cash. "Package Deal": New SR-150, Adcom Supply Used, & Mobile Mount, $679.00; Demonstrators "In Warranty": NCX-3, $329.00; Swan SW-240, $249.00; SB-33, $339.00; New Ham-M Rotor & Demo TH-4 Beam, $175.00; 75S-3, Unopened Carton, $519.00. Fre sht Damaged KWM-2 in Warranty, $825.00; Reconditioned 2-B, $219.-00; HT-37, $319.00; $200-V's, $595.00; 100-V's, $449.00; Swan 20 & 75 meters, $179.00; 32V-3, 249.00; 75A-4, $449.00; Loudenboomer, $199.00; 10-B, $79.00; HT-32-A, $395.00; 30L-1, $349.00; Ranger, $119.00; 312B-4, $139.00. Terms: Cash. Ed Moory Wholesale Radio Box 506, DeWitt, Arkansas. Phone Whitney 6-2820.

ELECTRONIC Kits wired: quality workmanship/service. K0HWE, Hammond, 1533 D Ave. N.E., Cedar Rapids, Iowa.

QST Library, August 1920 through 1962. To 1933 in binders. Make offer by years. Lettine 240 phone CW transmitter coils 10 thru 80 complete with two low-pass filters, $25.00. W2EH, 1355 Bushwick Ave., Brooklyn 7, N.Y.

MOBILE: Transistor power supplies for most commercial and homebrew rigs. As low as $50.00. Not a kit. Reich Electronics, P.O. Box 774, Garland, Texas.

AMATEUR Paradise Vacation. Livingstone Lodge & Log Cabins, Mascoma Lake, Enfield, N.H., couples, families, 100 acres, swim, fish, boats, sports, Dartmouth golf, tennis, 33rd year. Light housekeeping, $20.00. PPW. Children half. Literature, W2QPN, Al Livingstone.

SELL: 866A mercury vapor rectifier tubes. Tested, new, $1.30 each. George Cowperthwait, RR2, Ballston Spa, N.Y.

SELL: No. 866 mercury vapor rectifier tubes. Tested, new, $1.30 each. George Cowperthwait, RR2 Ballston Spa, N.Y.

JOHNSON 500 Transmitter, factory-wired. In perf. condx. W3OHY, Box 63, Exton, Penna.

HEATH Mohawk, in gud shape, $235.00; DX-40/VF-1, $55.00. Going transceive. Call 754-5910. Fred Macary, K1NVY, 36 Dixie Ave, Waterbury 6, Conn.

WANTED: HRO-50 coil type G, H, J. K5YAM, 9244 Meadowglen, Dallas, Texas.

SELL Or Trade one TS-175/U 85-1000 Mc. frequency meter, complete with original book and xtal, also RA-133B AC power supply. What's your best offer? W9ERU, Box 350, R.R. 4, Rockford, Ill.

FOR Sale: Complete station: Drake 2A recvr HT-37 exciter "both in new condx", 2 813's in grounded grid, heavy-duty pwr. supply (home brew). Built in V.S.W.R. meter and TVI suppressor filter in the antenna tuning circuit, any offer considered. K1ATF, 26 Chesbro Ave., North Adams, Mass. Tel. MOhawk 3-9127.

SELL: All clean equipment extras: Leece-Neville 12 volt 50 amp system, $55.00; Palco Bantam, 65 mobile xmtr with James C1050 pwr. supply, $125.00; PMR-7 recvr and PSR117AC supply, $125.00; 65 watt a8 Mc mobile xmtr, instant heating Hy 69's with new PE103 dynamotor, $50.00; 300 watt PP812, hi-level clipping, 160 thru 10 meters, enclosed 6 ft. gray rack, $245.00; Meissner Signal Shifter and Spotter, 160 through 10 meters, $35.00; GSB-100, $295.00; Ranger, $200.00; SX-101 Mark III, spkr, $265.00; HT-37, original sealed carton, in warranty, $445.00. Don Sleeper, W1ONK, 45 Gellette Rd., Fairhaven, Mass.

SELL: SX-101A, $250; HC-10 SSB converter, $75; Transtenna T-R switch Model 102, outboard, $50. All like new and F.o.b. Lamb, 1219 Yardley Rd., Morrisville, Penna.

FOR Quick sale, the buy of a lifetime! Brand new, only six weeks old, KWM-2, with AC pwr. supp., 30L1, price: $1000.00. That's right—$1000.00. Cash and carry. W2ZRY, Whitestone 57, L.I., N.Y.

TO settle estate of the late W2EEG, Calrad mike and stand DM-77; Jones MicroMatch model 262 w/coupler unit; TA33 beam Ham-M rotator and Easyway 40 ft. tipover tower and ground post, Collins 75A-4 with G-E SSB selector. All offers considered and answered. Many more items! Send for lust. W2FNF, Mike Rosenberg, Smithtown, N.Y.

RANGER; PTT with Johnson L.P filter and Dow-Key ant. relay mounted; Electronic keyer, also paddles; Vibroplex key; 221 frequency meter, Drake Q-match, Baldwin Type E, also C headphones, Olson, K2EN, 914 YOnkers 3-7187 evenings. (31 Jervis Rd., Yonkers 5, N.Y.).

VESTO 61 ft. tower, heavy-duty rotator, TA33 beam. All for $289. Will be home only July and early August so hurry. EX W9EH. Lee Faber, Sandwich, Illinois.

COLLINS 75S1, No. 1831; 32S-1, No. 1885, 516F-2, 312B-4, Electro-Voice 605 and Vibroplex Bug, all in new condition. Factory manuals and original cartons, $895.00. B. F. Auvenshine, 14821 Larchburr, Bridgeton, Mo.

FOR sale: Model RDP panoramic adaptor, $40; complete Multi Elmac rig, AF-67, PMR-7 and M1070 Pwr supp. Perf for home and mobile: $200.00. W/extras. Tel. FI 7-2046 after 7 PM. Sry, local deal only. WA2IEO.

FOR Sale: Collins 75S1, in mint condx, $300.00; Johnson Pacemaker SSB, $175.00; sry, no shipping. Will demonstrate. Harold Grigsky, K4MFF, 11613 108th St. N., Largo, Fla.

HAMS! 100 envelopes printed with call, name, address, $2.00. ARRL emblem, 50¢ extra. Church, 260 Russell, Woodstock, Ont., Canada.

SELL: HQ-170 like new, SB-10 professionally wired, $350.00 or your best offer. K7DHO, Dale F. Vosika, Box D, Kimberly, Idaho.

SELL: SX-111, $170.00; Ranger with PTT, $160.00, both in gud condx. Glenn Hinze, W9YTF, 3220 Wilgus Rd., Sheboygan, Wis.

WANTED: Schematic or gud diagram of DB-20 Preselector and Navy general-purpose type CME-50063 .55 to 32 Mc. Made by RME. Wm. Defoe, W5SZJ, Cabot, Ark.

NC-190, $175.00. Mike Neidich, 931 Walt Whitman, Huntington Sta., N.Y.

COLLINS 75S2 receiver for sale. Will take best offer over $400.00 this month. 609 Melrose Drive, Richardson, Texas.

NATIONAL NC-173 with C-E Model B slicer, $125.00. Morristown, N.J. W2YRK, JE 9-1511.

JOHNSON Kilowatt with desk 4-400 tubes; Pacemaker factory modified, power divider, audio amplifier, Drake 1-A with matching spkr, $1300.00. Complete only. 7210 nightly, W0AIO, 3524 W. St. Louis, Wichita, Kans.

FOR Sale: Variacs, 120V-18 amp, $25.00; Variac, 1.5 KVA, $15.00; large prop pitch motor with xfrmr and 2 115V selsyns, $35.00. Transformer, uncased, 6600VCT-500 Ma., $25.00. Bill Blake, W5SCM, c/o Telephone Co., Philadelphia, Mississippi.

HUNTER Bandit 2000A linear amplifier new, in unopened carton. Will consider trade. Richard E. Mann, 7205 Center Dr., Des Moines, Iowa.

FOR Sale: Johnson 6N2 Thunderbolt linear w/spare set of finals, best offer above $300; Poly-Comm 62B, best offer over $200. Both units still have 4 months warranty. All letters ans'd. WA5DXP, 1911 Metairie Ave., Apt. B, Metairie, La.

SELL: Central Electronics 200V, late serial, little use, $650.00; Heath Chippewa KL-1 2 Kw. PEP linear, $150.00; Drake 2B and 2BQ Q multiplier, calibrator, $225.00. All perf. condx, with manuals. Will ship collect all or part. W4VAG, Bill Robison, 4501 Limon St., N.W., Huntsville, Ala.

SELL: Collins Mechanical filters 4, 3.1, 2.1 and .5 kc, $30 each. Phillips, W4CEY, 125 Sun Road, Indian River City, Fla.

MULTIMETERS: R.F. meters, meter repairs and modifications, electronic development instruments, process controls, thermo instruments (milliameters, ammeters) our specialty. Complete repair, calibration facilities, large stock, parts, panel meters multimeters, recorders. Simpson, Triplett, JBT, Amprobe, Phaostron, Hickok, G-E, Texas Instrument recorders, West instruments, Westinghouse, Special ranges, special dials, prototype devices, custom applications, Calibration referenced to National Bureau of Standards certificates. Parcel post or Railway Express, $10.00 minimum. See, call, write us: United Instrument Laboratories, A Division of MED Electronics, Inc., 102 W. Jefferson St., Falls Church, Va. Phone Area code 703 532-4123.

NC-98 Rcvr, crystal calibrator, monitor, first $90.00; Super Six conv, $26.00; Super 12, $36.00; antenna relay, $4.50; Knight T-150 xmtr, $100.00. Used vy little. Webcor stereo tape recorder, used little, $100.00. Prices F.o.b. Worcester, R. D. Connor, 65 Suffolk, Worcester, Mass.

SELL: Heathkit Pawnee 2-meter transceiver. Three months old and perfectly aligned. $250.00. Bill Arnold, 7 Haven Lane, Smithtown, N.Y.

BEST Offer over $215.00 for almost new Heath kilowatt HA-10 Warrior linear including Guardian overload relay installed. F.o.b. W8IQ, Benton Harbor, Mich.

KWM2 wanted. Sell Ameco 6-meter conv., $12.00; #522 xmttr with AC supply, meter, $23.50. 12-V dynamotor 700 v. outp., $7.50. L. Wecker, No. 56-S. Foster Blvd., N., Babylon, L.I., N.Y.

TRADE RME DB-23 Preselector, used 3 months, in excint condx, for Indian head pennies, or other old United States coins. What do you have? R. Krick, WØYOZ, Schaller, Iowa.

SELL: Cheyenne, $85.00; A.C. supply, UT-1, $25.00; mobile supplies PP-1, $25.00 and MP-10, never used, $40.00; Gonset Super 12, $40.00; Super Six, $20.00; Gothard rotary converter, never used, 32 V.D.C. inpt, output 110 VAC, 60 cycles, 300 V.A. at 6.9 P.F., cont. duty, best offer. Dan Dinzik, W2OQX, 19 Hemlock Dr., Elnora, N.Y. Phone 877-7935.

FOR Sale: SX-101A with spkr, mint condx, $290; DX-100 with B modification, $135.00; DX-20 with UFO and pwr. supply, $50. Viking Challenger, $80. 1 to handle shipping. K8QDM, 1908 Francis, Grand Rapids, Mich.

DRAKE 2-A Receiver, Serial 1462 has 2AQ and 2-A calibrator, perfect shape, first check or m.o. for $170.00. Doyle, W9GPI, 4331 No. Wildwood Ave., Milwaukee 11, Wis.

FOR Sale: 500 Watt AC generator, continuous duty, type perfect for transceivers, $70.00 F.o.b. Ft. Dodge, Iowa. J. Kersten, 717 Crest.

TOROIDS Supplied and machine wound. Send specifications, W2UMR, Dunkirt, N.Y.

WANT 1000 QSL's printed in fluorescent ink. Will furnish art master. Send samples. W3AFM, 5800 Hillburne, Chevy Chase, Md.

AIR System sockets, 4X500A, pair, make offer or trade. WØLWZ, 1030 So. Dudley, Denver 26, Colorado.

MORROW Mobile Twins for 6 or 12VDC, MB-565, MB-6, RVP-260B, TV-600A, cables mike and manuals in like-new condx, $285.00. WA6ZSB, 785 Kavanagh, Hanford, Calif.

HUNTER Bandit linear demonstrator for sale: $450.00. E. Shafer, 3479 Kersdale Rd., Cleveland 24, Ohio.

TUBES: 100TH, 3B28, 837, 717A, 807W, 2E26. Your need, your price. Stan McCammon, W5RVZ, 6004 Hannett, N.E., Albuquerque, N.M.

COLLINS 75A4 serial No. 4054. In mint condx. In original carton. Express prepaid U.S.A. $395.00 Panadapter wanted for rcvr, w/455 I.F. Wiot, KH6EWG.

VIKING II, $170.00; 122 VFO, $20. both $180; SX-100, $200.00. Complete station: $360.00. Glenn R. Morgan, WA2QHQ, Box 85, N. Main St., Williamstown, New Jersey.

WØGFQ: Leo has big discounts on overstock of used equipment due to so many trades on the fabulous new Galaxy SSB Transceiver. Now's the time to save on reconditioned equipment. Write for our latest list, over 1,000 items. World Radio Laboratories, Box 919, Council Bluffs, Iowa.

HT-37, $335.00: Heath Monitor 'scope, $55.00; both for $375.00. In excint condx. Edwin Lauster, WA2MXW, 209-14 82 Ave., Queens Village 27, L.I., N.R. Tel. HO 8-5320.

GONSET II 6 meter Communicator and linear amplifier, $200.00; 6 meter converter, $15.00; Heath Grid Dipper GD1B, $15.00. K2JSQ, George Neumann, 171 Madison Rd., Scarsdale, N.Y.

APACHE Xmttr for sale, in top condx. Lance Johnson, K1MET, 27 Francis Dr., Newington, Conn. Tel. 666-0325.

HELP, Please. K5THF, disabled, but not unhappy, needs copy of your home-town newspaper (U.S. and worldwide) to complete research project. Need magazines, too, but cannot pay any postage. Help sincerely appreciated. 2700 Bay St., Pine Bluff, Arkansas.

WILL Trade unused CDR AR-22 rotor for 9ud Luger pistol. W9SML, 257 Coe Rd. Clarendon Hills, Ill.

WANTED: Commercial, military, all types. ARC, ARN, ARM, BC, GRC, PRC, TRC, URR, URM, TS, 618S, 17L, 51R, others. Ritco, Box 156, Annandale, Va.

AR-22, $16.00. WA2COQ.

COLLINS KWS-1, vy clean, two sets spare finals. Prefer local sale: $850.00. W2NLK, 125 Bregman Ave., New Hyde Park, L.I., N.Y.

A STEAL: 6-80 m AM/CW 75w. HT-40 and Globe Deluxe VFO 160-6 m. perf. condx. $100. 8 ele. Hy-Gain, 6M beam, $20.00. Santella, 43 Seaview Ave., Norwalk, Conn.

SALE: Telrex full-sized Tri-band beam. Model TB-7E, $87. Worked CX and LU schedules weekly. Excint condx. Pick-up only. Sry, no shipping. WA2EBS. Tel: CA 1-2404. North Bellmore, L.I., N.Y.

COLLINS KWM-2 and 516F-2 supply: $925; 30L-1, $325.00; 312B-5, $225. Above new, Feb. 4, 1963. No time to operate. Bill Lyons, W7WRS, 4200 Lorna Pl., Los Vegas, Nevada.

HY-GAIN vert. with radials, $15.00; SX-101 Mark IIA, $220.-00; BC-221 AA freq. meter AC supplied, complete instructions, $57.50. All in like new condx. Pr. 250THs original packing, $5.00 ea. Want: 399C-1 Gardner, 5333 Waterman St., St. Louis, Mo.

HQ-170C, $240.00; GSB-100, $300.00. Both perf. condx. Elmac A54H VFO xmttr, PMR6A rcvr, $45.00 each. W5RKR/4, 139 Mitchner, Key West, Fla. 294-3594.

HQ-100C: in great shape. Works perfect. Late model, $110. Unmatched speaker, $6.00. WA5AEK, RFD 4, Columbus, Miss.

SELL: Globe Champ 300, $200.00; Heath 'scope OM-2, $20.00. Will swap Verifax photo copier Model A. $50.00. K3IPZ, Archmere, Claymont, Del.

SELL: Hammarlund HX-50 transmitter, 6 months old. In excint condx, $345.00. WA4GAL, Milt Feldman, 1500 Bay Road, Apt. 597, Miami Beach, Fla., evenings only.

SELL: DX-40, VF-1, $60.00; SX-28, $60; RME 152A, converter, $30.00; RCA 3 in. 'scope, $25.00; TCS Navy rcvr, $30. All for $185.00. K5JGV, 1001 Fourth NW, Albuquerque, N.M.

WANTED: 3.1, 2.1, .8 and .5 Kc mechanical filters. State type and price. Have Collins F500B-14 filter for sale, $25.00. W7-OCL, 1732 N.E. Clackamas, Portland 12, Oregon.

HT37, $335; HT-41, $265; SX-101A, $285. Package deal: $850.00. RTTY for sale, model 15 and Model 26 Alltronics-Howard "K" converter, w/PR. WB2CNA, Phone Henry, Waldwick, N.J. Gilbert 4-3189.

GONSET G66B with 3-way 12v DC pwr. supply and Gonset G77 xmttr, 12v DC supply. Modulator with connecting cables, $225.00 for both. M. Tannenbaum, K2ABZ, 510 DuBois Ave., Valley Stream, L.I., N.Y. Tel. 516-PY-1-6720.

$1.00 Frames 60 QSLs. See page 146. Free sample and attractive discount available to ham clubs or ham agents. John Thomas, K4NMT, Box 198, Gallatin, Tennessee.

SELL: Heath AR-3, $15.00; Heath AT-1, $20.00; Philmore GR5-AC, $40; Gonset FM Halo, $2.50; Knight R-100, $80.00; home-brew 2 meter trcvr, $35.00; Morrow FTR and 5BRF, $60; Heath voice control, $15.00; 2 mtr. rcvr K&E mobile, $35.00; Gonset spkr, $10. Want: Lampkin 105 and 205; KWM-1 or KWM-2 and 30L-1 or KWS-1 and 75A-4. Will trade. WB6BLC, 1698 Norfolk, San Mateo, Calif.

CUSTOM Building VHF gear, converters, transmitters, etc. 432 Mc equipment, free quotes. Frontier Electronics, Orr 1, Minnesota, Everett, WØHPS and Frankie Hoard, WØPYC.

SELL Or trade: Morrow Twins, MB560a, MBR5 and RTS-600S 110v P.S., $150.00; Cush Craft vertical, $10.00; new Johnson whipload 6, $15.00 or will trade all for Central Electronics 20A with VFO. K1TWK, Island Park, Ipswich, Mass.

QUICK Sale: Gonset G-76 transceiver with DC supply in A-1 condition. One year old. Like new condx. Throw in 6 meter halo, $300 complete. Webster mobile all-band antenna, $10.00 with G-76 only. WA2TUZ, Joe Feldman, 26 Patrick St., Carteret, N.J.

6 Meter Gonset G-50 transceiver, $200.00. Drake TV1000 low pass filter, $7.00. Prefer local deal. Write Locascio, 8420 51 Ave., Elmhurst 73, L.I., N.Y.

PHILATELIC Hams, swap mint U.S. plate blocks for six meter transceiver. Robert Cobaugh, W2DTE, 29-29 213 St., Bayside 60, L.I., N.Y.

LOOKING? Shopping? Trading? Trying to save money? Write Bob Graham for special deals on new and reconditioned used gear. Cash or budget. Graham Radio, Dept. A, Reading, Mass. Tel: 944-4000.

COLLINS 75A2A with 800, 3100, 6000 cycle filters, $275.00; HQ-150 with matching spkr, $175.00; Central Electronics factory-wired B slicer, $60.00; GC-1 amplifier, $35.00; B&W 650 Matchmaster SWR Bridge, $25.00; Class B modulator wired with 805's and Multimatch transformers, $50.00; 2500 volt KW pwr. supply complete $100.00; 2000 volt pwr. supply, $75. United Electronics HV-18 tubes new/unused, $10 each. All F.o.b. Ed Schmeichel, W9YFV, 190 East North, Elmhurst, Ill.

COLLINS KWM-1 with AC and DC supplies, noise blanker, mobile mount, in excint condx. $595. Steel tower, 70 ft., $75.00. M. H. Klapp, 17 Kenosha St., Albany 9, N.Y.

NOVICES. Ameco 15 watt xmttr, Heath AR-3 recvr and QF-1 accessories. In excint condx. Name your price. WA2URL, 87 Brookside Place, New Rochelle, N.Y. Tel. NE 6-0178.

APACHE, SB-10, NC303. All in perf. condx. Complete, $500.00. Will arrange sked. Sry, cannot ship. Mike Herbstman, WA2-PHB, 1325 East 18th St., Brooklyn 30, N.Y. Phone home: DE 6-2549. Shop: CH 4-1226.

FOR Sale: 75A3 with one filter, $300.00; Matching spkr. $10.00; 500-watt Thordarson modulating transformer, $35.00 or first best offers. Need money for college. K1JAR, Lynn, Mass. Tel: 592-1657.

BIG Savings! Heath HX-20 SSB xmttr; HR-20 SSB rcvr, HP-10 mobile supply—All for only $299.00 cash. Beautiful wiring, in mint condx. W8EAA, 4020 Carlton Ave., Columbus 27, Ohio.

GO SSB! Factory-wired Central Electronic 20A exciter. Serial 7402. Used 10 hours. Best offer over $120.00. W8IAB, 170 Timberwood Lane, Holland, Michigan.

HEATHkit mod. IT-21 tube checker assembled in February 1963. Guaranteed to meet Heath's specified voltage and resistance test. With CRT adaptor and instructions: $60.00. K. Mabry, Rt. #1, La Center, Ky.

HEATHKITS in perf, working order, unscratched, new, at kit prices: Mohawk $299.95; Marauder, $334.95; Warrior $229.95 and HO-10 'scope, $59.95 for sale. No deliveries, sry. Wal Beth, 50 Laurelwood Rd., Holden, Mass. Tel: VA 9-3913.

COMPLETE Station: Drake 2-B with matching SSB 5" spkr; HT-37, antenna relay, Turner 354-C microphone. In perf. condx. Original cartons. $550.00. Make offers. WA4ENA, Rt. 4, Box 615, Charleston, S. C. Phone: 803-SN-6-7793.

SELL Complete station: SSB-CW-AM, $350.00. DX-100B, SB-10, SX-71 with spkr, mike, TR switch, in excint condx. Will ship anywhere on F.O.B. basis. K6SWY, 1012 Finch, El Cajon, Calif.

SELL: Polycomm PC-6AC, in excint condx, $175.00, Kellersman, Stony Brook Rd., Darien, Conn.

SELL: HQ-110, $140.00; DX-40, $30; VF-1, $10; E-Z Way 50 ft. tower with bracket, $150.00. K4NOG, 725 Delano Rd., Indian River City, Fla.

HIGH Power, parts for 500 watt modulator. 1 Kw triode final, 3 Kw plate supply. All cheap. Moving. Also miscellaneous. Complete ham station: SX-42 or HQ-100 and 200-watt HT-9 and accessories, $200. W2DBF, 777 Rte. 202, Somerville, N.J.

COLLINS KWM-2 transceivers, AC supply, DC supply, mobile mount, $1100. Standby rig, less than 10 hours use. Dr. William Cunningham, W4LAN. 19-A Twelfth St., Columbus, Ga.

SELL: SX-25, matching spkr., $65.00. In A-1 condx. W1QLA, Watertown, Mass.

SELL Heath Seneca, $145.00; Apache, $200. F.o.b. NYC. WA2FKN. Tel: OL 2-6426.

SWAP: Two good 4X-500 tubes for two SK-900 tube sockets. WA2QMN, 186 Java St., Brooklyn 22, N.Y.

WANTED: P & H Electronics VFO-matic, Model 820. Also 500 cycle filter for 75A4. Luther Pippin, W4AOI, Conicville, Va.

VALIANT F/W. Perfect. $275.00. W2TNS, RFD Southampton Cove, Southampton, N.Y.

SELLING: Complete sideband station Gonset GSB-100 transmitter, $225.00; Drake 2A rcvr, Q-multiplier-spkr, crystal calibrator, $230.00; Astatic D-104 mike with stand, $10.00; Heath SWR Bridge, $15.00. Sold as a complete unit, $495.00. All are in excint condx. Leo P. Friedman, K1OYP, 57 Evelyn Rd., Waban 68, Mass.

FOR Sale: 3600-0-3600 at 1000 ma. plate transformers with dual 110V and 220V primarics, $35.00; 7.5 VCT at 45 amp., 4-1000A filament transformers, $16.50. Peter W. Dahl, 5331 Oaklawn Ave., Minneapolis 24, Minn.

CENTRAL Electronics 200V, $695; Hammarlund 180, $350.00; Gonset G-76 with either AC or DC unit, $395. The above equipment is like-new condx, used only short time. Am going transceive SSB. Will carefully box and ship. R. Weatherby, 7549 E. 4th Pl., Downey, California. Tel. 802-4828.

TRADE: 10" f/7 commercially made reflecting telescope. Blue fiberglass tube, 6" brass setting circles, three eyepieces, barlow, spotting 'scope, and extra sturdy equitorial mount. Three months old. For recent model Collins gear. Bob Hume, 1900 Camino del la Costa, Redondo Beach, Calif. FR 8-6076.

WANTED: Plate transformer, 3000 volts or more at 1 amp. Also, pair of 4-65A's new or used. Residents of California please inquire. D. Taylor, 24 Southdale Ave., Daly City, California.

SR-150 Hallicratters with AC supply. Like new. $600.00. SX-111, like new. $170.00. Going homebrew. K6PQC, Box 902, Ridgecrest, Calif.

COLLINS, S/Line: 32S-1 A-1 condx. $380.00. Wid pwr. supply: $455.00. Ray Miller, K2PWG, First check takes it.

SELL: Hallicrafters SX-71 receiver 80M thru 6M, $95.00. W4ODU, 110 Hammack Dr., Morrow, Ga. Tel. GA 478-7843.

COLLINS Owners! Increase S/Line and KWM-2 versatility. Receiver MARS, RTTY, Short-wave, and space transmissions with same precision as ham signals. Just plug adaptor in. Receiver twelve (12) additional 200 kc. segments. $29.75. Less crystals. Tele-Labs, P.O. Box 6, Brooklyn 8, N.Y.

GPR-90, new, $325 cash and carry deal. Need Crown A30 amplifier, also schematic and instruction manual for Crown 822 recorder. H. Smith, 276 W. 117th St., N.Y.C.

A-1 Reconditioned equipment. On approval. Trades. Terms. Hallicrafters S-85, $79.00; S-108, $99.00; SX-99, $99.00; SX-110, $119.00; SX-11, $159.00; SX-101A, $249.00; Hammarlund HQ-100, $119.00, HQ-110, $169.00; HQ-170, $239.00; Ranger I, $149.00; Valiant I, $239.00; NC-300, $199.00; Collins 75S-1, $359.00; 32S-1, $495.00; 20A, $129.00; National, Gonset, Elmac, Health, Johnson, RME, and many others Write us for lists. Henry Radio Co., Butler, Mo.

VALIANT F/W, $275.00; SX-101A, $275.00; boyh for $500.00. Viking mobile xmtr, w/VFO and Regency converter, $100. Ken Powell, WA4AIT, 8101, Rory Way, Louisville 19, Ky.

20-A, QT-1, 458 VFO, factory-wired, $150.00; HQ-180C, in excint condx, $325.00. Will ship collect. Joe, WA2BQB.

A.T.J. TV camera converted and operating gud pix, $50.00. Knight general purpose 'scope, $35.00. Almost new condx. Pentron tape-recorder with stereo attachment, gud shape: $50.00. Mel Tschappat, 628 Jackson St., Sandusky, Ohio. W8HCC.

MUST Sell: DX-100 and TR switch; SB-10, GPR-90, DB 22A. Best offer for each. Dave Fraser, K2LAI, 427 E. 69th St., New York 21, N.Y.

ALL New: Topaz C1OWDD mobile DC power supply for G-76, $65.00; Polycom 6 and 2B transceiver, $210.00; P&H 400C linear, $130.00. 6146, $2.00. 816, $1.50. Other items. Williams, 64 Prospect Ave., Hackensack, N.J.

SELLING Out: Complete station, Collins 32V3 and 75A3. Make cash offers to W4IEA, 4363 Englewood Ave., Jacksonville, Fla.

MUST Sell: HT-37, $300; HQ-170-C, $240.00, both perfect. T. Lawyer, W2LBE, 45 Sturgis Rd., Bronxville 8, N.Y.

"MONIMATCH" SWR meter, 50 and 75 ohm, gud as commercial bridge, $12.00. WA6ZPJ, 7609 Errol, El Cerrito, Calif.

WANT To buy (or trade for ham gear) old Martin Guitar. Ken Law, W9K1U, 5873 N. Overhill Ave., Chicago 31, Ill.

TUBES Wanted: Top prices paid. Write or call Rex Radio, 84 Cortlandt St., New York 7, N.Y. Tel. COrtlandt 7-1616.

FOR Sale: Cheyenne, DC pwr. supply, mike, mount, Gonset Super 12. $175.00. W2PWF, 212-FI-3-9382, Floral Park, N.Y.

FOR Sale: C.E. 200V xmtr. Late model, little used, immaculate: $650.00; SX-101A rcvr, 2 years old, recently overhauled, in excint optg condx: $275.00. Will ship in org. cartons. Dr. M. B. Kassell, 7561 Overbrook Ave., Phila. 51, Penna. Tel TR 7-8281.

MUST Sell: Gonset G-76 with model 3350 transistor and AC supplies, with mounting brackets. In new condx, recently factory re-aligned. $410. WA6KUM, 1075 East 8th St., Chico, Calif.

KWM-2 and AC pwr. supply, late S/N. James E. Farner, 6541 Briley Dr., Ft. Worth, Texas.

BARGAINS! Write: "Brand's Bulletin", Sycamore, Ill.

SELL: 200V xmtr, in mint condx, $595; SX-100 rcvr and spkr, mint, $195.00; coax relay and 600D mic. $10.00. K3TFZ, Syn Rodin, 217 Clairmont, Clarks Summit, Penna.

JOHNSON Viking Invader, 200 CW, AM, SSB, factory wired, one year old, vy clean. Cash price $400. Bob, K9BHI, RR 2, Box 185, West Chicago, Ill. Tel: 231-0962.

FOR Sale: HT32A, immaculate, in original package, less than 40 hours use: $430; Viking Challenger, $70: Viking 122 factory-wired, VFO, $30; SX-99 with matching speaker, $100; Gonset Super Six converter, $20. Randy, K5KNR, 2220 Avenue "O", Huntsville, Texas.

I Need the following issues of QST in good condition with both covers and Operating Activities section: 1927: January; 1926, November, December; 1924: February; 1923: January, June. If you can supply any of these please write to Elmore Fitz, Lanesboro, Mass.

HUNTER Bandit 2000A, demonstrator, guarantee, "Ole", W4TVJ, 2916 Teakwood, Nashville, Tenn.

SELL: Viking 500 transmitter, in excint condx, best offer over $450.00; AC and F coils for HRO-5OT1, $30 the pair. Two new Eimac 4-400A's, $15.00 each. Sorry, no trades! Richard North, 18253 Swarthmore Drive, Saratoga, California.

HRO-5OT1, coils, $150.00; KWM-1, AC/PS, Noise/B, $450; Hy-Gain 12AVS ant., $13.00; Gonset Mobile G66B/G77A, $250.00; Johnson 250-23-3 Matchbox, $50; all excient with manuals. E. Northup, 207 Rush St., Roselle, Ill. Tel. LA 9-1325.

SALE: HT-3-2A, SX-101, both for $650.00. Will sell separately. Globe-King 500-C with spare 4-400A, $350.00. All in excint condx. Will deliver within 250 miles. W4LLV, 204 75th St., Virginia Beach, Va.

MUST Sell full station NC-303, Valiant, Vert, beam, tower, coax, relays, mike, etc. Best offer. Write or fone WA2LXC, 4 Southview Ct., Carle Place, L.I., N.Y. 516-ED-3-5128.

SALE: New Scout Deluxe transmitter and V-10 VFO in perf. condx. Cost $250.00. Will take $125.00. or trade for a 20-A exciter. Richard Hennis, 3912 Cedar, North Little Rock, Ark.

COLLINS KWM-1 (like new); noise blanker, mobile rack, AC supply connector, $575.00. Original carton. Extra mobile rack, $35.00. K2CQM, 3925 Arthur Ave., No. Seaford, L.I., N.Y. Tel: 516-SU-1-1967.

MOVING To Formosa: Hallicrafters SX-110, $85; Telrex 8 el. 2-meter beam, $6.50. Skillman bug, $6.00. All in A-1 condx. WA2VAL, 48 Midfield Lane, Levittown, N.J. TR 7-9622.

SELL: NC-300, in excint condx, $195.00; Morrow MBR-5 rcvr and 6/12 volt transmit-receive power supply, both: $95.00. Deliver 150 miles. K2CFC, 127 Van Kannel Ave., Yardville, N.J.

FOR Sale: Complete station: HQ-150, Knight T150 xmttr, ant. tuner, mike, key, coaxial relay: value $350.00. Package deal, $300.00. Also xtras. W2VFW, Jake Pittenger, Millburn, N.J.

SELL: SX-25 receiver, $55.00. First order gets 100 Kc. xtal calibrator free. Ben F. Taylor, W2BZK, 4 Lexington Circle, Hempstead, L.I., N.Y.

SP-600 JX-26 receiver, unmodified and in gud condx. Best reasonable offer. Roger Ries, W9FIU, 77 Lakeside Terrace, Urbana, Ill.

COLLINS S/Line, 312B-4, 516F-2, 75S1, 32S1, microphone and Vibroplex bug. In excint condx: $850.00. W4IPV, 510 Girard, Dothan, Ala.

HY-GAIN Roto-Brake, type without motor, in excint condx with instruction sheet. $35.00. F.o.b. W8FGZ.

CENTRAL Electronics 100V. $490.00: Drake 2A with calibrator, $190.00. W8QRL, 3910 Lawndale, Flint 4, Mich.

SELL: HQ-110C with matching spkr, $170; in original cartons; Johnson Matchbox 250-23-3, $60; manuals. Theodore W. Cook, WA2JEM, Tel. MO 8-2350, Montauk, N.Y. Edgemere Road.

SELL: 20 excellent WE 255-A polar relays, $3.00 ea. pp in 48, or trade for teleprinter. W9EJO, 2204 Ariz., Sheboygan, Wis.

SALE: B&W 5100, $225; Collins 75S-1 w/noise blanker and xtra xtals, $450; Elco 720, $75; Hammarlund HQ-129X with accessories and spkr, $145; HQ-145, $195; National NC-183, $135; NC-109, $125; Hallicrafters SX-110, $140; S-107, $30; S77A, $50; Johnson Navigator, $100; Challenger, $80. Small Matchbox, $45; Viking 1, $75, II, $125; Valiant, $275. Terms. Trades. Grice Electronics, Inc., P.O. Box 1911, Pensacola, Fla.

SALE: 6146-6883, 3-$5.00: new, guaranteed. H.S. 32 headset, new, boxed, $1.50; Variacs, $6 up; G-E rect., 1N 91, 6-$1; receivers-transmitters 4-19 kc., $15, new; chart recorders, $75 up; 1296 M.C., R.F. amp., 250 kw, G.E. new. Many bargains. Free list. A & B Eng. Assoc., 1040 E. 45th St., Brooklyn, N.Y.

OLD Wireless sets. Tubes, transformers, parts, equipment. Clearing shack. Bargain list for stamped envelope. W2CE.

SELL: Hy-Gain 2-element Tribander beam. Cheap. K2KGU, Tel. MO 6-8513, NYC.

SELL: Viking Ranger I, $150; SX-71 rcvr, $100. excint condx. Cash and carry deal. W2PRO, Yonkers, N.Y. Tel. SP-9-3057.

WILL Trade new PE-103 in carton for RBL-3 Navy long-wave receiver. W6KGG, Rte. 1, Box 1015, Ycaipa, Calif.

HAM BUERGERS—Used Equipment, Money Back Guarantee B & W 51SB, 399.95, Globe Champ 300A, 285.00; Gonset G 76 AC PS, 125.00; G-76 Transceiver, 375.00; SR-34, 274.95 FPM-200, 1275.00; Hallicrafter SX115 Mint, 485.00; Hammarlund HQ180C Mint 369.00; Johnson Challenger, $99.50, Pacemaker, 269.00, Thunderbolt, 399.95, Vik. 2, 149.95; NC 300, 244.95. TRADES . . . Write for Free list. Ham Buergers, Wyncote, Pa. CA 4-1740.

SSB Equipment for sale. Heath HX-10 exciter and HA-10 linear. A perfect pair for max. power SSB. Am an electronics engineer with 25 years experience so these units are hooked up beautifully and working perfectly. Will demonstrate or meet you on any band. These units are like new. Also have HRO 50T with A, B, C, D coils, crystal calibrator and a built-in plug-in adapter with product detector and dual xtal BFO for perfect SSB. HRO circuitry has not been changed in any manner, adapter plugs into NBFM socket. This is a perfect SSB receiver. Make offer for all or any part of above. Am going mobile exclusively. Wells Chapin, W2DUD, 118 Woodmancy Lane, Fayetteville, N.Y. Tel. NEptune 7-9724.

SELL: Electronics 1927 and 1958, $5.00 year; Radio, March 1937 through February 1942 in binders, $25.00, or $5.00 a year; IRE August 1953 through December 1956, $45.00 or $15.00 a year; 72" open rack, $10; 72" closed rack (no door), $20; transistor heat sinks, 3" x 1 3/8" x 4 5/8", $50; PL-259, $20; military type chassis slides 200 lbs capacity, 22" extends to 45", best offers. All prices F.o.b. Huntsville, Ala. Need sweep generator. Randolph E. Neal, 2802 Irwin.

MUST Sell: Heath HA-10 Grounded grid linear with internal high voltage relay, swamping network; Dow-Key antenna relay, in exc. condx; DX-60 with VF-1 VFO, in exc. condx. Complete with cables, $260.00. Bill Christoff, K8RCA, 3509 Harding Rd., Jackson, Mich.

RME 6900 receiver, $259.00; 10-meter transmitter-converter (Babb TRA 10-PT) $39.00 with broadcast receiver (12 volt), PTT mike, noise limiter, cables, $79.00. All in A-1 condx. K3EFR, 5508 Pimlico, Balto, 9, Md.

BEING Transferred: Heath HX-10 Marauder, RX-1 Mohawk w/spkr, Johnson TR switch and connecting cables. In excint condx. $595 shipping prepaid. H. McCreery, W8DZI, 2821 Willa Dr., St. Joseph, Mich.

GONSET G-76 only, factory reconditioned as good as new, $275. New Shure "Ten-Four" mike, $10.00. K1YRL, 1663 Central Ave., Needham 92, Mass.

FOR Sale: In excint condx, Johnson Viking II, with Viking VFO, $175; National HRO 50T with A, B, C, D, AC coils, $180.00; Central Electronics Model A slicer, $25.00; Johnson Courier, $150.00; Elmac PMR6A, ACPS, 6-volt PS, Bancock MT5A, $75.00. Jimmy Davis, K4SOH, 702 Eleanor, Houston 9, Texas.

EICO 720; 730 modulator; Heath HG-10 VFO; Hammarlund HQ-129-X, P.T.T.; E-V mike; $230. WA2SWM, 121 Ferndale Rd., Scarsdale, N.Y.

TRADE: Stereoe quipment for good AM-SSB-CW transmitter. Have Garrard Type A changer, base, cartridge-Bogen DB230 amplifier (60 watts), (2) Frazier bookshelf speakers. Cost $460 new. Vy gud condx. Will ship anywhere USA. State equipment willing to trade, condx. Terry Muncey, 3019 Monticello Ave., Dallas, Texas.

SALE: KW transmitter, PP 4-250 mod. by 810s, separate pwr. supplies, 5 1/2 ft. cabinet, TVI suppressed, 10 thru 80 mtrs, safety interlock KV meter, Thordarson power equip. and 500 W mod., requires exciter 25+ watts. Masco amplifier No MA 35N. Best offer over $400. W3TEM. Henry Woll, 309 Bewley Rd., Havertown, Penna.

SELL: Super Pro BC-779A w/p.s., $79.00; Hi-Bander, $90.00; National 6-2 VFO, $30.00; 50 ft. Rohn tower, $75.00; Telrex 2M-1528, $20.00; Telrex 6M-1127, $25.00; Telrex 220M-1520, $15.00. All with coax; Ham-M, $85.00, with control cable; Tecraft 220 Mc. xmttr, $50 w/p.s., tubes and xtals. Ameco Nuvistor 220 Mc conv. w/p.s., $35.00; Tapetone Nuvistor 6 mx conv. w/p.s., $35.00; 4-250A, $13.00 ea., 4X150A (used), $5.00 each; (2) 5000V at 50F cap, $10.00; Variac, 20A, $15. Write Larry Blouin, P.O. Box 428, Lawrence, Mass.

32S-1, AC power supply, manual. Like new, $550. Pick up deal only. W6HTK Suite 104, 2515 N. Main, Santa Ana, Calif. Tel. KI 3-1784.

SALE: 6 meter station. LW-51 transmitter with power supply, $50.00; Tecraft converter, 14-18 mc. I.F. with power supply, $25.00. National 6 & 2 meter VFO $30.00; HQ-145 rcvr and spkr, $185.00; B&W LP-1000 filter, $5.00 or name a price. Dick Mehner, 72 Pennwood Dr., Trenton 8, N.J.

HQ-170 in mint condx, $250, also NC-300, also in mint condx $150. Will ship F.o.b. Ed Noble, KØOLW, Gilman City, Mo.

FOR Sale: Meissner Model EX Signal Shifter, $30.00; ART-13 with heavy duty commercial AC pwr. supply, $65.00. C. M. Phillips, W5KJ, 444 Hammond Ave., San Antonio, Texas.

RANGER II, like-new condx, used vy little, factory-wired, new from Henry Radio Co. First m.o. for $200. Also HQ-145, like new condx, new from Henry Radio Co. First m.o. for $150. Will ship in same carton express collect insured. Bob Randall, WØRNR, Ashland, Kansas.

WANTED: Freq.meter, 20 meter full size beam, and KW antenna tuner. W8BNO, Hubbard, Ohio.

TRADE 300 watt 813 xtal transm. w/husky pwr.supply for 70-100 watt c.w. rig w/VFO. K5SAM, 609 W. Main, Edmond, Okla.

SWAN: 175 transceiver with HP-20 AC pwr.supply $185.00. Dick Uhl, WA9BSG, 1918 Hazelwood Ave., Ft. Wayne, Ind.

FOR Sale: HQ-170 with clocü, less than 1 year old, $270.00, or trade for Ranger F. W. plus $120.00. WA8AHG, 852 Walnut St., Elyria, Ohio.

FOR Sale: Apache, SB-103, Mohawk; all for $425. (Apache, $195.00; SB-10, $70.00, Mohawk, $195.00). Complete mobile rig, $225.00 (T-90 $75.00, PMR8, $130.00, M1070, $40.00). Globe Scout 680A, $45.00. W4ZFR, L. H. Dickerson, 3824 Bound Brook, Alexandria, Va.

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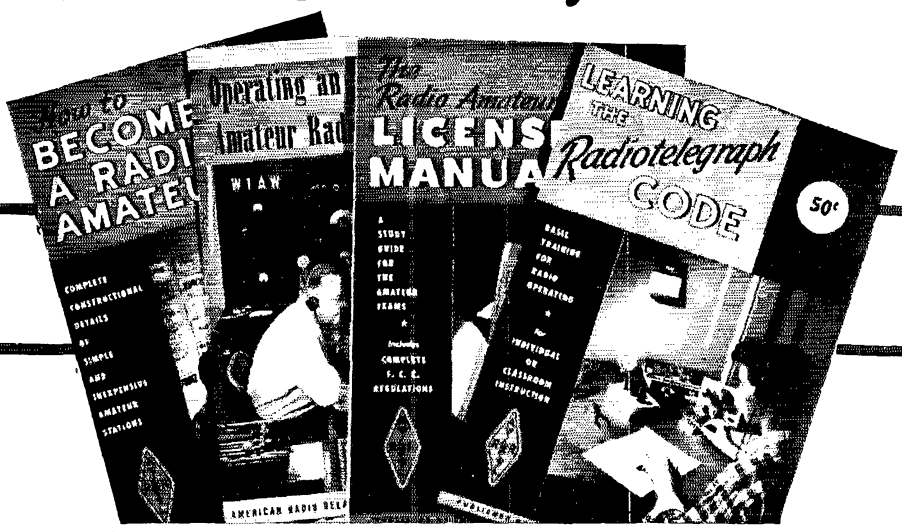

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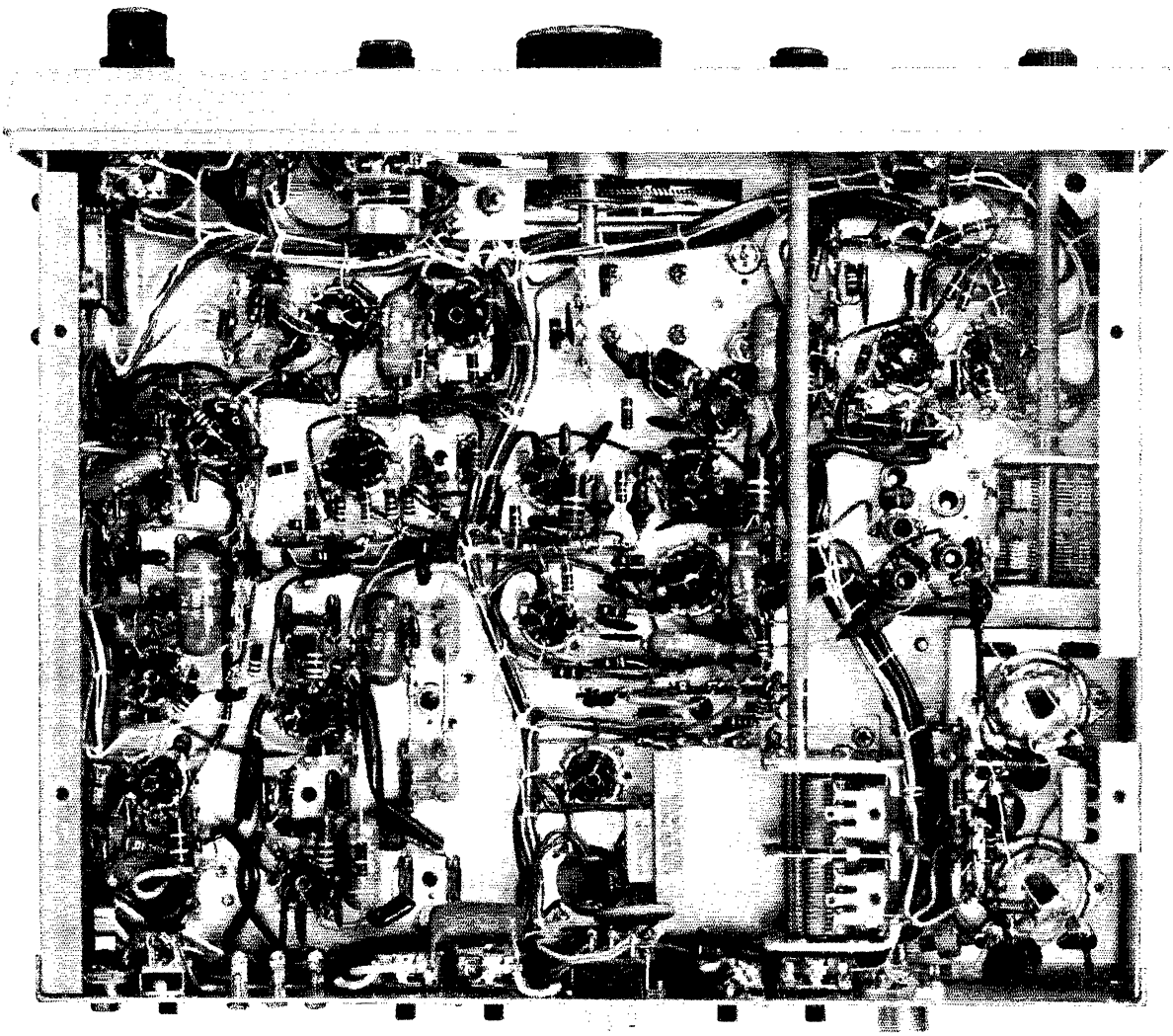

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7035/ 4X150D	26.5	250	250 500	500 150	Glass-Metal
7203/ 4CX250B	6.0	250	500 500	500 175	Ceramic-Metal
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