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FOR MAXIMUM STABILITY...

The UTC type HQ pernalloy dust toroids are ideal for all audio, carrier and supersonic applications. HQA coils have Q over 100 at 5,000 cycles... HQB coils, Q over 200 at 4,000 cycles... HQC coils, Q over 200 at 50 KC... HQD coils, Q over 200 at 60 KC... HQE (miniature) coils, Q over 120 at 10 KC. The toroid dust core provides very low hum pickup... excellent stability with voltage change... negligible inductance change with temperature, etc. Precision adjusted to 1% tolerance. Hermetically sealed.

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Inductance Value</th>
<th>Net Price</th>
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<tbody>
<tr>
<td>HQA-1</td>
<td>5 mhy.</td>
<td>$7.00</td>
</tr>
<tr>
<td>HQA-2</td>
<td>12.5 mhy.</td>
<td>7.00</td>
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<tr>
<td>HQA-3</td>
<td>20 mhy.</td>
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<td>HQA-4</td>
<td>30 mhy.</td>
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<td>HQA-5</td>
<td>50 mhy.</td>
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<tr>
<td>HQA-6</td>
<td>80 mhy.</td>
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<td>HQA-7</td>
<td>125 mhy.</td>
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<td>HQA-8</td>
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<td>HQA-9</td>
<td>300 mhy.</td>
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<td>HQA-10</td>
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<td>HQA-11</td>
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<td>HQA-14</td>
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<td>HQA-15</td>
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<td>HQB-14</td>
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</tr>
<tr>
<td>HQB-15</td>
<td>.5 hy.</td>
<td>23.00</td>
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</table>

These U.T.C. stock units take care of most common filter applications. The interstage filters, BMI (band pass), HMI (high pass), and LMI (low pass), have a nominal impedance at 10,000 ohms. The line filters, BML (band pass), HML (high pass), and LML (low pass), are intended for use in 500/600 ohm circuits. All units are shielded for low pickup (150 mv/gauss) and are hermetically sealed.

<table>
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<tr>
<th>Filter Case M</th>
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</tr>
<tr>
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<tr>
<td>BMI-120000</td>
<td>BMI-150</td>
</tr>
</tbody>
</table>

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2 Rules governing contacts and verifications thereof are the same as for ARRL W.A.S. Certificates (see page 6, "Operating an Amateur Station"). Your package of verifications must be postmarked not later than October 7, 1952.

Thanks to all of you who have already dropped us a line that you are "working all states" for the 1951-1952 Merit Awards. We would like to know the names of everyone who is competing — so we can publish later a list of calls, names and addresses of those in the running. This list will help you in your contacts.

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DATE OF
MY CALL……………………. LICENSE……………………

NAME……………………………..

STREET………………………………..

CITY………………………… ZONE………. STATE……………… QST
Section Communications Managers of the ARRL Communications Department

Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month of the preceding month (not the SCM) to the SCM-by-wire (ARRL) or, in addition to station activities and membership for Members, all amateurs in the United States and Canada are invited to report to the Amateur Emergency Radio Corps (as for Form 7).

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"It Seems to Us..."

21 MEGACYCLES—ON THE WAY
AT LAST

About this time each year, during the past three years, we have had an editorial to comment on the recurrent question “When do we get the 21-Mc band?” The gist of all preceding jobs has been that we couldn’t even hazard a guess. This, the 1952 version, will strike a more hopeful note.

Newer hams may want to know what this is all about. It refers to some changes in our frequency bands that will take place when the provisions of an international radio treaty written at Atlantic City in 1947 come into effect. Under its terms, we amateurs acquire an entirely new 450-kec. band, from 21,000–21,450 kec., and lose 50 kec. from the top of the present 14-Mc band, so it will be 14,000–14,350 kec. (These are the only changes affecting amateurs in the Americas; amateurs elsewhere will have additional changes, principally a loss of operating privileges in part of the 7-Mc band.) However, none of this has yet taken place. The reason is that the Atlantic City frequency table below 27.5 Mc. isn’t in effect yet, having been delayed by a host of practical operating difficulties. So the question at the start of this piece is, in reality, a question of when the Atlantic City allocations come into force.

Until now the only answer has been that we didn’t know because no internationally-agreed plan for making the changeover from the present allocations to Atlantic City had been worked out, not only for amateurs but for all services. It is this situation which has now changed; a plan has been worked out recently, and the business of putting Atlantic City into force will begin very shortly.

Remember references in QST last autumn to League attendance at a conference in Geneva? This is, mainly, what that conference was all about. When it wound up in early December it had produced a plan which, it is hoped, will do the job; all the countries concerned are now back home hard at work to get the plan under way.

Of course, there has to be a catch. That catch is that the Geneva Plan doesn’t spell out a simple time-table by which first this portion and then that portion of the Atlantic City spectrum will come into force. Everyone wishes life in the radio spectrum were that easy; unfortunately, it is not. We still can’t pin-point a date. At this stage, we can say only that at last after nearly five years, we’re definitely started on our way.

Why we cannot pin-point a date is easily explained. The Geneva Plan provides for an involved step-by-step procedure that, as now contemplated, will be completed sometime after early 1955. Between now and then there will be a slow conversion, a piece-work process, on a voluntary basis, from the old allocations table to the new.

Don’t let that “voluntary” discourage you; it’s simply a way of getting around commitments on dates that no one at Geneva was in a position to make. All have pledged themselves to work hard at conversion to the new spectrum. However, we do want to emphasize that many of the initial changeovers will be individually by countries, each bringing its own affairs in order as it can; at times, however, frequencies will be changed over from the old to the new by agreement between two or more countries. At some point in this process, our government will be able to make available to us the 21-Mc band (not necessarily all at once) and at some point it will find it necessary to change our regulations to cut off those 50 kec. at 14 Mc. Other countries will be doing the same in the case of their amateurs — some sooner than we, conceivably; others simultaneously with us; others, perhaps, not until later.

This is the subject now occupying a large part of our attention and time, as it will continue to do until our changes under Atlantic City have been effected. Sooner or later you’ll see the results in appropriate proposals by FCC to change our regulations with respect to the frequencies involved. It may be quite soon — and, of course, that’s what we’d prefer; in its entirety, however, it could cover a space of years. But we’re on the way.

We’ll keep you posted.

THE EXTRA CLASS EXAM

At the year’s end FCC made public the list of paraphrased study questions for the Amateur Extra Class examination. The list is comprehensive, containing 279 questions covering practically all phases of radio in which amateurs may be expected to be active. FCC itself has not the means to give the study guide
general distribution, but ARRL's License Manual is now being revised to include it and a new edition will be available at some time this issue of QST reaches you. Before seeing the list we had intended printing the questions in QST, but it has turned out to be so extensive that it would be impracticable to print questions and answers, License Manual style, without stringing it out over a period of five or six months.

We note some interesting things about the questions. Forty-nine of them have been taken intact from the present Advanced Class examination. Another ten are questions on amateur regulations. Of the remainder, some 140 are from commercial examination elements, principally Basic Radiotelephone, Advanced Radiotelephone, and Advanced Radiotelegraph; they appear either exactly as in those examinations or with slight rewording to make them more suitable for an amateur examination. The subjects covered are of course non-specialized — i.e., questions dealing with equipment, techniques and regulations peculiar to broadcast and commercial communications are not included — but constitute pretty thorough coverage of the general radio principles included in the commercial exams. The remaining 80-odd questions are new ones covering radiotelephony, antennas and transmission lines, single sideband, TVI, microwaves, and propagation.

It is fair to say, we believe, that the amateur who has earned his Extra Class license by passing this examination has demonstrated to FCC that he is on a par, at least so far as a broad knowledge of radio technicalities goes, with the best of his commercial brethren. In some phases he has to be better informed. Where, for example, is the commercial ticket holder who has had to show knowledge of single-sideband techniques? You can display this license with every bit as much pride as you would the first-class commercials.

RESOURCEFULNESS

Amateurs as a whole are a resourceful group. Time and again in difficult situations, whether it be substituting parts in a new rig or doing yeoman service in a communications emergency, the individual amateur radio operator has proved that the skill and knowledge gained from the pursuit of his hobby stands him in good stead. It did to Captain Henrik Kurt Carlsen, W2ZXM, who, as told elsewhere in this issue, put his amateur ingenuity to work in the very best amateur tradition to enable him to maintain communications from his badly damaged ship, the Flying Enterprise.

You can pick up a lot of practical knowledge in this game. Sometimes it can really mean a lot.

You never can tell.

FEED-BACK

In Fig. 3A of "A Civil Defense Control-Station Antenna for 144 Mc.," November 1951 QST, the top metal ring should be ¼ inch thick, not ⅛ inches as labeled.

The value of the Rg, Fig. 2, of "A Simplified Electronic Break-In System," December 1951 QST, was inadvertently omitted. It should be 100,000 ohms, 1 watt.

In the article, "A Complete Portable 40-Meter C.W. Station," by W9FKC, which appears in the December issue, the power-supply circuit of Fig. 2, page 13, is in error. Pin 5 of the power connector should go to the negative side of C9, instead of C2, R4 should go to the first rectifier and to the negative side of C9. The lower side of the a.c. line should connect only to Pin 1 of the power connector and to one side of transformer T1.

W1FWH has called our attention to the omission of an r.c. combination in the circuit of "Three Channels on Ten," January 1952 QST. A 4700-ohm 1-watt resistor and a 0.006-mfd. 1600-volt capacitor should be connected in series across the high-voltage secondary winding of transformer T3.

A lives ¼ mile from B and claims that B's 40-meter c.w. rig is clean as a whistle at low power (30 watts) but roughens up and has several spurious signals when the power is increased to a kilowatt, not to mention the key clicks that can be heard over most of the band. B says that the trouble might be in A's receiver. With real estate at the present prices, what is the solution?

(Please turn to page 110 for the answer)

HAMFEST CALENDAR

Ohio — Saturday, March 22nd, at the Billmore Hotel, Dayton — first annual "Ham-vention," sponsored by the Dayton Amateur Radio Association. The program includes Phil Rand, WD1BM, and Bob Goodman, W1DX, with all the best features of both hamfests and conventions being included in the day's activities. There will be special entertainment for the gals. Tickets (including the dinner) are $4.00, and there's plenty of hotel space for those wanting to make a weekend of it. Make all reservations with Chairman John Willig, W8ACE, 98 Canterbury Drive, Dayton, Ohio.

10 QST for
Instantaneous Prediction of Radio Transmission Paths

Results of a Test of Scatter-Sounding Techniques on Amateur Frequencies

BY OSWALD G. VILLARD, JR.,* W6QYT, AND ALLEN M. PETERSON,** W6POH

In the twenty-four hours following 1 P.M. PST on 14 December, 1951, approximately 320 fourteen-megacycle phone stations throughout the United States participated (although their participation was unknown to them) in a test at Stanford University of what may prove to be an important new technique for predicting and verifying skywave radio transmission. During each five-minute interval for substantially the entire period, a log was made of the 8-meter readings of all stations which could be positively identified. This information was then compared with a series of photographic records taken with the aid of modified amateur transmitting equipment and representing, if the present belief is correct, a plot of distance to the edge of the skip zone versus azimuth. Since radio transmission will be strongest when the distant station is at the edge of the skip zone or somewhat beyond, and since this skip zone varies with direction and time of day, the object of the test was to see whether the strongest amateur signals at any given time actually do come from the neighborhood of the zone outlined in the photographs.

This technique, called "scatter sounding," represents a method for determining the geographical areas to which strong transmission may be maintained at any given time and frequency. Should it prove reliable, its usefulness in both commercial and amateur communication will be very great. For the first time, it will be possible to state definitely (following a test of perhaps one minute's duration) whether two-way commun-

* Trustees, W6YX; Department of Electrical Engineering, Stanford University, Stanford, Calif.
** Electronics Research Laboratory, Stanford University, Stanford, Calif.

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* QST is proud to present in this article a description of an experiment, conceived and performed by amateurs, that represents not only a useful scientific contribution but also confirms a technique that has immediate applications in practical communication. By using the method discussed here it is possible to determine whether or not a band is "open" in a given direction, and to what distance if so, using familiar equipment with relatively simple modifications. The determination can be made entirely at the transmitter, and does not depend on other stations being "on the air."

Scattering Mechanism

Scatter sounding, in briefest outline, consists of noting the time delay between the transmission of a radio signal and the return of a small fraction of its energy scattered back to the transmitter when the outgoing signal strikes irregularities on the surface of the earth. Fig. 1 is a simplified diagram showing how this scattering occurs.

The ionosphere—a fairly homogenous gassy region, acted upon by solar radiation—seems to reflect radio waves as efficiently as a highly polished mirror reflects a flashlight’s beam. The
earth, on the other hand, is a less satisfactory reflector in this respect. The comparison is similar to the relative efficiency of a good mirror and a bright — but not polished — piece of metal in reflecting a sharp beam of light. If a man holding a spotlight stands in a darkened room and points it obliquely at a mirror, the beam will be reflected without noticeable loss of brightness and the man will have difficulty in seeing the mirror itself. If bright metal is now substituted for the mirror, the beam will still be reflected, but the reflected part will be appreciably weaker. The place where the beam strikes the metal will glow brightly, and the metal can be easily seen; this is light being scattered back to the observer.

Fig. 2 — Scattered energy produces an echo when the transmitter is keyed; from the echo time delay, distance along the ground from transmitter to echo source can be calculated.

The back-reflected energy produces an echo at the transmitter whose time delay is measured as in radar. A drawing of a typical oscilloscope indication (amplitude-time, or "A scope") is shown in Fig. 2. From the time delay shown (the interval A), the ground distance from transmitter to scatter source may be calculated. Fig. 3 shows a typical oscilloscope photograph of scatter reflected via the F-layer. The transmitted signal, which would otherwise appear as a vertical deflection at the left of the pattern, has been partially cancelled in our set-up by a "gate" in the audio system. The short vertical lines are range markers. Otherwise, this picture corresponds to that of Fig. 2, and is typical of daytime conditions at the higher frequencies.

Echo Interpretation

Various considerations complicate interpretation of the echoes seen. In the first place, the reader might wonder why a relatively narrow and well-defined echo appears at all. Since scatter comes back from all points beyond the edge of the skip zone it would be reasonable to suppose that one continuous band of echoes, starting at a range corresponding to the edge of the zone and extending outward, would appear. In point of fact, the echoes fall off in amplitude very sharply as range increases, leaving a well-defined clump at one particular point along the time base. The reason for this is complicated, but a rough idea may be gained from Fig. 4. Assume for simplicity that the ionosphere is a perfect metallic reflector. The time delay with which Each bit of scattered energy arrives back at the receiver must be proportional to the total length of path travelled. We may now draw a series of lines, as shown in the figure, representing ray paths each successively longer than the adjacent one by equal increments. Signals travelling out and returning along these paths will have equal increments of time delay, and will be equally spaced across the oscilloscope time base.

Now notice the angular separation in the vertical plane between adjacent paths at the transmitter, and consider what would happen if the transmitter radiated equal amounts of power into equal increments of vertical angle. It can be seen that the zones fairly far out from the transmitter, and corresponding to low angles of radiation, will then receive a much smaller fraction of the total power (because the angle between adjacent rays at the transmitter is small) than the zones closer in and illuminated by higher-angle radiation. Furthermore, the proportion of incident radiation scattered backward can be expected to become smaller as the angle at which the radiation strikes the ground decreases.

Thus, echoes with longer time delay tend to disappear into the noise level, because they are excited by less total power from the transmitter, and because the ground is a poorer reflector at low angles. The strongest will be those corresponding to the edge of the skip zone. The above remarks are by no means a complete explanation of this effect; they do serve, however, to bring out an easily overlooked aspect which plays an important part in the end result.

Thick Ionosphere

To represent the reflecting powers of the ionosphere in terms of a metal sheet is not a bad ap-

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<tr>
<th>F-Layer <em>(Assumed 200 km. High)</em></th>
<th>Eterzonic-B Layer <em>(Assumed 100 km. High)</em></th>
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QST for
approximation in the case of a thin layer such as sporadic-E; however, elaboration is definitely required when reflection occurs in a thick layer such as the F'. The ray penetrates a thick layer to a depth which varies with the angle of incidence and, of course, the radio frequency. Investigation of the detailed mechanism shows that the first energy which arrives back by long scatter is not that which was reflected from the ground at the edge of the skip zone. It corresponds, instead, to energy actually scattered from points well beyond the skip zone.

Fig. 5 is a reasonably accurate representation of the ray geometry which actually applies in Fig. 1, but which was omitted there for simplicity. Path (a) represents a ray leaving at a vertical angle so steep that it penetrates the layer completely. Ray (b) is the first actually to be bent down to the earth. Note that it travels in the layer for a considerable distance, striking the ground well beyond the edge of the skip zone. This is the so-called upper, or Pedersen, ray. As the angle of take-off is further decreased, a ray is presently found which returns to earth at the shortest possible distance from the transmitter. This is path (c) which defines the edge of the skip zone. Path (d), leaving at a still lower angle of take-off than the skip-distance ray, strikes the earth once again beyond the edge of the skip zone.

To tell which of these paths corresponds to the first energy to get back to the transmitter (the leading edge of the scatter echo) we must measure their relative lengths. It might be thought that path (e), which strikes the ground nearest to the transmitter, would have the least delay. Actually, this is not so, since path (e) travels much farther in the layer than path (d). Careful inspection will show that d's total length is actually shorter than the others; hence the energy coming back along this path arrives home first.

It is clear that if we wish to know the ground distance to the edge of the skip zone, we must multiply the time delay to the leading edge of the scatter echo by a factor taking into account both the longer path of travel via the ionosphere and the reflection mechanisms discussed above.

It is convenient to express the time delay $A$, in Fig. 2, in terms of the distance from the transmitter to a small reflecting object which we will assume to be actually producing the echo. We will call this distance "equivalent range." Since radio waves travel at 300,000 kilometers per second, and the measured delay is the result of a round trip to the assumed reflector and back, the delay $A$ expressed in microseconds may be multiplied by the factor 0.15 to obtain the equivalent range in kilometers.

In order to convert "equivalent range" into ground distance to the skip zone, Table 1 may be used. This table assumes an equivalent height of reflection of 300 kilometers for the F-layer, a reasonable average value. Actually, the height will vary according to the time of day and season of the year, but the error introduced by making the above assumption can be shown to be small at the ranges given in the table. Sporadic-E heights also vary, but to a much smaller extent.

**Unanswered Questions**

From this it may be surmised that there are certain complexities which beset the precise interpretation of scatter echoes! Among the complicating factors which will undoubtedly be resolved by further study and experience are the effect of varying degrees of ground roughness, or storms at sea, on the interpretation.

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**Fig. 5** — Accurate representation of reflection from a thick layer. Path d, which strikes the earth beyond the skip zone, is actually shorter than path c which determines edge of skip zone.

**Fig. 4** — Even with a metallic "ionosphere," longer-delay portions of scatter echo will be weaker because a smaller fraction of total energy is radiated to areas far away.

**Fig. 3** — A-scope photograph showing scatter propagated via F-layer. Partially-cancelled transmitted signal at left. Weak multiple appears at right. Short, equally-spaced lines are 500-kilometer range markers.
of the records. (For example, DL6DS, a well-known ionosphere researcher, has detected echoes from the Alps reflected back to his ionosphere transmitter in northern German via the F-layer!)

In addition, the sporadic-E layer and the reputed reciprocity of the ionosphere, known to amateurs as "one-way skip," must not be overlooked.

One of the ways to verify scatter-sounding predictions would be to locate a number of transmitters at different points about the country and then to observe whether their transmissions appeared when the scatter indications said they should. Unfortunately, there are not enough continuously-operating commercial stations to make this possible, and if one had to supply one's own stations (and operators) the cost would be prohibitive. Amateur transmissions, on the other hand, provide a geographical distribution which can be obtained in no other way. Because of the obvious importance of the scatter-sounding technique to amateurs, it was resolved to conduct an all-out test in the 14-Mc. amateur band. Furthermore, a three-element rotatory beam was available with which to make the transmissions both directional and variable in azimuth.

**Equipment Set-Up**

Fig. 6 is a semiblock diagram of the complete scatter-sounding set-up used at the Stanford Radio Club's station W6YX for A-scope display.

The rig consists of a Collins 310B1 exciter driving a pair of 4-250As in the final amplifier, usually operated at an input of 800 watts, key down, although with good conditions usable echoes have been received with the input as low as 40 watts. For reception, a Super-Pro was used, although any sensitive receiver would do. Receiver bandwidth is not at all critical, and on occasion, we have operated our Super-Pro in the No. 1 crystal filter position; a considerable improvement in signal-to-noise ratio results, but the filter is likely to "ring" if not adjusted carefully. Various minor modifications to the Super-Pro had to be made in order to prevent overloading by the transmitter.

The triode preamplifier ahead of the receiver is needed primarily to improve the noise figure. The grid circuit of this preamplifier is coupled to the transmitter tank circuit so that the same antenna can be used for simultaneous transmission and reception. A diode, connected across the grid circuit and so biased so that it is normally non-conducting, protects the preamplifier tube and prevents loss of power when the transmitter is keyed. The Q of the grid circuit is so reduced, when the diode is conducting, that the coefficient of coupling with the tank circuit becomes small and negligible power transfer occurs. Further protecting the preamplifier tubes are the high series grid resistances. As soon as the preamplifier grids go positive, a high bias is developed across these resistances which limits the flow of grid current. Since the shunting capacitors are small, the bias build up discharges in a very short time interval after the transmitter goes off. This simple T-R scheme is ideal for c.w. break-in.

Superimposed on the video output of the Super-Pro are 500-kilometer range marker pulses, generated as shown in the figure. (These are seen

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in the photograph of Fig. 3.)

The signal transmitted consists of a series of dots sent at the rate of about 20 per second (keying speed of 50 w.p.m.). They must be of short duration to permit good separation of the outgoing signal and the echoes, but must not be too short. A dot length of about one millisecond is used in this equipment. The keyer is a multivibrator with its output fed into the Collins exciter through a simple low-pass RC filter so that the sharp edges on the dots are rounded off. A reduction in the time constants of the key click filtering circuits was the only modification of the exciter needed. Although the keying cannot be made really "soft," because of the shortness of the dots, inspection of the signal at a receiving point a mile away showed that there was much less key click than accompanies the signals of a great many c.w. stations, and that clicks of appreciable amplitude do not exist more than a kilocycle or so either side of the operating frequency.

The final amplifier was loaded heavily and somewhat under-excited, so that saturation did not occur. As the single-sideband gang have found out, the amplifier tubes must be biased sufficiently to prevent plate current flow in the absence of signal, otherwise they will behave like diode noise generators! Fortunately, the smoothness of the dot waveshape is not appreciably affected by operating the tubes at true cut-off.

While a simple A-scope presentation will suffice when one is interested in measuring conditions over one particular path, for most convenient display of conditions over a large number of paths a plan position indicator, or PPI, display is desirable. In our case this display was obtained by mechanically coupling to the Gordon beam rotator a Selsyn which rotates a sine-cosine potentiometer inside the shack. With the aid of a gas-tube sweep circuit and this potentiometer a PPI sweep is generated, so that as the beam rotates a range-azimuth polar pattern is traced out on a Dumont type 304-H scope having a tube with a long-persistence (P7) screen.

Since ionosphere conditions are seldom the same in all directions from a given point of observation, a fairly sharp beam antenna is essential in order to avoid ambiguity. Fortunately, if the same antenna is used for both transmitting and receiving, a given amount of directivity does double duty. Fig. 7 shows the effective polar field-strength pattern of a three-element beam in this service. It is obtained by squaring the polar pattern of the antenna itself. We used the patterns of Cleckner 2 as the basis for the figure.

Receiving Arrangements

The ham signal receiving end of the scatter-sounding test was handled in a building about 200 feet away from the transmitter. Two Collins 75A-1 receivers were connected to a 14-Mc. folded dipole strung roughly north and south at a height of 30 feet. The three-element transmitting beam, being 50 feet high, thus had a height advan-


![Fig. 7 — Effective field-strength pattern of three-element beam when used for scatter sounding.](image)

The PPI photographs are arranged to form a series showing the appearance of scatter as the band opened on the morning of December 15th, and as it faded out on the night of December 14th. Showing the morning hours first is preferred because the ionosphere tends to be the most stable then. The chance of encountering sporadic-E seems to be less at that time. It helps in viewing the pictures to start out with conditions as nearly normal as possible. (The West Coast, incidentally, is an ideal location for a test of this sort, since the majority of stations lie to the east as the band opens up in the morning.) The times shown are Pacific Standard. During the hours of the day when conditions were relatively stable, runs were taken at 15-minute intervals. During the hours when rapid changes occurred, runs were taken at five- or ten-minute intervals as required in order to follow the various developments. Each run took about one and one-half minutes, or enough time for the beam to complete one revolution. Interference from the transmitter, although somewhat annoying, did not interrupt the station-logging operations in the adjacent building.

In these pictures, north is at the top or 12 o'clock position, east is at 3 o'clock, and so on. In order to prevent the transmitted signal from brightening the center of the picture excessively,
Fig. 8 — 'Scope patterns of scatter soundings over a 24-hour period.
it has been cancelled out by a "gate" in the audio lead. This leaves a hole in the center of the pattern where the "main bang" would otherwise be. There is a slight brightening at the edge of this hole due to a portion of the main bang leaking through the edge of the gate. The first, or 500-kilometer equivalent range circle, is visible well outside of the brightened edge of the hole. Additional equivalent range circles follow at 500-km. intervals. The grey background of the picture is the noise output of the receiver, which is always operated nearly wide open. Signals appear as bright spots or patches amid this "noise."

**Discussion of the Photographs**

The first picture, at 0515, shows no noticeable F-scatter. Actually, a very small amount could be seen with the aid of the A-scope. The band is essentially "dead" at that hour — only a few very weak signals are audible. The white splotches in the vicinity of the first range circle are transitory echoes caused by meteors. These echoes, quite frequent during the morning hours, taper off during the day and are seen much less often in the evening. Also noticeable at 0515, and again at 0520, is a patch of scatter reflected by weak sporadic-E extending from NNW to NNE between the 1000- and 1500-km. range circles.

At 0520 the first sign of F-scatter appears to the east and slightly south of east between the 3000- and 3500-km. range circles. At this hour the layer ion density is such that only one-hop transmission to the east can take place. However, conditions are relatively unfavorable for this type of transmission, and both scatter and signals are relatively weak.

Shortly after 0612, two-hop transmission opens up, and by 0650 we have strong F-scatter extending from NE to SW. To the SE may be seen two multiples forming fragments of additional concentric scatter rings. By 0745 the main scatter ring has nearly encircled the station, the band being still "dead" only to the NW. The multiples to the SE are now weaker, and by 0800 the third has disappeared and the second coalesced with the first into one virtually solid mass. It is now 1100 on the East Coast, and signal absorption caused by low-level ionization excited by the sun's ultraviolet light is beginning to have an effect. By 0905 the scatter ring is relatively thinner to the east, owing to absorption, than it is to the north, west and south.

From 0905 on throughout the day the F-scatter ring changes very little in appearance, its inner edge hovering close to the 1000-km. range ring at this time of year. By 1618, however, it has begun to move outward as the ion density decreases with the approach of evening. The sun's vertical rays are now falling on the earth to the west of our station; consequently, the multiples are stronger to the south than they are due west. By 1739 the range to the eastern section of the ring is lengthening, and at the same time the echo is becoming weaker. At 1758 a definite gap in the F-scatter appears, but a sporadic-E patch has suddenly appeared to the SE, extending inward to about 750 km.

These sporadic-E patches are not uncommon, and may be tracked with ease by scatter sounding. Their cause is as yet unknown. This particular patch persisted and grew in size and intensity during the evening, as the remaining pictures show. Its range closed somewhat, but there was no marked drift as has sometimes been observed. The F-layer scatter gradually decreased in extent and had disappeared completely to the SW by 1945.

**Explanations of Maps**

Data from the scatter photographs are compared with received signals on the summary maps, which are arranged in the same order as the PPI photographs. Each map is a great-circle projection centered on San Francisco, which admittedly introduces some error at the shorter ranges since Stanford University is some 30 kilometers south of that city. However, at ground distances greater than about 700 km., this error may be neglected. The circles on the maps now represent ground distances in multiples of 500 km. The equivalent range to a particular scatter patch appearing in a PPI photograph is scaled off, converted to ground distance with the aid of Table I, and plotted in the appropriate position on the maps. Each received signal is designated by a dot at its location and a number representing the S-meter reading. (These did not exceed 90 even in the case of the strongest signals because the 75A1 meters are inherently screechy and because resistive pads were used to prevent receiver interaction when working from a common antenna.) When a given station was calling a directional QI, or was in QS0 with another station whose QTII was known, the direction of fire of its beam antenna (assuming it had one) was indicated by an arrow. This information is occasionally helpful.

In interpreting these maps, the reader should bear in mind that if a scatter patch appears, and no ham signals are logged from or beyond it, one is not justified in concluding that transmission from that area was not possible, since there is no guarantee that a station was on the air in the indicated region at that particular time. The existence of a ham signal, when logged, should merely be regarded as corroboration of the transmission possibility indicated by the scatter. It is also worth pointing out that once scatter appears, it is normal to hear signals coming from beyond the scatter patch, since the scatter itself will always tend to be concentrated just beyond the edge of the skip zone. Signal readings, of course, should be taken with a considerable grain of salt since there will be large variations between stations owing to power, location, and antenna differences. On the average, however, these readings will indicate a trend.

**Discussion of Maps**

The map at 0515 shows only a few weak signals. The stations along the Atlantic seaboard are believed to be audible via one-hop Peiersen.
Fig. 9 - Correlation of scatter soundings with observed signals.
ray transmission, which for this distance (approximately 4000 km.) involves an angle of take-off of almost zero degrees. The distance and angle are at the extreme limit for one-hop transmission, and during the winter months the height of the ionosphere is too low for normal one-hop at this distance. The upper (or Federsen) ray, however, does get through, although feebly. Transmission via this ray is so weak that it does not produce any detectable 4000-km. scatter echoes with our set up. As time passes and the layer becomes more highly ionized, a detectable scatter patch builds up by means of normal transmission at a distance of about 3000 km., which is a more reasonable jump for normal single-hop in view of the layer height at this time of year. The angle of take-off for a hop of this length is only 4 degrees, however, and both hum signals and scatter are weak because (among other things) few antennas radiate much at this low an angle. The plot for 0600 shows various stations getting in by this method. Presently, by 0615, the ion density builds up to the point where two-hop transmission becomes possible to the East Coast. This is shown by the sudden jump in number and intensity of the East Coast signals. By 0630 the edge of the skip zone has moved into a distance of 2000 km., and all the signals tend to be stronger, since the angle of take-off for such a hop is 12 degrees.

By 0630, the two hops by which the signal reaches the East Coast have become of approximately equal length. At 0615, as may be seen, the hop between San Francisco and the Kansas area is actually longer than the hop between Kansas and the East Coast, because the sun is up higher in the east and the ion densities have risen sufficiently to support a shorter hop.

At 0700 the skip zone is still moving in, and by 0830 it has reached its stable value for the day.

In interpreting these records, it should be remembered that what one does not expect is to hear a number of strong signals originating from points well inside the skip zone. This is verified surprisingly well by the entire series of records. Weak signals from stations inside the skip zone occasionally appear and may be explained as transmission bounced indirectly from one place to the other via the area in which scattering takes place instead of directly via the layer. The 0630 record shows two excellent examples of this. The "2" signal in the skip zone to the north was W7FPY in Eugene, Oregon, who was logged in contact with a W2. The "1" signal in the Los Angeles area was W6DI, who at that hour was talking to a station in Oklahoma. Both these signals undoubtedly reached Palo Alto via back-scatter. The 0630 record shows what is apparently a genuine report from a station inside the skip zone; this could also be explained by back-scatter transmission, but various other possibilities (such as mistaken call letters) exist and we would rather not hazard an opinion.

The 1500 map begins a series showing the collapse of the band at night. The 2 report inside the skip zone is probably back-scatter. Had our receiving installation been equipped with a three-element rotary, it would have been easily possible to resolve whether transmission was via scatter or not, by rotating the beam and noting whether the direction of strongest signal coincided with direction to the station. If back-scatter is the answer, there will in general be no well-defined best direction unless the station is using a beam; in that case, the strongest scatter signals would be coming back from the direction in which the beam was firing.

The 1630 record includes W6DI again, now S2, and the receiving operator logged the signal on the basis of its fluttery sound as "definitely backscatter." The skip zone has now begun its outward march, and by 1730 transmission to the east has become distinctly spotty.

By 1800 the sporadic-E patch which has developed in the south is bouncing in a strong signal, and remnants of the F-layer to the east are still effective in bringing in a few eastern stations. By 1830 the F-layer is gone, but a few relatively weak Easterners linger on. The station shown at 1900 was overheard to say, however, that he had been hearing W1s and W4s for the last two hours, which suggests that a sporadic-E patch, perhaps similar to the one seen to our southeast, must have existed over the eastern part of the United States. (The maximum range at which sporadic-E scatter may be seen from any location is about 2000 km., because the layer is so low.) This being the case, the eastern stations might have been getting in via two-hop sporadic-E transmission. At any rate, this is a possibility one would wish to investigate further.

By 1930 the gang has become aware that good short-hop conditions prevail, and the number of stations taking advantage of the sporadic-E patch has considerably increased. On that particular evening, the patch obligingly stayed in for quite a long time; further records are not shown because there was so little change in the general behavior.

Conclusions

In considering the results of any test of this sort, a statistical approach should be used. That is to say, the accuracy of each individual piece of data cannot not be guaranteed because of the many uncertainties involved. It is only permissible to hope that on the average, the results will agree with expectations. Viewed in this light, the results of the test are quite encouraging. It seems safe to conclude that:

1) Satisfactory scatter soundings may be made with the aid of ordinary amateur transmitting and receiving equipment. The necessary apparatus modifications are relatively minor.

2) The beamwidth of the standard three-element rotary beam provides adequate resolution for this work.

3) Scatter soundings do in fact show the areas to which radio transmission is possible, both via F-layer transmission and sporadic-E.

4) The sensitivity of the indication is surprisingly great. For example, as the band opens up,
scatter appears almost simultaneously with normal F-layer propagated ham signals. Similarly, when strong signals reflected by the sporadic-E layer are heard, scatter is invariably present.

Acknowledgment

The test described in this article was carried out as an amateur activity by the authors working for the most part on their own time. They were assisted in this by various members of the Stanford Radio Club, many of whom made valuable contributions to the end result. Special thanks are due W6VUW, W6TOT, W6WZD, W6FZB, W6YLC, and W6AOF. The assistance of the U. S. Office of Naval Research in making available certain of the equipment, and in reducing the data, is gratefully acknowledged. Thanks are also due the staff of the CRPL-supported Ionosphere Research Project at Stanford University, and particularly R. A. Hellwell (W6MQC), its director, for stimulating comment and for valuable ionospheric data. To W6WB we are indebted for an ingenious method of coupling an external Selwyn to our rotary beam.

Selected References on Scatter Sounding


Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1MAL, Harold W. Taylor, Cohasset, Mass.
W1BEY, John H. Ferriter, Brighton, Mass.
W3GQO, L. J. Kapler, Trumbullsville, Pa.
W4DRE, L. M. Sarsby, Gaffney, S. Car.
W4EM, Dr. W. Wright Mitchell, Memphis, Tenn.
W4JVT, Marcus O. Nielsen, Miami, Fla.
W4SAT, Edward L. Schacht, Orlando, Fla.
W8SGC, Dr. Edgar H. Brown, Los Angeles, Calif.
W9FBY, Rudolph Strametz, La Crescenta, Calif.
W9KWF, Thomas A. Gill, Grandville, Mich.
W9FMN, Howard E. Lunsmeke, Milwaukee, Wis.
ex-W9VWII, Oscar E. Suddarth, Miamisburg, Ohio.
ex-C16AR, Cecil A. Landry, Halfax, N. S.

W5SON thinks her call not too appropriate for her present status — she has two small daughters. — W1QON

ZS6XQ is home. After extensive medical treatment in this country made necessary by a 1947 sports accident, Louis Nel returned to Mafeking, his condition improved. The many months of confinement caused by paralysis were eased through the untiring efforts of ham and non-ham friends here and abroad (Aug., 1951, QST, p. 68).

A committee with W1BB as chairman raised a substantial fund to provide Louis and his mother gifts — "going-home" presents — in token of friendship and esteem on behalf of U.S.A. radio amateurs. These included a wire recorder, record player and 1200 ZS6XQ QSL cards, the latter with best wishes for a fast DXCC.

Louis is now active on 28 Mc. and intends to tackle 20 meters soon. His brother, ZS6XL, is also active.

The entire amateur radio fraternity, we are sure, wishes Louis Nel an early and complete recovery.

Nathaniel G. A. Dorfman of New York City has developed an instrument with a typewriter keyboard — the Dorfman Electronic Brain Codetyper — which electronically produces International Morse Code at speeds variable from 10 to 125 w.p.m. Output leads from an internal relay may be used to key a transmitter.

A built-in monitor arrangement permits the user to check his own "sending." Letter and word spacing are controlled by the operator's typing speed and technic. The unit, smaller and lighter than an ordinary typewriter, contains a power supply of the selenium-rectifier voltage-doubling type to provide power for twenty-nine J3J dual-diodes and ten 2D21 thyatrons. The Codetyper operates from a 115-volt a.c. source.
Pointers on the Installation of Mobile H.F. Converters

BY BASIL C. BARBEE, W5FPJ

While most constructional articles and instruction sheets on converters devote some space to their installation, there are a few points that could stand more emphasis, if the ultimate in performance is to be derived.

1) When tapping the b.c. receiver to furnish the converter's power, it's a "stitch in time" to install a socket in which the converter's power cable is plugged, to facilitate subsequent disconnection for servicing. While you're at it, a relay to "kill" the plate supply at the vibrator while transmitting is quite worthwhile. Alternatively, the B+ lead to the converter may be routed through a spare pair of contacts on the transmitter control or antenna relay. Many mobile operators are forced to turn down the volume control on the b.c. set each time they transmit because of the lack of this feature.

2) All power leads should be shielded, to prevent pick-up of ignition noise. As an added precaution, it is well to by-pass each lead to ground with a disk ceramic condenser of 0.005 mfd, or so. If a noise-limiting system is used external to the b.c. receiver, its leads must be individually shielded (from each other), not only to prevent noise pick-up, but to prevent the very noise the limiter is intended to limit from by-passing the limiter through inter-lead capacity.

3) If your particular b.c. receiver has "mechanical" pushbuttons, it is feasible to preset one button to the output frequency of the converter. If its pushbuttons are "electrical," i.e., if pushing the buttons substitutes preset tuned circuits for those tuned by the dial, a considerable improvement in both gain and selectivity will probably result from using the "manual" or "dial" position, as such sets are usually designed to receive local stations only on the preset positions, and use fewer tuned circuits when operating on a preset pushbutton. A difference of 20 db, in gain between pushbuttons and dial is not uncommon. If your car is equipped with a "Signal-Seeker" radio, better install a switch to disable the seeking mechanism when the converter is on, unless the converter puts out enough thermal noise in a narrow-enough band around its supposed output frequency to be "sought." Otherwise you may have to use both hands to tune in a desired signal on the converter.

4) To avoid impairing performance on the b.c. band, make the antenna lead from the converter to the b.c. set as short as possible, and of the lowest-capacity obtainable, such as is commonly used for antenna lead-ins on car radios. With the converter connected, but switched "off" (so that the b.c. antenna is switched through to the b.c. receiver), trim the antenna circuit of the b.c. receiver as prescribed for that model (usually around 1400 kc.) on a very weak signal, in order to compensate for the added capacity. Next, set the dial of the b.c. set to the converter output frequency, turn on the converter, and trim the output circuit of the converter, either with a signal generator coupled to the mixer grid in the converter, or with a signal picked up off the air. In the absence of both signal sources, tuning for maximum rush-noise should be satisfactory.

5) The converter's antenna trimmer should be peaked for maximum output at the center of the band with the antenna with which it is to be used, installed and connected the way it is to be used. Peaking at band center instead of at a point near the high end is recommended, since we are concerned only with h.f. converters having a narrow tuning range ("percentagewise") with a high ratio of signal-frequency-to-i.f., making for little difficulty with tracking. If alignment is perfect at the center of the range, then reactive effects of the antenna and transmission line not taken into account in the design of the converter will cause but little tracking error at the edges of a narrow band.

6) One final kink: If the converter has a pilot light that glows too brightly at night, there is a simpler way to dim it than by inserting a resistor in series. Simply paint the inside of the jewell with pilot-bulb or fingernail lacquer of a complementary color; for instance, on a red jewel, use green lacquer.

I hope the foregoing will help somebody get better reception, for it is written, "If you can't hear 'em, you can't work 'em."

* 854 S. Fredonia, Nacogdoches, Texas.

March 1952
Twenty Watts Mobile for All Bands

A Simple Bandswitching Circuit for 75 to 10

BY J. ROY WOLFSKILL, W2RPU

The unit shown in the photographs is a complete bandswitching mobile transmitter, including modulator, and covering all bands from 4 to 29 Mc.

The circuit diagram is shown in Fig. 1. Either crystal control or VFO is available simply by snapping the toggle, $S_1$. A 6C4 is used in the VFO and this is the only indirectly-heated tube in the transmitter. All others are direct-heater types. The heater of the 6C4 operates from a separate circuit through $S_3$ so that it can be left on during receiving periods. This cuts down initial drift and moved from the circuit by $S_3$. Thirty volts of fixed bias from the modulator-biasing battery practically cuts off plate current to the 5618 when this stage is not in use.

A 5516 is used in the final amplifier. This tube has the same power rating as the 2E25, but it is shorter physically so that it can be fitted into a smaller space. The use of an all-band tuner in the final-amplifier output circuit eliminates the necessity for plug-in coils or switching. $C_{18}$ is a dual midget Hammarlund, originally of 140 $\mu$fd. per section. To obtain the desired range, one rotor and two stator plates were removed from each section. The high-frequency coil, $L_4$, is mounted vertically at the rear of the condenser, while $L_5$ is placed at right angles alongside the condenser to minimize coupling between the two. Care should be taken to make sure, with a grid-

The bandswitching transmitter installed under the dashboard in W2RPU’s car. The control knobs in line across the panel are, from left to right, for VFO, first 5618, second 5618, and final amplifier. The meter switch is to the left of the meter. Along the bottom are the VFO-tap switch, a dual crystal holder (one socket unwired for spare), the frequency-multiplier switch, $S_3$, microphone-control jack and the VFO heater switch.

eliminates waiting for the cathode to come up to temperature before each transmission. VFO output is taken from the cathode tap to minimize loading effects on frequency. The tuning range of the VFO is limited to 3500 to 4000 kc. This makes it necessary to use crystal control on 11 meters, unless it is desired to extend the VFO range. The plate voltage for the VFO is stabilized by an 0B2 regulator tube.

The 5618 following the VFO may be used as an 80- or 40-meter crystal oscillator, or as an amplifier or doubler for the VFO, since the output circuit, $C_5L_2$, will tune to either band, one near maximum capacitance and the other near minimum.

The next stage, also using a 5618, may be operated as a doubler to 14 Mc. or a quadrupler to 28 mc., depending on the setting of $C_{18}$ which covers both bands. This stage is inserted or reinserted after the 6C4....

* 113 Ringdahl Court, Rome, N. Y.

Inside view of the all-band mobile transmitter. The chassis measures 8 1/4 by 5 1/4 by 1 inches. The four tuning condensers are lined up across the panel just above the chassis level. $L_4$ and $L_5$ are to the left, mounted as described in the text. $L_5$ is mounted vertically behind the meter. $L_4$, at right angles, is fastened to capacitor $C_4$. $L_1$ is vertical behind $C_6$. The r.f. tubes are lined up across the center of the chassis. The 6C4 is hidden by the biasing battery to the right. The audio components and the 0B2 occupy the rear portion of the chassis. All small components are mounted underneath.
dip meter, that the circuit when completed does not tune simultaneously to fundamental and harmonic frequencies. This can be controlled by altering the coils somewhat. The RG-8/U antenna cable is tapped on L₅ at a compromise point that serves for all bands. Some slight improvement can be gained by adjusting the tap for the band considered most important. The antenna is a center-loaded whip with an adjustable tap on the coil. The coaxial cable feeds the whip in the usual manner at the base.

In the audio section, a carbon microphone drives a triode-connected 5618 which, in turn, drives two 2E30s in the Class AB₂ modulator. Type 5618s were tried in the modulator but would not give sufficient output for satisfactory modulation. Microphone voltage is obtained from the car battery through the filter consisting of C₉ and L₅. No audio control is provided, since the gain is just about right for the carbon microphone used.

The milliammeter, M₂₁, can be switched to read current at the important points in the circuit. When switched to position E₁, it can be used to check plate voltage for the amplifier stage.

(Continued on page 118)
The Twin-Loop Antenna

A Compact 20-Meter Array

BY THOMAS W. SWAFFORD, JR.,* W5HGU

A recent change in QTH by the writer brought about the requirement of erecting a temporary antenna for 14.2 Mc. between two natural supports approximately 28 feet high and 35 feet across. Past experience had shown that the usual folded dipole employed so often for such occasions just wouldn't "cut the mustard" on the low end of 20 'phone, therefore some other method was in order. All manner of concoctions were dreamed up to comply with space limitations. However, the temptation to try out a vertically-polarized arrangement in an effort to obtain lower angles of radiation than could be obtained with flat-topped beams, with the height restricted, was hard to resist. Equally as hard to resist was the temptation to use the \( \frac{3}{4} \lambda \) loop that has been made so popular by the "Cubical Quad" boys. Combining these two vices brought forth the arrangement shown in Fig. 1. This antenna consists of two loops with \( \frac{1}{2} \lambda \) sides. In order to obtain proper phasing a total of 4 half-wave elements is employed, although the array behaves as 3 magnetic dipoles vertically polarized, fed in phase with equal currents for broadside radiation. Thus both of the aforementioned ambitions are fulfilled.

The antenna may be looked upon as being 4 half-wave dipoles spaced \( \frac{1}{2} \lambda \) except for the two center dipoles which are very closely spaced. Additionally, the ends of the dipoles are bent over 90 degrees and joined at current minimum points to form a loop. In order to place the currents of the two loops in phase the two center dipoles must be transposed. Insomuch as the two center dipoles contain equal and in-phase currents and are very closely spaced at the magnetic loop, they may be regarded as being a single two-wire ra-

* 559 Chestaut, North Tonawanda, N. Y.

\[ \text{Insulator, 7 Regd.} \]

\[ \text{Dipole} \]

\[ \text{Feed Line} \]

\[ \text{Support} \]

\[ \begin{array}{c}
\frac{3}{4} \\
\frac{3}{4} \\
\frac{3}{4} \\
\frac{3}{4}
\end{array} \]

\[ \text{Fig. 1 — Plan of the twin-loop antenna. The dots indicate the points of current minimum on the system.} \]

24 QST for
II). This works out to be about 2 db.

It is interesting to compare the twin loop gain with that of two halfwaves spaced 1/2λ and fed in phase with equal currents. Such an arrangement gives a gain of approximately 3.8 db. with a terminal Z_r = 28 ohms at the center of either element when the two elements are connected with a halfwave resonant line. The apparent advantage of the higher gain of the latter is offset by the increased radiating efficiency of the twin loop. Moreover, the two halfwaves have reasonably narrow frequency bandwidths, whereas the twin loop may be operated over the entire 20-meter band without notably affecting the tank loading.

Further investigation into the behavior of broadside loop arrays indicates that optimum gain is to be had with critical over-all lengths. This is analogous to two halfwaves with optimum spacing. For example, three 1/4λ loops produce a gain of approximately 3.6 db. as compared to the 2.04 db. for the twin loop. The over-all length for three loops would be equal to 3/2λ, which locates the two end dipoles at points where their mutual impedances are predominantly negative, thus giving rise to greater gain. Not only does the gain increase with a longer array but the radiating impedance also increases. This assures good radiation efficiency which is in sharp contrast with most conventional beams.

Additional calculated data are given in the accompanying table for N number of broadside loops. This table again shows the optimum array length to be multiples of 3/2λ, i.e., 3 loops, 6 loops, etc.

Unidirectional radiation can be had with any number of broadside 1/4λ loops by backing up the driven elements with an identical array of loops spaced 0.15λ and tuned to act like a reflector. Addition of the reflector will approximately double the power gain and lower the Z_r by a factor of approximately 4.

Gain and Terminal Z_r for N Number of 1/4λ Loops Fed In Phase

<table>
<thead>
<tr>
<th>N</th>
<th>Z_rΩ</th>
<th>G_ab.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>210</td>
<td>0.8</td>
</tr>
<tr>
<td>2</td>
<td>550</td>
<td>2.3</td>
</tr>
<tr>
<td>3</td>
<td>800</td>
<td>3.6</td>
</tr>
<tr>
<td>4</td>
<td>700</td>
<td>4.7</td>
</tr>
<tr>
<td>6</td>
<td>1420</td>
<td>6.7</td>
</tr>
<tr>
<td>8</td>
<td>1550</td>
<td>7.4</td>
</tr>
</tbody>
</table>

The writer is aware that the discussion above is not completely analogous to vertical 1/4λ dipoles as described, but he feels the relation is sufficiently close to be comprehensible to most readers and offers results that do not differ appreciably from those found in ordinary practice. Actually, the 1/4λ loop theory is more nearly analogous to that of single-turn helical antennas whose circumference equals λ and whose pitch angle equals 0. However, this theory is far beyond the scope of this paper.

Appendix I

Terminal impedance, \( Z_t = \frac{E}{I} \) (I)

where: \( E \) = Applied voltage
\( I \) = Current at which the voltage is applied

This may be obtained by letting the applied voltage \( E \) be divided between the 4 dipoles, then
\[ E/4 = I_1 Z_o + I_2 Z_m + I_3 Z_m + I_4 Z_m \] (II)

where:
\( I_1 \) = Current of No. 1 dipole
\( I_2 \) = Current of No. 2 dipole
\( I_3 \) = Current of No. 3 dipole
\( I_4 \) = Current of No. 4 dipole
\( Z_o \) = Self-impedance of No. 1 dipole
\( Z_m \) = Mutual impedance between No. 1 and No. 2 dipole
\( Z_{m1} \) = Mutual impedance between No. 1 and No. 3 dipole
\( Z_{m2} \) = Mutual impedance between No. 1 and No. 4 dipole

Since \( I_1 = I_2 = I_3 = I_4 \), it follows that
\[ E = 4I_1 (Z_o + Z_{m1} + Z_{m2} + Z_{m3}) \] (III)

Further, since the spacing of No. 2 equals No. 3 dipole at the magnetic loop, then
\[ Z_{m1} = Z_{m3}, \text{ therefore, } (III) \text{ may be written } \]
\[ E = 4I_1 (Z_o + 2Z_{m1} + Z_{m2}) \] (IV)

Now, let \( I_1 = 1 \) amp., then the terminal impedance is approximately
\[ Z_r = \frac{E}{I_1} = 4(Z_o + 2Z_{m1} + Z_{m2}) \] (V)

Considering 1/4λ spacing between radiating dipoles, \( \mathcal{G} \) becomes
\[ Z_r = 4(70 + 82 - 13) = 550 \Omega \] (VI)

Appendix II

Considering both sources to be in free space, the broadside gain in the horizontal plane is
\[ \mathcal{G} = \frac{N^2}{Z_m Z_o} \] (VII)

where \( N \) = Number of dipoles with equal in-phase currents
\( Z_m \) = Array element self and mutual real impedances
\( Z_o \) = Dipole self real impedances

Substituting values into (VII), the actual gain for the twin loop is
\[ \mathcal{G} = \frac{2(70 + 40 - 13) + (4 \times 70) + (4 \times 40)}{70} \]
\[ = 1.6 \] (VIII)

Thus,
\[ G_{ab} = 10 \log_{10} \mathcal{G} = 2.04 \text{ db.} \] (IX)


\[ \text{Strays} \]

The Department of State is seeking radio engineers to set up VOA stations overseas. Salaries range from $4719 to $9507, plus a tax-free allowance for rent, heat, light, fuel and electricity. In addition, there is a variable cost-of-living adjustment at certain posts. Another differential is paid those employees serving at posts which are considered to have exceptionally difficult living conditions. Interested U. S. citizens of at least five years' standing who are willing to serve at any post abroad for a continuous period of not less than two years may obtain further information by writing a résumé of their qualifications to the Division of Foreign Service Personnel, 1734 New York Avenue NW, Washington, D. C.
On the TVI Front

A NEW KISER ARTICLE

William L. Kiser, FCC radio engineer and author of the widely circulated and reprinted article1 "TV Interference Problems," has written another clear-cut discourse on TVI. The new work, entitled "TV I.F. Interference... Where Does the Trouble Lie?" appears in Radio-Electronics for February 1952. Mr. Kiser discusses the TVI problems of radio amateurs and doctors using diathermy, defines the responsibility of service technicians to TV set owners, and outlines the obligations of TV manufacturers with respect to set design. The following excerpts from this pertinent article will be of interest to amateurs:

... When an amateur demonstrates that he can operate his transmitter without interfering with a television receiver in the same room it is ridiculous for the service technician to advise a television owner down the block that the fault is with the amateur transmitter. ...

... The technician who uses the amateur... or "outside interference" alibi is not giving... service unless he can state why the interference is taking place. ...

... The service technician puts himself in an awkward position when he agrees to service a poorly-designed receiver. ...

Before entering into an agreement to sell and service television receivers, independent distributors and service technicians would be well advised to find out just what action the manufacturer will take if it is established that certain types of interference are due to lack of design in the receiver. ...

... Now that a rapidly expanding part of the television industry is expressing its willingness to co-operate, the licensed amateur can and will demonstrate that he is a co-operative and useful citizen pursuing an educational and interesting hobby. ...

It would seem about time that... licensed amateurs... and the televising public... get a fair shake in the television interference problem.

The publishers of Radio-Electronics have very kindly provided the League with reprints of this latest article. Interested clubs and individuals may obtain copies by writing ARRL Hq.

WRITING TVI REPORTS

We had an opportunity recently to review a file of correspondence from Ken Adams, WSFLM, to his local FCC office in response to TVI complaints from an organized group of neighboring families. Ken being an industrial trouble shooter by occupation, the letters reflect his wide experience in writing a diplomatic yet factual report. A separate response was made for each case, broken down into three subdivisions: history, investigation, findings. Copies were sent to the complainant, serviceeman (if any), the area radio council TVI committee, and one copy was filed with the station log. To lend weight to the reports, in instances where TVI was treated at a complainant's house a competent fellow-ham was taken along as an observer-assistant. The net result — a comprehensive and authoritative report leaving the decision for any further action up to the FCC engineer.

WITH THE CLUBS

TVI Organization of New York: This newly-formed group has been making rapid progress in meeting the TVI threat in the New York City area. The organization is primarily interested in hearing from local hams in instances where a complaint is received — after adequate attention to harmonics — from a TV set owner living at a point farther away than the site of a receiver that is not affected. In the short time the group has been in existence, agreements to service sets so affected have been worked out with RCA, Du- mont, Stromberg-Carlson, Emerson, Crosley, GE, Admiral, Philco, Andrea, Westinghouse, Motorola, and Muntz. To achieve its objective of returning hams to the air, thereby bringing to a head any complaints of TVI, the group in January sponsored a highly-successful "Ten-Meter TVI Sweepstakes." A similar contest is scheduled for March 1st to 15th, with hams around the country invited to take part.

Mount Diablo (Calif.) Amateur Radio Club: The MDARC TVI committee has circulated questionnaires, pamphlets, and a chart showing the relationship of amateur harmonics to the TV channels in use in the area. In addition, the committee has been using an AN-APR-4 receiver (with coils for up to 300 Mc.) for making listening tests on amateur harmonics. In chasing down cases of TVI, some club members have found it convenient to team up in pairs, one operating the suspected rig while the other operates a mobile set-up for reporting back when the 'TV set owner doesn't have a telephone.

Inglewood (Calif.) Amateur Radio Club: Pursuing an aggressive campaign against TVI, IARC has prepared two form letters, one addressed to non-member hams and written in ham language, the other directed to TV lookers-in and written in layman's language. Both discuss the common problem and stress the need for cooperation.

* In response to many requests, ARRL has made available reprints of the January QST article, "FCC's Plan for Handling TVI," by George S. Turner, Chief, Field Engineering & Monitoring Division, FCC. Write Hq. your needs.
Letters from the TV Receiver Manufacturers

If you'll turn back to page 35 of your February issue of QST, you'll find a copy of a letter that ARRL Headquarters recently addressed to the presidents of leading TV receiver manufacturers. A month later the following replies had been received.

BENDIX

Your letter . . . has been turned over to me for reply. I am very much interested in the information it contains, and think you have a very good point in promoting an increased awareness of the need for good immunity to amateur transmissions in television receivers.

We believe that our present receivers are quite good in this respect, and do not contemplate making any changes in the immediate future, especially since we are already committed for a considerable quantity of our present tuners and other components. However, we have a new model coming along which should be ready sometime this spring, and I am very much interested when the time arrives in taking advantage of your kind offer to permit us to engage in cooperative tests on interference susceptibility of these models at your laboratories. I think it is likely that representatives of our Service Department will also be interested in such a program.

— J. M. Miller, Jr.,
Chief Engineer

NATIONAL

... we had the problem in mind when we developed the first TV receiver. That is why we used a 3.5-Mc. i.f. You can rest assured that when we go into production on a new model, we will have the points that you brought out carefully considered. . . .

— W. A. Ready, President

CAPEHART-FARNSWORTH

... I am sure that amateurs have done a very excellent job in eliminating transmitter difficulties, and I recognize that in the past the receiver manufacturers have not paid too much attention to the problems of providing adequate selectivity and rejection of signals, other than radiations from the television transmitter in use.

The Engineering Department at Capehart has given this problem a great deal of consideration, and the 1955 line, which will be introduced in the second quarter of this year, will include adequate preselection of signals in the tuner, plus very effective shielding all through the r.f. and i.f. system. Incidentally, the intermediate frequency will be in the 40-megacycle region and we will provide good rejection to the band of frequencies involved.

In the near future I may take advantage of your kind offer to conduct tests on interference susceptibility. I would like to have you send me the location of your laboratory and the person we would contact so that during the test period we can include this location in our itinerary.

— Antony Wright,
Vice President of Engineering

MAGNAVOX

I acknowledge with thanks your letter . . . which has been referred to our engineering department. We appreciate the precautionary stand you have taken in the matter of interference on the u.h.f. channels and your helpful attitude in this matter.

I am sure our engineers will want to take advantage of your kind offer of test facilities at the proper time.

— Frank Freimann, President

WESTINGHOUSE

... The subject of television interference, particularly with reference to interference caused by amateur stations and resulting from receiver difficulties rather than from spurious radiations, has always been of concern to us and we have considered this factor in our designs. As an example, our receivers have a tuned input circuit ahead of the first grid having a Q as high as practicable, and for some time now we have used a 0.055 input tube to achieve this result.

To the best of our knowledge and from the records of our Service Department, we have had very infrequent complaints from our customers of interference of this type.

Your letter also expresses concern over the possibility of interference design in the u.h.f. range which may make the receiver susceptible to TVI. This also has been of concern to us and in our approved u.h.f. designs having application in our new receivers, we are using a single superheterodyne tuner feeding directly into a 41.75-megacycle i.f. and having two tuned circuits ahead of the crystal modulator. Our experience is that this is the only design that is free of undesirable spurious responses and at the same time gives the maximum in performance.

We shall be very happy to cooperate with you to determine comparative interference susceptibility in some of our new models. We shall be very pleased to send you some of our new chassis, including u.h.f. tuners, which should be available within the next few weeks, or if you prefer, we will have one of our engineers visit your laboratory and assist in this work. We would appreciate hearing from you as to how you prefer to conduct these tests. I feel that your interest in this matter should stimulate the industry to produce sets with greater freedom from interference.

— G. C. Larson,
Manager of Engineering

STROMBERG-CARLSON

I appreciate your letter . . . and your discussion of interference problems.

We have had cases of interference from amateur transmitters brought to the attention of our Service Manager, but fortunately those cases have been very few, possibly a half-dozen in the last two years. In each case we have corresponded immediately with the distributor or sales organization in the area, and they in turn have cooperated with the owners of the receiver and transmitter. We are of the belief that each of the cases has been solved in this fashion.

Our receivers are designed with the need for selectivity in mind, and our tuners particularly have been designed to suppress frequencies outside of the television bands. We have never built a television set without an r.f. stage, and the circuits have been designed for narrow band pass for the television channels with sharp attenuation on either side of the channel. Our present receivers use four variable tuned circuits in the tuner and associated coupling networks to assure selectivity. We will continue in our future designs to keep the need of selectivity foremost in our minds and can assure you of our diligence in this regard.

Thank you also for the kind offer of your laboratory facilities and engineering experience for making cooperative tests on interference susceptibility. I am referring this plus the entire correspondence to our Chief Engineer, Gerrard Mountjoy, for consideration.

— Robert C. Tait, President

MOTOROLA

... We are quite cognizant of the fact that there have been competitive receivers on the market whose front-end selectivity has been inadequate. We feel rather proud of the fact that there has been only one instance of amateur interference concerning Motorola receivers that has been brought to our attention. This particular case was not due to poor front-end selectivity but was an image problem due to the fact that one of our models had the local oscillator on the low side of the signal. Inasmuch as Motorola alone was susceptible to this particular amateur signal, due to our
Getting Ready for 21 Mc.

Hints and Kinks for Modifying Equipment

BY GEORGE GRAMMER, * W1DF

The 21-Mc. band has been in the ofling for so long that it has come to be more of a mirage than a promised land. But as described in this month's editorial the machinery for putting the Atlantic City frequency allocations below 25 Mc. into effect has at last been approved by all concerned and is beginning to function. It is truly just a matter of time until the necessary shifts in frequency assignments are made and we find ourselves in possession of some new and interesting territory.

It's a good idea, therefore, to get ready for the great day even if we can't immediately use the red crayon to mark the calendar. Of course, a lot of us have been ready, so far as station gear is concerned, for a long time. Much of the multiband equipment that has appeared in QST and the Handbook since the Atlantic City Conference has included 21 Mc., as a matter of course. Communications receivers offered for ham use cover the band automatically, many of them with special bandspread arrangements. The purpose of this article is to offer a few suggestions for those who aren't already in a position to open up on 21 the instant the band is available.

Receivers

The surplus military sets represent the principal problem in the receiving field, since the popular varieties stop short at about 18 Mc. The most satisfactory solution is to build a converter, and if you are interested in top-notch performance the crystal-controlled variety that has been featured in the last few editions of the Handbook is the type to build. In frequency stability and in signal-to-noise ratio it will compare favorably with anything you could buy or build.

For a quicker and simpler job, the one-tube converter circuit shown in current Handbooks for 10-11 meters easily can be modified for 21 Mc. The only change that is really necessary is to use a somewhat larger tuning condenser at C1 so the input circuit will cover 21 as well as 28 Mc. A 30-μfd. variable substituted for the 15-μfd. unit specified in the circuit will do it. The oscillator and i.f. circuits need not be touched, since the oscillator range is such that the same i.f. can be used on both bands, the oscillator being on the high side of the signal for 21 Mc. and on the low side for 28.

Transmitters

The details of getting output on 21 Mc. from a transmitter that does not at present have specific provision for that band naturally will vary with the circuit layout. However, the thing is basically simple. If the transmitter now covers the 14- and 28-Mc. bands the chances are that it starts out on 3.5 or 7 Mc. and uses frequency doublers to 14 and 28. In each case the principal change is that one of the frequency multipliers should triple from 7 to 21 Mc. This may or may not require a change in the circuit constants. Except for gang-tuned or bandpass rigs the probability is that the existing circuits cover a fairly wide frequency range. It is not unusual to find, for instance, that the tank circuit of a 28-Mc. doubler can also be tuned to 21 Mc. In that event the initial driving power on 21 Mc. can be obtained simply by connecting the grid of the 28-Mc. multiplier to a 7-Mc. driver instead of to a 14-Mc. source, and using the tube as a tripler instead of a doubler. The efficiency as a tripler may turn out to be a bit less than as a doubler, but this depends a good deal on the type of tube used. With the 6AG7, a currently-popular frequency multiplier, there is hardly any difference between doubling and tripling.

If the tuning range is not sufficient in the existing doubler circuit you can take the most convenient of two choices — either increase the tank inductance or the tank capacitance. The former is easier if the stage has a plug-in coil. A new coil having about twice the inductance — that is, about 40 per cent more turns in the same over-all length and same diameter — substituted for a 28-Mc. coil will tune to 21 Mc. with the same capacitance. If the 21-Mc. tripler is a former 14-Mc. doubler, the 21-Mc. coil should have about 70 per cent of the turns used on 14 Mc., again with the same over-all length and diameter.

Tuning over 14 and 28 Mc. with the same coil requires about a 2 to 1 capacitance range. Allowing for tube capacitances and strays, it is unlikely that the actual capacitance at 28 Mc. will be less than 20 to 30 μfd., even with the coil adjusted so that the circuit is resonant with the condenser close to minimum. Hence even if the coil is carelessly pruned it is unlikely that a condenser having a maximum capacitance of less than 50 μfd. will cover both bands. It would be safer to use 75 or 100 μfd., in the event that the most convenient way to get on 21 is to use a single coil for two bands. The same considerations hold if the stage is to cover the 14- and 21-Mc. bands instead of 21-28; the required capacitance ratio is a little over 2 to 1 but 75 to 100 μfd. should be enough maximum condenser capacitance.

The amplifier circuits following the tripler may already have enough tank capacitance.

*Technical Editor, QST.
range to hit 21 Mc. with a 28-Mc. tank coil, requiring nothing more than retuning to get on the band. This is the quickest way, although it may lead to pretty high C in the tank circuit at 21 Mc. and thus may lower the tank efficiency somewhat. If the coils are plug-in, or if an extra one can be switched into the circuit, it will in general be satisfactory to figure on using the same in-use capacitance at 21 as at 28 Mc., because on the latter band it is rarely possible to get a low-C circuit. Hence the coil for 21 Mc. should have about twice the inductance of the 28-Mc. coil, that is, 40 per cent more turns in the same space.

It isn’t a bad idea to have a wavemeter or grid-dip meter handy to check the tuning of the circuits. A lot of fellows have got on 21 by the accident of picking the wrong harmonic (sometimes not realizing it until POC cooperated by advising them) and the same thing can happen in reverse. Once we get the band this isn’t too likely to result in pink tickets, since the probability is that you will band on either 14 or 28 in trying to get on 21; still, there is very little random cross-band operation and you may find it difficult to get any QSOs.

Incidentally, in tripling from 7 Mc. the range of 21,000–21,450 kc. is covered by a 7-Mc. fundamental range of 7000–7150 kc.

Antennas

If you already have a multiband antenna system using tuned feeders you’re all set for 21 Mc. On this band a quarter wavelength along air-insulated line is close to 11 1/2 feet, so the tuning will change from series to parallel at about 11 1/2-foot intervals. It may not be possible to figure very closely in predicting which type of tuning to use because with fairly long antennas the end effects prevent the resonances from falling in exact harmonic relationship with the fundamental. The simplest thing is to try both types of tuning and see which gives the best coupling to the transmitter. If neither works well, change the feeder length by about five feet and try again. When one or the other method shows signs of working, a final pruning should give the kind of coupling you want. These small changes should have little or no effect on the operation at lower frequencies, although they may cause the condenser settings to change somewhat. Changing the line length is likely to have its greatest effect on 28-Mc. operation, so it may turn out that a compromise (involving only a few feet of line at most) may be desirable for optimum operation on both bands.

Fig. 1 gives dimensions for ordinary and folded dipoles for 21 Mc., in case a special antenna is put up for this band. The recommended lengths are for the center of the band. Air-insulated line should be used for the straight dipole, and the line length preferably should be some multiple of 11 1/2 feet. Odd multiples will require parallel tuning and even multiples will take series tuning.

The 300-ohm line to the folded dipole can of course have any convenient length since it will be fairly closely matched to the antenna. The customary methods of coupling the transmitter can be used: if a parallel-tuned coupler “antenna tuner” is employed the tuned circuit must of course be capable of resonating at 21 Mc. In the coupler unit shown in the transmission-line chapter of the Handbook the same coil that covers 28 Mc. also will cover 21, although for matching purposes a separate coil may be desirable in that the line taps may not come at the same points on both bands.

Beams for 21 Mc. can be constructed on the basis of scaling existing designs for other bands. All dimensions will be inversely proportional to frequency, so 28-Mc. dimensions can be multiplied by 4/3 to get measurements for a 21-Mc. beam, and 14-Mc. dimensions may be multiplied by 2/3. These are “round” figures, and in view of the limited frequency range of some beams, particularly the close-spaced variety, exact frequencies should be used. For example, if the beam is to be cut for 21.2 Mc. and is based on an existing design that has been cut for 28.7, the ratio of all dimensions is 28.7/21.2 = 1.353. Or, if the same frequency is to be scaled down from a beam now centered on 14.25 Mc., the ratio is 14.25/21.2 = 0.672. The bandwidth can be expected to be proportional to frequency, and so will be 3/4 the 10-meter bandwidth or 1.5 times the 20-meter bandwidth.

The 21-Mc. band opens a new, although somewhat specialized, antenna possibility, in

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that some matched systems may work well on their odd harmonics. For example, a 7-Mc. folded dipole will be reasonably well matched to 300-ohm line when operated on the third harmonic. The fact that the harmonic relationship is not exact introduces a bit of difficulty and may require careful adjustment of length. For example, the writer measured the standing-wave ratio on an Amphenol folded dipole cut for a center frequency of 7100 kc., at which frequency the s.w.r. was 1.15 to 1 under the conditions of installation. At 21.3 Mc., the exact third harmonic, the s.w.r. was 4.4 to 1, but at 22.2 Mc. it reached its lowest value of 1.7 to 1. This latter frequency is the resonant frequency of the antenna based on the long-wire formula in the *Handbook*. Over a 450-ke. band centered on 22.2 the s.w.r. did not exceed 2 to 1. Making the antenna the right length to center the "third harmonic" in the 21-Mc. band would give satisfactory operation in this band at the expense of a somewhat increased s.w.r. at the high end of 7 Mc., but still without exceeding 2 to 1 anywhere in the latter band. The length required is about 68.5 feet.

**Propagation — 1952**

Of considerable interest, naturally, is the question of what kind of propagation we can expect when the band is finally opened to us. On present sunspot-cycle forecasts, the next couple of years are likely to be the poorest, in terms of number of hours per day that the band will be open. At this writing the CRPL forecasts for March and

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**Fig. 2** — CRPL-predicted m.u.f. at 40 degrees N. latitude in the W zone. Solid line is the prediction for March, 1952; broken line is the prediction for April.

**Fig. 3** — Similar to Fig. 2, but for 20 degrees N. latitude, W zone. In both charts, a band is expected to support communication by reflection from the ionosphere at the latitude given, whenever the curve is above the frequency under consideration.
April are the latest available, and Figs. 2 and 3 give some indication of what is to be expected during those months. Fig. 2 shows the predictions for 40 degrees N. latitude in the United States and is representative of the average conditions for the country. The curves show the predicted 4000-km. m.u.f. directly overhead at that latitude, and the band should be open whenever the curves are above the 21-Mc. line. The times have to be shifted an hour or so, depending on the distance, for east-west transmission since the reflection point is not overhead in actual long-distance communication but lies up to 2000 km. from the station.

Fig. 3 is a similar prediction for 20 degrees N. latitude in the United States. It is representative of the southern part of the country for east-west transmission, and also indicates in a general way what the band will be like for working south from about 40 degrees N. latitude. It is easy to see that rather good conditions can be expected in the direction of South America for a considerable portion of each day. The 28-Mc. band is expected to open in this direction as well.

These two charts give only a small glimpse of the over-all propagation picture but do show that even though we are approaching a sunspot minimum we can expect to get considerable immediate use out of the band. For the present, working Europe regularly from the middle and upper U. S. latitudes is not to be expected, but signal paths lying below an east-west line should produce contacts over most of the daylight hours. The nearer you are to the southern border the better your chances of getting out in all directions at some time of the day.

**Strays**

A corona "sniffer," designed for use in the examination of large motors and generators, has been developed by General Electric. "Capable of distinguishing corona on adjacent coils of a large machine," this might have possibilities as a test unit among the high-power gang!

The International Projectionist and Independent, organ of IATSE, has published a list of W and VE amateurs who are professionally employed as movie projectionists or stage bands. A limited number of copies is still available. Those interested may write Amos Kanaga, W6BAA, 262 La Casa Avenue, San Mateo, Calif.

No constructor or experimenter in the amateur field should be unfamiliar with components bearing the Cardwell trademark. We note with regret the passing of Allen D. Cardwell, founder of the manufacturing concern bearing his name and otherwise a contributor to the art. In retirement, Mr. Cardwell had been working on pilot models of physical-therapy equipment to be used in the rehabilitation of disabled veterans.

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**Bureau of Standards Model Antenna Range**

A new model antenna range, shown in the photograph below, has recently been completed by the National Bureau of Standards at its Radio Propagation station at Sterling, Va. Its primary purpose is to facilitate the measurement of antenna radiation patterns in the vertical plane. The inverted "V" type plywood structure, capable of 180-degree movement, supports a target transmitter at its vertex some 50 feet above the metal hardware-cloth ground plane. The antenna model to be tested is placed in the center of the plane. The model test antenna, which by the law of reciprocity has identical radiation and reception patterns, intercepts target-transmitter energy which is then rectified and transmitted along underground cables to a recording pen attached to an automatic pattern plotter. Particular care has been taken to prevent stray reflections within the field.

These antenna investigations are mainly concerned with the high-frequency spectrum from 3 to 30 Mc. at which frequencies the wavelength varies from 300 to 30 feet. Measurement of full-sized antenna performance would require a site several thousand feet long whereas a prototype frequency may here be represented by model-transmitter frequencies from 60 to 1500 Mc. This employment of model techniques ("electrodynamical similitude") eliminates the necessity of full-scale work with attendant complexities such as free-flight balloons and aircraft. This NBS unit is believed to be the largest ever designed for its purpose.

For an example of amateur work along this line we refer readers to "Parasitic-Array Patterns" by Joseph L. Gilson, W3GAU, in the March, 1949, QST.

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**SWITCH TO SAFETY!**

March 1952
A Power Supply for the Novice Transmitter
A Practical Unit and Some Hints for the Beginner

BY RICHARD M. SMITH,* WIFTX

The first thing anyone should learn about a power supply is that it is a lethal instrument, capable of killing or injuring without warning. It should, therefore, be handled with extreme caution. Forming good habits in this respect right at the start is important, and will help you live to a ripe old age. We don’t want any Novice calls appearing in “Silent Keys”! More about the safety angle later; right now, we want to get to the subject at hand.

Following the appearance in QST of instructions for converting a Command transmitter for use by Novice licensees, we received many inquiries concerning the design and construction of a suitable power supply for the unit. This opened up the whole question, and eventually resulted in the supply shown in the accompanying photographs and in Fig. 1. It is about as inexpensive as any supply having comparable output, and will serve to introduce the Novice to some of the things he needs to know.

The supply shown is designed expressly for use with the “Command” transmitter, but its output ratings are such that it can be used with many other c.w. transmitters. It delivers 425 volts at 150 ma. for the amplifier plate, 250 to 300 volts at about 18 ma. for the amplifier screen-grids, and 255 volts (regulated) at 25 ma. for the oscillator. In addition, it furnishes 12.6 volts a.c. at 3 amp. for the filaments. If desired, the filament circuit can be rewired to provide 6.3 volts at 6 amperes. A single “replacement-type” transformer is used to provide all output voltages. Admittedly, this is not the most convenient arrangement, because it requires that the high-voltage and filament circuits be turned on at the same time. To get around this disadvantage, a ceramic switch having sufficient insulation to withstand the high voltage is used to turn the plate supply voltages on and off separately. It works out to be a little less expensive this way, because the price of the ceramic switch is less than the cost of the two separate filament transformers that would be required otherwise.

The high-voltage winding of the transformer specified is rated for 600 volts a.c. each side of the center tap. Its current rating is 200 ma. In addition, it has three separate filament windings, one rated at 5 volts, 3 amperes to handle the rectifier, and two rated at 6.3 volts, 3 amperes. To obtain the 12.6 volts needed for the transmitter filaments, the two 6.3-volt windings are connected in series so that their voltages add.

How the single high-voltage winding of the transformer is used to supply three different d.c. potentials is shown in Fig. 1, and is explained below. It is suggested that the Novice make reference to the Power Supply chapter of any recent edition of The Radio Amateur’s Handbook for the information he will need to understand the terminology used in the following paragraphs.

Before the output of the rectifier is split into the various d.c. output levels required by the transmitter, it must be filtered to remove the high ripple content resulting from rectification of the a.c. This is accomplished by the simple single-section, choke-input filter comprising L1 and C1. In addition to providing the degree of filtering needed for a c.w. transmitter, the circuit has quite a bit to do with the degree of voltage

*Technical Assistant, QST.

This view shows the arrangement of the components on the chassis. The filter condenser is at the left next to the filter choke. The tubes are grouped near the center of the chassis, with the transformer at the right. The a.c. switch and the rotary switch used for tune-up and transmit-stand-by purposes are mounted at one end of the chassis so that it may be placed beside the transmitter without “hogging” too much space on the operating desk.

QST for
regulation obtained. Use of choke input restricts the rise in voltage that always occurs when the load is removed from the supply, as it is whenever the key is opened. Thus, the components used in the filter serve the dual purpose of removing most of the ripple content, and preventing the output voltage from rising excessively under no-load conditions. It should be remembered that less filtering is required in a crystal-controlled v.w. transmitter than in either a VFO or a 'phone rig. We have used the minimum required to keep the cost of the unit low.

Another factor affecting the degree of regulation obtained in a given power supply is the amount of current passed by the bleeder resistor. This, of course, is a constant load on the supply, tending to hold the output voltage down when the external load is removed. In addition, it serves the very important purpose of discharging the filter condenser after the supply is turned off. In the usual supply, the size of the bleeder resistor required for good voltage regulation is determined by the inductance of the filter choke. Here, however, we have an additional constant load across the output of the filter in the form of the VR tubes used to provide the oscillator plate voltage. The current through the VR tubes is great enough to take care of the regulation aspects of the problem so it is merely necessary to provide a discharge path for the condenser to protect the operator. This resistance, which is made of $R_1$ plus $R_2$, is much higher than normal, and for that reason low-cost carbon units can be used.

It might seem like duplication to provide more than just the VR tubes as a discharge path, but actually it isn’t, because the VR tubes stop conducting after the voltage falls below a given point. After the VR tubes drop out of the picture, the resistors continue to discharge $C_1$ until the voltage falls to harmless proportions. Note that $R_1$ and $R_2$ are always connected across the filter regardless of the position of $S_2$. This is the only safe place for the protective bleeder, because if it was disconnected by the switching, the discharge path would no longer be in the circuit.

Because the output voltage is considerably higher than that allowed by the ratings of the oscillator tube, some means must be provided to reduce it to about 250 volts before it is applied to the tubes. A dropping resistor could be used, but this method is undesirable where an oscillator is concerned because when the tube is not drawing current (when the key is open, for example), there is no voltage drop through the resistor, and the voltage appearing at the plate of the oscillator tube soars up to the full supply voltage.

We chose a better way to do it, using voltage regulator tubes. They are made in 75-, 90-, 150- and 150-volt types, and two or more may be connected in series to produce a variety of combinations. Thus, by using a VR-105 in series with a VR-150, as shown in Fig. 1, we get what amounts to a regulator for 255 volts. There is, of course, a limit to the amount of current that can be drawn from a regulated supply using VR tubes. The maximum load current that can be handled is determined by the initial regulation of the supply. This is because it is necessary to use a resistor, $R_3$, in series with the VR tubes to limit the current flowing through them to the rated value of 30 ma. The higher the initial voltage, the larger the resistor must be. In general, the poorer the regulation of the supply to start with, the smaller the load current that can be regulated.

In the present case it is not possible to regulate both the oscillator plate voltage and the amplifier screen voltage because of the limiting factors discussed above. For that reason, the 255-volt output is used on the oscillator plate alone, and
Fig. 1 — Schematic diagram of a power supply designed for use by the Novice with the "Command" transmitter.

C1 — 2-pF, 1000-volt paper.*
R1, R3 — 68,000 ohms, 1 watt.
R4 — 10,000 ohms, 50 watts, with slider.
R5 — 10,000 ohms, 10 watts.
L1 — 10 henrys, 200 ma., 140 ohms (Motor C-3181).*
S1 — Single-pole single-throw toggle switch.
S2 — 2 poles, 2 to 5 positions, ceramic (Centralab 2505).
T1 — Replacement-type power transformer, 600 v. a.c. each side of center tap at 200 ma., 5 v. a.c. at 3 amp., 63 v. at 3 amp. (2 windings) (Stancor PC-6416 or Stancor P-6170).
* Values may be changed; see text.

A dropping resistor, R4, is used to obtain the 250 to 300 volts needed by the screens. Use of the dropping resistor is permissible here, whereas it was not in the case of the oscillator, because even though the screen voltage rises to the full supply voltage when the key is opened, it does not exceed the breakdown rating of the 1625s, nor does it reduce the frequency stability of the signal.

As a matter of operating convenience, a switch is provided to remove the d.c. supply voltages while leaving the filament and heater voltages applied. This switch, S3, is a double-pole ceramic wafer capable of withstanding the full supply voltage. The wiring to the switch is arranged so that with the knob turned fully counterclockwise, all d.c. voltages are removed from the output terminals. Turning the switch one position clockwise applies the oscillator voltage alone so that the oscillator may be tuned to resonance and adjusted for best keying before the amplifier is turned on. The third position brings both oscillator and amplifier voltages on, and is the position used for transmitting. The fourth position removes both oscillator and amplifier voltages at once. Thus, in operation, the switch is merely turned from Position 3 to Position 4 to turn the transmitter off after a transmission, returning to Position 3 when you want to transmit again.

Construction and Adjustment

The general layout of parts is shown in the photographs of the unit. In power supply construction it is permissible to let operating convenience and mechanical considerations determine the layout, because lead length is of small importance. You can rearrange the layout to fit your own circumstances if you like, and the result will still be the same. Adequate insulation must be provided, of course, but in many instances this is already taken care of by the construction of the components themselves.

As shown in the bottom view, the wiring is not complex. The only components mounted beneath the chassis are the switches, and the resistors. The bleeder resistance is made of two 1-watt resistors in series, and is connected right across the terminals of the filter condenser. The current limiting resistor, R3, is mounted across the bottom of the chassis on the mounting feet supplied with the resistor. Screen resistor R4 is mounted on the inside of the power output socket, which is a 5-prong tube socket. A 3-terminal tie point is mounted near the primary leads of the transformer for connection of S4, and a 2-terminal tie point is used to provide a junction point for the series-connected filament wires.

The wires from the transformer pass through the chassis in half-inch holes lined with rubber grommets to prevent the sharp edges from chafing through the insulation. A similar hole is used to bring the leads from the filter choke through the chassis.

After completing the wiring, check it thoroughly against the schematic diagram to make sure that it has been done correctly. It is then only necessary to set the sliding contact on R3 to the proper position before the supply can be used. Connect the transmitter to the supply before starting this adjustment. Before turning the supply on for the first time, set the slider on R3 about three-fourths of the way down from the end that is connected to S2. Don't clamp the slider too tightly or you may damage the fine wire used in the resistor. Just turn the screw enough to hold the slider in position. Now disconnect Pin 2 of the VR-105 from ground, and connect a d.c. milliammeter between Pin 2 and ground. The plus side of the meter should go to Pin 2, and the minus side to ground. The meter should be capable of reading at least 100 ma.

Set S2 to its extreme counterclockwise (off) position, and then turn S4 on. This applies power to the primary of the transformer and allows the filaments in both the supply and the transmitter to warm up. After a few seconds, turn S4 to the "OSC. ON" position. Make sure that the key of the transmitter is open, and then note the reading of the milliammeter that is connected in series with the VR tubes. If it reads more than 30 ma., turn the supply off. If it reads 30 ma. or less, close the transmitter key, and notice whether the VR tubes stop glowing. If they do, tune the
oscillator to make sure that it is functioning. If the oscillator is working and the VR tubes continue to glow, the slider is already set to the correct position, and no further adjustment is needed. If adjustment is needed, one of two things will happen. First, if the meter shows that the VR tubes are passing more than 30 mA, more resistance must be added to the limiting resistor. If it shows less than 30 mA, yet the VR tubes do not continue to glow when the key is closed, less resistance is called for. It is normal for the VR tubes to glow more brightly when the key is open than when it is closed, but they must remain aglow under both conditions if they are to do their job properly.

If you find that adjustment is needed, and you probably will, don't just grab your screwdriver and start moving the slider. You won't get very far, because you'll get a serious shock. Turn the a.c. switch, $S_1$, OFF. Then take an insulated screwdriver, place the blade against a good ground point on the chassis near the ungrounded side of the filter condenser, and then tip the shaft until it touches both ground and the condenser at the same time. No, don't ever rely on the bleeder in any power supply to discharge the filter condensers. Always ground the high-voltage first. If the bleeder has done its job, nothing will happen, but if the bleeder happens to have become disconnected, or is faulty, there will be a loud crack as the stored-up energy in the condenser discharges. It is a much nicer sound than that of a falling body, so pay heed, and always short the high-voltage to ground first.

Once you are sure that the filter condensers have been discharged, readjust the position of the slider until all of the conditions mentioned above are met, namely, that the VR tubes draw less than 30 mA, and that they glow whether the key be open or closed. Sometimes you have to look pretty closely to see the faint glow down inside the tubes, but as long as it is there, the circuit is working properly. Now you can apply the high voltage to the amplifier tubes and get the rig on the air. It may be necessary to make further readjustment of the slider on $R_3$ to compensate for the slight reduction in plate voltage that takes place when the amplifier stage is heavily loaded, but it should be a simple matter once the approximate setting is found.

A word now about parts substitution in this supply. There are not too many transformers listed in the regular catalogs that will do the job that the one shown can do. If, however, you want to use a different transformer, the same circuit arrangement can be used, provided that the proper filament voltages are obtainable. It is sometimes possible to series-connect a 5-volt filament winding and a 6.3-volt winding to obtain 11.3 volts for the filaments of the transmitter tubes. They will work on this voltage, but tube life may be reduced somewhat because the cathodes will not be operating at high enough temperature. You cannot do this with any 5-volt winding that is used to operate a filament-type rectifier, because the entire filament circuit would then have the high voltage on it.

The choke and condenser combination used in the supply as illustrated can be replaced with other units if desired. Just make sure that the combination you choose will serve to reduce the ripple percentage to 5 per cent or less. This can be determined from a chart appearing in the Handbook. Use the chart applicable to single-section, choke-input filters. It will tell you how much $C$ is required in conjunction with a given inductance to reduce the ripple to 5 per cent. For example, with a choke of 10 henrys, only 2 $\mu$F, is required to get down to the 5 per cent level, but with a 5-hy. choke, 4 $\mu$F, is required. In selecting the choke, pay attention to the current rating, the inductance, the d.c. resistance, and the voltage it is insulated to withstand. Making a choke handle more than rated current is bad from two viewpoints. First, the wire with which it is wound may be overheated, resulting in an eventual insulation breakdown. Of even greater importance is the fact that the more current a choke passes, the lower its inductance becomes. Thus, if overloaded, the inductance may fall below that needed to do a good job of filtering. The d.c. resistance is of importance only as one of the numerous factors influencing the voltage regulation obtainable from the supply. The voltage drop when current is passed through the choke, and therefore the poorer the regulation of the supply.

It does not pay to skimp on filter condensers in either quantity or quality. We've specified 1000-volt paper condensers for this unit, primarily because they will last indefinitely if operated below ratings. You could substitute electrolytic condensers, which are apt to be less expensive. Be sure, however, that they are rated to stand at least 750 volts, because when $S_2$ is turned off the voltage read from the junction of $L_2$ and $C_1$ to ground is 700 volts. When $S_2$ is turned to “OSC. ON,” the load presented by the current through the VR tubes causes the voltage at this point to fall to 500, and when the supply is delivering full load to the transmitter it drops to about 440.

If the supply is used with the “Command” transmitter, as a final check, measure the screen voltage applied to the 1625s. This must be done with the transmitter in full operation delivering power into a load. Any voltage between 250 and 300 will be satisfactory, but the closer to 300 the better. If it is much lower, it will be difficult to load the transmitter to full output. If screen voltage is too low, check the plate loading of the amplifier stage. Insufficient loading causes screen-grid current to be greater than normal, resulting in a greater voltage drop through $R_4$. If screen voltage is too high, increase the value of $R_4$ to about 12,000 ohms, and make the measurement again.

If the supply is used with some other transmitter, the value of $R_4$ should be changed to correspond to the correct value for the tube (or tubes) used in the transmitter.
QST Visits “Captain Stay-Put”

A Day with W2ZXM/MM

This is a story about an amateur you all know. Captain Henrik Kurt Carlsen, master of the Flying Enterprise . . . “Captain Stay-Put” . . . welcomed at Falmouth by admiring throngs . . . given an ovation at a press conference by 300 news and radio men . . . knighted by the King of Denmark . . . awarded the highest medal given a seaman — Lloyd’s Silver Medal . . . acclaimed with a thunderous ovation and ticker tape parade by the City of New York . . . reunited at last with his family at their home in Woodbridge, N. J. And through it all, the man never changed. When we arranged with Isbrandtsen Line officials to obtain an interview, the Captain, willing, little did we expect the warm reception he gave us at his modest home . . . the hospitable welcome from Mrs. Carlsen . . . the hot coffee and cake after the long drive from Connecticut . . . the QSO with W2ZXM from the mobile rig. We came for an hour — the Captain insisted we stay for the day.

Setting in his favorite easy chair, Captain Carlsen (“I’m Kurt to my ham friends”) told how an amateur radio operator can meet and conquer a communications emergency. Said W2ZXM, with a grin: “I never once considered myself in a serious spot as long as I had the radio working.” And the radio Kurt had working was one born out of the emergency situation he found himself in. But let’s recount the story as the Captain told it to us:

On Christmas Day, four days out of Hamburg bound for New York, Kurt sat down in his ham shack (off the Captain’s cabin) to his last ten-meter QSO for many days, a contact with W0YZO in St. Louis. After that contact, with the seas running high and the wind blowing at hurricane force, he went on the bridge to remain there for 75 straight hours.

On December 28th, with the USMS Golden Eagle standing off the now badly-damaged Flying Enterprise, Captain Carlsen ordered his passengers and crew to abandon ship. Seeing their rescue efforts, Carlsen went into the radio shack (port side), the ship already badly listing to port. The big commercial rig useless, the emergency diesels unable to operate because the list tilted the fuel tanks, he switched on the ship’s 50-watt battery-powered c.w. transmitter and worked the Golden Eagle. But Carlsen knew he could not remain in the ship’s regular radio shack long — knew that the batteries would not be good for lengthy communication. In his mind he had already worked out what he would do. “Stand by,” he radioed, then went into his ham shack on the starboard side. His homebuilt one-kilowatt amateur transmitter also useless, he dug out a five-watt Radiomarine transmitter purchased for a cabin cruiser his father-in-law built. But this rig was also inoperative as it was — ham ingenuity and skill had to be put to work. Raiding his ham shack junk box, Carlsen threw together an antenna tuner and erected a long wire on the deck of the ship.

W2ZXM liked to construct equipment. He had been hard at work on a push-push 807W transmitter from the Radio Amateur’s Handbook and QST. The rig was completed except for the wiring. This rig was to be the nucleus of an emergency-powered set and, fortunately, in the ham shack were six-volt storage batteries and an emer-
gency power supply all ready to test the new transmitter. Again the ham junk box was raided and a pair of battery clips hooked to a cable. The small commercial rig was now in business.

For his contemplated emergency set, Carlsten had planned on a ham-converted ARC-5 receiver. The 24-volt dynamotor had already been rewound to six-volt operation, and an audio stage added by his friend OZ5KP. Using this receiver operating in the 2-3 Mc. range, Carlsten tuned up the transmitter, went back to the c.w. rig and told the Golden Eagle to listen for him on 2738 ke. "Where in the — did you get that thing?" blurted forth from the ARC-5 speaker, after contact had been established.

But the elements which had already smashed his beam to the deck were still against him. The long wire blew down. Again typical amateur ingenuity stepped in. Kurt clipped the line cord from his broken desk lamp, twisted the ends together, hung the whole works on an out the porthole and was on again. It was necessary to prune the new antenna "but it finally loaded up beautifully."

"There is no doubt in my mind," said Captain Carlsten, "that it would have been a very ticklish proposition without the ham gear."

The little emergency rig lasted until the end. As we sat in the Carlsten living room, he played recordings of the radio contacts, commenting when his voice was heard: "Doesn't the modulation on the little rig sound good?" (Mrs. Carlsten handled the record player — Kurt quipped, "I don't have a license for it!'')

Throughout the entire 16 days of his ordeal his radio contacts were being recorded by many people, among them two close amateur friends, DL1SD of Hamburg and OZ5KP of Silkeborg, who relayed news to Carlsten's parents in Denmark. One British ham used up 450 feet of tape recording the transmissions.

Carlsten's only contact with humanity was via radio until Kenneth Daney, mate of the British salvage tug Turmoil, jumped aboard on January 4th. Said Daney, extending his hand, "Captain Carlsten, I presume. . . ."

Ham radio figured in another way aboard the Flying Enterprise. When Carlsten sailed from Hamburg, DL1SD and his XYL, DL1SM, gave him a Christmas wreath adorned with four candles in holders to brighten his cabin at the holiday season. They didn't realize then what cheer the wreath was to bring. On the fifth day alone, Captain Carlsten related, "the urge for something hot got so terrific" that he filled a can with water from his meager supply (five cups in 16 days) and using two candles from the wreath stuck in the mattress he bunked on, brewed a cup of tea "that was really something." We asked him how long it took for the water to get hot. He grinned and replied, "Try it sometime — your arms get plenty tired."

During the period aboard ship, Kurt carried on communication with escorting vessels. One of the Naval communication officers aboard the destroyer Keith turned out to be a ham and a short QSO resulted.

All of you know the heartbreaking story of the final days . . . with success so near the parting of the tow line . . . the new storm . . . the death of a gallant ship. Kurt maintained radio contact to the end, the receiver still on as he and Daney scrambled hand over hand up a rope to the cabin door above them, the ship on its side by then, the two of them actually standing on the bulkhead. The last message from the Keith ("Don't wait too long") went unanswered.

When Carlsten was safely aboard the Turmoil he pulled out his wallet. Despite the four minutes in the water, its contents were fairly dry and legible—including his amateur ticket.

Among those waiting in Falmouth was OZ5KP. And when the train from the port city puffed into London there was Scotland Yardman G6KC among the police officers assigned to guard the skipper from the admiring crowds and inquiring reporters.

When the ship went down in 40 fathoms she carried all of the Captain's amateur and personal gear. His station was one of the best-equipped afloat. As reported last month in QST, the main transmitter ran one kilowatt, a bandswitching 2- to 80-meter exciter driving a pair of 813s in the final. The rig, Kurt's first transmitter con-
Construction project as a licensed amateur, took six months to build during his spare time aboard ship; each unit of the transmitter was individually compartmentized. ("When I think of those coils on the bottom...") groans Kurt.) Much other equipment and tools went down, too.

As might be imagined, his personal loss was great. You know of the many offers he has turned down. We thumbed through letters and telegrams offering fabulous sums for commercializing his story. But Kurt Carlsen has earned the respect of the world, saying "I would not be able to live with my own conscience if I were to take one penny for doing my duty." Fellow hams have been donating money to replace his equipment. We told him of this action. You could literally see the gratitude swell in his chest. But Kurt, deeply appreciative of his fellow amateurs for their gesture, feels he cannot accept any donation. You have to meet this man to appreciate his feelings; we hope you will respect his wishes.

Kurt was licensed as W2ZXM in 1949, but his interest in radio goes back to his boyhood in Denmark where he built one- and two-tube receivers. His sea career included stints as an officer and radio operator aboard Danish ships but most of his construction experience and skill, he says, was gained after becoming interested in amateur radio.

Captain Carlsen told us that he had succeeded in catching up on most of his QSLing. An active operator, W2ZXM/MM was one of the best-known of the ten-meter 'phone signals. Sitting on his desk when disaster struck were nearly fifty QSL cards, stamped and ready to mail, confirming contacts made on the trip over to Germany. These, along with his card collection and logs, rest on the bottom of the North Atlantic.

Undaunted however, Captain Kurt says he will start over again. His new command, a faster and larger ship, especially pleases him because it already has a.c. aboard. The first maritime-mobile rig, now at the home station, will be put into shape and used again while he builds a new rig. Hans Isbrandtsen, owner of the company, has assured Captain Carlsen of a new Flying Enterprise; Captain Carlsen assures us of a new maritime-mobile W2ZXM. — H. P.

25 Years Ago

March, 1927

... Communications Manager F. E. Handy announces plans for a world-wide contact contest, an International Relay Party which will run for a two-week period in May.

... There are now 39 members on the WAC Club roster. From the U.S.R. we hear of some 30 transmitters in operation on amateur wavelengths.

... 2EB and 2NZ covered the 30-mile path between Jamaica and Twineck using a wavelength of 5.19 meters. 2EB and AGD, Bologna, Italy, are reported to have heard each other's five-meter signals.

... Twenty meters is rapidly becoming thickly populated and contacts are now easily made during the week as well as on Saturdays and Sundays.

... The relative merits of grid and plate detection are examined by Sewall Cabot. The author favors the grid detector for c.w. and plate detection for 'phonies.'

... Glenn H. Browning and Frederick H. Drake analyze tuned r.f. transformers in a mathematical and graphical presentation.

... "A Flexible Transmitter" by J. F. Marco, 9ZA, features a t.p.t.e. circuit for 20 through 160 meters using plug-in coils and the popular UX-210 tubes.

... Master oscillators and power amplifiers are treated in the fourth article of the series "How Our Tube Circuits Work" by Technical Editor Robert S. Kruse.

... Reception interference caused by industrial and domestic electrical appliances is discussed by Mr. Kruse.

... "Quartz Crystal Calibrator" by A. Cranley goes into the matter of frequency-standard equipment and oscillator circuits therefor.

... The Arizona gang favors using a very weak solution of borax in their rectifiers. According to 6BWS the danger of "creeping" is then negligible.

... 57U of Austin, Texas, 8AUL of Wheeling, W. Va., and Standard Frequency Station 9XL are described.

COMING A.R.R.L. CONVENTIONS
June 28th-29th—West Gulf Division, Corpus Christi, Texas

QST for
I.A.R.U. CALENDAR

In the December issue of the I.A.R.U. Calendar four societies are proposed for membership in the Union — the Deutscher Amateur Radio Club, representing Germany; the Guayaquil Radio Club, representing Ecuador; the Radio Society of Bermuda, representing Bermuda; and the Vereeniging voor Experimenteel Radio Onderzoek in de Nederlandse Antillen, representing the Netherlands Antilles. All of these societies are well-established groups, and their membership in the Union will do much to extend the good relations which already exist amongst radio amateurs throughout most of the civilized world.

Union Secretary Budlong reported on EARC to member-societies, with the substance of his report being covered editorially elsewhere in this issue of QST.

In 1951 the Headquarters of the Union issued a total of 681 WAC certificates, with 239 of these being for work done entirely by radio-telephone. In 1950 the comparable figures were 916 and 376. Twenty-eight of the special 3.5-Mc. endorsement stickers have been issued, one being for work entirely on 3.5-Mc. phone.

AUSTRALIA

The Wireless Institute of Australia is sponsoring an annual v.h.f. contest — the Ross A. Hull Memorial V.H.F. Trophy Contest — to inspire greater interest in this field of activity. The late Mr. Hull was for many years the editor of QST, and was a native of Melbourne, Australia. He was a prolific amateur experimenter, well-liked both in the United States and in the land of his birth, and this trophy is indeed a fitting tribute to his many contributions to the amateur v.h.f. field.

NETHERLANDS ANTILLES

Late in December the government of the Netherlands Antilles gave formal approval to amateur radio, and announced that examinations for amateur licenses would commence in January or February. At the same time it announced that the following frequencies would be available for use by its amateurs: 3520–3635, 3685–3800, 7020–7280, 14,020–14,330, 21,020–21,430, and 28,002–28,680 kc. In addition, these higher frequencies will be assigned: 50–54, 144–148, 220–225, 420–450, 1215–1300, 2300–2450, 3300–3500, 5650–5925, and 10,000–10,500 Mc. Maximum power input allowed below 29,680 kc. is 150 watts, with a limitation of 50 watts input above that frequency. There will be an examination fee equivalent to about $13.00 U. S. funds, and a yearly license fee of $25.00 U. S. funds.

The Federal Communications Commission still forbids U. S. amateur communication with hams in PJ-land, since the government of the Netherlands Antilles has not yet withdrawn its formal objection to amateur radio with the International Telecommunications Union. I.A.R.U. Headquarters has kept in close touch with the officers of the Netherlands Antilles amateur radio society and is making every effort to coordinate correspondence with the I.T.U. so that the FCC ban will be lifted as soon as possible.

The progress made by the amateurs in the Netherlands Antilles is excellent, and they deserve congratulations for the success of their long struggle to secure government recognition and approval. This achievement on the part of the PJ hams was indeed one of the high spots of international amateur radio in 1951.

VISITORS AT UNION HEADQUARTERS

During the past year the Headquarters was honored by visits from the following overseas hams: CM2AC, CM9AO/FG7X8, G3DKS, G5WI, DL7AF, HC2JR (president of the Ecuador society), HP1AW, HB9AW/FP8AW, HB9P (president of the Swiss society), LU3BAC (treasurer of the Argentine society), TA3GVU, V5L4V, V5SCQ, and ZE1AC. In each case a mutual exchange of ideas and information resulted, further strengthening I.A.R.U.'s bonds of friendship and cooperation. The Headquarters extends a cordial invitation to all amateurs to pay us a visit in West Hartford when visiting the United States.

ARGENTINA

On October 21, 1951, the Radio Club Argentino celebrated its 30th anniversary, with I.A.R.U.'s president Bailey sending a cable of congratulations on behalf of the Union. We know that all members join with the Headquarters in extending to the Radio Club Argentino best wishes for continued success.

QSL BUREAU CHANGES

The following address changes should be made to the list carried in the December issue of QST.

Greenland: Amateur Radio Station, APO 858, P.O. Box 50, New York, N. Y.
Guam: KG6H, P. O. Box 100, Anan, Guam, Marianas Islands
Southern Rhodesia: Box 2277, Salisbury
Sweden: SSA, Stockholm 4

March 1952
Some Simple Ways of Erecting Temporary and Semi-Permanent Antennas

BY RICHARD SILBERSTEIN,* W3JQB

The amateur who loves the wide open spaces (and who also loves ham radio to the extent that he must serve both masters when on a vacation trip) requires a simple means of erecting a temporary antenna. The same is true of the Field Day enthusiast, and a similar requirement exists for the unathletic urban or suburban ham who wants a good antenna without risking hide to get it.

Fairly constant, so the rock will begin to swing with increasingly greater amplitude of swinging arc. If the withdrawal is continued at a rapid enough rate (which is altogether too easy to achieve) the rock will do one of two things: If some lateral swing is present, it will wrap itself around the line leading up to the branch but, in the worst case, even without lateral motion, it will wrap itself completely around the branch several times. In this situation, further attempts to retrieve the rock yield only a broken line, leaving the rock as a sword of Damocles.

Experiences (culminating in the use of Fire Department facilities to render certain sidewalk free of overhead menace to innocent pedestrians) have convinced the writer that rocks or other objects on the ends of lines used for erecting antennas in civilized communities should always be light enough so as not to become a public menace if they choose to remain in a tree. Also, the type of line used should be such as to permit the object to coast down of its own weight. For instance, a light rock on a heavy string, if thrown so as to fall with just a few feet of string on the far side of a branch, might not be heavy enough to come down of its own weight, since it has to drag the whole weight of the string and overcome friction where the string runs over the branches.

In portable operation, where it is desirable to carry all the equipment in a suitcase, a rubber ball is a convenient and safe object for throwing. An inexpensive line can be made of button-and-carpet thread. Before throwing the ball or other

Brute Force

A method used in the past in some branches of the armed forces for erecting antennas in trees was to whirl and pitch a heavy metal slug attached to a line. Heights of 60 feet were claimed for the method. One advantage of the method is that the heavy slug can crash through places where lighter objects might become "hung up." However, the slug can also crash through the neighbors' windows, and if it does become hung up it is a perpetual menace to passers-by. The disadvantages of this method are shared by companion techniques from the elegant rod-and-reel to the lowly rock-on-a-string.

Incidentally, the process of an object tied to a line getting hung up on the branch of a tree is a graphic, if bitter, lesson in an important physical principle — the conservation of energy. It may be explained by assuming that the reader has tied a rock (or a chassis punch) to a string and has just succeeded in heaving it over the wrong branch. If the string is short enough that the rock does not touch the ground (assuming the other end of the string is held), the rock will swing like a pendulum pivoted on the branch, and the height of swing will be dependent upon the amount of kinetic energy stored in the object. If the reader now attempts to withdraw the line supporting the rock he will begin to shorten the pendulum arm. The kinetic energy will remain

* 3118 Legation St., N. W., Washington 15, D. C.
strong pull should be exerted on a chimney. The thread may be followed by a heavy cord for a temporary antenna support. Nylon cord, although very strong, has great affinity for small irregularities and crevices in branches when carrying any load and may be, in general, difficult to handle. With the ball and thread, heights of the order of 35 feet may easily be achieved by the average white-collar worker.

**Other Methods**

Frequently, it may be desirable to take full advantage of what nature has to offer in the way of altitude, the portability of the gear for erecting and securing the antenna being of only secondary consideration. For these cases the use of a bow and arrow is strongly recommended, since heights of 80 to 100 feet can be readily attained.

Bows are rated in the number of pounds pull at the maximum allowable draw, which is 26 inches for a large range of bows. The heaviest bows have a rating of the order of 65 pounds and, for the ham who is not expert in climbing but is otherwise possessed of physical strength, affords the maximum in height attainment. The author, being of slight stature, found that even after practice, which affords remarkable improvement in skill here as in other activities, a 28-pound bow represented about the heaviest he could nock (string) and draw. Another point is that the lighter bows exert a lighter strain on the potential user’s purse.

The use of lighter bows requires the use of lighter arrows and lines. This, however, is in keeping with safety requirements, since arrows have a way of remaining lodged in dense foliage, even when shot by a skilled archer. The arrows used by the author are 3/4-inch dowel sticks 26 inches long. A deep notch is sawed and filed into one end for the bow string and at one side toward that end the dowel is notched deeply with a knife for rapid fastening of the line. It was found that with the very light line to be described, “tail feathers” were required to keep the arrow from tumbling in flight. The tail assembly consists of three fins fashioned from Scotch tape and folded so that both sides of the fin are smooth. They are arranged so that each fin rises from the surface of the arrow shaft and extends back at an angle for about two inches.

An arrow as light as the one described must carry a very light, smooth line, because of the requirement that the arrow, like other objects used for carrying lines, be capable of pulling the line over a branch when the section of the line between the arrow and the branch is very short. At the same time the line must be strong enough to carry a heavier line without breaking, since in the next operation it will be used to pull over a heavier line. These requirements are met very nicely by size A nylon thread at the low cost of 5 cents for a 40-yard spool at any of a million different notions counters throughout the United States.

It was found that spreading the nylon thread on the ground was poor practice because of its tendency to snag on small irregularities and to pick up objects. The solution was to construct an open-sided reel by driving eight equally-spaced nails completely through a 1-inch board in a 4-inch diameter circle. The thread is wound onto this reel, the nails are pointed in the direction in which the slot is to be made and when the arrow is released the line plays off the open side of the reel. After a shot has been made in which the line falls over the desired spot, such as a particular limb of a tree, it is necessary to draw several successively heavier lines over the limb before the final antenna support is reached. The author followed the nylon thread by a button-and-carpet thread that was then used to pull over a length of packaging twine about 1/4 inch in diameter. This was then followed by a 3/8-inch Manila rope. It is often of advantage to follow the Manila rope by a short length of galvanized wire, to take most of the wear caused by the swaying of the limbs.

![Diagram](image)

"Misdirected Arrows in a Crowded Community Constitute a Hazard".

In passing from one diameter of line to the next heavier in dragging the lines over one or more limbs of a tree a smooth, gradual joint is essential. Again, our old friend, Scotch tape, comes to the rescue, being used over the knotted joints. If the job is done during a rainstorm it may fail if the tape becomes soaked. Some brands of cellulose tape are worse than others in this regard.

The joint between the 3/8-inch rope and the wire is the most difficult to make. To protect the rope from direct contact with the wire, an eyelet known in the hardware trade as a “thimble” may be used. Of course, the best way to secure the rope around the thimble is to interweave the end with the section of rope just ahead of the thimble, as the mariners do. However, most hams lack the time available to sailors on a long, uneventful voyage, so it is recommended that the end of the rope be brought around the thimble and back about a foot along the approaching length of rope, the two being lashed together rightly along their whole length by a continuous wrap of antenna wire.

(Continued on page 114)
50 Watts Output on Ten and Six

A Bandswitched Transmitter Using the New 6146

BY RICHARD M. SMITH,* WIIFTX

As time goes by, tube designers continue to make it easier and less expensive to build efficient v.h.f. transmitters. Not too many years ago it was considered something of an accomplishment to generate a few watts at 28 Mc., and it was, too, considering the tubes that were available. With the newer tubes, however, the job has been simplified greatly, and now it is no more difficult to build a rig for the 6-meter band than it is to make one for use at “eighty.”

For example, the newly-announced 6146, a low-drive tetrode for use at frequencies up to 175 Mc., when used in conjunction with the 5763, which has been with us only a couple of years, makes an ideal tube line-up for a 10- and 6-meter transmitter in the popular 50-watt output power classification. Operating well within its ratings, the 6146 can produce 50 watts output in these bands, and the 5763 is capable of delivering more than enough power for its modest drive requirements. The transmitter described below makes use of these tubes in a bandswitching unit that is simple to build and efficient in operation.

The Circuit

Circuitwise, as shown in Fig. 1, the transmitter resembles many low-frequency rigs, and the techniques involved in its construction will not be strange to anyone who has built low-frequency gear. A 5763 is used as the crystal oscillator in a popular modification of the Pierce circuit. The plate circuit of the oscillator tunes to harmonics of the crystal frequency, and is capacity-coupled to the grid of another 5763 which serves as frequency multiplier and driver. In both of these stages, sufficient tuning range is provided to eliminate the need for either plug-in coils or bandswitching. The oscillator plate circuit tunes from 14 to 30 Mc., permitting the use of 6-, 7-, or 8-Mc. crystals. The multiplier tank circuit covers from 28 to 54 Mc. Thus the stage may be used as a doubler for 10-meter output, or as a tripler for 50-Mc. operation. The tube performs well in either service, and supplies more than enough excitation for the grid of the 6146.

A potentiometer is used to adjust the screen-grid voltage of the driver stage so that close control may be exercised over the grid current flowing in the amplifier. This is of importance in any transmitter where there is apt to be an abundance of grid excitation available, because overdriving results in both excessive screen-grid current and increased harmonic output.

The plate circuit of the amplifier stage employs a novel bandswitching system that minimizes the number of r.f.-carrying circuits that must be switched to change bands. Two separate tank circuits are built around a split-stator condenser. One plate coil is connected across each half of the condenser, and the desired one is selected by a ceramic wafer switch. This system has the advantage that the tank currents do not have to flow through the switch contacts.

Because most operators use separate beam antennas for each v.h.f. band, separate output circuits are used, each designed to couple power into a 52-ohm resistive load through coaxial

* Technical Assistant, QST.
Fig. 1 — Schematic diagram of a bandswitching transmitter for the 10- and 6-meter bands.

C1 — 10-μfd. mica.
C2, C6, C20 — 100-μfd. mica.
C3, C5, C7, C8, C11, C13, C16, C17, C18, C19 — 0.001-μfd. disk ceramic.
C4, C5, — 100-μfd. variable (Millen 22100).
C12 — 25-μfd. per-section variable (Millen 23925).

Two stator plates and three rotor plates are removed to form C12, while Cr15 requires no modification.

C12 — 0.001 μfd., 1200 volts working.
C14 — 220-μfd. mica, 1200 volts working.
R1 — 68,000 ohms, 1/2 watt.
R2 — 22,000 ohms, 1 watt.
R3, R4, R5, R6 — 100 ohms, 1/2 watt.
R7, R8 — 33,000 ohms, 1 watt.
R9 — 50,000-ohm wire-wound potentiometer, 4 watts.
R10, R11 — 15,000 ohms, 10 watts.

L1 — 10 turns No. 18 wire, 5/8-inch diam., 1/4 inch long. Approx. 0.57 μh. (B & W Miniductor No. 1010).
L2 — 3 turns No. 18 wire, 5/8-inch diam., 1/4 inch long. Approx. 0.18 μh. (B & W Miniductor No. 1010).
L3 — 5 turns No. 18 wire, Linc cord, 5/8 inch long. Approx. 0.21 μh. (B & W Miniductor No. 1015).

The oscillator circuit and the driver are enclosed within a shield box to prevent radiation of harmonies from the transmitter itself, and all power leads are filtered to prevent them from acting as antennas for the harmonic energy.

Construction

The transmitter has two major assemblies, as shown in the photographs. The first, a 6 × 17 × 3-inch aluminum chassis, contains all parts used in the oscillator and driver stages. The second is a bracket holding the amplifier tube, the bandswitch, and the amplifier tank circuit. This bracket (see Fig. 2) is bolted to the top of the chassis inside the 6 × 9 × 8-inch aluminum utility box which serves as a shield enclosure.

1 Grammer, “By-Passing for Harmonic Reduction,” QST, April, 1951.

The oscillator tube socket is placed in the center of the chassis 4 inches in from the left. The driver tube socket is 1 3/4 inches back from the front edge and 7 3/4 inches from the left. Placement of the driving condensers for the first two stages is shown in the bottom view, with the oscillator condenser mounted on a small aluminum bracket, with its rotor shaft insulated from ground and brought to the panel through an insulated coupling. The multiplier tuning condenser is mounted right on the front of the chassis. Its rotor shaft passes through a 3/8-inch clearance hole in the panel to insulate it from ground. An insulated tuning knob (Millen 10007) with a recessed set screw must be used on this condenser.

Placement of other parts in the first two stages is shown in the photographs, and is not critical except that the coils should be mounted so that they are as far away from the chassis as possible. Coupling condenser C310, which goes from the
plate circuit of the driver to the grid of the amplifier tube, passes through the chassis in a 1/2-inch grommet-lined hole visible adjacent to the tuning condenser.

In the bracket assembly which holds the amplifier circuit, the rotor shaft of the tuning condenser must be insulated from ground. It passes through a 3/4-inch clearance hole. The rotor connector also passes through a clearance hole to contact one side of plate by-pass condenser, C13, which is bolted flat against the side of the bracket. All r.f. grounds are returned to the same side of this bracket, and are made by connecting the by-pass condensers to the nearest ground point.

Bandwitch S2 uses one of the new heavy-duty ceramic units, and is made up to fit the requirements of the circuit from standard parts. The switch section is spaced 3 inches behind the de-tent assembly so that the contacts are close to the rear of the tuning condenser.

The 6-meter tank coil is soldered across the rear of the plate tuning condenser, with the 10-meter coil at right angles to it. The “ground” ends of both coils are soldered to the rear rotor connection on the tuning condenser. The output links are made from smaller diameter B & W Miniductor so that they can be slipped inside the tank coils and moved to the position that affords the desired degree of coupling. Once this has been determined, the links are cemented in position. Parasitic suppressing choke RFC4 is connected between the plate cap of the tube and the rotary arm of S2.

Both plate r.f. choke RFC6 and grid choke RFC5 are supported on the rear of the bracket by a small insulated tie-point slipped under one of the mounting screws that hold the tuning condenser. The chokes should be separated as much as possible and should be placed at right angles to each other.

Meter switching is incorporated in the design to permit observation of the plate current of each stage and the grid current of the amplifier. We used a 0–50 ma. meter, and wound a shunt to extend its range to 250 ma. for reading plate current in the amplifier stage. The shunt is wound from fine wire around a small resistor, R11, and is mounted on the rear of the meter switch.

![Diagram of the bracket used as the foundation for the amplifier circuit. The bracket is bolted to the top of the chassis in the position shown in the photographs.](image)

Shielded wire (Belden 8885) is used for all d.c. leads and the heater wiring, and by-pass condensers C14, C15, C16 and C19 are placed right at the input terminals as shown in the photograph. The harmonic-filtering condenser for the plate supply lead, C14, must be rated to withstand the applied d.c. voltage and the audio voltage if the transmitter is to be plate-modulated. It is shown mounted between the high-voltage safety terminal and a metal spacer bolted to the chassis.

**Adjustment and Operation**

Adjustment consists merely of making sure that the tuning range of the oscillator and driver coils is sufficient to permit full coverage of the desired bands, and in determining that there is adequate grid current for the final amplifier. With 250 volts applied to the plates of the 5763s, at least 5 ma. grid current should be obtained with the excitation control turned fully clockwise. This is considerably more than is required by the amplifier, which seems to operate best with about 2 ma. current through the 33,000-ohm grid resistor. More current than this merely results in excessive screen current, which not only can reduce output, but may also damage the tube. Plate current in the oscillator stage will run about 20 to 25 ma., with a 250-volt supply, while the driver will take somewhat less, depending, of course, upon the setting of the excitation control.

After checking the low-power stages, plate and screen supply voltages may be applied to the

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▶ A close-up view of the interior of the shield box, showing the mounting bracket detailed in Fig. 2, the mounting of the tank coils, and placement of the bandswitch with relation to the amplifier tube. Note that the plate by-pass condenser is mounted on the panel side of the bracket, along with the plate and grid r.f. chokes. In this view, the 6-meter tank coil is at the top of the picture, with the 10-meter coil to the right. The link coils are slipped inside the tank coils and cemented in place after adjustment.

▶ QST for
amplifier tube. Off-resonance plate current in the amplifier will probably be well in excess of 175 ma., so caution should be exercised to avoid leaving the plate circuit detuned for more than a few seconds. At resonance, plate current should dip to a very low value, about 10 ma. Again, do not allow this condition to exist for more than a short time, because, like other screen-grid tubes, this one will draw excessive screen current when operated without plate load.

It is suggested that an initial check of the amplifier screen-grid current be made to be sure that it is within the tube ratings. The maximum permissible screen-grid dissipation in plate-modulated 'phone service is two watts. This figure will be exceeded if the amplifier is overdriven, or if it is operated with insufficient plate load. Measure the d.c. screen voltage at the screen end of $R_{an}$ and compute the screen current by the voltage drop appearing across the resistor. From these data the screen dissipation can be obtained. If grid current is normal, yet the screen dissipation is still too high, increase the plate loading by moving the link winding inside the plate tank coil, and then check the conditions in the screen-grid circuit again.

In plate-modulated 'phone service the 6146 may be operated at 600 volts and 112.5 ma., or 67.5 watts input. For c.w. or narrow-band f.m., plate voltage may be increased to 750 volts, and plate current to 120 ma., or 90 watts input. These ratings apply to frequencies up to 60 Mc. In regions where TVI is a possibility, a low-pass filter should be connected between the output terminal and the antenna coupler, and the bottom of the chassis should be closed with a tight-fitting aluminum plate. If a filter is to be used for 6-meter operation, be sure that its cut-off frequency is higher than the operating frequency!

If you desire to use a balanced output line instead of the coaxial arrangement shown, 300-ohm Twin-Lead may be used, with ceramic crystal sockets replacing the coaxial output jacks. When working into the higher-impedance line, the size of output coils $L_1$ and $L_2$ can be a turn or so smaller than those specified in the parts list, which are designed for optimum transfer of power into 52-ohm loads.

The below-decks wiring makes extensive use of shielded cable to reduce the possibility of TVI, and is uncluttered because parts are not crowded for space inside the 6 x 17 x 3-inch chassis. In this view, the oscillator circuits are at the left, the driver stage in the center, and the meter switch and heater transformer at the right. By-pass condensers filtering all power leads are visible adjacent to the power terminals.
How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD/1

How:

The 'phone division of the 18th Annual ARRL DX Competition is now over the dam but the c.w. session is upon us.

Rugged individualists who manage to get full time in using both mediums should perhaps receive some kind of award of their own, win or lose. Or, even more appropriate, how about a toast dedicated to some really rugged station installations? (Jeeves suggests slugs of coffee spiked with benzedrine.)

Anyway, it's not over yet. Take inventory of your remaining 866 spaces, grab your keys, and dig in!

What:

Roses are red, and violets are blue, "Twentynine is punks but that's nothing new.

— Anon.

But let's not be bitter. VE3CCK isn't. AG2AG (14.008), EA6AD (089), EK1AR (027), CR5AD (074), FF88S AF (040), AG9A (P0UJLJ (028), W3QRPA (020), 9Z1KD (775) on phone raised with c.w. INNU/Trieste (060), VK9s GW (066), XJ (100), VQ6 2GW (035), QG (150), 4AO (050), 4HTP (048), ZS8B E (047), Q (030), C3TA A (040) and 9S4AD (070) heard. "Things have been pretty full with most constant signals coming from Japan, etc. in the early evening around 6 p.m. EST," says WSUPN. Novelt spreaded with K5E6O (070), JAS 7SS (088), 8AB (058), OX3EL (053), VU2NB (110), ZE4JC (053), VQ1RF, SP3PAF (020) and KT1LM (073). "VQ6AB (058), YO3RD (000), 4X4DE (070) and an FF8 furnished c.w. practice for XE1AIG. FL1BC (075) got away. W3QH2H took time off from 80 to grab HRIKS, VE6AG (080), SP3PF, VP3YN (081) and TF3SG (077). "DL4LQ notes LZ1KAB on the low edge regularly with a T6 chirpy note. The guy sticks to certain-country QSOs, though ... W3MTF is getting his share: FO8AB (050), LQ5K (050), VE6CW (150) and some FF8s. Russ still pursues KB6AQ (060), ST1GC (030), ZD4BH (000) and one ZAIA (050). AP4A (050-035), HZ1AR and XZ2EM put good signals into Elizabethtown each week end."

For one of his first DX QSOs W3HEV (ex-W9HVE) picked a dilly. One ZD7AR (026) was raised. "After 32 years in this racket, I worked three new ones in a week," writes W2GZV. Those included EA0AB and VK0XX ...

... didn't pay rent.

... reads a cutting remark from W0NN. (We should guard his feeder for that one, Jeeves.) Bob needs QSLs from ZM6AK, VQ2GW, HS9L, HIY1AT and FJ7GA to clinch his DXCC. Ron happy. W3AGB thinks the T79KAA he heard was a WZ. Bill added VK1BS (051), MP4BRD (084) on almost daily around 8:30 a.m. EST, OY3IGO (035-085 drift) EA8s AB (115) and AD. He also hears people calling an AG4YN whose reassembly would seem quite unlikely ...

... QSLs. VQ1RF, W3ERJ, ZE6D1T, VP3AM and VE2DB in the Leewards, F'D8AB, VP3AP and some VE9s full victim to W8SYC. Clint's latest QSLs: VK0NR, CP6SEK, ZD6JL, MP4KA6, FO86s AC, AG and EC. He wonders where his VP3PL, VP5RH, UP2EBC, AC4RF, ZP8VL and ZD6AB pasteboards are ...

... W4KE's bookkeeping and QSLing for the Sweepstakes held his DX down to VG4RF, ZF4JG and CR5AD; W2ABM adds ZS3MI, SP9KKA, ZC3A (050), KE4IJ, ZL2, VP5KL and E9AB.

W4VE reached 140 with some help from VQ4FCA (062).

Fo8aK (040), IS1IFC (070), Q0S5P (020), G2CFZC (010), SY9FWY (100), EZ1HZ (055), CT2BO (040), EA6AM (090), FO84AA (030), ZD4BH (026) and 9S4AAX (014). On Ben's sked list are AP2N (050), KGM6X (070), MC1WN (065), VK1BS (035), ET3R (080), G93D8M (055), ZD8 1SD (085), YAB (085), 8CR7 (085), Z5ON (014), VU2SA AC (040), JG4V (060), VE6C0 (070) and F88AB (035). "From the Northern California DX Club's DXer we list UB9KAA (097), ZB2L (031), MP4KAE (042), VP681 (048), VQ4KRF (020), ZD1AJ (090) and F88AF (037).

... in SW4AP (070) in the Yemen, VP0B (110), FNS8AD (103), FLSAE (030), MI3AB (020), L2IARF (050), YL1SECU (118), ZA1AB (020), ST2GL (025), ZD4BH (025), ZD2FBBF (030), VP3BF on T. & C. (080) and HZ1AR (075) show up in the Southern California DX Club's DX Bulletin.

... The West Gulf Division DX Club DX Bulletin fills us in on (mornings) FJ9W/FC (077), FQV/FQV/FC (093), F9JD/FC (060), FR7ZA (022), FG8A8 (010), FG8s AB (080), AC (150), FO84E (042), G3s G3G (028), F8M (090), GQ6 (055), G3Q KML (090), HPF (060), KLM0A0/ K56 (050), ST1CW (050), IS1CNQ (060), AP2K, 4UA (319) in Pakistan, 4U4AJ (038) of Kafrin, HBIHY (023), L2IIR (070), VK1WO (081), VE6B0 (110), VS6V (040), FG (040), RA (089), VP1LA (100), VP2KEM (055) in the Leewards, VP3FD (109), VQ3s JTW (047), R9G (029), SP6XA (100), JY1AY, MD5JS (036), MD2DW/MD5 (065), MC1SD (060), ZB1HC (025), ZB1AJX (052), ZC4A KH (015), ZP3 (037), ZD4s JL (034), HRI (056), ZC4A KML (090), HPF (060), KLM0A0/K56 (050), D (050) and ZS8MK; (evenings) FY7YC (027), FM7WP (023), F8SFP (016), F8BAM (020), KX6ZA (065), KH6QY/KC6 (100), LB6D (020), VP8s AS (038), AT (060), AU (071), ZSEE (020), ZC4A KH (015), ZD4s (101), 1BS (072), 2DCP (021), ZJB (017), XZ2FK (020) and HZ1AA (017). Moral seems to be: Get Up Early!

"Twentynine is still worth a shout or two. W2APU understands ZS3MI to be on regularly Monday through Saturday (1418-1500). Best way not to work ZS3MI is to climb on his frequency. Charles adds VK1NL (145) of Heard Isle, CR4AC (140), CS3AC (350) and HZ2ALLA (170) ... MJ5IE (322), MP4KAE (302), HZ1TA (310), F8BBB (314), CR4AF (307), VJ4DT (140) and YU1AG (150) answered XE6WAC ...

DL4LQ rounded up G1DUB, V57TC, SU1AS, MP4s KAC (200), KAW, VE8CB (310), TA3AA, LJ2B, EA6AR,
VIBZ, SV35 WP, WB, TTESTP and VK1AWL.

At W20WP we find MDZIB (392), CN890 (399), TRBK of Guatemala (170) and VP2PE in the Windwards (180). As activity ascertainment by W5KUC’s DX Bulletin devotes: CR6 6AL (340), 6AV (360), 6BC (200), 7AH (349), 7BP (309), 7DP (207), 7SE (192), 7XIN (298), 7WV (208), 9CM (373), ZD4AK (115), ZP1W (390), ZS6S Q, Z (315), ELJS 5A (331), 9A (345), VQ8s 2D7 (384), 2GW (305), 3CP (375), 4A5 (299), 4AX (146), 4V6 (320), SAU (156), 8AL (156), HFIADL (155), HFIWF (150), HFIWZ (310), HF1A (296), HF3AB (398), HF7XQ (394), MT2KL (339), MPtt4s KAD (153), MPtt4s (364), EA8s AP (380), AX (180), IT1BXX (345), VFS 2LE of the Windwars (209), ZAF in the Leewards (180), SAP (105), VK1s BP (338), ZC (390), 2E1JX (317), ZK2AA (167), FB5BR (314), FB5AS (118), F6QAI (320), G0Dz FYR (147), RF (367), VR2CQ (351), VU7s HB (140), CN (302), CQ (270), RS (130), XD (165), E66HF (175), YV7s 2Q9 (900), DW (183), DK (90), LV (77), XJ (158), ZQ5G (158), OX3MW (355), 4X6s AF (327), AS (380), DR (175), RE (368) and ZB1JX (333).

Violets are blue and roses are red;
Forty will open when we’ve gone to bed.

**VQ1**

We can do without any more of that. W20WP wasn’t caught napping, anyway; ZK1AZ (7029), PSSPA (011), VU7C 6CR (030), 9X0EY/EC (102). ... W3DLH and VE6CC caught Ta3EFA (073). The latter helped V532CC to a WAC in two hours, 17 minutes. ... W9NTQ lifted YU1AN0 (012) and W62Q raised YV20WB0 into VP4AA/AM operating from a plane over Bermuda. W9YGR adds VP5BH (005) of the Caymanas. ... KE6MA (040), YU3FMC (015), FA9DA (005) and VQ4JHP (021) QSLs are awaited by WH9UZ. ... W3JQ AK mentions Z6NA, 8SG and QH9NQG, while W4QGQ1U5 raises VP2OZ (001) and KZSP5 ‘way up on 7288 kc.

‘Thirty watts at W5EXZ knocks off Oceania and Europe conveniently as well as T2PZ (007) and QSS4O (019).’ JPM is curious about X553B (024). ... W5E0QJ is on 1339, and K26AD/KW6 is thinking of having a rest. ... SWL Eric Trebicloch, Victoria, Australia, tells W1AW (Chas) of hearing the long-path signs of W1s AW and WA, W2s CQ and GUM WZ, W5s GMA and W4VE during last year’s SS. Nice DX.

**VQ2**

Eighty has its ups and downs as usual; you have to be lucky enough to be in on the ups. Novice WN4UGD already has ten countries on the band. F8BQG, KX4AA and H1PAFK, with the others. ... WQG2HW spoilt ON4AO (3502), PA0OFYXZ (22), CT2BO (49) and K64AF (025). Howy needs just about ten more countries for 100 on eighty. ... VPSAP in South Orkneys (13) has been working Europeans. ... W4DRR 2455 has the following info for W1RWS: W5Y6T (10) was worked by P2s 2AJ, 7WS and G5DO. W5Y6G has heard W4RWB; Ws 2QELF, 6ZAT and 8BKP have heard W3VT. A W7T call was imminent, W4DRR raised W4QCM and OZ6X (006), while VE1JJ scored on F8S6P (12) and OX3EL (20). New 80-meter stuff rumored active: V0KKK, VK2CQ and ZK1AX (07). ... W6ZOL made the grade with Gs ZPL (28), ZBY (44), F8BQG, ZL4J (03) and Q0BNF (15). W22WP has AF1R (96) and we hear that VE4CM worked South America for his 3.5-Mc, WAC. ... Fourteen watts got KG4AD for W9OES who says he also heard ZK1AC (06) working a W7.

On the phone, the West Gulf gang and W5KUC hear of TG9AD (3602), YN4CB, K25PC, ZEX2W, WPSW (3802), HR1BG (3850), ZS6DW (3920), ZL6s FM (3802) and FS (3802). ... W4QCM says VPSFR (3795) and KX4Z (3790) are handy.

We’ll have to quit dithering for ten so much. This band is picking up. W2AEZ and Z2ZVS are at it again. The former captured Ta2EFA, VQS 2N8, 3P8D, Z69s G, M. ZD9s 18W, 3F7, Z5s 2LZ, 2LT and 4AJ, W22ZV met OZ5s CW, GA, CRs 4AE, TAD, T9G5U, LHI1OH, ZP4FBB, MD2AM, PZ1D and HCS6G. ... YL W4TAV was in on some European openings which aren’t to be missed at these lean days; also OQ6s CC, CJ, an MD2 and a ZS3. ... The foreground was all phones. On e.w., W2Q1HH hit F8SAG (2830), W4TAV nailed F8FAC and W4KE worked KW6AR. W4TWN works Europeans now and then on the low edges. ... More phones from W5KUC & CR3 (150), PZ1RM, R4GA (242), G2CILS, GCS6AK (320), VP2GZ (250) of the Windwars, ZK2AA (300), ZD4BF (325), ZE1JE (110), PZ1RM, OQ5BQ (110) and 3V8AX (200).

One-sixty deserves a poeeful eulogy of some kind but it can very well speak for itself. The “pond” has been crossed quite regularly during the DX Teste on this band. W1BB worked C2A, 2L4, 6DJ and 6XM dm (0WZW and KV4AA during the wee hours of January 20th. ... WILYV raised G2PL, 3DFY, 6BQ and GW2ZV on this date. Larry also swapped reports with an EKI whose call he’s not positive of. Other Europeans worked earlier at 3W8VZ were WK5R, 03A CO1, EEH and PE. ... Some of the participants on our side were Was BB EFC EFN LVY SS, W2s BFA TKE, W3OKU, W9s CVQH NE and W4NWX (ex-W4NN). ... ZL1AJ is still on 160 at 7:45 a.m. EST using 19005 kc.

**Where**

The “preliminary” QSL bureaus set up by the PJ gang: Curacao — F. Funnemel, St. Laurent T-24-1, Curacao, N.W.I.; Aruba — S. J. Hooeings, Post Box 80, San Nicolas, Aruba, N.W.I. The W ban for PJ QSOs is still on at this writing but you can file this info for the future. ... The corrected bureau address for Sweden is: SKA, Stockholm 4, Sweden.

A23AE Amateur Station Custodian, 2nd Bn. 351st Inf. Regt., APO 209, QM, Postmaster, New York, N. Y.

A23AF E. R. Horwinski, DAC, Bq., TRUST TI&E Section, APO 209, QM, Postmaster, New York, N. Y.

C86A0 Jorge Barboza, Box 1227, Luanda, Angola

C86AF Jose Pires Antas, Oficina Navais, Maceo, Angola


EL9A A. H. LeMere, FFA, Roberts Field, Liberia

F7AU Maj. Fred Powell, 0-16439776, SHAPE (ALFCE) APO 11, QM, Postmaster, New York, N. Y.

F88AJ Box 239, Damako, F. W. A.

F16BC G. Besseid, Box 353, Djibouti, French Somali-land

ex-FQ8AC Jean Moyon, Tit rue H. Barbuus, Nantes, France

ex-H1FPA QSL to (W32ZP)
Tel-Aviv's IXAAG is consistently worked on 14-Mc. phone and c.w. A pair of 807's modulate 807's at 120 watts. Dipole antennas are used. Operator A. Kachioff (shown) now studies at the University of Miami but IXAAG is kept active by his brother, also an amateur.

The boys send their best wishes to the WVE gang and state they'll duplicate lost QSLs if contacted at the address listed in "Where." Watch for them bearing a jointly-held F call. ... Old OX3GG is now OX3BI and is still having little luck in obtaining printed QSL stock. Frank is anxious to clean up the backlog and will do so as quickly as possible. ... VQ42RR bumped into a Mr. Hawkins who, it turned out, was one of the members of the Pahg Jln party of the ill-fated globe-trotting Chinese junk (Oct., 1959, QST). Small world. ... Could we persuade IP8AC to try a little Field Day work? He tells W6AM he is but three miles from Rio de Oro. GM3CSM would like it published that he is not the Ian Hamilton involved in the "Stone of Destiny" episode of last year. He's been getting much mail from folks under the wrong impression. ... Notes from the 'phone archives of W2APU: The previous operator of ZS2MI didn't bother to keep a log; hence, no QSLs. The present operator, aided and encouraged by W9RBI, W1NWO, W2APU, ZS6BW, ZS6KD and others, will see that things are done properly this time. He will transmit his log by radio to ZS6BW who has tackled the ham's share of the work. Only contacts made since November 18, 1951, can be verified as no log exists for previous ZS2MI QSOs. Strange enough, ZS2MI seems to prefer operation within the confines of the U. S. phone band ... FTAT, of 3A2AG and PX1AR, has returned to the States (California) for reassembly ... B3A8W (ex-EA8CO) has been given the call B6DRC for contemplated operation in IJi and Rio de Oro ... TI2s RC and RU with other associates intend a trip to Cocos Island (TI9) sometime in March ... CN8CS (ex-4Q8SN) may find himself an FT7 before long. He prefers 'phone and he does QSL. His call may be FY7SN. ... Could there be some ethical way to increase VQ5AL's interest in working W 'phones? ... W2APU could use tracing data on ex-MP4BAB. Any help?

Tidbits: 
P565N tells us by way of letters to W5FNA, W6RIL and W1IKE that the complete officially-recognized status of amateur radio in the Netherlands Antilles is but a step away. This should be instrumental in removing the FCC ban on the working of PA6 now in effect. Included among the tentative regulations for PA amateurs: bands from 3.5 to 10,500 Mc.; powers of 150 watts input below 50 Mc. and 50 watts above; bandwidths of 10 kc. for a.m. and 30 kc. for f.m.; D4JLA is heading back home to Massachusetts. John has collected ex-PACX, PX1AX, D4JLA and D2TSA during his travels. ... A line from W2MNH: "During my visit to Germany last September I met several [DL] hams and enjoyed many happy hours with them. ... I also got quite some help from them during my travels there." ... Illness in his family, rebuilding and work around the house curtailed W2HAA's DXing. What a time to remain stuck at 99 confirmations! ... We hear from Lc. Cdr. Sturkey in Turkey where he has TAE2FA on the air. He has held U.S. call W2ZQ, W3EFA, W4COWD and W8TNA. TAE2FA has been hitting 10 'phone and 40 c.w. He has difficulty working into W6 and W7 on ten with his 250-watt n.f.m. rig and 3-element rotary. ... Jean and Jack of FQ8AC are now spending a six-month holiday in Paris. I'll settle for six hours, Boss. - - - Joves. (Bah. The only French you know, Joves, is par avion.) The boys send their best wishes to the WVE gang and state they'll duplicate lost QSLs if contacted at the address listed in "Where." Watch for them bearing a jointly-held F call. ... Old OX3GG is now OX3BI and is still having little luck in obtaining printed QSL stock. Frank is anxious to clean up the backlog and will do so as quickly as possible. ... VQ42RR bumped into a Mr. Hawkins who, it turned out, was one of the members of the Pahg Jln party of the ill-fated globe-trotting Chinese junk (Oct., 1959, QST). Small world. ... Could we persuade IP8AC to try a little Field Day work? He tells W6AM he is but three miles from Rio de Oro. GM3CSM would like it published that he is not the Ian Hamilton involved in the "Stone of Destiny" episode of last year. He's been getting much mail from folks under the wrong impression. ... Notes from the 'phone archives of W2APU: The previous operator of ZS2MI didn't bother to keep a log; hence, no QSLs. The present operator, aided and encouraged by W9RBI, W1NWO, W2APU, ZS6BW, ZS6KD and others, will see that things are done properly this time. He will transmit his log by radio to ZS6BW who has tackled the ham's share of the work. Only contacts made since November 18, 1951, can be verified as no log exists for previous ZS2MI QSOs. Strange enough, ZS2MI seems to prefer operation within the confines of the U. S. phone band ... FTAT, of 3A2AG and PX1AR, has returned to the States (California) for reassembly ... B3A8W (ex-EA8CO) has been given the call B6DRC for contemplated operation in IJi and Rio de Oro ... TI2s RC and RU with other associates intend a trip to Cocos Island (TI9) sometime in March ... CN8CS (ex-4Q8SN) may find himself an FT7 before long. He prefers 'phone and he does QSL. His call may be FY7SN. ... Could there be some ethical way to increase VQ5AL's interest in working W 'phones? ... W2APU could use tracing data on ex-MP4BAB. Any help?

X61AC paid West Hartford a visit and has Joves all het up about the $80,000,000 pirate treasure known to be buried somewhere on TI9. He's now cooking up a mine detector with a 304TL final.

These Victorian hams you very well may have worked are VK3s KE, FO, ED, and DY. VK3D7Y is secretary of the Victoria division of the Wireless Institute of Australia. (Photo courtesy W5AGB)

QST for
Judging by reports from the v.h.f. activity centers, the 5th Annual V.I.F. Sweepstakes was the best on record, yet there were considerable areas from which no sign of activity was reported. Apparently the result of the combined impetus of scores of WNs and the organization for civil defense communication, the number of 2-meter calls was swelled in many urban localities, and at least one 144-Mc. operator rolled up over 200 different stations worked.

Use of 50 Mc. was down in comparison to the summer parties, probably because no DX breaks came along to make that band pay off the way it does when openings swell the totals. Reports of propagation conditions vary widely. From the West Coast comes the comment that it was the "best contest yet, but under the worst conditions!" The Middle West got no great help from the weatherman, but east of the Great Lakes a fairly good inversion developed Sunday afternoon and got better as time went on. In the last hours of the party the W1s, 2s and 3s were adding new contacts and section multipliers right up to the closing gun.

Tabulation of the final results takes a bit of time in a contest of this magnitude, particularly where club scores are involved, so no final picture can be given at this time. Some highlights are visible, however, from a quick look at the nearly 300 reports already on file. W2NLY's 211 contacts in 9 sections for a score of 3700 points looks like a good candidate for top honors, though we know that Jim was getting plenty of competition that may show up when all the club reports are in. There was a hot time in Western New York and Ontario, as evidenced by 91 contacts by W2OWQ, Niagara Falls, and the same number for VE3AIB, Toronto. Both had 4 sections, for identical scores.

There was a surprising turnout on 144 Mc. in Ohio, Indiana and Illinois. W8LDP had 66 contacts in 5 sections for 660 points, and W9PK 53 in 5 for 530. Particularly around Dayton, Ohio, where scores of 2-meter rigs have been built for c.d. work, was the activity many times that of previous contests.

Out on the West Coast, W6MIF has the high in the San Francisco section so far, with 83 contacts in 4 sections. W6LOZ/6 caught 106 in 5 sections, for the best Santa Clara Valley entry received to date. There were all too few entries from W4, W7 and W8, however; these being areas that depend largely on DX breaks for v.h.f. interest.

2-Meter Standings

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<td>12</td>
<td>5</td>
<td>350</td>
<td>500</td>
<td>6</td>
</tr>
<tr>
<td>W1KV</td>
<td>12</td>
<td>5</td>
<td>350</td>
<td>500</td>
<td>6</td>
</tr>
<tr>
<td>W1KL</td>
<td>12</td>
<td>4</td>
<td>500</td>
<td>500</td>
<td>6</td>
</tr>
</tbody>
</table>

Proof that the Novice Class license is becoming a major activity-building factor in 2-meter work in the more populous areas is obvious when we examine the contest reports for WN calls. An incomplete tabulation of the first 150 reports

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received shows 14 WN1, 55 WN2, 12 WN3, 3 WN5, 11 WN6, 1 WN7, 12 WN8 and 7 WN9 calls listed as worked. A rough guess puts this at something like 10 per cent of the stations active, with the figure running well above that in parts of New York and New Jersey. By now, we should be well over that habit of not tuning over 145 Mc.

DX Down Under

The peak of the sporadic-E season for our friends in Australia, New Zealand and other South Pacific Islands turned up some surprising DX on both 6 and 2. Last month we reported the near-record first 2-meter work between ZL and VK, and now we hear of more 144-Mc DX, this time between VK5GL and VK6BO, about 1150 miles. This happened on Dec. 30th, in the midst of several days of almost continuous DX that swelled the scores being recorded in the Ross Hull Memorial V.H.F. Contest. With 50 Mc. wide open, VK5GL made simultaneous tests on both 50 and 144, and was heard immediately by VK6BO. Crossband contacts were made both ways, as well as a two-way exchange on 144 Mc. Widespread 50-Mc. DX has brought in some "rare" ones on 6, too. At least they would be rare to Ws! VK9XK, Samauri, New Guinea, has worked ZL, and all Australian states except West Australia. Up in the Fiji Islands, VR2CG (ex-ZL3LR) had worked about a dozen ZLs crossband to 10 and 20, with his transmitter on 51.15 Mc. He has a converter going by now, and will be looking for chances to check with any interested parties. Our thanks to VK5JD and VR2CG for passing along these items.

Here and There on the V.H.F. Bands

In order to further their aurora studies at Cornell University, W2ZGP and W2TTU have arranged for the use of a 1000-foot elevation near Cortland, N. Y., as a transmitting site. The rig (eventually to be high-powered) on 20, 60 and 144 Mc.) are keyed by a large oscillator from the Ithaca receiving location on 430 Mc. Large speech-reflector arrays have been erected at the remote site, and preliminary tests have been run on the control system, using 50 Mc. on 2 and 6.

An encouraging response has been received to ARRL’s request (through bulletins and QST) for v.h.f. aurora observations. In case you’ve missed other announcements, reporting forms are now available for recording auroral effects observed on the v.h.f. bands. If you have not already received yours and would like to take part in this program, drop us a card and a supply of the forms will be sent at once. Observations should be sent to a Regional Coordinator, who will forward them to Cornell University for use by W2ZGP and W2TTU.

The winter sporadic-E season was unusually productive for W2MNC, Boharns, Eastwood, N.Y. He heard radiotelephone signals, believed to be of Alaskan origin, close to 50 Mc, several evenings in late December, VE7AFL and WF7IV were heard on the 23rd between 10:30 and 11:30 p.m., and the f.k.k. signals earthed after midnight. There was visible aurora on the 27th, and a good opening to V7 to between 10:15 and 11:15 p.m., with signals clear and steady from VE7A, DU and NM and somewhat erratic f.k.k. reception until after 1 a.m. F.k.k. was audible again at 7:55 p.m. on the 30th, and VE8ATF and W5CNF were making contact at 9:35. W5CNF and VE8ATF were heard at 9:35 and VE7AAH and VE7BQ soon after. The band was open in both directions, and the f.k.k. signal remained in until about 11 p.m. Contacts were made with 9W0QCA and 9V8ABC.

Need North Carolina on 144 Mc. W4CVQ (ARRL Roanoke Division director) is doing his best to provide it. Jake is on nightly with close to 1-kw. input, and a 12-element yagi, horizontal array 110 feet above ground. He makes test transmissions between 9 and 9:35, swamping his beam between northeast and northwest. So far he has heard only ten stations since he moved to Raleigh last October. There should be better days coming.

Another nightly sked, this one between W8EQF, Everett, Ohio, and W4JDN, Erlanger, Ky., at 8:30 p.m., has served as an official band-opening time for 2-meter operators over a wide area, according to W8PTF, Dayton. He says the Dayton spark plug is W8NROH, who though only recently licensed has been an ardent v.h.f. listener for years. He has built or helped to build lots of equipment throughout the area, and has monitored the 2-meter band endlessly, often calling other 2-meter operators by telephone to get them on the air when good conditions start to break. The much-improved scores of many Ohio stations in the V.I.F. SS demonstrate what this kind of enthusiasm can do for v.h.f. activity.

Still another sked, a 300-mile tough one between W3QKI Erie, Pa., and W2NLK, Oak Tree, N. J., has not been working this winter, and both parties wonder whether this is because of a simultaneous change in antennas, or the hazards of winter. W2NLK changed from 30 to 48 elements, and increased height, and W3QKI went from an 8-element Yagi at 90 feet to a TV-style double Y at 110 feet. Both seem to have improved local coverage, but they have not
worked each other since the new arrays went up.

When he was on 144 Mc. in Germany, DL4X5 knew what he meant to work for his contacts. For a long time he traveled 36 miles each way to get on the air from a chosen location near Wiesbaden, maintained jointly with DL3KE. Between the two of them, they worked plenty of choice 2-meter DX. Now DL4X5 is settled in Midwest City, Okla., and he's looking forward to working some good stuff from home, for a change. As soon as his W5 call comes through, he'll be in there pitching. Remembering all the weak-signal work being done with low power in Europe, mainly because the change over there use c.w. effectively, he hopes to get more of the 144-Mc. We to do the same. He used to maintain consistent contact with PA and ON stations, the closest of which was 212 miles away, and often was able to work G6DVC's, 360 miles, under seemingly normal conditions. With the higher power and larger antennas over there, it is certain that more really good DX could be worked under average conditions if the boys would use c.w. regularly and form the habit of tuning carefully for weak c.w. signals.

The California V.H.F. Marathon sponsored by W6MVK completed its fourth period at the end of 1951. Mileage winner was W6BYE (now permanent holder of the trophy) with an aggregate of 14,820 miles covered. W6AJF and W6HJZ followed with 10,700 and 6000 miles, respectively. Section awards for activity went to W6BYE, San Diego; W6BZ, Los Angeles; W6ZYP, Santa Clara Valley; W6QGZ, San Joaquin Valley; W6L0Z, San Francisco; W6AJF, East Bay; and W6AC, Sacramento Valley. The expedition awarded W6BYE.

W8PY brings us up to date on the 2-meter doings around Jackson, Mich. At present 12 stations, W8E BAN BYF BFG FRN Q88 EXJ HHJ KCM KKB PYY RBB RSS and ONZ are active, with several more getting ready. Describing a mobile transmission, roll call each Wednesday at 8:30 p.m. is followed by a stand-by for calls from other areas. Net frequency: 145,6 Mc. Most of the rigs presently used are 6J6-636-2E26 jobs running 10 to 25 watts input.

W2ZLD and W2OSW, Trenton, N. J., would like it known that they are operating nightly, Monday through Friday, on about 420 Mc. They listen for five minutes at 7, 8 and 9 p.m. At present they have 10-element arrays, and are planning to expand to 32 elements shortly.

How About the Technicians?

Much attention is being paid to the Novices, and there is no question that this class of license is having a considerable effect on the amateur picture as a whole, and certainly on the 2-meter portion of it. It is likely that before the end of the year we will have several hundred new 2-meter stations as the result of interest developing among the Novices. At the same time, we tend overlook the Technician, yet the figures show 1431 Technician Class and 5746 Novice Class tickets issued in the six months of 1951 that these licenses were available.

Many of these overlook, of course; the above figures do not represent 7227 new hams, nor can it be assumed that nearly 1500 beginners obtained Technician Class licenses primarily because they expected to go on 220, 420 or some higher band. Quite a few Technicians, we must assume, are General Class applicants who couldn't quite make the grade on the 13-w.p.m. code test, but who were able to qualify on technical grounds.

But there is genuine Technician interest. "Can you give me a list of amateurs operating on 220 and 420 Mc. in Los Angeles?" (or Philadelphia, Boston, or Podunk) is a common query in Headquarters correspondence these days. More questions are coming in to the ARRL Technical Information Service asking for dope on equipment for the u.h.f. bands than heretofore. Articles in QST and talks at radio club meetings dealing with 220 and up are meeting a growing audience.

Here, then, is the opportunity we have been waiting for—the development of mass interest in our higher bands. Here, too, is a job for the v.h.f. clubs like the Rochester V.H.F. Group, the Two Meters and Down Club of Los Angeles, the Midwest V.H.F. Club of Chicago, the V.H.F. Institute of New York, and many other ham organizations with members active on the v.h.f. bands. We'd be happy to refer such inquiries to club groups; if you want to receive them for your area, just drop us a line. Meanwhile, we suggest that clubs boldly Novice-Technician nights periodically. Spread the word around as completely as possible—you may be surprised at the response.

Here are some examples of Technician possibilities: W9JFJ, San Gabriel, Calif., a recent licentiate, has several of his associates at Cal Tech interested in 220-Mc. work and well on their way to obtaining tickets. They are working on gear, too, so the plans include beacon transmitters and antenna and propagation experiments.

The first Technician known to have made use of his license is W2BLV, Haddon Heights, N. J., who has been working W2QED on 420 Mc. since last fall. He is also active on 145 Mc. as W2BLV.

Up in the Boston area, W1CTW is rounding up the local Technicians and expects to have several of them going soon on 220 Mc., to augment the activity that has been maintained regularly on that band for some years.

In Collierville, Tenn., W4HJK hopes to promote activity on 220. Paul feels certain that the present DX record on 220 is but a fraction of the distance that could be covered if any of the better present-day 2-meter operators put comparable gear on 220 to that they use on 144. The same undoubtedly applies to 420—and wouldn't it be something if a couple of Technicians were the boys to turn the trick?

Technicians actually operating and those interested in getting started are cordially invited to drop ARRL a line regarding their plans. If we are ever to make anything of the amateur assignments from 220 Mc. up, this is certainly the time to get started!

OES Notes

Among several calls making their first appearance in the OES file this month is that of W9MIB, Coleta, Ill. Clare has been concentrating on 434 Mc. for some time, and on Christmas Eve he and W9ZIB celebrated completion of a regular contact on this band. A 420-Mc. project at W9MIB is the construction of a crystal-controlled converter with a low-noise i.f. at 50 Mc. and another crystal conversion to a tunable i.f. system that tunes upward from 5 Mc. W6FYF, Sacramento, who is back as an active OES after an absence of many months, describes a mobile transmitter line-up for 144 Mc. that should be of interest to those who are looking for ways to save on battery drain. Using a combination of design features of several OES articles, Ken has a 5½ overtone oscillator-doubler and another doubler (with two halves connected in parallel) driving an 832A final. By connecting the two 6Fs in series as far as the plate supply is concerned, these stages are operated from the 350-volt supply used on the final, with an exotic drain of

(Continued on page 110)

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LEAGUE FILES ON "RACES"
RULES

In early February, by direction of the Executive Committee, ARRL's position on the proposed rules for a Radio Amateur Civil Emergency Service was filed with the Commission. It follows:

FEDERAL COMMUNICATIONS COMMISSION

In the Matter of
Providing a Radio Amateur Civil Emergency Service

Docket No. 10102

COMMENTS OF THE AMERICAN RADIO RELAY LEAGUE

I


II

The League notes the proposed rules with gratification and, with two minor changes indicated below, urges their prompt adoption in order that amateurs may now extend their civil defense emergency activities already being carried on throughout the country.

III

The League suggests two minor changes. The first refers to Section 12.231 (2) wherein the emissions authorized for the various bands are indicated. Current amateur privileges for the named bands above 50 Mc include the privilege of using audio-frequency-shift-keying teletype, under the general designation of A3 carried in the amateur rules. A considerable and growing number of amateurs have availed themselves of this privilege and now constitute a sizeable body of amateurs proficient in the use of teletype operation. It appears to the League to be desirable to retain their availability in the event of civil defense emergency and the League therefore proposes that in the bands beginning at 50.35 Mc upwards the designation 2 A2 appear for each band in the authorized emission column be changed to 6 A2.

The second suggested change concerns sub-paragraph (c) of the same Section 12.231 (2). It is understood to be the clear intent of this section to provide for the inauguration of such joint operation only after normal amateur activity shall have been suspended because of war or other national emergency. The League proposes, therefore, that Section 12.231 (2) (c) be amended to read as follows:

At any time when normal amateur activities shall have been suspended because of war or other national emergency, these bands will be jointly available to stations in the Radio Amateur Civil Emergency Service and to stations of the military services for training and tactical operations, and, in areas where mutual interference may occur, local arrangements shall be made concerning times of drills, tests, and other training operations. In time of an actual civil defense emergency, stations in the Radio Amateur Civil Emergency Service shall have absolute priority.

THE AMERICAN RADIO RELAY LEAGUE, INC.
A. L. BUDLON
by PAUL M. SEIGAL
Secretary General Counsel
February 5, 1952

Diploma-type certificate awarded to those who qualify for the Amateur Extra Class license; it is 7 by 9 inches and suitable for framing. The actual license is still the card form, however, which is endorsed for Extra Class privileges.

CALL LETTER LICENSE PLATES

With four bills already introduced into State legislatures, the new legislative session promises to see some additional call letter plate added to the fourteen states already granting the privilege. However, some words of caution are in order this year: from the wording of the various bills and laws, any amateur who qualifies may receive the plates for his car; Novice licensees are therefore eligible for the plates. The additional letter presents a physical problem but of more importance is the fact that Novice licenses are good for only one year and, further, that many Novices are progressing to the next highest grade of license well within that period. Wording of pending bills should take this factor into account. Secondly, the National Production Authority will be restricting sharply the manufacture of new license plates in 1953, when metal allocations will be drastically reduced. It will be well to bear this in mind in pressing for call letter plates.
CONDUCTED BY
ELEANOR WILSON,* WIQON

It is said that if you want something strongly enough, you'll get it. Generally, though, more is involved than mere wishful thinking. Many girls certainly would "like" to have an amateur license, but those who "want" one do something about it.

Belief that the requirements are difficult, or lack of a technical background or a ham in the family to aid, may discourage some from going ahead, but others find these seeming hindrances not insurmountable.

Not only is Carol Coven, W8GEN, the only ham in her family, but also before getting her own license she wasn't even slightly acquainted with another ham! In the summer of 1950 she learned the code and theory and even built a rig— all without outside aid—and in November got her ticket. Now seventeen and a high school senior, Carol has made many radio friends throughout the world, and she is thoroughly enjoying her extensive amateur activities.

Dot Scavuzzo was not satisfied merely to watch her son, W2YUP, copy code. With no technical training nor previous knowledge of amateur radio, Dot studied by herself, passed her Class B exam, and became W4QBY. Now Advanced Class and active on twenty 'phone, she keeps regular schedules with her son, who is away at college. (Bill considers this a convenient way to QRRR for extra cash.)

Thus, the cases of only two of the many YLs who have shown what desire, interest, and persistence can do!

*YL Editor, QST. Please send all contributions to WIQON's home QTH: 318 Fisher St., Watertown, Mass.

Grateful for the many thousands of messages she has sent overseas for them, the neighbors of Clara Reiger, W2RUF, submitted her name to the Mutual Broadcasting System's "Tell Your Neighbor" program. As a result of her outstanding service to her community, Clara recently received the Golden Rule award and a set of silver.

Clara's amateur activities have been extensive since 1933, when she became licensed. In 1949, '50, and '51 she made BPL seventy-five per cent of the time—she handles traffic eight hours a day, Monday through Friday. Manager of the NYS Net, alternate NC of the WNY MARS 'Phone Net, she is also a member of RN, EAN, CAN, PAN, TCPN, and ECEN—all traffic nets. She is an AO Operator, ORS, and holds a 35-w.p.m. Code Proficiency certificate. A charter member of the YLRL, she originated the expression "33" used by members of that organization.

Top Scorers—12th Anniversary Party

Congratulations to the following winners of the YLRL 12th Anniversary Party:

Phone Section
WSUUC..........................3884 W1PFTJ..........................2980
WSIPO..........................3304 W3JSH..........................1591
WSQOQ..........................2424 W6JTX..........................969

C.W. Section
WJ9UlQ..........................3884 W1PFTJ..........................2980
WSIPO..........................3304 W3JSH..........................1591
WSQOQ..........................2424 W6JTX..........................969

Keeping Up with the Girls

The Ninth District welcomes three new YL Novices— W9NTO and WN9OTN (mother and daughter) and W9PEEX. W9NEPC is added to the list of Vermont YLs. . . . J2II was formerly W4IKA. . . . On Tuesday at 10:00 P.M. EST, YLs in the vicinity of Chicago meet on 29,000 kc. for traffic-handling and rag-chewing. Interested YLs are invited to join. . . . W6UCQ helps her OM, W5KUG, issue the West Gulf Division DX Club DX Bulletin. . . . The West Seattle Amateur Radio Club surprised W7LC8 and her OM, W71YY, with a housewarming. . . . A sergeant in the WAF, W802A operates from Donaldson AFB in South Carolina. . . . When not hammering or trading her three jr. ops, W6NOLP serves as a nurse at a La Jolla hospital. . . . W5IUPZ has her own pilot's license and does considerable flying. . . . Purchase of a receiver they saw in a pawn shop window helped Betty and Louisa Wilson become W7PTC and W7NPPV. Before Betty was stricken with polio three years ago, the Wilsons bicycled extensively throughout the country. But now ham radio takes preferences, and Betty averages four hours per day on the air. . . . ZS9KK devotes much time to the Johannesburg Branch of the South Africa Radio League. . . . A fall down a flight of stairs recently bruised W8ATB but didn’t stop her from continuing with the big task of 1952 YLRL nominations. . . . W8HWW and W8HUX have edited "Ham Shack Gossip" monthly for the past two years. The publication, which is sustained by donations, is of particular interest to those in the Eighth District.

(Continued on page 119)
Notes on Speech Clipping and Filtering

Ideas for Increasing the Effectiveness of 'Phone Transmission

BY WARREN B. BRUENE, W8TTK

Speech clipping in a crude form is probably as old as voice modulation in amateur radio. Increasing the audio gain for maximum loudness, until very noticeable distortion appeared, undoubtedly indicated that overmodulation or overloading of the audio system was taking place. That was speech clipping in a sense, but today we do it in a more refined manner to realize certain advantages and call it speech clipping instead of "heavy modulation." The most objectionable result of "heavy modulation" is splatter due to overmodulation, although the audio distortion caused by generation of high-frequency harmonics of the speech frequencies because of limiting or clipping of audio peaks, also is objectionable.

Overmodulation, Key Clicks and Splatter Filters

Splatter caused by overmodulation of a Class C amplifier is very similar indeed to key clicks. The high frequencies causing the clicks and splatter are in the sharp corners of the keyed wave shape, or modulated r.f. envelope waveshape. In c.w. we round off those sharp corners by using discharge characteristics of the filter are important because they correspond to eliminating the click on make as well as on break, in c.w. language.

In contrast, if the peak audio swing in the modulator is limited on both positive and negative peaks, as proposed by the writer, then the high-level filter functions mostly as a low-pass filter and the d.c. transient characteristics are of less importance.

Nonlinear Phase Shift and Low-Level Clipping

In the first commercially-built amateur gear using low-level speech clipping the clipper was followed by a single-section low-pass filter. The filter served to attenuate the high voice frequenc-

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key click filters. Many types of key click filters have been used, but it is worth noting that they all are designed to use their d.c. transient characteristics.

The introduction of the splatter filter was an important step forward in eliminating splatter. Although the filters used were designed according to conventional audio filter equations, the writer believes that, until recently, it was not generally known that the important splatter-filtering action is that contributed by the direct-current transient characteristics of the filter and not by the audio passband characteristics. Both the charge and discharge characteristics of the filter are important because they correspond to eliminating the click on make as well as on break, in c.w. language.

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former and a driver transformer, can change a flat-topped clipped wave into a sawtooth wave. Now this isn’t a very good way to get maximum power in the sidebands, since the power in a triangular or saw-toothed wave is only one third the power in a square wave of equal peak amplitude! Compared with a sine wave, the triangular wave has two thirds the power while a square wave has twice the power. (See Fig. 1). So our object is to keep that flat top from tipping up very much.

Perfection is not needed when using a low-level clipper system because the clipping must be kept down to a level corresponding to 70 per cent modulation. This is because the peak amplitude of the fundamental component of a square wave is or 127 per cent of the peak amplitude of the square wave. (See Fig. 2). For example, when a 2000-cycle tone is clipped heavily and passed through a low-pass filter with a 3000-cycle cut-off, the output is almost a pure sine wave. The filter in effect shaves some of the energy off the sides of the square wave and pils it up on top. Hence the clipping level must be set at or below or 79 per cent of the expected peak out of the filter to avoid overmodulating. Thus, tipping of a low-frequency square wave can be tolerated if the rise doesn’t exceed that normally anticipated — that is, from the 79 per cent clipping level to the 100 per cent modulation level. A single-section low-pass filter, plus driver and modulation transformers with good low-frequency response, will stay within the required nonlinear phase shift limits. A simple k-section filter should be used because its nonlinear phase shift is much less than that of m-derived sections. Also, the attenuation is better farther out, which is important. The use of filter inductors with Qs in the range of 10 to 20, rather than high-Q toroids, gives improved phase linearity near the cut-off frequency.

The low-frequency response of all the stages following a low-level clipper should be as flat as possible down to at least 150 c.p.s., to avoid too much nonlinear phase shift. This means large coupling condensers and either good transformers or the elimination of all interstage and driver transformers entirely. The driver transformer is the weakest point in most Class B modulators, and the writer advocates their elimination. The simplest method of accomplishing this is to use beam power tetrodes operating Class AB1 as modulators. The tube cost is more, but you make it up in other parts savings. The writer uses a direct-coupled cathode-follower driver and triode modulators with excellent results, but these circuits are a little tricky to design. Of course, an easy way around this requirement is to do the clipping right in the modulator stage.2

Holding down the clipping level to 79 per cent to avoid overmodulation takes a good slice off that 2- or 3-to-1 power advantage we mentioned. The splitter filter or the high-level clipper and filter do not have this disadvantage, which is a point in their favor. The disadvantage of the splitter filter is that on the negative modulation peaks the filtering action is not as good because the harmonic attenuation of the d.c. transient characteristics of the filter rather than by its audio-frequency characteristics. Again the writer recommends the straight k-section filter over the m-derived filter as being better in this regard also.

**Fig. 2** — The fundamental sine-wave component of a square wave has greater peak amplitude than the square wave that contains it.

**Fig. 3** — Curve 1, response of 2-section filter ahead of clipper; Curve 2, response of high-level clipper with 4000-cycle cut-off; Curve 3, theoretical maximum level of distortion components arising from clipping. The shaded area, 4, shows the region in which distortion components actually fall when using 10 db. of clipping.

**Fig. 4** — A desirable low-frequency response curve.

**High-Frequency Attenuation Requirements**

Actually, we should have more high-frequency audio attenuation than a single-section filter will give. If an audio oscillator and an oscilloscope are available to check the transmitter, two filter sections can be used following the clipper, if everything else is good enough, but otherwise it is better to use just one filter section after the clipper. The place to put the extra filtering is ahead of the clipper. A two-section filter will do a very good job of attenuating the audio fre-
quences above 3000 c.p.s., but a single-section filter with an $m$ of 0.8 will do an adequate job also, since it gets some help from the filter following the clipper.

With adequate filtering ahead of the clipper about all the filter following the clipper has to do is to clean up the high frequencies generated by the clipper. This is fairly easy to do since in a square wave the third harmonic is one third, the fifth is one fifth, and the seventh is one seventh the amplitude of the fundamental. These ratios correspond to about 10 db., 14 db., and 17 db. down, respectively, before filtering. Fig. 3 shows the attenuation curve of a 6-section low-pass filter and the maximum amplitude of the spurious frequencies. Careful measurements using 10 db. of clipping, a low-distortion r.f. detector, and a wave analyzer showed that these spurious frequencies actually are substantially below this and fall within the shaded area in Fig. 3.

**Low-Frequency Response**

In order to keep the speech signal so it sounds well, the low frequencies, also, should be attenuated. Proper low-frequency attenuation not only gives the signal better balance but also attenuates the strong low vowel frequencies so they don’t need to be clipped as much to get the higher consonant frequencies up to 100 per cent modulation. A low-frequency attenuation rate of about 6 db. per octave below 500 or 800 c.p.s., as shown in Fig. 4, has been found to be a good choice. The rate of attenuation can be increased below 150 or 200 c.p.s., if desired. Attenuation of 6 db. per octave is easy to obtain by using small coupling condensers of the proper value ahead of the clipper. If a Chicago Transformer LPF-1 low-pass filter is used ahead of the clipper, a 0.01-mfd. coupling condenser into it will give the desired response curve. If you think this is too much low-frequency attenuation, you should see the response curve of the standard telephones. They have roughly 6 db. per octave drop below about 2000 c.p.s. and cut off sharply below 300 c.p.s.

**Precipping Overload**

The overload characteristics of the stages ahead of the clipper must be watched, particularly if clipping is done at high level. The signal level ahead of the clipper may be several times the 100 per cent modulation or clipping level, and this may overload some stage. This does no harm if the stage overloads equally on both positive and negative swings, and if no undesirable spikes appear on the waveform. When the clipping is done in the modulator stage the driver will overload soon after clipping starts. Actually, this is desirable, but it is worth checking.

**How Much Clipping?**

Speech clipping, like most good things, should be used with moderation. Six to 10 db. of clipping on the peaks is enough. It will give your signal about twice the punch and still sound pretty clean. For the weak ones, it will help to talk a little louder, but you can push the microphone back a little for the “locals.”

To summarize, the writer recommends the following:

1) Use a single 6-section filter and flat low-frequency response design following either a high-level or low-level clipper, to keep the top and bottom of the clipped wave flat for maximum sideband power.

2) Place an additional low-pass filter ahead of the clipper for speech filtering so that the filter following the clipper need only clean up the high frequencies generated by the clipper.

3) Attenuate the low frequencies 6 db. per octave, starting at 500 to 800 c.p.s., for proper balance and less need for heavy clipping.

4) Make sure the stages ahead of the clipper have adequate swing capability or clean overloading characteristics for input signals up to at least four times that required for 100 per cent modulation without clipping.

In conclusion, the writer believes some form of properly functioning speech clipping is the best single investment one can make in a 'phone transmitter. There are several pitfalls, however, which must be guarded against and this undoubtedly explains why many have had poor success. A 'scope and an audio oscillator are invaluable in checking clipper performance. The writer does not favor those circuits which either slam in 12 db. of clipping or cut it out entirely. Leave the clipper in all the time and don’t hit it so hard. Just advance the speech input gain to the point where distortion becomes noticeable, but not objectionable.

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**HAMS AT HEADQUARTERS**

**W1AW, ARRL Headquarters Station**

The following calls and personal sines belong to members of the Headquarters gang:

- W1BAW R. T. Beaudin, "rb"
- W1BDI F. E. Handy, "fx"
- W1BUD A. L. Budlong, "bud"
- W1CEG H. M. McKean, "mac"
- W1DF George Grammer, "gg"
- W1DHY Harry Paxon, "hp"
- W1DX Byron Goodman, "by"
- W1FTX R. M. Smith, "dx"
- W1FWH W. E. Bradley, "wh"
- W1H0Q E. J. Tolton, "ed"
- W1HCP L. G. McCoy, "lgy"
- W1IRE Richard L. Baldwin, "ike"
- W1JEQ C. V. Chambers, "ve"
- W1JMY J. A. Moskey, "joe"
- W1LVQ John Bantoon, "jhn"
- W1MFA H. K. Isham, "hk"
- W1NIM George Hart, "goos"
- W1QDS Murray Powell, "mp"
- W1RWS John E. Cen, "je"
- W1TJS D. H. Mix, "don"
- W1VGC L. A. Morrow, "pete"
- W2VMX/1 C. L. Wood, "chaz"
- W9BRD/1 Rodney Newkirk, "rod"

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4 Chicago transformer LPF-1, for example.
4 Bell Laboratories Record, Sept., 1951, p. 417.
There are now two active manufacturers of s.s.b. transmitters, so if you have been waiting until you could buy a rig, you no longer have any excuse for not being on the air. Paul of W9OHM sells a voice-controlled rig that uses a crystal filter and ends up on 75 with provision for another 807 if you use another power supply. Wes of W9DYY offers a phasing job on 9 Mc. with mixing that gives 6AG7 output on any band from 10 to 160, with crystals or an external VFO for the frequency control. Voice control is optional. The exciter is offered either wired and tested or in kit form.

A new big signal on 75 that many of the gang have worked is KH6UL. John has 800 watts running nicely and has worked W2EWK, W2JJC, W2NJR, W2TTQ and W8FSA, plus plenty of W6s, W7s and W6s. KH6UL is ex-W6CTU, and the rig is a W1JEO exciter and a the loudspeaker. My present problems center around the choice of receiving methods. So far, I have played with the use of crystal-lattice filters in the receiver in conjunction with the balanced-modulator-detector receiver described in the April, 1948, QST."

W3UR in Harrisburg built a W1JEO exciter and wasn’t satisfied with the low output he got. One little thing that helped to bring it up was the substitution of 0.01-µf. ceramics for the 0.1-µf. papers in the 6K8 circuit, and it also helped on the crystal-oscillator starting time. Other items that helped in the alignment were a homemade v.t.v.m. and a limited-range VFO.

Florida was put on the s.s.b. map by W4ORB (ex-W8TKM) and W4QN. They both use W1JEO exciters—ORB runs 100 watts to a pair of 807s, and QN kicks an 829 to 75 watts. Good reports have been received from the East Coast and the Middle West, and both agree that “Single Sideband is tops.”

Remember how proud we were in 1950 to announce that W2URX on s.s.b. was only 17 years old. Well, old graybeard Denny will have to look to his laurels, because W4MKT in Winston-Salem is only 15 years old! We don’t have any dope on his rig, but we hear that he succumbed to the siren cry of s.s.b. only after a pair of 810s. A full-wave antenna helps to insure that the Stateside boys get the best possible signal from the land of the lei.

Delaware showed up when W3ATV checked in with the gang. His exciter is a Weaver-Brown crystal-lattice affair (aligned primarily with a broadcast receiver) and at present ends up with a pair of 814s running up to a half kw. To quote part of his letter, "... I have been repeatedly amazed at the reliability of low-power s.s.b. signals, especially under conditions of fading. After getting over the initial thrill, I am quite impressed with the use of voice control and now have the system operating in conjunction with several very successful years on v.h.f. Since one has to be an engineer to get a s.s.b. rig going (as you have no doubt heard), that must make Paul the youngest engineer in the country.

Dr. Schwalbe, W4VP, in Louisville, Ky., has a W1JEO exciter and a pair of AB7s. 807s. In only a few hours on the air he worked 12 states and both coasts, and says, “How these fellows can hear my peak power of only 50 watts is a constant source of amazement.” Like so many others, he got much of his dope from the QST articles and from “reading the mail” on the high end of 75, and he also feels indebted to fel-

(Continued on page 118)
Capacitance Meter for Small Values

A Simple Gadget for Checking Fixed Condensers

BY S. A. SULLIVAN, W6WXU

* In this article, W6WXU describes a simple meter for checking small condensers. Since the unknown is connected across a fixed condenser in series with the calibrated condenser, measurement is not limited by the capacitance of the latter, and the calibration at the low-capacitance end of the scale is opened up.

to the resonant frequency of the measuring circuit (C1 at full capacitance), as indicated by a dip in grid current. Then the unknown capacitance is connected across C3, and C1 is backed off until the meter again shows resonance. The unknown capacitance is then read directly from the dial on C1. The calibration of this dial is shown in Fig. 2. Unlike most bridges and capacitance meters, the scale is spread out more at the low-capacitance end. The first half inch of scale length covers 0 to 5 μfd.

The circuit is simple and uses readily- obtainable parts. Everything fits easily in a 3 × 4 × 5-inch box. A.c. is used directly on the plate of the 384 oscillator tube, and the filament is heated by the reactive current through a 1-μfd. condenser connected in series with the line. Thus, power consumption is confined to just the 1 or 2 watts used directly in the oscillator itself and heating is held to a minimum. Any meter with a 1- or 2-ma. scale will serve, since all that is required is an indication of grid-current change. The one used here happens to be a 2-ma. war-surplus item. All parts of the oscillator circuit are insulated from the chassis for obvious reasons. C7 was added to cure a slight hand-capacitance effect.

Reasonable care should be used to make everything solid, particularly in the measuring circuit, so that it will hold calibration. The frequency used is not important, and any convenient coil size may be used. The only important requirement is that both circuits tune to the same frequency. This particular unit operates at about 4500 kc., which is a fair compromise between

More and more amateur circuits these days call for the use of small capacitors of 2000 μfd. or less, even in by-passing applications. Although the larger capacitors are usually clearly and completely labeled, most small sizes are identified only by a color coding which is frequently faded or covered with dirt and wax. Furthermore, it is not always apparent which of several code systems was used in marking the capacitor.

Having an innate mistrust of color codes anyway and not possessing a bridge, I built the little gadget described here especially for checking small capacitors. It covers the range 0 to 10,000 μfd. with sufficient accuracy (10 per cent or better) for most purposes. In addition, it is small and uses very few parts. It requires no accessory equipment. A flip of the switch and it is ready to go with no heating time.

As can be seen from the circuit diagram of Fig. 1, it uses a built-in grid-dip meter coupled to the measuring circuit, L1, C1, C2, and C3. In use, the oscillator is adjusted by the trimmer, C4.

* Route 2, Box 400 E, Sonoma, Calif.

The capacitor checker is built in a 3 × 4 × 5-inch box. The knob under the meter is the control for the g.d.o. tuning condenser. The condenser to be checked is connected across the two binding-post terminals above the calibrated dial.

Interior view of the capacitance meter. L1 and C1 arc in the foreground. Behind the milliammeter are the 384, L3 and C5. C1 is below the meter.

58 QST for
coil size and oscillator stability. Any 100-µfd variable can be used for \( C_1 \), but the straight-line frequency type used here gives a better spread on the low-capacitance end of the scale. \( C_2 \) spreads the high-capacitance end of the scale. The two coils should be placed no closer than necessary to give a readily discernible dip on the meter.

As always with home-constructed equipment, the weak point in dial marking and panel labeling. The dial shown is from an ancient receiver. It was mounted on a piece of \( \frac{1}{4} \)-inch rod, checked in an electric hand drill, and the original markings taken out with sandpaper. The new calibration was made with white ink and a fine pen. This is not too satisfactory, but it does have the advantage that mistakes are easily corrected. The instrument is calibrated by connecting capacitors of known size, or combinations thereof, and marking the dial at the grid-dip point.

The meter was built primarily to measure capacitors before they are used. However, a fairly close measurement can be made on capacitors already wired into a circuit without disconnecting them. Connect a pair of test leads to the meter and connect the grounded lead to one side of the capacitor. Before connecting the other lead, rotate \( C_1 \) to the dip and read the lead capacitance. Then connect to the unknown capacitor and again rotate \( C_1 \) to the dip. Subtract the lead capacitance from the total to find that of the unknown. Do not balance out the lead capacitance by readjusting the trimmer.

**Organized Electronics Battalion**

Things have been happening in Great Falls, Mont. Originally Volunteer Electronics Company 13–23 (K7NAQ), the Great Falls unit had grown to semi-breaking size (23 officers, 110 enlisted personnel). With the green light from the Navy Department, Great Falls built up even more steam and produced a sufficient number of officers and men for a Battalion Staff and two Organized Electronics Companies. Thus the first Naval Reserve Organized Electronics Battalion was born.

**Notes**

The first Naval Reserve Electronics Company in the Sixth Naval District to attain organized status is the unit at Anderson, S. C., which is now Organized Electronics Company 6–4. C. J. Walker, jr., RM2 USNR (W4SSH) has reported to this activity as stationkeeper.

Every day is festive day at NDF/W6USN, Eighth Naval District Reserve master control station. All operator and maintenance personnel associated with that station are licensed amateurs: W6s EGX LNU RCZ SPL SPZ TZY; WN6s UEO UEP UIY UNP.

In addition to the above, the following amateurs in active military service are filling billets in connection with the Naval Reserve Electronics Program: W6s NK SGC; W6s BHH FCE; W6s CE5 GFU STU; W6s BHH BL EF IA KQD LW MYV ODA PPC QEL RCQ BQR RPI SEE SRL SSN; W6s HNW PLQ SEG; W6s BOM BVY GYI GYJ TO8 MRS VHE VWF K6DL; W6s CQK DTL NAE NSE OM7; W6s CLT DTB DSD KOX; W6s AKP FDC; W6s DHE DRY.

**U. S. N. R.**

Electronic Units Commended

The achievements of the following Naval Reserve Electronics Units from the standpoint of training, personnel, and administration have been recognized by Letters of Commendation from the Chief of Naval Personnel.

- Organized Electronics Company 1-1 (K1NRA), Malden, Mass.
- Organized Electronics Company 8-2 (K5NAN), Harlingen, Texas
- Volunteer Electronics Company 12-6 (K6NRM), Modesto, Calif.
- Volunteer Electronics Platoon 12-18, Ukiah, Calif.
- Organized Electronics Company 13-5, Medford, Ore.

**March 1952**
3-WIRE 6-12-VOLT SYSTEM AS A MOBILE POWER SOURCE

Much of the surplus gear available was designed for 12-volt d.c. operation. To take advantage of this situation without having to rebuild the equipment, an extra generator, regulator, and 6-volt battery are used in the circuit shown in Fig. 1.

![Diagram of 3-wire 12-volt system for mobile power supply](image)

Fig. 1 — A 3-wire 12-volt system for mobile power supply that permits use of surplus gear without modification.

Preferably, the extra components should be identical to those already installed in the car, except the regulator, which must be one designed for the opposite polarity, and for the particular generator used. Distribution of the power can be almost any way desired, although it is suggested that the starter be run from one 6-volt battery, and the rest of the load off the other.

The photograph shows the method used to install the extra generator in a 1948 Chevrolet. The plate that supports the generator bracket is fastened on with modified head bolts. There are nuts underneath the plate against the head. The generator rests close to the intake manifold, and is also supported by a brace from the water outlet. The brace for the original generator has an extension welded onto its brace. The regulator is mounted on the sheet metal side a little below and to the rear of the oil filter. A bonding strap is run between the generator and regulator. The extra battery is mounted in a cut-down Plymouth battery carrier under the front seat. — K. B. Karns, W9MYH

QUIET OPERATION OF RELAYS

The clank and clatter of relays is both annoying and unnecessary. Most of the noise can be eliminated by the simple, effective method of mounting described below.

The relay is mounted on a strip of discarded carpeting about 5/16 inch thick and somewhat larger than the bakelite base of the relay. Mount the relay equidistant from all edges of the carpeting by passing machine screws, with flat washers next to the heads, through the carpeting and the relay base so that the nuts and the lock washers will be against the base. Now take a second piece of carpeting the same size as the first and place it against the back of the assembly, sandwiching the heads of the machine screws between the two pieces.

To fasten the unit to a chassis, cut two strips of aluminum about 1/2 inch wide and long enough to cover the full width of the carpeting, and use them as hold-down plates, one at each end of the carpeting. Pass machine screws through the aluminum strip, the two layers of carpeting, and the chassis.

As an example of the effectiveness of this system of mounting the writer uses two keying relays mounted in a metal box. They cannot be heard when wearing earphones, even though they are only a couple of feet away. — Rev. Joseph A. Terstegge, W9LQE

MOBILE RECEIVING HINT

In many mobile installations the transmitting antenna, mounted at the rear of the car, is used as receiving antenna as well, instead of using the original receiver antenna. To do this it is usually necessary to run a long lead from the rear of the car up to the receiver. If this lead happens to be a high-capacitance affair, it may add enough shunt C across the receiver input terminals to detune the r.f. stage far beyond the range of the antenna trimmer provided in the set. If this is the case, the sensitivity of the receiver will seem lower than when the original antenna is used.

A simple cure is to put enough fixed capacitance in series with the antenna lead to limit the effect of the shunt C. At W1KDK/A1KDK, a 200-µfd. tubular ceramic condenser effected the cure. With this condenser in series with the center conductor of the RG-59/U cable used to run between the whip and the receiver it was again possible to peak the antenna coil in the receiver, restoring it to its original sensitivity. — Theodor Simmington, Jr., W4JOT/A1JOT
The Publishers of QST assume no responsibility for statements made herein by correspondents.

LONG BEACH GRANDPAPPYS
237 American Ave.
Long Beach, Calif.

Editor, QST:
... It is my sincere feeling that we old timers have each of us given something to bring amateur radio, as well as the development of electronics, to its present high esteem and development.
-- Cecil D. Willis, 6FPE
4344 Greenhier Road
Long Beach, Calif.

Editor, QST:
February QST just in! What goes — four letters objecting to the grandpappy-archctrling of FCC! None favoring it. What's the matter — none of you fellers at Headquarters that old! And a suggestion that it be put to a vote.
How soon the younger generation (et tu, Brute) forget the men who pioneered this here wireless. ... Let's see QST uphold its reputation for impartiality and give the other side a break.
-- F. I. Shipppes, 6GCK
1208 Maple Ave.
Los Angeles, Calif.

Editor, QST:
The W6AM Extra Class license is a grandpappy license, dated the first day available, January 2, 1952, but these are also valid: Radiotelegraph First and Radiotelephone First — they hang on the stack wall, too. ... Please don't be too hard on the few old grandpappys who tuned so hard to get amateur radio going, and who then knew, almost by heart, the only radio textbook available.
-- Don C. Wallace, W6AM

QST COVER
Glastonbury, Conn.

Editor, QST:
I very much enjoyed the cover on QST for December. I think it must be a "posed" picture, though — I don't believe that even Brother Goodman's bench always looks that clean. If it does, then he should have a picture of my bench and write an article on "How Not To Build a Transmitter." On second thought, I wonder if the condition of my bench has anything to do with my not being on the air. ... Warren N. Doubleday, W1UJA

HANDBOOK
109 Indiana Ave.
Morton, Ill.

Editor, QST:
... Recently I took and passed the exams for a commercial radio operator license. ... During my studying I could not find the necessary material I desired to clarify several subjects that came up. These are usually covered just briefly in study material available for this. Naturally, being a licensed amateur, I turned to the ARRL Handbook. I found all the material I needed, written in such a way that I was able to understand it fully.
-- Albert Russell Krug, W9OIF
445 Dalzell St.
Shreveport, La.

Editor, QST:
It is with considerable disgust that I saw the circuit diagram on page 269 of the 1951 Handbook. There is absolutely no justification for the use of miniature tubes in this circuit. The argument of being modern does not hold water, especially considering that some of our manufacturers of quality equipment have not fully accepted them and at least one large manufacturer has abandoned their use.

Particular care should be exercised by the editors of this book to be sure of including only quality equipment, especially since many people use circuits directly as printed and many beginners form their ideas of what is suitable and unsuitable from the circuits you print.
-- James L. Strauss

BOOTLEGGER AT LARGE
Ed. Miller, W6MSG; O.O., of Albuquerque, has advised that he heard a station operating on both 14- and 28-Mc. phone during the 1951 Sweepstakes, using the call "W5CA, Tijeras, New Mexico." The station was heard on Nov. 24th and 25th. This station was actually operating and participating in the contest as W6MSG reported that he heard "W5CA" transmit SS messages. Another Albuquerque amateur heard a W8 in contact with this "W5CA, Tijeras, New Mexico" on the 25th on 28-Mc. phone.
The real W5CA did operate in the 1951 SS, but solely on cw. I would be appreciative of any reports from any station who contacted this bootlegger who was operating in the SS using my call, W5CA, on the "phone" band. Any information will be helpful.
By the way, if this bootlegger worked VE8, I would be glad to know of it, as that is the only section I missed.
-- A. David Middleton, W5CA

GOOD OLD A.R.R.L. . . .
1601 Fine Knoll Lane
Mamaroneck, N. Y.

Editor, QST:
After playing around for lo these 30 years with radio I finally got up enough courage to go for my amateur license — and now I am WN2FBE.
And there is no question but that for QST and the ARRL I would never have made it. The magazine itself is absolutely indispensable for any one in amateur radio ... and without the ARRL slow-speed code practice I would still be floundering around 8 w.p.m. I am still copying it and hope to go for my General Class ticket in a month or so.
Darn it, I had to buy a new larger hat ... the old one won't fit.
-- William B. Sullivan, WN2FBE

Huron Terrace
Kincardine, Ont.

Editor, QST:
I cannot understand those who complain of costs of ARRL membership or the services rendered. If they would discard their dog-in-the-manger attitude and explore even a few of the many possibilities ARRL offers, they would be amazed as I am at how much can be had for so little.
-- R. Loudner, VE3ATF
1441 Oakley St.
Orlando, Fla.

Editor, QST:
The article on by-passing, April, 1951, QST, is directly responsible for curing a nasty case of super-fringe area TVI for which I cannot adequately express my thanks. This is a 150-mile fringe of Jacksonville, Florida, TV and people (Continued on page 180)
Speaking of Appointments. All amateurs qualified and interested who have been licensed for a year or more are eligible to be considered by SCMs for an appropriate ARRL (Official Station) appointment. All not currently participating in operating organization through activity or appointment-holding are invited to consider doing so. Section e.w. and "phone nets offer fraternalism, at the same time they constitute the means to communicate by radio and handle record communications to as many cities and towns as can be covered in each state. Consistent operating in these nets helps one's procedure and marks him as more than a casually interested man. To all and sundry may we suggest that no engraved invitation to net participation is needed or will be provided. To knock on this door just note the section frequency used in the Net Directory in this and earlier QST's; report to the NCS as you hear others do at the time and spot in the band indicated, and you're in the net. It's a good idea after getting the hang of the net operating pattern to use the net facilities and connections to NTS by starting off a message or two to friends that may be out of the immediate circle. Now this isn't to say that the net is by any means the whole story in getting ORS, OPS, or other appointment; those are available only to members who meet the qualifications set down in Operating an Amateur Radio Station, and this, except for OES, after a whole year of licensed experience.

What you are doing in a radio way is in any event of regular interest to your SCM (address page 6, QST). When you have reported some real communications handling activity, you will not find him unwilling, but glad to consider your application for one of the station appointments. With or without such appointment there's a section net certificate, which may be earned, and usually requires the recommendation of your RM or PAM, as the case may be. A booklet describing all the appointment requisites, in addition to the year-of-licensed experience (which can be waived on v.h.f. applicants for OES), is available to members on receipt of radiogram or postal card request. Note the fields for participation in the following list:

| EC   | Emergency Coordinator. Organizes amateurs of a community or other area for emergency radio service; liaison with officials and agencies served; also with other local communication facilities. |
| ORS  | Official Relay Station. Traffic service, operates nets and trunk lines. |
| OPS  | Official Phone Station. Voice operating, example in setting operating standards, activities on voice. |
| OES  | Official Experimental Station. Experimental operating, collects reports v.h.f.-u.h.f.-e.h.f. propagation data, may engage in facsimile, TV, TV, etc., experiments. |
| OOS  | Official Bulletin Station. Transmits ARRL and FCC bulletin information to amateurs. |
| OO   | Official Observer. Sends cooperative notices to amateurs to assist in frequency observance, insures high-quality signals, and prevents FCC trouble. |

*Available where SCM determines vacancies exist. Let your SCM.

Suggested Mobile Net Operating Procedure. Mobile operational procedure for nets has been and is being evolved in the school of hard knocks. The following is from suggestions of the Oakland Civilian Defense Mobile Gang (3995 kt.). They were edited by W6BS, appearing in SARO News (S. F.). Introduced in practical operations, the points have already proved decidedly helpful and so we have no hesitation in passing along notes on this subject early in the '52 operating season. A good mobile operator will:

1. Listen for at least one minute when going on air (not to jam a round table or net operations in progress.)
2. Minimize transmitting all calls involved in a net each time he gets his turn. FCC demands that in a round table you identify yourself and station you are contacting at least once in 10 minutes. The ensuing break in operation need not be cluttered with call letters, i.e. "W6NTU and the gang, this is W6UIM/Mobile," after delaying two seconds to allow break-ins.
3. Ask the control station or other stations on a channel for permission to tune up day or night.
4. Identify by call whenever tuning, day or night.
5. In a large net or round table quickly pass the channel along to the next station.
6. Self-limit transmissions to two minutes. This helps keep up the interest for all and makes for a snappy list. Don't be an air hog.

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<tr>
<th>A.R.R.L. ACTIVITIES CALENDAR</th>
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<tbody>
<tr>
<td>Mar. 7th: CP Qualifying Run — W6OWP</td>
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<tr>
<td>Mar. 14th-16th: DX Competition (e.w.)</td>
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<td>Mar. 17th: CP Qualifying Run — W1AW, W6TOD</td>
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<td>Apr. 5th: CP Qualifying Run — W6OWP</td>
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<td>Apr. 12th-13th: CD QSO Party (e.w.)</td>
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<td>Apr. 15th: CP Qualifying Run — W1AW, W6TOD</td>
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<tr>
<td>Apr. 19th-20th: CD QSO Party (*phone)</td>
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<td>May 4th: CP Qualifying Run — W6OWP</td>
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<tr>
<td>May 14th: CP Qualifying Run — W1AW, W6TOD</td>
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<tr>
<td>June 6th: CP Qualifying Run — W6OWP</td>
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<td>June 7th-8th: V.H.F. Contest</td>
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<td>June 19th: CP Qualifying Run — W1AW, W6TOD</td>
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<td>June 21st-22nd: ARLR Field Day</td>
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<td>July 12th: CP Qualifying Run — W6OWP</td>
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<td>July 18th: CP Qualifying Run — W1AW, W6TOD</td>
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<td>July 19th-20th: CD QSO Party (e.w.)</td>
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<tr>
<td>July 26th-27th: CD QSO Party (*phone)</td>
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7. Wait two seconds before transmitting (all around) so that breaking stations have a chance to sign in or out.
8. Think twice before calling a weak DX station while in a round table of more than four stations. Attempts at such contact may result in complete disruption of a round table.
9. Operate utilizing control station and directed net instead of free net procedure on most occasions when more than five stations are in the net.
10. Break the net. Identifying with your call letters. The procedure for breaking given in the January '52 ARRL 'Phone Bulletin to PAMS and OPS ... two short carrier bursts for “please stand by as soon as possible, not urgent,” and three times similarly, meaning “please stand by at once, urgent.”
11. Check out of net where possible during a waiting period to speed up operations, reporting in at a convenient break when he returns. Practice the Golden Rule.

Let’s Work Some DX. All amateurs are cordially invited to take advantage of our ARRL International DX Competition to work or try for some new countries. Advance notices were sent by ARRL to rare DX as well as to all foreign amateur societies. Some tips: (1) Listen for DX stations instead of calling. If you can’t hear the station, don’t break the station as a rule. (2) Be sure to keep your frequency band limits to avoid disqualification. (3) Observe any tuning instructions of the DX. These are usually in the form such as 25 U or 20 D (for number of kc. up or down) or may consist of HM, LLI (high-to-middle, low-to-high, etc.) indications. (4) It is worth while of course to spend some time under contest-sponsInitied incentives to get your apparatus adjusted to peak performance, new antennas up, etc. Such efforts will continue to produce for you during the whole year of operating, and the immediate results of a station check-over are sure to be gratifying. A good antenna is half the battle. Using the same antenna for receiving and transmitting increases the likelihood of contacting more of the stations you hear. It is not generally so profitable to send Q5 DX unless you reside in DX territory. The general call falls more or less on deaf ears when W/VEs are already calling the specific DX and there are less numerous DX stations, making domestic competition keen and putting the DX in the drivers seat. Careful monitoring pays off . . . listening before calling permits timing your calls to best effect. Good hunting in the March periods of this annual ARRL DX Test! — F. E. H.

CODE-PRACTICE STATIONS

The following stations are transmitting code practice in the ARRL Code Practice Program:
W2FSI, Adolph F. Eister, 35 Commercial Ave., Avenel, N. J., 3675 kc., daily at 0700 to 0800 EST.
W2ZJX, Viola Grossman, 18 Philips Ave., East Rockaway, N. Y., 3805 kc., Mon., Tues., Thurs., 1100 to 1130 EST.
W3FZA, Karl R. Medrow, USNREF W-1, 930 “H” St., Washington, D. C., 3750 kc., Friday, 2100 EST.
W4NVU, Dade Radio Club, Charles J. Bolvin, 2207 N. 28th St., Miami, Fla., 3097 kc., Monday through Friday, 1930 EST.
W5JZ, Ray Cornwell, 909 Curtis Ave., Albany 8, Calif., 3590 kc., Mon., Wed., Fri., at 1845 PST.

Additional volunteers are needed to send code practice by radio. Schedules may be arranged to suit your convenience. Suggestions for conducting code practice are available from the Communications Department. Drop us a postal card indicating your interest and we'll send the details.

CODE-PROFICIENCY AWARDS

Have you received an ARRL Code Proficiency Certificate yet? Twice each month special transmissions are made to enable you to qualify for the award. The next qualifying runs from W1AW/WSTQD will be made on March 17th at 2100 EST. Identical texts will be sent simultaneously by automatic transmitters. Frequencies of transmission from W1AW will be 1897, 3555, 7124, 14,000, 28,000, 52,000 and 146,000 kc. WSTQD will transmit on 3534 kc. The next qualifying run from W6OPW only will be transmitted on March 7th at 2100 PST on 6500 and 7245 kc.

Any person may 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 five speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers.

Code-practice transmissions are made from W1AW each evening at 2130 EST. References to texts used on several of the transmissions are given below. These make it possible to check your copy.

<table>
<thead>
<tr>
<th>Date</th>
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<tbody>
<tr>
<td>Mar. 3rd</td>
<td>Practical Application of Pi-Network Tank Circuits for TVI Reduction, p. 10</td>
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<td>Mar. 5th</td>
<td>Three Channels on Ten, p. 18</td>
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<td>Mar. 11th</td>
<td>FCC’s Plans for Handling TVI, p. 22</td>
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<td>Mar. 13th</td>
<td>Add a Dipole to the Notes One-Tuber, p. 25</td>
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<td>Mar. 19th</td>
<td>R.F. Amplifiers for 40 M., p. 28</td>
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<td>Mar. 21st</td>
<td>75-Meter Mobile, California Style, p. 32</td>
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<td>Mar. 25th</td>
<td>The World Above 90 M., p. 45</td>
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<td>Let’s Go High Hat!, p. 52</td>
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DX CENTURY CLUB AWARDS

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RADIO TELEPHONE

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<td>W3AJO</td>
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<td>W8DAM</td>
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NEW MEMBERS

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RADIO TELEPHONE

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March 1952

63
It is impossible to consolidate information on the basis of intangible factors. Many of the factors which make or break the efficiency of any particular AREC organization and strictly of an intangible nature. The attitude of the AREC gang, the degree of good relations with local officials, the popularity of the EC and his leadership qualities—all these factors are of importance to the success of any local emergency or civil defense communications organization. They can be described on paper and even evaluated to some extent, but they cannot be consolidated into an over-all summary or survey of amateur emergency facilities, for a look at the general state of our preparedness.

A good many of the reports we receive here at Headquarters from ECs and SECs are of this nature. They do not deal in figures or quantities, but rather in evaluations of results and qualities. They do not tell us how many AREC members they have, how many mobiles, how much equipment; instead, they tell us what has been accomplished and how, and dwell on the good and bad aspects of activity, and discuss plans for the future.

The tangible figures which can be consolidated and surveyed into an over-all prospective are less important, perhaps, than the vital inponderables mentioned above; but this does not mean that they are not important. Throughout the years, reports of various kinds have flown thick and fast from appointees to leadership appointees to elected officials to Headquarters. These reports have been filed, collated, tabulated, surveyed and, in time, discarded after they have served their purpose. They have enabled us to arrive at certain numerical facts which have been invaluable in presenting a numerical picture where such a picture is needed—and it often is.

The reporting system for the Amateur Radio Emergency Corps is simple, and can include both the numerical tangible factors and the intangibles. Unfortunately, only the former can be summarized and forwarded, except in a vague sort of way. The local EC, who keeps a record of local AREC members with information on each as to address, occupation, telephone number, equipment, hours of availability, etc., files a small card once a month with his SEC. If his organization is in good order, it takes him perhaps five minutes to fill out this card. Once a month the SEC files a slightly longer report in which he summarizes the figures in report from ECs and passes along any other information which he considers important or vital; this requires perhaps a half hour to an hour of his time each month. The SEC report goes through the SCM and to Headquarters, where it is filed after being studied.

We have been studying these SEC reports to determine how effective they are as a means of evaluating the status of the AREC at any particular time—and how effective they could be. Our SEC reports filed throughout 1946, show that at one time or another reports have been received from SECs of 39 different sections. This leaves 33 sections whose SECs have not sent in a Form 8 report since the war. Of the 39 who have reported, 16 last reported in some year prior to 1952 (one in '46, one in '47, two in '48, four in '49, eight in '50). The remaining 23 sections all have one or more SEC reports to their credit for 1951. The high month in 1951 was February, when 16 SEC reports were received; the low were July and November, each with six. Ten have been received so far for December. SECs in only three sections sent in reports every month in 1951—Colorado, Arkansas and Tennessee.

We by no means judge the value of an SEC (or ECs either, for that matter) on the number of reports he sends in. Nevertheless, considering the job we have to do and the importance of maintaining a close-knit organization so that the Headquarters can act adequately on the information which AREC from a solid basis, we think that a high of sixteen reports from 72 SECs is not too good a showing. ECs may requisition Form 5 and SECs Form 8 from Headquarters upon request. A few minutes spent each month in filling them out is all that is required.

This column each month will follow the progress of SEC reports received and briefly summarize the statistics taken from them. We hope that your increased attention to this small but important detail will enable us to report continuing progress.

Amateur radio was the only communications outlet of Pierre, South Dakota, when the city and surrounding area were without electricity and completely isolated by the snow from December 6th until December 10th. At the first warning of the storm, WB5UPL put the South Dakota Amateur Emergency Net into operation. During the emergency, this net handled a large volume of traffic, dispatched telephone crews, called doctors, relayed weather reports between CAA stations, sent news dispatches and handled many personal "worry" messages. During part of the time bad conditions deteriorated to the extent that messages had to be relayed, with W9QDL and W9UTI taking major roles in this work. Amateurs all over the country helped to keep this 3900-kc, frequency clear of QRM. W6BTE, FKE, OXO and UVI were active in Pierre. Additional participants included W6BU ARU BQB BJY BLZ BQH BQS BWP CJR CTI DGC DSK DXC DYM EHO EXX FJS GDE GLA GQH GWA GWH HWS HYV I7I I7Y IVA JXU KTI KZL MMQ MIZ NJQ OBE OQG ORG OYB PHR PIN PIZ QIK SDE SIF UCS UID VQY 2NM 2ZM and ZUS.

Within 15 minutes after the plane crashed in Elizabeth, New Jersey, on December 16th, three amateur operators went on the air, one of them a mobile at the scene of the accident. W2YII, who lives near the scene of the crash, served as control station while W2FMG/mobile went directly to the scene to provide immediate communication. W9QQR, New Jersey SEC, joined them on 3995 kc. Messages were relayed to the Deputy State C. D. Director, State Police Headquarters in Trenton and to the Governor. W2ASC and Philadelphia's civil defense "ace in the hole" is a 28-foot truck containing its own heating, lighting and air-conditioning facilities, and radio equipment capable of operating on police, fire, CAA and amateur frequencies. It also has outside floodlights and a public address system which can be connected to any existing circuits, and a 10,000-watt a.c. generator. It was built by RCA for the City.

The amateur transmitters and receivers in the unit are shown above. The controls for the generating unit can be seen through the doorway.

QST for
W2SBP were standing by in Had톤field in the event the Governor needed their services. A little later, W2GUL joined W2AMG at the scene of the crash. W2LJQ and W2QD operated from Cross Headquarters. W3GJQ mobile served as a relay station. The 2-meter net was controlled by W2WCC. Others who participated were W2WCC, W2YV, W2VP, W2DK, W2MC, W2AZ and W2AJO.

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On September 21st W7FU advised W7DHN that the services of the Oregon Emergency Net were needed by the State Fire Defense Board. The forest fire situation in Tillamook County was out of hand, the phone lines into Tillamook were out and other methods of communication were needed. At 1400 W7DHN contacted W7LZE and W7WIX who got word to W7FRA to get on air. The County Fire Marshall was at W7FRA and Captain Newman of the State Fire Force. W7DHN contacted the paper plant by phone from W7DHN. W7DIX later moved his equipment to Oregon City, but was unable to get on the air in time to be of service.

The Oregon Emergency Net on 3840 is called upon frequently by Oregon state fire fighters, and the above is only an incident of several in which OEN has been of service.

**TRAFFIC TOPICS**

Expressions of appreciation for traffic handled on behalf of servicemen and veterans are beginning to reach us here at Headquarters. Some of these come from amateurs, some from non-amateurs who have benefited from the service. Here are a few of them:

1. The Coral Isle Amateur Radio Club, KG0AY, wishes to express their gratitude to the many StateSide amateurs who have handled traffic from KG0AY.
2. The Trustees of KG6FAA, now returned to the states, compliments the ARRL National Traffic System on its excellent service. Clem, KG0AD (now W8NCX), mentions W5MIQ, W5Z, W5EE, W5KZ, W5W, W6DF, W6RD, W6RZ, W6N, W6XY, W6JL, KG6AI, W7IOQ, W7MZE, W8AB, W8URC, W8F, W8FX, W8W and W8W. There are many others.
3. The Oregonian Amateur Radio Society of Portland, Oregon, installed two-meter transmitters in two Veterans' Hospitals in the vicinity in December, for the purpose of originating traffic which was relayed to W7W by two members, sent to the speedy traffic nets. About 360 messages were originated from the two hospitals in 3 hours time. W7W put the traffic on the regular NTS nets, for the most part; his main outputs were W4CE, W7FJU, W7DHN, W7NY, W7TIL, W8GQ, W8HC and W8WE.
4. W4HWA has been publicly complimented for handling some traffic for the veterans of the U.S. Naval Hospital in Jacksonville, Florida. The traffic was routed over the early HAM Transcontinental Net. Most of it, being Christmas greetings and utilizing the TRLI texts, was speedily handled as a result.

The call of W9NZZ has been appearing in the BPL right along with W8 with nobody thinking very much of it, especially since the totals submitted were not particularly high. This month, for the first time, he breaks into the "hard way" BPL list with a total of 507.

So what? We thought you might be interested to know that practically all of these came from people "frozen in" in the Far North with no other form of communication available to them for months on end, and that most of the messages were 300 to 500 words in length. Good thing they didn't have messages with texts this long, but we have to admit that in this case it's different, and that maybe W9NZZ's call in the BPL ought to have a gold star after it.

**National Traffic System**

There has been quite a turnover of management in NTS in the last few months. Nine NTS regional and area nets have been thus affected since the start of the present traffic season. Some of these have been covered in previous issues of this column, but we want at this time to introduce some new management personnel.

In the Third Regional Net, W3GEC leaves out in favor of his more pressing official duties with ARRL, and Bill Wand, W3HP, steps into his shoes. In the Sixth Regional Net, W5QI takes over temporarily from W6JZ, but Bill wants a net from traffic and would like to see someone else take the reins of RNE. In the Tenth Regional Net, W8SCA is turning the management over to W8TQ. In the Pacific Area Net, W6ZJG has resigned, leaving this net temporarily without a manager.

This turnover of management is all right if there is someone to step into the vacuum. Otherwise, it is disruptive to the smooth operation of the system. When a net manager resigns, we always try to obtain from him a recommendation for his successor; and indeed, resigning managers should make sure the administration of the net is in capable hands before they step out — because quite often it is not possible to act quickly enough to obtain a replacement to avoid a significant amount of floundering on the part of an important link of the NTS chain.

December reports:

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| Eastern Area Net: W8SCW issues regular EAN bulletins. All NCS are supplied with reporting cards and NCS traffic records. EAN is well attended by all Eastern Regional NTS and a high level of efficiency is being maintained. Pacific Area Net: The "one man Area Net" has lost its one man with the resignation of W6ZJO. PAN is temporarily without a manager.

| First Regional Net: Certificates have been issued to W3 EPS ETQ KRC NUP ONT and TBS. Second Regional Net: Certificates have been issued to W2 CUT EAS (JP RG and TYC. The 1930 session continued to increase in popularity while the 2130 session decreased; consequently, the 2130 session has been discontinued.

Third Regional Net: W3GEC, in turning over 3RN to W3FJP expresses regret at his inability to do the paper work for 3RN. Sixteen 3RN certificates have been issued, of which those to W3Q ZEC WTS and UP have not previously been mentioned.

Fourth Regional Net: 4RN has liaison connections with all phone nets in the region, and also nets in Virginia, North Carolina and Florida. Participation in EAN has been difficult due to QRN from foreign commercial station.

Fifth Regional Net: W5MKR is already thinking about NNE summer schedule. It's not too early.

Sixth Regional Net: W6WQZ takes over temporarily until a permanent manager can be found.

Seventh Regional Net: W7HIN reports that participation is on the increase, with Wyoming now on the "reliable" list, and some participation by British Columbia. Still nothing from Alberta, Saskatchewan or Alaska.

Eighth Regional Net: 8RN is holding sessions on Saturdays temporarily. West Virginia is now well represented through the efforts of W6 AUJ BWK and BTV.

Ninth Regional Net: Christmas traffic not as heavy as expected. Conditions have been very fair.

Tenth Regional Net: W8SCA says that NTS is a training ground for managers as well as traffic men. He will continue to support TEN, but W8TQ is the pilot beginning February lst.

Thirteenth Regional Net: VE1HT has earned a TRN certificate. He and VE1OM are keeping Maritime represented. A great bunch of fellows to work with, says VE8BSL.

March 1952
## SUPPLEMENT TO NET DIRECTORY

The following list of nets will supplement and correct the listings of page 65, January QST, and page 64, November QST. An asterisk (*) indicates correction from previous QST listing. This includes all information received between November 15 and January 17, 1952. Neta meeting less than once per week are not included. This list can be used to correct the mimeographed cross-indexed net directory. Another supplementary list will appear in May QST.

<table>
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<th>Freq.</th>
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<th>Days</th>
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<td>3860</td>
<td>1900 CST</td>
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<td>7140</td>
<td>0000 EST</td>
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<td>3900</td>
<td>0800 CST</td>
<td>Sat.</td>
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<td>CAA Net</td>
<td>3977, 3987</td>
<td>0815 EST</td>
<td>Wed.</td>
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<td>Delta 75 Phone Net</td>
<td>3906</td>
<td>0730 CST</td>
<td>Sun.</td>
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<tr>
<td>Denver Amateur Radio Net</td>
<td>3926</td>
<td>1930 MST</td>
<td>Wed.</td>
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<tr>
<td>East Bay Section Net (Calif.)</td>
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<td>Mon.–Fri.</td>
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<td>Eastern Mich. Novice Net (Q5MN)</td>
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<td>Mon.–Fri.</td>
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<td>Wed., Fri.</td>
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<td>Five O’Clock Net (B.C.)</td>
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<td>1700 PST</td>
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<td>1815 EST</td>
<td>Tue.</td>
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<td>Sun.</td>
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<td>N. Dak. 60 Net</td>
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<td>Y.L.R.L Network</td>
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## RESULTS — 1951 VE/W CONTEST

Final results have been announced by the Montreal Amateur Radio Club for the 1951 VE/W Contest. Listed below are the scores of all participants submitting entries. In each case the first-listed station has been declared a section winner and will receive a special certificate award from M.A.R.C. Figures following calls show the total score, number of sections worked and power input (A for 30 watts or less, B for 100 watts or less and C for input over 100 watts). In addition to the section awards, special trophies are being awarded to the top Canadian scorer and the leading U. S. entrant. The VE award goes to Clifford F. Sawyer, VESQZ, who will retain possession of it for one year, fol-

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**QST for**
BRASS POUNDERS LEAGUE

Winners of BPL Certificates for December Traffic:

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W4PPVH and W4QGH claim to hold the record for the longest Novice QSO. 8 hours and 21 minutes. Any Novices to challenge their claim?

BRIEF

A message total of 500 or more or any message originating-plus-deliveries will put you in line for a place in the BPL. The Brass Pounders League is open to all operators who qualify for this monthly listing.

March 1952
**ATLANTIC DIVISION**

**EASTERN PENNSYLVANIA —** SCM. John H. du Bois, 72387E — SEC: ISL: RMs: AXA, BIF. On Dec. 27th a complete civil defense mobile unit, the first of its kind, was delivered to the City of Philadelphia, at Reyburn Plaza, by RCA. Notables in attendance were: His Honor, the Mayor, superintendent of police, fire, and electrical public works. The Radio Association is expanding its network of well-equipped emergency set-up and recently applied for an ARRL charter. Again we make a plea for ECs, particularly in the northern counties. AXA is new RAl handling E. Pa. Net, BIP now is checking into Third Regional Net. CUUL's traffic total certainly is noteworthy. LQV also made BIP new. LQV had averaged 38.4 P.M.F. p.p.m., respectively, in the November FMTI BES hit 240 in DXCC and needs only 2 states on 28 Mc. For 4-band WDXCC is 165. The Third Annual DXCC FRG joint meeting was held Jan. 8th at 2001 Parkway, Philadelphia. Successful as usual, the main items of interest were visits to LRW BES, DX-EC exchanges, and DX50 chain contacts. Thanks for their planning, and to outstanding DX operators from several countries. The number of reports from ORS is fair, but from other appointees it is nil. Reports, not rumors, will help expand the Sollum. Bulletins: W3ICU 9955, BIP 342, AD 188, LQV 182, Q8W 65, ADE 55, OML 26, HA 30, BIE 5, QV 2, BES. ORS.

**MARYLAND-DELAWARE-DISTRICT OF COLUMBIA —** James W. John, 7W0MAN — Thirty-seven stations operating seven overfliers, on the 28-year-old Eastern Phone Net. Additional information can be obtained from KAV or TT. The Baltimore Amateur Radio Communications Association was organized on January 7th by the first of its kind, was delivered to the City of Philadelphia, at Reyburn Plaza, by RCA. Notables in attendance were: His Honor, the Mayor, superintendent of police, fire, and electrical public works. The Radio Association is expanding its network of well-equipped emergency set-up and recently applied for an ARRL charter. Again we make a plea for ECs, particularly in the northern counties. AXA is new RAl handling E. Pa. Net, BIP now is checking into Third Regional Net. CUUL's traffic total certainly is noteworthy. LQV also made BIP new. LQV had averaged 38.4 P.M.F. p.p.m., respectively, in the November FMTI BES hit 240 in DXCC and needs only 2 states on 28 Mc. For 4-band WDXCC is 165. The Third Annual DXCC FRG joint meeting was held Jan. 8th at 2001 Parkway, Philadelphia. Successful as usual, the main items of interest were visits to LRW BES, DX-EC exchanges, and DX50 chain contacts. Thanks for their planning, and to outstanding DX operators from several countries. The number of reports from ORS is fair, but from other appointees it is nil. Reports, not rumors, will help expand the Sollum. Bulletins: W3ICU 9955, BIP 342, AD 188, LQV 182, Q8W 65, ADE 55, OML 26, HA 30, BIE 5, QV 2, BES. ORS.

**MIDWEST**

**ILLINOIS —** SCM, Robert P. Lyle, 7N5U — SEC: ISL: RMs: AXA, BIF. On Dec. 27th a complete civil defense mobile unit, the first of its kind, was delivered to the City of Chicago, at Wacker Drive, by RCA. Notables in attendance were: His Honor, the Mayor, superintendent of police, fire, and electrical public works. The Radio Association is expanding its network of well-equipped emergency set-up and recently applied for an ARRL charter. Again we make a plea for ECs, particularly in the northern counties. AXA is new RAl handling E. Pa. Net, BIP now is checking into Third Regional Net. CUUL's traffic total certainly is noteworthy. LQV also made BIP new. LQV had averaged 38.4 P.M.F. p.p.m., respectively, in the November FMTI BES hit 240 in DXCC and needs only 2 states on 28 Mc. For 4-band WDXCC is 165. The Third Annual DXCC FRG joint meeting was held Jan. 8th at 2001 Parkway, Philadelphia. Successful as usual, the main items of interest were visits to LRW BES, DX-EC exchanges, and DX50 chain contacts. Thanks for their planning, and to outstanding DX operators from several countries. The number of reports from ORS is fair, but from other appointees it is nil. Reports, not rumors, will help expand the Sollum. Bulletins: W3ICU 9955, BIP 342, AD 188, LQV 182, Q8W 65, ADE 55, OML 26, HA 30, BIE 5, QV 2, BES. ORS.

**OHIO —** SCM, Leonard F. Clevenger, 7FRD — SEC: ISL: RMs: AXA, BIF. On Dec. 27th a complete civil defense mobile unit, the first of its kind, was delivered to the City of Cleveland, at JFK Plaza, by RCA. Notables in attendance were: His Honor, the Mayor, superintendent of police, fire, and electrical public works. The Radio Association is expanding its network of well-equipped emergency set-up and recently applied for an ARRL charter. Again we make a plea for ECs, particularly in the northern counties. AXA is new RAl handling E. Pa. Net, BIP now is checking into Third Regional Net. CUUL's traffic total certainly is noteworthy. LQV also made BIP new. LQV had averaged 38.4 P.M.F. p.p.m., respectively, in the November FMTI BES hit 240 in DXCC and needs only 2 states on 28 Mc. For 4-band WDXCC is 165. The Third Annual DXCC FRG joint meeting was held Jan. 8th at 2001 Parkway, Philadelphia. Successful as usual, the main items of interest were visits to LRW BES, DX-EC exchanges, and DX50 chain contacts. Thanks for their planning, and to outstanding DX operators from several countries. The number of reports from ORS is fair, but from other appointees it is nil. Reports, not rumors, will help expand the Sollum. Bulletins: W3ICU 9955, BIP 342, AD 188, LQV 182, Q8W 65, ADE 55, OML 26, HA 30, BIE 5, QV 2, BES. ORS.
LISTENING to the Novice stations on our bands is apt to bring back to us "old timers" fond memories of the "good old daze" when we were just starting in the game of ham radio. These memories are bound to produce a pronounced feeling of tolerance and good will toward the beginners of today. Does a ham, no matter how many years at the game, ever forget his first QSO? Do you remember some of the amusing mistakes you made when you were still green as grass? Certain things still stand out in the writer's mind. I was first licensed in July 1924. The first transmitter used a UV-202 on 180 meters. The antenna system was the inevitable antenna and counterpoise, the latter being the lower half of the antenna hung a few feet above ground. The antenna current was 1.2 H. W. amperes!

The power supply was similar to those used today except for the rectifier. Efficient tube rectifiers were not available yet so a "slop-jar" rectifier was used. This consisted of a couple of dozen jelly jars with slabs of lead and aluminum for electrodes. The electrolyte was a solution of borax in water. I plainly remember the day that the family cat started to quench its thirst from one of the jars just as I pressed the key!

All DX was worked at night as daylight DX was not possible. I remember visiting a ham in Attleboro and watching him work a W4 right in broad daylight, using a de-based UV-203 on 40 meters. It was just unbelievable! The usual procedure to work DX was about as follows: after supper the rectifier jars were filled with new borax solution and the power turned on until the plates were formed. The power was turned off, the alarm set for 3:00 A.M. and then to bed. At 3:00 A.M. the rig was turned on and checked. Ah! The H. W. ammeter reads 1.2 amperes. Now to work the DX (maybe a W9 or a W5) until the sun comes up. As the first faint signs of daylight showed in the east, the DX would fade out. About now the antenna current was down to .2 amperes and a look at the rectifier jars showed that the borax solution had boiled away until it barely covered the bottom of the plates.

As an example of what green-horns can do until they learn better, let me relate an embarrassing little episode of my own. In those days we made our own equipment, but, of course, it was much simpler than today's apparatus. In building the transmitter I needed two capacitors. I obtained several 6" x 4" x 1/8", glass plates from the local photographer, stacked them with copper foil plates and taped up the bundle. And where did I use them in the circuit? As filament center-tap bypasses as shown in the sketch. With these two huge capacitors in series across 7 1/2 volts A.C., I was not bothered with voltage breakdowns.

I often feel that today's ham who buys a transmitter and receiver ready-made and perhaps has someone else put up his antenna for him is missing a great deal of the fun in ham radio. I mean the pleasure and thrill of building up a piece of gear and making it work. What an advantage he has over the old timer, too. I have just been looking over the new 1952 National parts catalogue. There is an array of parts such as the old timer never dreamed of. All kinds of tuning capacitors capable of handling any power or frequency that the amateur is allowed to use. There are all kinds of choke coils, sockets, couplings and other "small stuff." Tank coils are available (we used to wind them on oatmeal boxes) and even complete tuning systems like the MB-40L and MB-150. All types of dials are available from the little MCN to the fancy PW drives. And so on. What the old timers wouldn't have given to have had all that available back then. After all, these old days are nice to dream about, but today's ham certainly has the advantages.

CAL HADLOCK, W1GTV
Eldico’s Engineering staff led the fight for the correct approach to TVI elimination. Early realization that Amateur Radio was being blamed for defects in TV receiver design, Eldico produced the new famous “W2GEX” High-Pass filter. Results of many actual field tests and installation of these filters in TV receivers procured enough data so that Eldico has convinced certain TV manufacturers to install the Eldico High-Pass filter in cases of complaint which call for use of a high-pass filter.

Pictured Above:

GRID DIPPER
Indispensable in eliminating TVI. Based on the original grid-dip oscillator designed by W2AEF and improved with regeneration especially for locating and analyzing harmonic energy. The grid-dipper includes special case, tubes, internal power supply and big 3" meter. Range 3Mc-250Mc in six steps.

GDO, complete kit with assembly and operation instr. $29.50
Wired and tested $43.00

ANTENNASCOPE
Indispensable companion for the GDO, used for positive antenna performance and efficiency testing in less TVI. Measures radiation resistance, resonant freq., transmission line impedance, receiver input impedance, feed line standing wave ratio, etc. Each kit complete including 100 µA meter.

ANTENNASCOPE-complete with instructions $24.95
Wired and tested $29.95

LOW-PASS FILTER
ELDICO’s new famous TVD-42 is a two section M-derived low-pass filter supplied with coaxial connectors for the input and output. Attenuation of harmonics radiated by the antenna is in excess of 60dB. The TVD-42 will handle up to 1 kw A.M. and is designed for 52 or 72 ohm coaxial feedlines.

TVD-42: Complete with instr. $9.99
TVD-42: Wired and tested $12.99

HARMONIC CHASER
A must for TVI. Modified absorption type wave meter for locating, measuring, and identifying transmission line harmonics. Will not swamp from fundamental. Requires an external current indicator as listed below.

TIV-complete kit with instr., less meter $6.98
TIV—wired and tested, less meter $10.98
TIVS-500—500 µA meter in matching case $7.50

HIGH-PASS FILTER
ELDICO’s famous, compact, high-pass filter for reducing and eliminating r.f. from the TV receiver. Quickly and easily assembled in minutes. Install directly at antenna coil of TV Receiver.

Sizes: 2 1/4" x 1 1/4" x 1 1/4".

TVR-300: 300 ohm Filter $1.98
TVR-62: coaxial 52-77 ohm $1.98
Filter filter wired, tested $3.98

BRUTE FORCE LINE FILTER
R.F. feeding back through the power lines into a serious source of TVI and BCI. Patterned after the recommended model in the ARRL Handbook, the brute force line filter kit comes in 2 models—1 kw and 2.5 kw. The TVI-1KW is supplied with heavy duty line cord and plug and female outlet receptacle. The TVI-2.5KW is equipped with BX changes for securing a.c. lines.

TIV-1KW: Max line drain of 1 kw. Complete kit with instr. $7.98
Wired and tested $10.98

TIV-2.5KW: Max line drain of 2.5 kw, $13.98, W. and T. $19.98

Signals of Distinction
Have you heard our "Private Tutor" Novice Course? See your distributor or our
ed in QST, Novem
ber, pages 70-71.

Eldico
OF NEW YORK
INCORPORATED
FOR HANDLING TVI -- AND HAS DONE SOMETHING ABOUT IT!

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HATRY & YOUNG OF LAWRENCE, INC.
262 Lowell St., Lawrence, Mass.

HENRY RADIO STORES
211 N. Main St., Butler 1, Mo.

HUSKIN RADIO
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New York 19, N. Y.

THE MYTRONIC CO.
121 W. Central Parkway
Cincinnati 2, Ohio

NELSON ELECTRIC CO.
233 W. Madison St.
Chicago 6, Ill.

OFFENBACH & REIMUS CO.
1584 Market St.
San Francisco 2, Calif.

RADIO AMATEUR CENTER
411 Hillsboro St.
Raleigh, N.C.

THE RYOUBU CENTER
62 Craig St. West
Montréal, Canada

RADIO ELECTRIC SERVICE CO.
OF PENNA.. INC.
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704 Hamilton St., Allentown, Pa.
916 Northampton St., Easton, Pa.
3rd & Tashall Sts.
Wilmington, Del.

RADIO ELECTRIC SERVICE CO.
OF N. J., INC.
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Atlantic, N. J.

RADIO EQUIPMENT CO.
821 W. 21st St., Norwalk 10, Va.

RADIO PARTS, INC.
300 Howard Ave.
New Orleans 12, La.

RADIO PARTS CO., INC.
538 W. State St.
Milwaukee 3, Wis.

RADIO PRODUCTS SALES CO.
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RADIO PRODUCTS SALES CO.
1214-1st Ave., Seattle, Wash.

RADIO SHACK CORP.
167 Washington St., Boston, Mass.

RADIO WIRE
TELEVISION, INC.
100 Sixth Ave., New York 13, N. Y.

R. C. & L. F. HALL, INC.
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SREPPO, INC.
135 E. 2nd St., Dayton 2, Ohio

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Salina, Kansas

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Council Bluffs, Iowa

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Have you QSO'd the 630 lately?

NOTE how clearly and exactly it reproduces the speaking voice. No other dynamic can match its brilliant performance and rugged versatility—at such a price! Thousands now in use prove it! Has the exclusive Acoustalloy diaphragm and other E-V quality features. Withstands shock, extreme temperature and atmospheric conditions.

High fidelity response 60-11,000 cps.
Output level -55 db. "On-Off" switch.
Choice of high or low impedance models.
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The MERCURY

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More Safety...Less Guesswork When You Use

**PRECISION**

- **TEST EQUIPMENT**

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With **"PRECISION"**

**SERIES 85**

**AC-DC**

(Circuit Tester)

(20,000 Ohms per Volt)

**SELF-CONTAINED TO 6000 volts, 60 Megohms, 12 Ampere, +70DB**

A compact, laboratory type, high sensitivity test set indispensible for test and maintenance of modern amateur communication equipments. Design: rugged, easy to use.

- **20,000 Ohms per Volt D.C.**
- **1000 Ohms per Volt A.C.**

<table>
<thead>
<tr>
<th>VOLTAGE RANGES:</th>
<th>0-3-12-60-300-1200-6000 A.C. &amp; D.C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURRENT RANGES:</td>
<td>0-120 microamps; 0-1-2-120-MA; 0-1-2-12 Amps D.C.</td>
</tr>
</tbody>
</table>

**RESISTANCE RANGES:**

- 6000-600K-6 Meg-60 Megohms

**DECIBEL RANGES:**

- From -26 to +70DB.

**Complete with batteries and test leads.**

**$39.95**

**PLUS**

- 45½", 50 microamps, Easy Reading Meter.
- Heavy duty bakelite case 5½ x 7½ x 3".
- Deep etched, anodized aluminum panel.
- Reversed 6000 volt safety jacks.
- Only two pin jacks for all standard ranges.

**LC-1 LEATHER CARRYING CASE**

Custom designed, top-grain cowhide case with tool and test lead compartment. $9.50

**See Series 85 and other famous "Precision" instruments, on display at leading radio parts and ham equipment distributors. Write for latest catalog.**

---

**WN2EBA** is a new ham at Northfield. The mobile gang at Minneapolis has a 400-watt transmitter and the station that is 280 feet high. QGQ has a new Viking Transmitter. CXO and 9Z9K/9 are new calls in Bemidji. ITQ is now the Twent SF Wog Tenna Manager. There are now 72 stations checking into the Minnesota Phone Net. There has been 1420 applications made for the new State call letter licenses plates. KEC was the first one to mention the Twin Cities to receive the new Extra Class license. AMM and AME attended the ARRA Club meeting at Duluth. W661AID, KPW, and H8LZ put in to the W6LW club. QJ is moving in for the winter. WEJ is on the air with the station of 1292.3. 45Z-1D raised his 75-meter wire antenna 20 feet. JID had a medium frequency. JID had a medium frequency. JID had a medium frequency. WBZ also has a transmitter trouble. M17T is temporarily off the air because of school studies. EBF is building a 200-watt O-2X. QVX has been on for a grand total of 120. J1M has been heard on 75 meters. YPQ has been giving c.w. a whirl. The South Western Illinois Radio Club banquet was a big success. The Minneapolis Radio Club, Inc, also had a Christmas banquet that was very successful. MRZ is back on 75 meters. XA1 soon will be on 75 meters. JAD is now in charge of the joint 10-meter antenna. QGQ has a new Combi-Tri Band and Mastermount. BMJ is going on 144 MHz. BQH is building E-57. Traffic: W67I 564, KEF 478, MAG 173, B46 178, BBA 72, CVY 62, GHT 52, LH 36, TKX 20, S温暖 27, HPG 19, RKC 22, KEI 18, FYH 18, FZT 5, JFZ 3, EVD 3, PXZ 2.

**DELTA DIVISION**

**ARKANSAS — SCM, Dr. John L. Stockton, WSDW**

- **LUX** had the yearly exams and handled all traffic for Harrison through OEF and ICS. Nice going, fellows. RWJ has been busy working the traffic nets, as has KT. LITA is working on rig to get on all MARS frequencies. ANR has been QRL with his taking an old job again at Camp Chaffee. NQH made some nice frequency checks over the phone and is moving to a place to take over the job at Fayetteville. Conway ham s traveled the Little Rock gang at a rather rapid pace which was well attended and enjoyed by all. FUN has new 10-meter antenna that will make him too late to be included. They must be in my possession by the third, so try to mail them not later than the first of each month. Reports are welcome from all amateur stations, so let's hear from some of your new Novices, Traffic: WS9CW 29, IFO 91, ANR 12.

**LOUISIANA — SCM, Robert E. Barr, WS6HF**

- **LET** has moved to Pineville. TCI operates 3.5 and 7 Mc from Mansfield and is building a new 150-watt station. JMA, ex-8QZ, of Donaldsonville, now is an operator of K2QW, Army Chemical Center, Md. STA and TIL, father and son, of New Orleans, are hunting some slow-speed net practice. The CAP Net now must be on the state frequency of 3870 kc each Tuesday evening. USN reports serious difficulty copying the W1AV bulletin direct because of skip conditions. EAI and FMI are making some FB records in the Frequency Measuring Tests. R1Q is a regular member of the Post Exchange Net on 14 Mc, RNS and DON on 3.5 Mc. PL, traffic operator super extra, visited NG recently. TUK, UDS, and TQX are newcomers in Shreveport. KRX and W6MT are in the W6KJ station. W6MT has two boys and two girls. DMP sends a picture of about the best-looking time meter ever, a four-element meter that cost him $2. **WN6TVW reports in from New Orleans. MWE is a consistent member of 7 different nets. Louisiana hams with W5DJ, who is hospitalization in Covington, a radio enthusiast. The attendance on the Pelican Net now runs better than 35 stations per week. 2GL has applied for his W5 call and has set up the old station K2QW/3 in Shreveport after being mobile for several months. BLQ and RTQ both underwent surgery in December with successful results. OX7 still keeps Ramsey AF3 in his shack going. KBOJ now is a consistent net outlet for Alexandria Traffic. (Nov.) WS6HI 311, NO 176, WMV 31, QCC 31, QCC 32. (Nov.) WS6HI 35, QG 349, WMV 35, QCC 35, WMV 35, QCC 36, WMV 35, QCC 36.

**MISSISSIPPI — SCM, Norman B. Seaborn, WAUJ**

- **LEJ** is now the new SEC for USF. MUG, retiring SEC, has taken a position with the Telephone Co. RTFX noted that the SSB in Japan for him on the air. PGF has been promoted to a colonel. SEP is in London, learning all about guided missiles. K5FBB is doing a fine job on J1M and Ruel. SS8 and JHS are checking into CFN, LBY, SBY, RWN, and WMV. All are doing well. W6NQ, the SEC, has emergency power available at a minute's notice. SNR is back on 7 Mc after a fling at 38 Mc. TK2W has rebuilt his 10-meter rig and is having lots of fun working W5. R1M and RHG are doing a fine job taking Jackson traffic. Thanks to W5D and WMV for their assistance in doing with the 10-meter net. Your SCM would like to have a post card or QSL from every Novice in the State. Traffic: (Continued on page 79)
The 4E27A/5-125B in the past two years has confirmed the soundness of Eimac Engineering

- **Pyrovac plate**... high overload capacity, freedom from gassing.
- **Moulded-glass header**... simplified cooling, lower losses, closer tolerances.
- **Heavy plate lead**... low r-f loss.
- **Long-life thoriated tungsten filament**.
- **Precision-aligned, non-emitting grids**... stable characteristics.

For the amateur who is building with an eye to the future, a rig with a 4E27A is the answer for fone and CW at medium or high power. The high power output of this tube with its low driving power requirement and the simplicity of modulation make this tube one of the most versatile and least costly for both amateur and commercial applications. The 4E27A pentode is rated at 125 watts of plate dissipation, is capable of an easy half kilowatt input of class-C service, or when suppressor modulated will deliver 75 watts power output at carrier conditions.

- Write for complete data on the Eimac 4E27A power pentode. Also, remember Eimac offers a personalized engineering service to help amateurs get the most out of Eimac tubes.
HERE'S HOW!!!!

The WARD SPP-143 requires only one 15'/16" hole for installation.

Installed in the same place as a standard radio antenna...no unsightly hole to refill when you trade-in your car. Merely replace with a standard auto antenna.

WARD's SPP-143 is available at your radio parts distributor. See him for the complete line of WARD amateur mobile antennas.

The WARD SPP-143 is a tapered stainless steel whip that can be adapted for all amateur mobile frequencies. Highest quality components throughout.

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the COIL that foils breakage

BUD 75 WATT COIL
with Polystyrene Plastic Base

Now Bud gives you improved performance, better appearance and long lasting quality in these 75 watt coils with the new Polystyrene base. Polystyrene has proven superior to porcelain for many reasons, including:
1. Far greater resistance to breaking or cracking.
2. The Q of the coil is exceptionally high due to the extremely low power factor.
3. Pins are moulded in place—always remain perfectly aligned.
5. Transparency adds to smooth modern appearance.

Bud 75 watt coils are furnished with fixed or adjustable center links and fixed or adjustable end links. They are air wound, mount into 5-prong tube sockets and can be used on bands from 6 meters to 160 meters. OEP and OCP Coils are designed for use in circuits using Pentode tubes with high output capacity such as 666, 6807, etc.

<table>
<thead>
<tr>
<th>Catalog No. Fixed End Link</th>
<th>Catalog No. Adjustable Center Link</th>
<th>Band</th>
<th>Capacity*</th>
<th>Amateur Net</th>
</tr>
</thead>
<tbody>
<tr>
<td>OLS-160</td>
<td>OLS-80</td>
<td>160 Meter</td>
<td>100 MMFD</td>
<td>$2.28</td>
</tr>
<tr>
<td>OLS-80</td>
<td>OLS-40</td>
<td>160 Meter</td>
<td>86 MMFD</td>
<td>2.28</td>
</tr>
<tr>
<td>OLS-80</td>
<td>OLS-40</td>
<td>160 Meter</td>
<td>86 MMFD</td>
<td>2.28</td>
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<tr>
<td>OLS-20</td>
<td>OLS-20</td>
<td>80 Meter</td>
<td>75 MMFD</td>
<td>1.95</td>
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<tr>
<td>OLS-20</td>
<td>OLS-20</td>
<td>80 Meter</td>
<td>75 MMFD</td>
<td>1.95</td>
</tr>
<tr>
<td>OLS-15</td>
<td>OLS-15</td>
<td>40 Meter</td>
<td>52 MMFD</td>
<td>1.92</td>
</tr>
<tr>
<td>OLS-15</td>
<td>OLS-15</td>
<td>40 Meter</td>
<td>52 MMFD</td>
<td>1.92</td>
</tr>
<tr>
<td>OLS-10</td>
<td>OLS-10</td>
<td>20 Meter</td>
<td>40 MMFD</td>
<td>1.83</td>
</tr>
<tr>
<td>OLS-10</td>
<td>OLS-10</td>
<td>20 Meter</td>
<td>40 MMFD</td>
<td>1.83</td>
</tr>
<tr>
<td>OLS-10</td>
<td>OLS-10</td>
<td>15 Meter</td>
<td>30 MMFD</td>
<td>1.80</td>
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<tr>
<td>OLS-10</td>
<td>OLS-10</td>
<td>15 Meter</td>
<td>30 MMFD</td>
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<tr>
<td>OLS-10</td>
<td>OLS-10</td>
<td>10 Meter</td>
<td>25 MMFD</td>
<td>1.74</td>
</tr>
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<td>OLS-10</td>
<td>OLS-10</td>
<td>10 Meter</td>
<td>25 MMFD</td>
<td>1.74</td>
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<td>OLS-10</td>
<td>OLS-10</td>
<td>6 Meter</td>
<td>17 MMFD</td>
<td>1.41</td>
</tr>
<tr>
<td>OLS-10</td>
<td>OLS-10</td>
<td>6 Meter</td>
<td>17 MMFD</td>
<td>1.41</td>
</tr>
<tr>
<td>OLS-10</td>
<td>OLS-10</td>
<td>10 Meter</td>
<td>45 MMFD</td>
<td>1.74</td>
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<td>OLS-10</td>
<td>OLS-10</td>
<td>10 Meter</td>
<td>45 MMFD</td>
<td>1.74</td>
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<td>OLS-10</td>
<td>20 Meter</td>
<td>50 MMFD</td>
<td>1.83</td>
</tr>
</tbody>
</table>

* Denotes tube plus circuit plus tank plus output coupling capacity required to resonate coil at low frequency end of band.

- **SHIELDED COIL LINKS**

These links are made to fit RIS, VLS, and MLS series of coils. This link will prevent capacity coupling between the tank coil and the link and would reduce TVI by greatly attenuating harmonics. The links can be used on co-ax or balanced lines.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>DESCRIPTION</th>
<th>Amateur Net</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM-1300</td>
<td>Used with RLS coils (150W)</td>
<td>$1.92</td>
</tr>
<tr>
<td>AM-1301</td>
<td>Used with VLS cells (300W)</td>
<td>2.19</td>
</tr>
<tr>
<td>AM-1302</td>
<td>Used with MLS coils (Kilowatt)</td>
<td>2.61</td>
</tr>
</tbody>
</table>

- **ADD-A-LINKS**

When the circuit that you are using requires a different number of turns on the coil link than is furnished with the standard coil, the links listed below can be used to replace the standard link.

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Used With</th>
<th>No. of Turns</th>
<th>Amateur Net</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM-1303</td>
<td>RLS</td>
<td>3½</td>
<td>$0.59</td>
</tr>
<tr>
<td>AM-1304</td>
<td>RLS</td>
<td>4½</td>
<td>$0.54</td>
</tr>
<tr>
<td>AM-1305</td>
<td>RLS</td>
<td>5½</td>
<td>$0.53</td>
</tr>
<tr>
<td>AM-1307</td>
<td>VLS</td>
<td>3½</td>
<td>$0.73</td>
</tr>
<tr>
<td>AM-1308</td>
<td>VLS</td>
<td>4½</td>
<td>$0.54</td>
</tr>
<tr>
<td>AM-1309</td>
<td>VLS</td>
<td>5½</td>
<td>$0.63</td>
</tr>
<tr>
<td>AM-1310</td>
<td>VLS</td>
<td>6½</td>
<td>$0.72</td>
</tr>
<tr>
<td>AM-1311</td>
<td>MLS</td>
<td>3½</td>
<td>$0.81</td>
</tr>
<tr>
<td>AM-1312</td>
<td>MLS</td>
<td>4½</td>
<td>$0.96</td>
</tr>
<tr>
<td>AM-1313</td>
<td>MLS</td>
<td>5½</td>
<td>1.05</td>
</tr>
<tr>
<td>AM-1314</td>
<td>MLS</td>
<td>6½</td>
<td>1.14</td>
</tr>
</tbody>
</table>

Bud products include coils, condensers, R.F. chokes, sheet metal ware, etc. See the complete Bud line at your local distributors.

**BUD RADIO, Inc.**
The Mark of Perfection
2120 EAST 55th STREET CLEVELAND 3, OHIO
ELV 390, SCW 275, ILP 151, QBO 134, QIX 103, DLZ 87, JV 55, SPF 50, COW 45, FX 45, AQA 40, RTN 37, WYO 35, YNY 39, IXR 27, TLD 25, DAP 21, DOF 20, QRM 17, LB 16, JVR 14, TQP 12, LDQ 11, RJL 9, DZ 8, EXZ 4, MGQ 4, EGI 3. (Nov.) W8UKV 140, NZZ 71, SWG 87, IBD 23, COW 21, NIT 19, KHT 10, DLO 4, EGI 2, PP G 1.

OHIO — SCM — John E. Sinner, W9AJW — Asst. SCM — C. D. Hall, FPON, and J. C. Erickson, SDAE. SMP: UPB, PAM; PDN: R. M. St. John, and PAM; PAM: CQ-5. PAM: BPL, new QRM: RM for Ontario County, LG for Noble County, and TOB for Lorain County. CDT has moved to Los Angeles. CAS is operating over N7JMB. AUF is threatening to go QRP. AQ received his 3.5-Mc. WAC endorsement. PKB has completed his new shack. We have acquired a 10-zero antenna designed by M. G. G. in Florence, Italy, and plans to be on with a 320-W and 440-W out. The OPP is active on 425 Mc. DMD has just completed his 200th country. PEN has returned to 3.6 Mc. Newly-elected WPRO officials are AJW, pres.; SBB, secy.-treas.; and VM and ZEG, trustees. WM7 was elected president of the Dayton Club. BRA has just received QSF from country No. 220. W7SHOF has worked 16 states with his ten meter multielement, QSL. QSL Manager, was first at L87, QSL Manager, was second at L87, QSL Manager, was third at L87, QSL Manager, was fourth at L87.

The Dayton Club, QSL, now has a new member, W5QMC, who is NCS of the new Northeastern Ohio MARS Net, which meets Mondays and Wednesdays at 1900 and 2100 EST, respectively, on 27,204 kc. The QSL was received on Jan. 12th. ZP operated from the mayor's office in Beaver Dam in the u.o. alert of Dec. 9th. UPB, our most capable and beloved SEC, is doing a fine job of covering the section. L7Q has acquired a Viking 8 kit. FJX is a newcomer to the 2-meter band. Only two bulletins arrived this month. The Q5 of Springfield tells us that W7NHK is on 143 Mc. every evening. GUD has a brand-new male ham, W7NHM, now is city commissioner at London, Ohio, and IRT is a newly-licensed amateur. The Columbus Circumcision states that GO-1, now known as G70, is W7BM, a new member. G70 was the speaker at the Jan. 4th meeting. N7AKO now is W7BM at Lockbourne Air Base. FJN is back in the 37th Air Group, W7RC has worked 11 states on 144 Mc., and Franklin County ARRC, in charge of WAB, SEC, met on Jan. 6th. Your news wish is to thank the reporters in this section for the ever-improving support and cooperation he has gotten. As all of you know this is YOUR column and each additional report received will make it more "new," Earl Gibb, W9XVC, operator of the Ohio State Highwy Patrol, Findlay, Ohio (and in the Patrol for some 15 years), writes to say that the Patrol is expanding operations from 400 Mc. to 144 Mc. for 200 Mc. and 40 radio operators to 650 and 80 operators. Communication with and assistance to the police is handled in cooperation with the Ohio Highway Patrol, and 46 calls are handled daily. W8XMF is president of the club.

Hudson Division

Eastern New York — SCM: Stephen J. Neason, W2EWA; Assistant SCM: Robert J. Cushing, W2GSC; Assistant SCM: Robert J. Cushing, W2GSC; Assistant SCM: Robert J. Cushing, W2GSC; Assistant SCM: Robert J. Cushing, W2GSC; Assistant SCM: Robert J. Cushing, W2GSC. As you know, the pressure of the requirements of the Club's vocation has made it easier for him to get more ham radio for more people. We have a large number of satisfied and interested in the best of success, and we would like him to know that everything possible will be done to assure the continuation of all of his policies. We are happy to note that W7SE, retaining the post of Assistant Director, Teamwork is the foundation on which the success of any section is built, and CLL has assured me that such teamwork needs not be solicited as it has always been present and is one of the outstanding characteristics of this section. My field of activity has been mainly confined to the 30-Mc. band and for the past year I have served as your SEC. I will rely almost entirely on the suggestions and activities of the various groups who have a part of this section and likewise, the PAMs and the QSOs for the phones' news, phone and Mail. W7GH, a hobbyist, is a regular contributor, and the number of the section are solicited, welcome, and will receive prompt attention. ARREC work is moving along rapidly, and that field also is expected to be more active in the new demands, Jan. 5th marks PH0's 175th QNI into DON, every single morning, starting July 14th. Including holidays, seven times a week, special requests, section activities, traffic finals, and appointments made or renewed are omitted this month because of insufficient time to transfer the necessary information to this information will be included with next month's report. Please send me as much information as possible each month as you can. Please, don't forget that news and traffic reports are due by the fifth of the month. Thanks and 73 to each of you.

Traffic: W8PRO 325.

W7LX NY CITY AND LONG ISLAND — SCM: George W. Carver, Jr., W2RUB — SEC: SYW, RM: TUK. PAM: YBT. The new TV1 Organization of N. Y. has the

(Continued on page 78)
SUPPLYING TODAY'S NEEDS

Present-day jeweler's "magic" is seen in this Time-O-Graff, used to check accuracy of watches. Made by the Borg Equipment Division of the George W. Borg Corp., it relies on the delicate mechanism of a JK H18-5 crystal.

and DESIGNING TOMORROW'S

Even newer crystal design is reflected in the JK-8-T Temperature Controlled Crystal. A boon to manufacturing savings, it is directly interchangeable with several other JK crystals — without need for wiring changes!

THE JK-8-T MARKS A PATHWAY FOR THE STARS!

More astounding every day grow the uses for James Knights crystals in every phase of industry and science! Recently the JK-8-T — teamed with the JK-07 and JK H-18 crystals — has been used in "celestrial timers" in observatories. It's part of the intricate mechanism which keeps huge telescopes beamed directly at celestial bodies in their path across the heavens. Still another dramatic application of James Knights crystals which are designed or adapted to fill every possible crystal need!

The James Knights Co.

Sandwich 6, Illinois
As Seen in QST

May 1951 page 21

One-Tuber

following officers for '52: EBP, pres.; KTH, vice-pres.; DMC, secy.; KNV, treas. The group announces a 10-meter TVI Sweepstakes to get all possible air on 30 meters before the weather turns bad. No. 1 station for this worthwhile way of luring TVI. Prizes will be a hand-bound book tied with the call letters and a beautiful certificate presented to those turning in the highest score. The Num-

erous Club elected the following officers for the new year: DRZ, pres.; ACO, secy.; LAG, treasurer; AAG, and BDG, delegates to FLIRC. The Club operates a net on 3600 on Sundays at 1000 for all members, The North Shore Radio Club officers are KBX, pres.; JMA, vice-pres.; TAT, secy.; AMB, treas. Some of the members are learning to n.a.b. and trying out new beam antennas. AMB is lining up QWA members for a net on 5405 kHz, Thursdays at 1000 and Saturdays at 1100. The Mid-Island Club recently elected YBT, pres.; ICW, vice-pres.; QM, secy.; SMQ, treasurer; CLG and TGG, trustees to FLIRC. (X3) was a life member of the Club, the first ever in the Club. GE, past pres. of the Albany Radio Assn., was voted a new member. Look for Paul on 7-Ma. etc. The New York Radio Club selected VOU, pres.; IVE, vice-pres.; ZFZ, secy.; UMK, treas. and INB, hon. secy. for 1952. The Club has a membership of 15 and is growing. The club operates two nets on 7-Ma: one at 740 and the other at 760. The club members are all active members of WAA. The Queens Radio Amateurs of Glendale elected LJI, pres.; AOY, vice-pres.; MJO, secy. The Club has 14 members with a couple of hams who are licensed to operate in various combinations. Members participate in the club, and many more are in the NLL Traffic Net. The Lake Success Club, YQG, named RQH, mem.; AHE, vice-pres.; and TNL, secy. An intensive program of TVI elimination is in progress in cooperation with the Field Day and the H.F.S. Club. The club has made its objective of 100 contacts, including contacts, on 144 MHz, alone in 51 Traffic. W2VWI 794, BO 381, ODU 513, EC 530, JQ 214, LF 208, GP 201, QX 128, TUK 105, VO 54, BGO 31, D1C 23, FF 17, PZE 15, QW 10, DZE 8, BM 5, ROJ 3, DX 7, LLA 6, IES 6, XFK 3.

NORTHERN NEW JERSEY - SCM, Thomas J. Ryan, jr., W2NKG - SEC; VQB. The Jersey Nets meet at 9000 daily on 3700 kc. The L.D. Phone Net meets at 0000 Sundays on 3900 kc. The N.J. Phone Net meets at 0000 Sundays on 3900 kc. The Garden State ARA held its annual dinner Dec. 19th in Fair Haven. If you want to join the club, contact LAM for details. Elizabeth Area has 50 members, 40 of whom had great work following the tragic O-46 plane crash which took 10 lives. Taking part were KAGG, EUI, LIQ, GJQ, WCC, HVK, VCY, JYC, WN3A2G, WN3KNI, HFP, IIN, and PFX. Diesel contact to KIM headquarters went through W7I. The latter attended the GAIA meetings for a week in Washington. He reports great progress being made for amateur radio in the c.d. organization. AREG applications were received from IGD and ETFL. WN3A2JR is working 144 Mz, from Villanova College, where he is studying biochemistry, and the station for TVI elimination is in progress with the help of all members. YQG was attended in the Astronomical College in Louisville. In addition, he was a new Motorola receiver for his module. CWS was appointed chairman of the radio table at Westwood, EAS, using a 7-Ma phone with 59 watt peaks, worked four W6s. NBY has worked 200 Novices. A new VAMR, 800, was bought in a home by a ham in New York City. The Ocean County ARA held its annual dinner Jan. 30th. LIQ is the new E7 of Elizabeth. YXX has purchased a new WRL-130 watt and is quite busy. WZL33R, 113, has a new tower. WZL34, CUI 337, CWS 314, WC1N 302, HGL 317.

(Continued on page 32)

Transmitter complete except for coil

NOVICES -- you find answers to your problems in QST, the complete magazine on amateur radio. Whether it be a simple transmitter or a question on wiring, it's in QST. Just look back through the past twelve issues at the

14 articles, containing

19 diagrams, using

49 pages

aimed at beginning operators. More are coming. Don't miss any!!

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THE AMERICAN RADIO RELAY LEAGUE, INC.

HARTFORD, CONNECTICUT

80

(Continued on page 28)
New 1952 Heathkits

**Heathkit**

5" OSCILLOSCOPE KIT
- New "spot shape" control for spot adjustment — to give really sharp focusing.
- A total of ten tubes including CRT tube and five miniatures.
- Cascaded vertical amplifiers followed by phase splitter and balanced push-pull deflection amplifiers.
- Greatly reduced retrace time.
- Step attenuator — frequency compensated — cathode follower vertical input.
- Low impedance vertical gain control for minimum distortion.
- New mounting of phase splitter and deflection amplifier tubes near CRT tube base.
- Overall simplified wiring layout.
- Increased frequency response — useful to 5 Mc.
- Tremendous sensitivity .03 RMS per inch Vertical 6V RMS per inch Horizontal.
- Dual control in-waver sweep frequency circuit — smoother aging.
- Positive or negative peak internal synchronization.
- Multivibrator Type Wide Range Sweep Generator.

A brand new 1952 Heathkit Oscilloscope Kit with a multitude of outstanding features and really excellent performance. A scope you'll truly like and certainly want to own.

The kit is complete with all parts including all tubes, power transformer, printed and formed chassis, etc. Detailed instruction manual makes assembly simple and clear. Various step-by-step instructions, pictorials, diagrams, schematic circuit description and uses of scope. A truly outstanding value.

**MODEL 0-7**

**SHIPPING WT. 24 IBS.**

**$43.50**

**Heathkit**

VACUUM TUBE VOLTMETER KIT
- New styling — formed case for beauty.
- New truly compact size — Cabinet 4-1/2" x 4-1/2" x 8-1/2" high.
- Quality Simpson 200 microamp meter.
- New ohms battery holding clamp and spring clip — assurance of good electrical contact.
- Highest quality precision resistors in multiplier circuits.
- Calibrates on both AC and DC for maximum accuracy.
- Terrific coverage — Ranges from 10 V to 10000 V AC, 10 V to 1000 V DC, and to over 1 billion ohms resistance.
- Large, clearly marked meter scales indicate ohms, AC Volts, DC Volts, and DB — has zero set mark for FM alignment.
- New styling presents attractive and professional appearance.

The 1952 Model Heathkit Vacuum Tube Voltmeter! Newly designed cabinet combines style and beauty with compactness. Greatly reduced size to occupy a minimum of space on your work-bench. Covers a tremendous range of measurements and is easy to use. Uses only quality components including 1% precision resistors in multiplier circuit for greatest accuracy. Simpson 200 microamp meter with easy to read scales for fast and sure readings.

All parts come right with kit, and complete instruction manual makes assembly a cinch.

**MODEL V-5**

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MERIT HIGHPOWER
Filament Transformer P-2943

Designed for highpower use in both Amateur and industrial applications.

Specifications: Sec. Volts, 5—Sec. Amp., 50—Insulation Volts, 3000—Center tapped with primary taps for 110-115-120 volts, 60 cycles—Dimensions, 37/8 H. x 3-3/16 W. x 45/8 D.—DL Mounting... Will handle a pair of 250 TH's... 4–250 A's... 4–125 A's... 4–400 A's, etc.

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for the high-power man!

ANG 113, EAS 105, OXL 26, NCY 20, NIT 14, HIA 10, CBP 8, G3X 4. (Nov.) W2CUM 218.

MIDWEST DIVISION

IOWA — SCM, William G. Davis, W6FBP — AUD, had a pleasant surprise birthday party from the members of the Des Moines Radio Club. NFI is in the Navy, ZFO is building a new compact 60-watt c.w./phone rig. IVU has the Lyco rig. FZO received his Novice licence in Burlington is WNI6CCG. ANR and TQG now have their Advanced Class licences. LAG visited his son in West Virginia over the holidays. SCM says it makes BPL. It's getting to be a habit. WMY reports that his license, VTA, was home on a 20-day leave from the YTA; reports that he's coming back on 76 meters one of these days, by heck! The Waterloo Club threw a dinner party for the XYLs at the December meeting. BOL reports that his XYL, WN3FPCW, are new Waterloo residents. RPT is spending his time looking for a new TV set. The Iowa 100-meter Net's roll list 37 members, of which 26 are operating members. BZJ reports from Iowa City. BWL reports a new VFO which is working top shape. PP is now a member of the Old Timers Club. SEP is a new Club Watch for his bulletins on 3560 kc, at 9:45 p.m. Monday through Sunday. Let's see that this column is filled with news. Traffe: (Dec.) W6S2A 805, W6CST 204, VTA 150, NCY 110, N12 84, DF8D 42, FZO 28, WMU 12, USO 9, BWL 1. (Nov.) W8BDR 34.

KAN. — SCM, Carl E. Johnston, W6FCV — SEC: PAH, RMI: EJL, FAM: HEC. The Jisvaban Amateur Radio Society of Kansas City held election of officers Dec. 28th. and now has CAG, prez.; DXE, vice-pres.; ZGR, sec.; KED, treasurer; and FQE, Robert E. Kuhl, AIC, and KXX/NIY, directors. On Dec. 28th the Central Kansas Radio Club elected RGW, prez.; BDK, vice-pres.; KLL, sec.-treas., and TSR, alt. mgr. On Dec. 15th CRBC held its annual ladies' night with forty members and XYLs attending. The Topeka Emergency Net, which operates on 26.28 kc., handled 62 messages during December. GHIR is Net Manager. OAG was absent from Lawrence, was very busy during the TCRN handling Christmas traffic. W6SBEK is a new call here also. HIG, at Lawrence, has just finished 500-watt rig with p.p., 840's and three-element beam on 16 Me. Besides keeping his O6s steady and pinch-hitting for ED, is building a 6-meter converter. UWN, of Waterville, a new repeater, has a new NC-125, DEX, of Topeka, gave General Class ticket after having his Novice ticket a couple of months. W8BDYT has 30-watt mobile rig on 144 Mc., and 4-meter Gmcr perk PB. QBO is getting his 128-element tube modulated 4–125 going on 28 Mc. The Kansas C.W. QRS gang handled over 900 messages. Nice going, fellows. Traffe: W6NY 118, FDL 145, OAO 129, BEH 140, Y6E 95, YFE 85, BHI 69, ICY 25, LIX 24, KXJ 21, TWD 14, BNV 12, V8Q 10, HBL 2.

MISSOURI — SCM, Clarence L. Arandula, W6GBJ — QXO makes BPL, again although activities were curtailed because of the illness of his XYL. OQR gathered a nice traffic total from MON, TEN, CAN, and DUN Nets. Our apologies to BVI for the error in the last traffic report; BVL's traffic was mainly from the Early Bird Net. IQY reports into MON, MEB, TEN, and TCFN Nets. IOW reports increased traffic activity on SE MO Net, WAP recently paid a QRP visit. ARM and ARH have a good bowling association so ham radio has been neglected of late, GAR's traffic fell off because of his illness during a part of December. OUD reports a need for outlets in Southern Missouri on MON Net. AID is in Washington, D. C., attending C.R.E.I. and we miss those traffic reports from him. SUI has new Lyco VFO programing the transmitter. EBE is building a new exciter unit which looks very fine. PHJ has the rig back on the air, but is having trouble with r.f. in the speech amplifier. G1W now has a DX LIX of 151 countries. The 8MAR has elected the following officers for 1962: BPD, prez.; CIA, vice-pres.; CZC, secy.; VTH, treas.; and IBE is reporting to MON and TEN Nets. ARD visited his father's BPD, during the holidays. FNN is trying to eliminate an offending harmonic. DCFB has a good trail report. Those handling traffic are urged to send a monthly report to their SCM. More reports on news items of interest are needed from various parts of the State. Traffe: W6SVS 807, CFI 424, IQY 181, BVI 174, BHI 165, OKC 103, GAR 87, EBB 54, HUI 47, OUD 38, ICW 20, KKK 12, NIN 7.

NEBRASKA — SCM, Guy R. Bailey, W6KJP — JED has resigned as SEC because of the press of his general business, JDI of Lincoln, is our new SEC. Fran is a member of the State Civil Defense Board. OYD is geologist on Oilie Dam in South Dakota and reports the arrival of a new baby girl, QIK. Now is one of the operators at K4AF. Fort Myers, Va. AUS has moved to St. Paul, Minn. APK now is living in Denver, Colo. BPP now is working a new 5-in. Advanced Class ticket. BUD is a newly-wed. KD8 is the daddy of a new baby girl, Linda, born Nov. 12th, Frank is trying to get those 2000s into working. SB1 acts as N3C, for the time being when Buzz is absent. Buzz reports new c.w. net members AlP, YNA, OFL, WCB, BSA (in Colorado), and G7Q. UVU is doing a nice job with the 75-meter net. BZJ now is active (Continued on page 84)
Be Sure of Your Installations

Get the Aptitude-Tested

RG/U TRANSMISSION LINE CABLES

- You know what you are doing when you use Belden RG/U Transmission Line Cables—they’re aptitude rated. They are designed to provide desirable electrical characteristics, and rigid control assures constant quality. Specify Belden Radio Wires.

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To You,
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—product performance that can come only from a 'know-how' that has grown through actual service since the inception of Radio.

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on 75- and 160-meter phone and will soon be available on the 75-meter net. KJX reports having a fine time with 00 duties, checking 3.5 and 7-Mc. cw, and may be heard at the end of the report. DX operators at KEWO, the new b.c. station at Oklahoma University, are active every Monday and Wednesday, 1:30 a.m. to 3 a.m. You can talk to them. We wish you the best of luck. Also, check for cooperation in getting your reports in the first of each month. Trafficer: (Dec.) W8KTC 146, LAF 128, JDJ 104, EOT 72, SAI 59, XLJ 43, KJX 25, KDW 10, BZC 12, KJF 8, YNA 2. (Nov.) WBZBC 12.

NEW ENGLAND DIVISION

CONNIE CUTE — Acting SCM, Roger C. Amundson, KWHII — Because of State Guard and other activities, his PAM and CPN management positions. Harold Class, STM, of 334 Silver Lake Rd., Naugatuck, is handling PW only. Please give him your utmost cooperation. Thanks to Ray for the many years of service to the section. KSH is a new YL ham in Norwich. We need a new PW, please. David Shink, DJV, is active on the QST, and D17K, who is new EC for Darien, and LIG. Also W1UYB was the new one to QN into CTN. SJ0 leads with a total of 188, including new OHS, on the new one. QST in November, PAM, new PW, on Wed, Fri, at 1200 on 3960 kc., at 1800 on 3880 kc. SLAM and SLI, of Orange, formerly BNYN and STONC, are active on 75 meters, YW takes part in the November PAM, BtY, 000, and YW. LQV, who has been off the air, is a new PW for Shelton. SJ0 is new PW, Class III, and OPS. Those who have not heard any PWs are wanted, and who do not report are going to lose them shortly. Do your part. What does it mean? Just a thought about having the section meeting this year. We have the New England Division Convention in Spring. Would you like to be featured on June 14th? Would like to hear your opinions. Traffic: (Dec.) W8SJO 415, AXC 268, LIF 165, H1X 125, AW 112, HYF 109, KQY 108, RSW 46, RJS 58, RJS 26, BZD 31, NIF 3, W2D, BTY 24, LIG 24, OQV 18, OS 15, LQV 12, CTY 11, QVR 8, (Nov.) W2NQI 56, LQV 51, NBR 9, YU 3.

MAINE — SCM, Orestes R. Brackett; W9PTB — WSC, KG, RM: LKQ, Net frequency and time: Treese Net, 3309 kc., at 0900 Mon, through Fri; Sea Gull Net, 3960 kc., 1730 Mon, through Fri, Civil Defense every Thursday from 1045 to 1100 on 3960 kc., also, Friday from 1000 to 2000 on 3001 kc., Control Station, FRS. Another new PW in Fairfield, OQV, is doing a nice job with an HT on 28 Mc. A new PW in Skowhegan, W1NQI, the son of the late Fred, of Skowhegan, has the new Advanced Class license, and is doing a fine job on 3.5 Mc. W2UNY, WAU 14, W2UPX, and W9WPF, are active. Students of Deerfield High School, are operating on 3.5 Mc. W2NF, Warren, has gone South for the winter, as has his PW, who probably will go to Texas before he returns. A new PW in Stockton Springs was awarded to K9Q, really a regular member. KG and OEN should be back in Maine before long, after having signed a contract with ENSWO. QST in November, PW, Ocean Springs, has been calling into the QGN quite often lately with traffic from the PTA. WFH has made house new house complete as he back with the PW. A new PW is living in Winthrop but we don’t hear much from him since he got married. SBU finally has 14, 15 Mc, with a swl signal. Traffic: W8ELT 127, QVB 68, QYQ 25, OLQ 26, HXXQ 34, SJE 32, EFR 31, BTY 30, PTI 23, RZX 22, HUL 17, FLL 14, WSGC/F1 11, WLL 9, QEK 5, SRO 9, KDE 1.

EASTERN MASSACHUSETTS — SCM, Frank L. Babcock, jr.; W1ALP — New appointments this month: E8C: STA for Haverhill, PTY for Ipswich, DIXH for Fall River, QW for Newburyport. OBS: QON. Appointments endorsed for another year: E8C: PBT, RRP, MZ6 Topsfield, R36 Whitman, DDC Ayer, D3C Nahant. As O8: RRP, As OBS: RBB, MRQ, AQB, PYM, LAM. As OBS: MZB, As RM: AQB, As QM: AQB, As OQV: AQB. Sorry to have to announce the death of two hams, CAL and MEF. Hams on 144 Mc.: AZY, SXTD, KQ, T7T, KGU, KBK, KAV, E4U, E4V, KVR, and NAV, and N4Y are on 28 Mc. QNP are on 3.9 Mc, JCI on 3.5 Mc, 3QZB gets on at 01X. HZT, LLZ, QU, LAZ, RVK, and BBR are on 28 Mc. Net certificates have been issued to BY, MX, and PA1 in the Eastern Mass. Net on 3960 kc. The Boston Morrisides both have calls now. RUS in UQB and Bob is U6M, new Novices. The South Shore Club had the TCP from ABU at its meeting. The Wellesley Amateur Radio Society is holding regular classes. The T-9 Radio Club met at W9YV’s QTH. The Eastern Mass. Club and Bob Hall put on a show to talk. The Quannapowitt Radio Assn., had Dick Miller, of Harvey Wells Co., give a talk on TBE-2. The Braintree Radio Club held its monthly meeting. RRP gets on at KBN some. HZT got a Bandmaster and is on 3.9 Mc. DIXH is active on 144 and 3.9 Mc, GBC, Chatham, acts

(Continued on page 90)
VIKING I TRANSMITTER KIT

Final Amplifier: 4D32 with pi-network tank circuit — ganged rotary inductor and variable condenser results in efficient continuous tuning — numerous random length antennas can be matched without external couplers — protective fixed bias applied to 4D32 at all times.

Exciter: 6AU6 Pierce crystal oscillator with electron coupled plate circuit — choice of 10 crystal frequencies with both fundamental and harmonic operation — low current current — buffer screen voltage variable for 4D32 excitation control — ample drive on all bands.

Modulator: 6AU6 speech amplifier, 6AU6 driver, pp 807s modulators — designed for use with crystal microphones — nominal 500 ohms output impedance available for driving high powered modulator.

Power Supplies: 5Z4 low voltage rectifier, 6AL5 bias rectifier, parallel 5R4GY high voltage rectifiers — transformers supplied for 115 volt 60 cycle operation only — power consumption 375 watts with transmitter fully loaded on phone.

Physical Description: Cabinet 113/4 x 15 x 21” with dark maroon wrinkle finish, hinged top cover — panel grey 83/4” x 19” with matching maroon trim — dials are special for the transmitter, maroon phenolic with satin chrome skirts — net weight of assembled Viking 1, 69 pounds. JOHNSON VIKING I KIT, complete, less tubes, crystals, mike and key amateur net $209.50

VIKING VFO KIT

6AU6 electron coupled oscillator, OA8 voltage regulator — calibrated for and covers all amateur bands from 160 thru 10 meters — two separate, temperature compensated, tank circuits — frequency substantially independent of plate voltage — air dielectric high and low frequency trimmers — ceramic insulated condensers and coil form — rigidly constructed throughout — housed in dark maroon cabinet with contrasting grey panel and maroon knobs — cabinet equipped with rubber feet and handy tilt bracket — VFO readily adapted to existing transmitters — simply plugs into the Viking I transmitter.

JOHNSON VIKING VFO KIT, complete, less tubes amateur net $42.75

JOHNSON SPEED KEYS

A variety of models to choose from — every one a quality key. All have live steel vibrator spring; complete pivot, contact and excursion adjustments. Damping wheel and adjustable paddles. A wide range of speed adjustments, plus heavy or light dots, as you like. 114-501 Beautiful chrome finish, heavy steel base 61/4” x 31/2” x 1/2” with four non-slip rubber feet. All machine parts heavily chrome plated, 1/4” coin silver contacts. Equipped with circuit closing switch. Net weight 4 1/2 lbs.

114-510 Complete adjustments, wide speed range and action to please the most critical operator. Die cast base 31/4” x 6” x 1/2”. Base and frame black wrinkle finished. Vibrator and all hardware heavy chrome plated, 1/4” coin silver contacts.

114-510 amateur net $8.10

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**TYPE BH6A RANGE:**
1.4 - 75.0 mc
Supplied per Mil type

**TYPE SRSA RANGE:**
2.15 - 65 mc
Supplied per Mil type
CR-1 when specified.

**TYPE TCO-1**
Temperature Control.

**TYPE BH7A RANGE:**
15.0 - 50.0 mc
Supplied per Mil type
CR-27 when specified.

In the KP4 net each Monday at 6:45 on 5500 kc, and some in the Eastern Mass. Net and other nets in the A3C and BC-345. EMA has a 60-day model 606 frequency multiplier, TC relayed traffic for the Hoby Show in Berkeley, PL, and the 50 MHz, 2,340 kc. When in London, has a call on the A3C Net over W3XV, Vt. He is also in the General Radio Net, BB is busy with a 5-6 Mc. DX tests. QN is in deep Sea in Dragnet 3.9 k., New hams in Lynn: Tom Ehrlichberger is W1MNE, his XYL is W1U1MZ, Dick Ward is TUX. New officers of the Old Colony Amateur Radio Assn. are SUE, pres.; OLL, vice-pres.; EGE, treas.; meetings are held at the Community Club House in East Foxboro. SUE has mobile rig in his car. ODQ, 10T, TQQ, SUB, and PGC put on a demonstration for local c.d. ban. At Amherst, Belmont, is back on the air, after a lapse of 30 years, with a Lyco 600S. MRQ is a major in the CAP, DDC is working at M.L.T. and is on 1.8, 1.94, 2.2 Mc. Town EC, has the following working with him: ADL, AXD, OMD, IQD, LNX, MR, PAG, and CRK, has a mobile rig. QSY Radio attendance list for the ham session held by the Yankee Radio Club were S8N, HCH, HP, QTY, PTV, TQO, and Bill 7TH, HK-8, who was in Europe, had a QSO with HCH. HCD has a rig in his car on 4.3 Mc. BW is busy with a CAP work and has been working with c.d. director and is on 7- and 14-Mc. c.w. CTW, BW, B6, DBS, TQQ, and SH attended a meeting at M.L.T. on frequencies for the State's c.d. work. Bud Fischer, Roger McCoy, Bob Cullbom, and Ed Loring, members of the Wellesley Amateur Radio Society, are going to be examiners and are awaiting licenses. W1UJQ is building a 6m fighter transmitter. PL has been in Alabama but is moving to Kansas City. MfX is building a rig. PL has a list of Novice amateurs at $1.00 for 10 issues. RBN is NCS for Region 9 Net on 29.245 kc. Wed. at 9 p.m. MGF has a rig and is using it. P2U is set on 3.8 Mc. New Eng. and Net is on Thurs. at 7 p.m. on 1525 kc. SS is NCS and all states report in. PXX, BFG, and BBI brought part of the frequency Massing to NCT. W1UFL and W1TWG are on 144 Mc. W1USM is now in Charleston, and NT are on 3.5-Mc. c.w. TST, in Saugus, is on, too. F1's girl is W1USI. New officers of the So. Eastern Mass. Amateur Radio Assn. are AYX, pres.; L1Z, secy.; L1Z, treas. All Massachusetts amateurs are urged to get their new drive to get call-letter license tags. Letters have been sent to all Senators and Representatives in Massachusetts, Support House Bill 610, Traffic; (Dec.), W1HAR, 388, TY 399, SS 305, LM 271, JCK 174, NUP 119, DMH 110, UE 106, WU 23, CTR 13, THU 12, 21, 35, 8, 9, 10, QON 4, AVY 2. (Nov.) TOS, Type X.13.

**WESTERN MASSACHUSETTS — SCM, Victor W. Peacock WIEOB — SEC: JYH, RM: BYR, PAM: RJO. WMM meets Monday through Thursday on 3790 kc. at 7 and 10 p.m. The Net is operating at slow speeds to encourage newcomers to participate. Everybody is welcome to join. It is, in great part, because I report the passing on of W1GZ. We had been doing an excellent job with the c.d. nets in Region 9. His guiding hand will be sorely missed. CO is working a JA station and doing very well with 4.9 p.m. error. KO's emergency power is in good operating condition. As a member of his neighborhood required 24-hour work of his generator. AGM joins c.d. nets from mobile rig. BEY is busy developing electronic gadgets for school. W1XX has a new address. Two friends in his neighborhood have two afternoons to rebuild his final in a TVI-proof fashion. It can be done, fellows. New EGCs are CLO, NO, Brookfield; N9D, Ansonia; and NAL, Milford Ares. It is suggested that all c.d. nets register themselves with ARRL. Advise the time and frequencies used by your net for inclusion in the net directory. Equipment for Region Headquarters stations is now being furnished by the State. YL W1NURM became member No. 125 in the Hampden County Radio Club. Another new ham is W1UMF in Springfield.


**NEW HAMPSHIRE — SCM, Norman A. Chapman, W1NC — RM: CRW. Something should be said about the lack of amateur activity report Friday evening section. For the first time.

We have been subjected to a Section Emergency Coordinator since last June. You fellows have been well aware of this. How about some cooperation? Remembering the name of the "man" to fill this important vacancy? Second: How about reactivating our Emergency Nets which operated on 8800 and 3920 kc? Remember civil defense is yours. What are you doing about it? Third: We need Emergency Coordinators in Concord, Carroll, Strafford, and Sullivan Counties. I ask you fellows to get in touch and pick a Coordinator for your individual county. Let me hear from you. Fourth: To you fellows who already have appointments as Emergency Coordinators or Asst. EGCs, remember there is work to be done. Are you doing all you can to promote civil defense in your county? Are you in touch with c.d. directors? Got all amateurs in your area signed up for the emergency plan? Fifth: To make this column of increasing interest, send in those monthly signal reports by the first of each month. Traffic: (Dec.) W1CIRW 1968, SAL 50.

(Continued on page 88)
BABY your rig with the BEST...

USE OHMITE
WHERE DEPENDABILITY COUNTS!

BROWN DEVIL RESISTORS
These wire-wound, vitreous-enamedel units provide utmost dependability in a size small enough to fit most installations. Easily mounted by 1½” tinned wire leads. Three sizes: 5, 10, and 20 watts. Tolerance ±10%.

RHEOSTATS
Available in 10 sizes from 25 to 1000 watts, Ohmite rheostats can be relied upon for close control and long life. Ceramic and metal construction. Windings are locked in place by vitreous enamel, and the metal-graphite brush provides smooth gliding action.

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These wire-wound vitreous-enamedel resistors, with one or more adjustable lugs, provide a convenient means of obtaining odd resistance values. Stock units made in 10, 25, 50, 75, 100, 160, and 200-watt sizes, in many resistance values.

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Single-layer-wound on low power-factor steatite or bakelite cores, with moistureproof coating. Seven stock sizes for all frequencies, 3 to 520 mc. Two units rated 600 ma, others rated 1000 ma. Used in plate circuits of many types of electronic equipment.

DUMMY ANTENNA RESISTORS
For loading transmitters or other r.f. sources. New, rugged, vitreous-enamedel units are practically non-reactive within their recommended frequency range. Available in 100 and 250-watt sizes, 52 to 600 ohms, ±5%.

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RHEOSTATS RESISTORS TAP SWITCHES

87
HARRISON HAS

MILLENN SWR BRIDGE

Having antenna trouble? Here's an instrument that will help solve your problems! The Millen Standing Wave Ratio Bridge indicates the SWR on 50 or 72 ohm coaxial transmission line. The unit is not frequency critical and can be used from 1 MC to 150 MC. Use in conjunction with any 0-1 DC MA meter. Complete accessories for input and output simplify attachment. A "must" if you use coax.

Millen 90671 — $16.80

MILLENN GRID

DIP OSCILLATOR

Ask any ham who owns one, and he'll tell you that the Millen Grid Dipper is the hardest piece of test gear on the workbench or in the shack. There is no substitute for Millen precision craftsmanship.

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ABSORPTION WAVEMETERS

Accurately calibrated absorption type frequency meters, with calibration accuracy of 1% or better. Use to measure frequency of any RF source — fundamental frequency of an oscillator, buffer, or final. Pick correct harmonic from crystal oscillator. Continuous coverage from 3-140 megacycles in four bands.

Millen 90600 (3-140Mc) — $20.40

JNC 71, PJU 63, JQX 25, PBE 20, TBS 50, POK 8, JGI 4.
(Nov.) WICRW 429.

RHODE ISLAND — SCM, Roy B. Fuller, WICJII — SEC: MIL, RM; BTT, BNV meets Monday through Friday at 1000 on 3560 kc. The section traffic men are spotlighted in this report for the unusual rush of Christmas mail, which was much time devoted by them in getting traffic to its destination. The AQ Club station is Rhode Island representative to the 1st Regional Net on Monday evenings 600.

NEW YORK — SC, BGA on a s.s.b. CPV has a new black box VFO for mobile operation and reports that it works fine. W1UNB is the newest ham to report this month, but he has been with the area's emergency net on one of the new f.d. frequencies. RVQ now is on 25-meter 'phone. Traffic: W1BNH 125, HLY 115, QY 104, CPV 87, TRX 35, QHV 50, QHV 50.

Vermont — SCM, Raymond N. Fossil, W1FPS — 10, gang, haven't received any news items from you. Guess we've been too busy with all the Christmas rush. WBQWB, Vermont boys in the 43rd Division in Germany have a BC-610 on 14 Mc, with the call DJ4KK. Be on the lookout for them. The T-County ARC showed G, R's latest film, "And a Voice Shall be Heard." Town and city officials were invited. This film is a must for all parties concerned. Please return the yellow sheet. MF-1.

NORTHEASTERN DIVISION

ALASKA — Acting SCM, Jack Walden, K17BK — Most of the traffic handled by A1G is for servicemen. They rely in the Far Eastern Net, plus handling the major part of the general Alaska traffic. Traffic: K1M3F 614, YG 114, PI 110, AO4 44, AGU 14, UI 11, AL3 41.

IDAHO — SCM, Alan K. Ross, W7IVU — Burley: KI6 CI reports the Magic Valley Radio Club held a ham athletes' contest with Dr. Molmer and W. Lotttridge showing slides and moving pictures. Attending were VAJ, MLJ, HJY, NBY, WBN, PT, MCM, GSN, JRX, and HAI, also Bill and Slusher, a W2. Tjink Falls; OQF reports officers for the Keys and Milles Radio Club are PDM, pres.; NGA, vice-pres.; OQF, sec.; Hayes; F63 receives regular on Bendix TA-12 for Christmas from the AYL Nampa: A civil defense parade and communications drill under EC-77 was held Jan. 14. Covington: Mobiles participating were ZM, PIT, and NPO, of Nampa, and FOX, DOG, and AHS, from Boise. TVG manned a booth for them. Gem State Radio showed G, R's latest film, "And a Voice Shall be Heard." Traffic: K7NIA 219, OAK 131, AY 86, ITX 25, FRS 41, TAN 38, BNV 27, ELJ 124, TXY 18, BIP 6.

MONTANA — SCM, Edward G. Brown, W7KXG — The Gallatin Radio Club has started to work on its mobile emergency unit under the direction of NB. ED's Jr. operator now is stationed at Mountain Homes MBA. ED checks in nightly to receive traffic from Lee via ABK. JDZ is active in FARM and TCPN nets. Local band activism is back. We are back on 3850 kc through KTX and others after blowing the transformer in his HT-9. CT is new OBS and BSU is new BO. LBK is back on the air with controled-overload CW and JS. CPY is spending a few months in West. Aria, SAW is installing his 10-meter mobile unit. MBB received his "Good Wishes," QSL, a new 10-meter is on the air. K7TPG is transmitting on 3.5 and 7 Me. BNU is undecided when to vacation: Deck says Arizona and K7XJ says Florida so probably will be Florida. Thanks to Jo for the card reporting his XYL's Notice call. Congratulations to W7P5B, who probably is the first Notice call in Montana. Skip conditions are unusal and some trouble but activities continue to improve. Traffic: (Dec.) W7KCGJ 425, JDZ 171, CT 148, CVQ 54, COY 47, BNU 20, LBD 20, MT 6, LCF 3, (Nov.) W7LBK 423.

OREGON — SCM, J. E. Eden, W7MQ — WJ is new RM for Oregon, and wishes to have a lot of the old Oregon broadcasters formerly on the a.o. contact him. He is reorganizing the c.w. picture in Oregon. WJ is high-point man for Oregon traffic handled this month. ED now is located in Cenntac Seele and is with the Forest Service again and also much interested in the ARRC. GCT makes BPL the month with a total of 742. QVX is new OO phone for OT and 111. BDN reports successful operations of AREC in emergency near Pendleton with a lost plane hunt in which the local amateurs as well as W7BPA and W7BWA and others were commended by the press and officials for their good work done. LE also makes BPL with a total of 371 originating. JUH has been doing a swell job on 3.6- and 7-Mc. bands, AF, besides doing a real bang-up job as NC on OEN many times this month, also makes BPL, and with a score of 568, PFM, too, is doing well. APJ now has moved from Ashland. He is now the local Telephone Company, and also is active on the 29-Mc. band and has a mobile. JDR, Oregon SEC, also had a good traffic (Continued on page 90)
(a) COLLINS KW-1
Convenience! Simplicity! Power!
Combined by Collins in their KW-1.
Completely band-switched — 160,
80, 40, 20, 15, 11, and 10 meters.
VFO control throughout. Single
knob. QSY. A HAM'S DREAM!

(b) COLLINS 3Y-3
NEW TVI-proof medium power
Collins. Completely shielded one-
piece cabinet. NEW filtering and
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one of the most reliable medium-
powered rigs on the market today.
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(c) HARVEY-WELLS BANDMASTERS
Portable Mobile or Fixed Station;
here's a compact, versatile,
all band unit. Ideal for old timer
or novice op 40 to 50 watts to 80'
or Phone or CW. 100% Break-
in operation. All controls and Xtal
in front panel for quick.
QSX. Provision for VFO input.
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1250-C—Carbon Mike Input $111.50
1250-D—Crystal Mike Input $137.30

(d) 50 WATTS — VFO — MOBILE!
The new Elmac — VFO or crystal
control on all bands. Band-switching
10, 15, 20, 75 meters. Fully
calibrated dial. Push-to-talk! For under-desk mounting or
fixed station operation.
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A-54 (for carbon mike)
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(e) JOHNSON VIKING I
Here's America's BIG transmitter!
Completely wired and tested.
125 watts. Incorporates TVI-preventive
measures. 100 watt Phone — 150 through
CW OUTPUT! All bands through
10 meters. Use the 15 position xtal
selector or plug in a VFO and
away we go.
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month and made BPL with his total of 588. The Eugene
gang is encouraging early registrations for the big OARA
Convention to be held the last week
(a) TWA 589, GCT 742, HNN 588, APY 568, BE 371, BDX
155, GNS 113, AJN 91, HJU 59, AWI 44, BSY 36, DH 34,
M8 31, GWE 27, MID 27, Ahh 22, DHEX 21, FY 18,
AXJ 13, EUG 12, BDN 11.

WASHINGTON — SCM, Laurence M. Sebring, WTCZ
— SEC; BTV, Pam; NEB; RM, RM. The first Extra
Class license was issued to RA, with VI getting No. 2 in
this district. The results of the WARTS election are: LPA,
champion; JFC, assistant; CFT, MBK, OME, BBK,
directors; MTX, secretary. Conditions have been
good for KCU, ETO, and TH, unable to hear west-side
stations. Don Knier, Jr., passed General...a new
dropped the N ANZ modified his 7S1-1 with good results.
MEU has a new tower for his beam. PGY remodeled his
shack and installed a console, drapes, and davens. G3YB
will have a new modulator in June. NJS is using a
7S3-1 and 2S1-1. OYO now is on 14 Mc with a new
phone make. Officers of the Richland Amateur Radio Club are: MLZ, president; OAF, vice-president; OMB, secy.; KIN, treas. RNT is packing up on the air.
FSP has his tower blow down in the gale. BGB has a
new mobile rig. OYI is on 10- and 75-meter mobile. OYI
is using a fine audio amplifier for the WYI's record-player. LEC
has his 10-meter mobile working at last. JJK is stationed at
Camp Gove, Calif. NTX has been working for 2 months. OBE
is on 28-Mc 'phone with an 832A, converted. GWK has a
7S3-4 on 14.8. SCI is attending electronics school at IGC
and OB is making contacts in 60 sections. BDY is running
a new generator on the CQ. KGQ, KO, MIG, BYK, FIM, and FAW are active on
14. TRAFFIC (Dec.) WTCZ 2431, IQ 1839, BA 641,
FRU 394, BY27A, PXN 168, FYK 156, GKG 215, KJ 396,
KCU 50, OBE 44, EHH 40, EY 37, NWP 37, LEV 32,
KTL 20, ETO 9, ATS 5, CU 8, CWN 3, GAT 3, NCB 3.
(Nov.) WTPH 195, ZZ2 24, NTU 18, ETO 12.

PACIFIC DIVISION

HAWAII — SCM, John R. Sanders, KH6RLU — Officers
for '22 of the Manoa Club are: ABF, pres.; ABD, vice-
pres.; OL, treas.; ABF, recr. A drive is being
on Hiho Club is being made by ABF, AFQ, ASB, and
BO. These fellows have placed ads in the Hiho paper offering
old and new items. A new member is getting into
an amateur ABY, aided by DK, ABF, MG, and VG, has
formed a new group. phone rig used on Maui. RX has 35 watts on
7 Mc. RX relayed another new Christmas greetings to the
boys out west. ABO is on 7 Mc. ABY joins the increasing
number now using the interisland phone services to
Guam. EU is on 3.9 Mc for a long time, and the
radio phones. ADY now claims 185 KH contacts.
TS is attempting to copy the WIAT Official Bulletin. HU
is trying to relay the latest news on his OBS schedules. U1
attends the Ham Radio dinner at the club.

For Pacific Area: JAAI will next be heard from W4-Land. KG6FBA
had 49 phone patches and notes KG6AAX for BPL for
December. KG6FBA has an all-time high of 3256. KG6FBA
for September but the report was lost in transit.
Traffic: (Dec.) KG6FBA 2512, JAK2W 1989, KG6AAY
9741, K6HADY 25, TS 25. (Nov.) JAAI 850, (Sept.)
KG6FBA 5429.

NEVADA — SCM, Corbin L. Short, Jr., W7BNQ — SEC;
JU, BNC, HI, JLM, FYW, BRL, KOB, MBY, TVY, VO,
and ZT. RMI: FST. OJU, OO, LGS. Nevada
State frequencies are 3650, 7225, and 36,300 kc. How about
more of the gang showing up on 36,300? KG6BD is
3690 kc. regularly. JOS is on 7225 kc. week ends. NRU
divides time between 7-Mc. and 36-Mc. phone. KHJ
is on 38 Mc, his 7-Mc. rig is haywire. K5B is helping JAI
build a new receiver antenna. IVE is on the air in Reno
7- and 14-Mc. and 36-Mc. phone. K40 is QRV.

For all size picture tubes, 12" to 24".

The greatest advance in TV Kits developed by
TECH-MASTER! Acknowledged by leading
engineers as the TOPS in the field.

MODEL 630D19 (De-Luxe) Principal components assembled—Resale Price—$159.50
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(Continued on page 94)
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HAND CARRY
HT-21 (25-50 Mc) • HT-22 (150-174 Mc)
Complete 2-way radio-telephone station. Operates from self-contained dry or wet rechargeable batteries. Rugged weather-proof case—weighs only 14 pounds complete. Full 2-watt antenna output on 25-50 Mc, (1-watt on 150-174 Mc). Uses 22 sub-miniature tubes. Under average conditions, will maintain dependable communications throughout a 3 square mile area. Range can be extended to as much as 8 square miles by elevating antenna at Central Station (below). Requires readily obtainable FCC license (not designed for Citizens Band). The perfect answer for short-range communications in thousands of industrial and commercial applications.

CENTRAL STATION
HT-23 (25-50 Mc) • HT-24 (150-174 Mc)
AC-operated Central Station with same performance and specifications of Hand Carry unit. Audio amplifier provides 1-watt of audio for built-in loudspeaker. Power consumption, 36 watts. Operates from any AC (117 volts) outlet. Where one or more extra stationary receiving stations are required, the economical Hallicrafters 8-81 receiver may be added.

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91
traffic this month and made BPL both ways, origination and total. HC was out of town the latter part of the month so we had a small traffic total. He also stated that the construction of a panta Clara Valley Net to tie into the newly-organized East Bay Section K6WAE again comes up with a fine line total even though the net was closed for a Christmas vacation. CIS was low on traffic but busy as a hard dog doing what a good Director ought to be doing. Trailing: W6NPT 1007, K6WAE 1405, W6IWC 46, CIS 21, NW18, MMG 14, FYK 6.

EAST BAY — SC1M, Ray H. Cornell, W6JZ — Asst. Sec., Guy Black, 6L1R, SBG, W6K, RRB, AKB, IDY, QDE, TCU, and WGM. The Oakland Radio Club sponsored a Christmas dinner party in San Leandro Dec. 25th for the East Bay area amateurs. The Richmond Radio Club held its party at El Nido near Lafayette-Dec. 23rd. The East Bay Radio Club celebrated at the home of KEK. The Mt. Diablo Club had a very enjoyable evening at Bertoles in East Oakland Dec. 18th. Dinner, dancing, and good fellowship were in evidence at these parties and everyone had a fine time. It would be nice to have one of these parties for the whole section next year. Anyone interested? The East Bay Section Net (KB8BN) made a good start; 16 different stations checked in to 23 sessions and handled 80 messages. The Net meets at 1000 PST Mon. through Fri. on 3005 ke. A Tri-Section Net (BAN) comprising the San Francisco, East Bay, and Santa Clara Valley sections was activated on Jan. 14th. time 2000 PST, frequency 3709 ke. for both Nets is IPW. Here is a list of new officers of the various clubs: KB8A — WILL, KM 6, CBB, CHL, vice-pres., treas.; JDO, secy. Monthly meetings are held the 4th Fri. Richmond Ave. A new 10th Club — LBE, PPS, pre., PPT, pres.; VVZ, vice-pres.; HFFM, secy.; EMA, treas., EFFD, sect-at-arms. Monthly meetings are held the 4th Fri. SARO — BZ, pre., BEZ, vice-pres., KEB, secy., EFFD, sect-at-arms. The Club met for the first time on Jan. 12th. Diablo Radio Club — KB8AQ, pres.; DNO, vice-pres.; NJO, secy.; JK, treas. The Club met for the first time on Jan. 12th. Oakland Radio Club — AKB, pres.; NTT, vice-pres.; TKL, secy.; YDP, treas. The Club meets the 3rd & 3rd Thurs. (Specific information as to club meetings will be furnished by your SCQ upon request.) RVC, pres.; SEC, spent two weeks at St. Mary’s College undergoing training in civil defense. EC appointees are: AKB, Oakland; MAM, IDY, Martinez; QDE, Richmond; JR, Walnut Creek; WGM, Vallejo. Cdr. Jim Steffley was the speaker at the KB8A January meeting. JDO has a new 10-meter beam. WM6DTB is a new member in the Valley Number. QDE is resuming from duty. W6ONB has changed call to W6WBN. TI cleaned up some kids calls. He has 20 different stations checked in this month. CCE has rebuilt and sold the old band of 4128 As. He’s sporting a new storm-proof 20-meter beam and handling traffic from Japan. Trailer: W6IWP 405, 3Z 201, HGR 197, LXT 85, YDI 5.

SAN FRANCISCO — SCM, R. F. Czakleowitz, W6ATO — phone: JUL 7-5561, SEC: 6NL; Phone: JUL 5-6407. Santa Rosa Area: EC: LOU, Asst. ECs: DRX, DZ2, and HNN. The 2-meter net for cut activities meets every Tuesday at 8 P.M. on 145.35 Mc. with approximately twenty stations now is active on Wed., at 8 P.M. LOU has taken over the post of EC, while IEN has taken over the secretarial position for SCRA. While I am quite proud of his YXII (HHD) now that he has that Advanced Class ticket, DRX also made the grade for Advanced Class. The YXIIIs prepared a pot-luck dinner for the OMs at the Club’s annual shindig at Aqua Caliente, 9CR, of Sebastopol, has joined the Club. The Sonoma County Radio Amateurs Club meets the 1st Wednesday of the month in the Hacienda Room in the Tanbush Room of the Grace Bros. Brewery, Second St., west of the Freeway, Santa Rosa. Eureka Area: EC: SLX. FYX has installed a new 75-meter mobile, while ZK8 has modified his mobile for both fim. and a.m. BJO is building a new rig for KOF. BME is in need of a new power transformer. FYX is one of two 75-meter mobiles which are gaining favor in this area. SLX would like a schedule with his son on Whidby Island in Washington. ZEB is dihng on 7 mc., and EQK is using the 6-meter band on 14 mc. AEE is sporting a new 10-meter beam, KIDB-LBU/W6 is a newcomer in Eureka, ECR is trying a CIC phone on 20 meters, and AKP is attempting telephone service in San Francisco. It is hoped that LE’s XYL, now as fully recovered, the Humboldt Amateur Radio Club meets the 2nd and 4th Fridays, YAGA renews race of Min. Auditorium, “E’’, St. Eureka, Marin Area: EC: EVZ, KIN2; Tanakas RC EC: ZUV, The Marin Amateur Radio Club has been reorganized, ably headed by Chairman LTC, who has presented a number of excellent ideas, including the restoratin of the Golden Gate Net. The GON will meet on 24,700 ke. at 9 P.M. on Wed. with LUP, LCCM, LEH, LTL, TJJ, and K6BPA on the roster. All others are invited to participate. The Marin Amateur Radio Club meets the second Friday in the Engineering Lecture Room, College of Marin, Kentfield. The Tanakas Radio Club meets the third Friday in the new quarters of OIC on Beach, near Corona Road, in Tiburon. It would be nice to see a San Francisco Area: EC: BYS, The AREC Net meets every Monday at 8 P.M. on 147.15 Mc. All are welcome. W6ONK now is

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(Continued on page 24)
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WHOCE, Peggy Delach, the XYL of GCV, received both WN0PCN and W6PCN. JCJ and IU are checking into the new East Bay Net. JGJ also checks in on RN0, but advises that San Francisco needs more power with more power than his 35 watts for the RN8 traffic. HUP is signing DL4HIM and using BC-610 and a 12-watt peak output "V" beam and is advising the use of his new Collins receiver. The San Francisco Radio Club meets the fourth Friday at 1641 Taraval St., and the High Frequency Amateur Mobile Network meets the second Sunday at the Red Cross Bldg., 1625 Van Ness Ave., San Francisco. My term as SCM is drawing to an end and inasmuch as I have received the honor of representing the Pacific Division as Vice-Director for the next two years, I am not a candidate for reselection as SCM. My thanks to the SCM candidates and all SCM a man who will work strenuously for your best interests, as I have tried to do. Traffic: W6UCG 135, FYJ 20, ATO 5.

SACRAMENTO VALLEY — Acting SCM, Willie van de Kamp, W6KRV — Northern Area: Assn. SCM, Edward M. Critts, 65N130, in Korean, has been named SCM and says "hello" to the gang. FCE and JDN handled traffic for SFRR during a recent storm. Central Area: Assn. SCM, Willie van de Kamp, W6KRV now has Advanced Class ticket. RCM is now located in Los Molinos. HBM used 10-meter mobile for home contacts on trip east. RT finally got on the air from Chico. New officers of GERE are CKY, pres.; HNL, vice-pres.; TID, sec.-treas. LRK is wintering at Lake Tahoe, Southern Area: Assn. SCM, Richard H. Hall, W6ZTV, GDE, stationed at Fort Monmouth, spent Christmas furlough at home. EUX now is 1594 and 164 Me. EHT and KXZ are on 28 Me. The SARC held a splendid 15th birthday party. The O'Brien clan of HTS, HBD, and GDO moved to a new location, JEG was evacuated, HEB’s station is SOUL2, and BQX is working for SCM. BQX is the Golden State: Traffic: WDIN 217, FYJ 148, ZZY 81, KIXX 47.

ROANOKE DIVISION

NORTH CAROLINA — SCM, J. C. Geahlen, W4DLM — I want to explain why the sky is not the color of the air for the past month or so. I have been digging a new basement under the house, putting down a concrete floor and laying cement block walls. I’ve installed an oil-burning hot-water heating system. This is the longest period away from my hobby in years, but in so doing I have found 4000 more murals and saved myself the cost of a new hearing aid. The SCM, JPY, Elizabeth City, is now Advanced Class and has joined the Hot Heel Net. Another top-notch e.w. man gone wrong. HU, the North Carolina SCM, has new offices: JPY, pres.; NBR, vice-pres.; NRT, treas.; Carlyle Horner, secy. RLZ, Raleigh, sends in an excerpt from the MARS Bulletin which has been written up as the MARS “Station of the Month.” Congrats, Riley, and more power to you. LWD, Goldboro, reports a new club there, the Wayne County Radio Amateur Assn., with HHB, pres.; N2S, vice-pres.; LWD, sec.-treas.; TIB, KMM, and TAJ, tech. adv. comm. IRP, Clinton, reports DQ, former SCM, still is at Corpus Christi, Tex., but hopes to be back in this area soon. The Mecklenburg Amateur Radio Society, Charlotte, has new officers: JPY, pres.; FD, vice-pres.; DLZ, secy.; CAY, treas. Our ever-growing mobile gang on 75 meters is topped up by two more: RO, Cherryville; LUN, Charlotte. The CVQ has dreamed up a new mobile antenna and soon will be on 70-meter mobile. Traffic: WARRH 81, AKE 80, CVQ 4, LWO 4.

SOUTH CAROLINA — SCM, T. Hunter Wood, W4ANK — Congratulations to OGG on making the BPL, W4UES, ex-TM8, and SPOX, is now N. Charleston on 7-Ma, e.w. AZT reports that W4NUIK is new in Greenville, FBR is new on 3.8 Me., and the Greenville ARC held a dinner Jan. 14th. DX reports ULH on 160 meters from Florida and W4NULF is new at Batesville, JGM and MPR are new on 3.8 Me. HEV has been transferred to Australia for the next few weeks. W4ATW is the following active South Carolina WNs: W4AQED, Columbia; LQO and TEP, North Charleston; TIT, Greer; A4N, North Augusta; US11 and TAD, Orangeburg; UNO, UNV, UMW, UMP, and TOS, and Rock Hill, with USO and TNG, a father-son team, the son age 11. CE reports five new licensed amateurs in the Darlington Radio Club with three receiving operator licenses only and new calls UHR and UHV. All South Carolina WNs interested in a South Carolina Novice net are requested to drop a card to the SCM giving call and mailing address. Traffic: W4ANK 564, OGG 577, FFR 84, AET 16, FYJ 56.

NEW JERSEY — SCM, H. Edel, W4EFA, NAD, the SBC, MWH, IA, PXX, and SDK are RMs. The N4RC and the Frankford Club met at Philadelphia in joint session for the third consecutive year to 100 and make each other as victim or vanquished in this last SS. Universal rule has PYRC in front running from 4W were SZY, NTZ, IA, KFC, PNE, and FF. Included as guests of the W4s were KL3ABH and DL4HGF. TFX has chaled the states and 4 VE sectional leadership using 18-meter DX on 6, 6.2. Twenty-six fixed stations and 11 mobile units, staffed by 35 RACES "hams," participated in a recent emergency (Continued on page 60)
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Drill withstanding the rigid inspection of General L. R. Tilton, Civil Defense Administrator. The RACES group was accepted as official emergency communications under a joint plan comprising Hampton, Elizabeth City County, and the town of Phoebus. Drills will be held the second and fourth Sundays of each month. Net Control Station operations were donated by local banks to be used in the event of an emergency communications standards by RTZ, RGN, HW, 'the JCM, and OIM. AJA is Chief of the D. Section of RACES of the aforementioned group. F7 claims to be the recipient of the first Amateur Extra Class license issued by the FCC. New ORS applications and renewals went to AJA, AKN, CKN, JZQ, OvE, KMG, JDB, and NY. New EC for Portsmouth is TG7M4. New certificates were issued to GWY, FI, IA, IYI, KSW, MW, NY, NAD, NAB, PAXA, RYS, SAD, and SNH of VSN: KDL, KY, KRC, KX, MMW, MW, RYS, SNH, SUN, and SHI of WSN: AR, BPE, AU, MIU, OKN, PFC, RL, LTTZ, and SBF of VNF. Hornets certificates were given 3UF and 3AV for their fine attendance and help in QSP on the air. William and Mary College, informs us that 4PV is being reactivated. HQN is using that heralded 7-SC, rotary beam, sky wire and has 3 for rigs stacked around the shack. KK is rebuilding. CFY is VPO all bands; Traffic: (Dnc) W4KNW 348, PWX 214, HQ5 203, PAX 134, CQX 108, KPS 54, FP 79, JAC 70, IA 63, BHI 62, NY 49, NAD 41, CFY 40, LR 27, OKN 23, IYI 8, TFX 6, KMS 4, WN2-KRC/2. (Nov: W4PWX 201, NAB 38, KMS 4.

WEST VIRGINIA — Congratulations to WN8HJF, the XYL of VPO of Beasley, who recently received her license. New amateurs in the Fairmont-Area are ISA, IFA, IDW, IBX, and VJL, with Novices IOJ and HUM. At Princeton there is JBE, and IY1M is at Rock. FTS, at Tanser Gilmore Co., is a member of the 3-8-Mc. group. The following stations were monitored in the next two weeks: 28C, CQZ, EPK, GGC, EZL, FFZ, HUF, BTV, ONF, EPO, TDO, and DWA. A total of 96 messages was handled. The new AO 3-Chap VFO and reports FB signals.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM. W. W. Mitchell, W7Q0Z — NEC: J. Keo, Asst. SEC; PGX, RM; LZY and ZIO. PAC: KHQ. ZJO writes that this will be his last traffic-handling report. He says that because of the traffic his list has deteriorated considerably and so has his disposition. For these reasons he is giving up traffic-handling for some time and is going to leave his home and pick up some much-needed gear. He says that he will be back again sometime but doesn't know when. KHQ almost made BPL, but his signal was blocked by some bad weather. He recently bought a new 7000-SC rig on the air. JDL has a new 500-SC rig on the air. JDL has a new 5000-Mc. rig on the air.

COZ handles a lot of traffic but doesn't report it for BPL credit. Visitors at the University of Colorado, include a band leader, Pee WOO Hunt, and 4UV, ex-CA8BW. 88BV built up an 807 rig at IQS's but didn't get to test hop it before he left for other assignments. He has an SB mobile rig in his orchestra car. ZJQ is building a 3-band mobile rig. ZJO advises that a new manager is badly needed for the Pacific Area. Anyone who wants to volunteer to forget that the traffic you get on the Colorado Emergency and the Colorado Slow-Speed Nets are a great help in the defense program. ZIO reports that the IPF was transferred to Hollywood by NBC. Traffic: W7Q0Z 1976, KHQ 458, AGU 12.

UTAH — SCM: Leonard E. Hafsmann, W7SP — NUZ (Lt. Col. H. B, Whitehouse) left for an overseas assignment, leaving the UARC without a president and the Utah SLARS Net without a leader. WHiley says he is on an eye on 14 and 28 Mc, and we will be hearing from him soon. KUX has been silent for some time as the operator has been wintering in California. The rig was last seen in Utah winter. The UARC Ten-Meter Mobile Net boys and girls are all set to take some more police and defense training. Let's see, they are and they are the Utah State Police, now — Deputy Sheriffs next! UTN says he got the Power Company to install a new pole transformer for him. It is in the ground, but didn't help the power leak. ZDX says he finally got a generator to run up the antenna at his new QTH. Traffic: W7UTM 219, JFA 22, UTN 14.

WYOMING — SCM. A. D. Gaddis. W7THI — In this corner of "Double You Seven, Land." PX7 and LUV de

(Continued on page 20)
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serve a big hand for their efforts in traffic work. Contact them for traffic in any direction. KXG has the rig on 160 meters. HDV is back on the air after a long absence. Welcome back, Hank. PMD is NOS for Intermountain Net on 17 meters. Ed P 500 is on 20 meters. Ed is back on 17 meters. KJO is on 25 meters in Laramie, N3U with his HMI's and a friend, who said he has a new 4-band antenna. JJO is on 27 meters in Laramie, NOU with his HMI's and a friend, who said he has a new 4-band antenna.

SOUTHEASTERN DIVISION

A LABAMA - Acting SCM, Wm. H. McGowan, Jr., WART 45 - SEC, ISD, HFP has resigned as FAM of AENP and PGT has been appointed FAM of the Net. RAY has had a special job as manager of the phone net. PGT and OKU are carrying on under the name as NCE. Operation on AENP has picked up considerably. E7Z, SUF, QAO, and KIX are representing Alabama in the NCE Traffic System. KNC, ELX, TXK, DLU, KUX, GOH, N7F, and W4MTT, all of Tuscaloosa, and PSW, FIG, and R7T of Birmingham, are active on 17 meters. In one night PSW worked 9 states on 144 Mc making 40 contacts. RCQ, ELX, FIG, and N7F also had good luck the same night. W4MTT is now active in the Birmingham Club on "The Story of X-Ray." EBD is now president of the Birmingham Club, with GET, JXJ, RKS, and MSP also holding office. The Birmingham Club has completed its portable power unit having it mounted on a trailer. JBN decided to remain a Rebel and now is living in Tuscaloosa, UHZ is a new Net in Birmingham. NCE is getting some good results with new four-band antenna. RZJ has a QS-er cut-in and QSL. KXK is still rebuilding to eliminate T-11. MVM has passed his Extra Class exam and is sending out ticket. PPK's father is expecting to receive his Novice ticket any day. Traffic: WAEZ 205, KIX 120, SUF 93, GJZ 50, OJO 2, PPK 23, MW 12.

EASTERN FLORIDA - SCM, John W. Holdt, Jr. W4PFWZ - OXZ, of Jacksonville, had many QSOS with Bob, KG 59, and the ill-fated "Jolly Roger" of Deland, is the MO for the Knights of the Kiloheyes, and succeeds AYX who did a bang-up job. Bob tells the Deland-Strongsville Radio Club a nice job at homecoming. FUJ and ROY did another set up a booth and cleared 124 messages. QSPs included EOB, PJU, and FST. K4T has been using a parallel 414a completely bandwidth-bending sounds of interest. IY 27 1/2 reports QZG reports JIE is at the U of F. RHT moved to the Panes, W4K to Key West, and FB to Homestead. Jacksonville: N5J ARS officials include OZQ, SHQ, HFB, N7G, and JWJ. TTI has gone to Camp Gordon School and is served by RMY at the Aeronaut. On the 16-meter band, RMY handled plenty of stuff for our servicemen and their families. Bill QSPed through DJU, PTU, and Transcon for excellent service. Miami's W4MTT now is active in the Miami Club on "The Story of X-Ray." E25 has been busy accumulating 50,000 qs for 144 meters, and a group of exceptionally qualified young men. Your inquiry will receive prompt reply.

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DC VOLTAGE: 0 to 1.5, 5, 15, 50, 150, 500, 1500 volts
PEAK-TO-PEAK VOLTAGE: 0 to 4, 14, 42, 140, 420, 1400, 4200 volts
RMS VOLTAGE: 0 to 1.5, 5, 15, 50, 150, 500, 1500 volts
RESISTANCE: 0 to 1000 megohms in seven overlapping ranges
DC CURRENT: 0 to 0.5, 1.5, 5, 15, 50, 150, 500 milliamperes; 0 to 1.5, 15 amperes

Featuring an 8½" meter, the new WV-87A Master VoltOhmyst is really the master of every testing application. Its peak-to-peak scales are particularly useful for television, radar, and other types of pulse work.

The WV-87A measures dc voltages accurately in high-impedance circuits, even with ac present. It also reads rms values of sine waves and the peak-to-peak values of complex waves or recurrent pulses, even in the presence of dc.

Like all RCA VoltOhmysts, the WV-87A features ±1% multiplier and shunt resistors, a ±2% meter movement, high-input resistance, zero-center scale adjustment for discriminator alignment, dc polarity-reversing switch, and a sturdy metal case for good rf shielding.

On direct-current measurements, extremely low-meter resistance gives an average voltage drop of only 0.3 volt for full-scale readings on all ranges. Nine overlapping ranges provide dc readings from 10 microamperes to 15 amperes.

An outstanding feature is its usefulness as a television signal tracer... made possible by its high ac input resistance, wide frequency range, and direct reading of peak-to-peak voltages.

The RCA WV-87A Master VoltOhmyst has the accuracy and stability for laboratory work. Its large, easy-to-read meter also makes it especially desirable as a permanently mounted instrument in the factory and repair shop.

Sold Complete — with the following Probes and Cables
- Direct Probe and Cable
- DC Probe
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- Ground (Case) Cable

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✓ WG-289 High-Voltage Probe, with WG-206 Multiplier Resistor, for increasing dc-voltage range to 50,000 volts and input resistance to 1100 megohms.

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on 7 Me. LUF is going high power on 75 meters. Traffic: W4PQW 35, MS 2.

GEORGIA SGM: James P. Bowen, Jr., W4ZD—New

of the Macon Radio Club is JMW, pres.; PFD, vice-pres.; FCC, sec'y; LXE, treas.; NTV, att. resp.; JMW, LXE, and BK, TVI, committee. The Atlanta Radio Club elected the following: JMW, pres.; PFD, vice-pres.; W4ZD, sec'y; WTV, treas.; WTV, att. resp. Also new is the editor of the Atlanta Ham, The Camp Gordon Radio Club of Atlanta was awarded a Public Service certificate for its handling of traffic in the July Kansass Flood Disaster.

Congratuations to K4WF, who has been up to Val-Ans and had the chance to ride the mountain on another flight this month. The Atlanta C.W. Net frequency has been changed to 3.60 Mc. Our LHF, OSE, is forming a c.w. traffic net, and the others are requesting Novice stations interested in sending him a radio gram or drop him a card at Box 672, Gainesville. This will be held for the next 30 days only. Novice stations interested in sending a card to Joe Pugh or to F4KOF should contact them at the address above.

A new 500-watt radio is being installed in the new town hall in Fort Bliss, Tex., UYK, UYK, and UYK are still new in Browning, the Tri-County Radio Club. The new net on 3025 Mc. is being operated on schedule through the radio club. The attendance dropped off. AZ has kw. and folded dipole on 3.8 Mc. Traffic: K4HOF 66, DV 14, DJ 5.

SOUTHWESTERN DIVISION

LO ANGELES—SGM, Samuel A. Greene, W6ESE

LJ SEC—KSB, PAM; PIB, RMB; FYW, LDR, Section

Traffic Net—Mon., through Fri. C.W.; Southern California Net (SCN), 3650 kc. at 1903 PST, El Capitan Net (ECN), 3720 kc. at 1930 PST, MFB, "Phone: Northern Counties Net (NCN), 2945 kc. at 1905 PST, KFV, that is, "Yorba Linda, Orange County, by W6KYV, CE, YGT, CMN, GEB, LDR, and BHF. Ornaments of the L.A. YLAC gale (CBE, prexy) for bringing Santa Claus to those on air. Where's MA? MA is among the traffic men, "phone and c.w., for their magnificent job handling that Christmas message avalanche; to FYW (F3B) for his successful handling of ECN (restricted speed)—and that, brethren, is a job; to BHF for his "phone, "phone, ODS, and traffic activities; and to KSX for its thorough job of assorting the 1200 cards and putting them atop the hook 100 per cent clear of traffic. NCP watched his bears "take off like a rocket" in our recent storm. KSX lost his antennas, too; he has new 48-ft. tower completed. HLZ is new "veep" of Mission Trail Net, PIB (H6M) is new prexy of American Legion Net (ALN). The Crescent Valley AREC (VCV, EC) held a Christmas dinner-dance with all the trimmings. CE still says he's "taking it easy." WNS: NTV is active on all W6 bands, DX, too, and NTS made QSO No. 500 in December. LYG skeds several M/Ma. OO Dept.; CK nearly fell over when he received a card of acknowledgment and thanks from K4K and sent a friendly notice. Why is it that amateur courtesy seemingly does not apply to ONS? Looks like the boys would rather get their warnings direct for a FCC. S.B.H. is out of it, fellows; if the ONS quit, then we would really be in trouble. 1952 is B.U.R.'s 30th year under that call. GJP is on with a new rig, looking for c.w., and his prominent traffic man is building a portable 70-meter "phone rig." (Going to use your own call, Tom?) KSX reads some old QSOs while looking for old QSOs (he doubts). BLY reports: CBA is now prexy of Radio 50 Club. CBA reports a new Viking transmitter; AM is creating new skimmers for all bands; KFD has transmitter troubles and is looking for a 14-Me. beam. (Did that blow away, too?) KSX reports the emergency gang (VMW, EC) has relay transmitter atop highest hill, automatically rebroadcasting all net signals on alternate frequencies. The new "phone net" at H.C. Club station is the latest thing out. What well known W6 in QSO while mobilizing Christmas Eve casually mentioned his speed at 60 (325 m.p.h. zone) and his speed onto the right alongside? You guessed it, he got the ticket! KSX, SEC, extends his warmest thanks to all EECs, net members, and the ARRL staff for their cooperation. Have you seen (Continued on page 108)
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offers YOU:

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PMG's mobile rig? 75-10 VFO, Top e.w. operator, too. YG7, who has been on active duty for the Navy for five years and getting ready for reserve. Also reporting: BUK, CPI, CIE, COF, HOY, MIA, MU, PEB, PMG, QSW, WOO. Traffic: WA8KVR, WA8SEL, WA8SDF, W7FVY, WA7MID, W7FVY, WA7MID, W7FVY, WA7MID, W7FVY. In the next episode near there is OQY, ex-QO1R and QO1R, who has an S-70 receiver and lower-power e.w. rig. N7QMM, in Tucson, is interested in handling traffic and is planning to hear from other Novices in the State with a similar interest. His QTH is in Rt, 7, Box 93, Tucson. We got a nice clipping from a new member of the W2VSH, covering events of his trip to Europe. Also, a new Novice in Phoenix is active. A new mobile is QK9B. Another new call in Phoenix is 2CRTY, on 29 Mhz., with 20 watts, PQA has a new beam, tower, and rotator. QZK, the West Phoenix High School station, got a large gift of ham equipment. KXN has a new tri-band converter, and is building a 400-watt watt rig. OCB, in Scottsdale, has a new业余. P7Q is on 28 Mhz., with a 1025 final. QPQ spends some time on 3.5-4mc, e.w. K7WFL, with 700 watts and a ground-plane antenna, is a new Phoenix call on 28 Mhz. NAP has two new telephone poles to hold up his 75-meter antenna. LQG worked all districts in one evening on 3.8, plus W6C, with Norm, EC for Tucson, and were amazed at the activity for which he is largely responsible in the 10-meter emergency net there. To date, 75 districts have been checked into that net. Traffic: K7PAP 1004, W7FBB 100, J7G 97, PKU 53.

SUN DIZERO — SCM, Mrs. Ellen Latin, W53UY — Asst. SCM, W53CS: Shelley E. Trotter, 63AM: Richard E. Hud- dleston, 6DN; Thomas H. Weis, 6GU, S56N; SBJ; R: E. IGZ; EC: DEX and T&IC. Up and coming in traffic handling is GRC. RMC IGZ reports that GTC has an FH flat, which any 7-Mc. operator can confirm. BVI finally is back on 75 meters. YLH and QO2F are Advanced Class licenses in the Newport Beach Area. NSK is now QRS and is planning to go 40-meter mobile! IZG has a new 29.8-w. p.m. stoker on his Code Proficiency license. The Sonoran Radio Club is starting Field Day plans with YGN as Field Day chairman. New YLs on the air are WN6HTY and W7FVXL. One of the old-time radio fans is back on the air in La Mesa running a kw. on 14- and 28-Mc. phone. He is RKBX, who has held the many calls of 4DK, 4DJ, 7GW, 8GF, 9GF, and 8Q6, W53CB in 1925. The San Diego TVI Committee is an organization under the able direction of KWH, KRA, and is operating with a legal Class license. The Oxnard Radio Club also has a VTIV Committee for its immediate area operating effectively. TSP, ham radio's gift to Channel 2, is back on 29 Mhz. with 400 watts. DWU has been using much of its time with a new 5-inch "scope", which he got for Christmas. ODB, in short order, got his General Class license telegraph and radar endorsement, and is working away at his aircraft endorsement when time from State College allows. News was slow because of the New Year's holidays but is picking up with the start of another year. Traffic: W61ZG 364, EL94S 104, GTC 184.

WEST GULF DIVISION

NORTHERN TEXAS — SCM, William A. Green, W55KB — Asst. SCM, Joe G. Buch, 5CDU; SEC: QJQ, RM3; LSNN and QH; PAM: IWQ, KTR was re-elected NGS for NTGB, with JQJ as alternate. The ARC under the guidance of QJQ, had a full-dress rehearsal Jan. 2, 3, and 4 for the ice storms that visit this section annually. CFWST, MEQO, and FLOV0 were out during the winter months communicating with the entire North Plains Area, experiencing much circuit delay. To remedy this situation the W7PTF established a new station 2900 ft. above sea level with the following participating: AXX, ARK, AW, BFA, BEY, BXX, BEP, DCM, FQP, FQT, FNQ, GZQ, HBS, HBB, HVE, IWW, JNQ, NUN, WQP, WPP, WQX, PTK, QR, RRM, RY, RGG, SG, and SQW. Considerable traffic for Western Union was handled by FNQ to Lubbock, El Paso, and Amarillo. QJQ, who maintained nearly constant watch. QJQ and BVR furnished a circuit for their State Carpenter Sweepstakes, the Speaker of the House, Mr. JQJ, and the Rev. Mr. AUL, all of whom were on hand during the Christmas holidays. As a result, many of the Nortz/Oklahoma phone net have been issued certificates. If you were left out, you can still write in for a W7PTF family team composed of LUN and Sons TFM and TXO. QJQ started a social meeting with the XYLs and officials of the House. They had their "big event" of the year on with a Viking. RRM also is using a Viking, Traffic: (Dec.) W5KKS 249, PAK 221, G2U 210, SQW 186, QHF 189, ARK 167, IWQ 143, RRM 93, RRM 82, LEZ 97, BFA 61, MTQ 45, AW 41, HBB 37, HBB 36, EKQ 35, JQJ 27, SGR 26, OQF 17, SQR 12, RRR 10. (Nov.) W61ZG 20. OKLAHOMA — SCM, Frank Fisher, WA5H/AST — (Continued on page 104)
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Attention: Harry Harrison, W9LY. Tel. Taylor 9-2200 Ext. 141

Acting SCM, J. M. Langford, W5GIV. SEC: AGM, RM: QOD, PANAS: OZX and AT. Because of unexpected developments in my business I found it necessary to sell some of my radio equipment. SCM, W5GIV will assume SCM duties and responsibilities until my successor is elected. My sincerest thanks to all the groups who have given such wonderful cooperation in making our section really representative of the League and what it stands for. Keep up the good work, fellows, and I hope that I will be of service to you again some day.

A. F. Good luck to you, and the new venture. W5NSU, RTX'S XYL, is now in active in Lawton, OK. 1919 XYL, 3069 GQ, to 3000 originated. PA has accepted membership of the Lawton Amateur Radio Club, will coordinate it with the Texas Great State, as the 2 are an equivalent, and with the Oklahoma Office of Civil Defense, prepared a drill for all EOCs with 19 counties registered. Ten counties reported messages delivered within 48 hours after reports. All counties delivered within 10 minutes. The End.

Amateur Radio Club had its annual Christmas dinner Dec. 30th, with 21 attending from Canton, South Dakota, and 3 from Ponca City, Blackwell, Webb, Winfield, Washita, Tulsa, and Burlington. For a total attendance of 34, YNO, Bartonsville, has been started in track, with OLZ, Trailing, and UZ, Trailing, are getting a new receiver. QIO, W5STT, JBW, and MEU are very active on v.h.f. QRP, now 3 is Advanced Class and RWP will be on his new 34000. Ken, W9RWW, 1044, MO, soon. PCC moved back to West Texas. QDE reports progress in emergency preparation. The club is obtaining emergency powers and licensing for emergency work. NHQ has a new paddlesender and is active on H Energy. Lic. C.E.E.N., 24, 3000, with 5 meters, W5SPP is developing a nice set on 80-meter e.w. KFY is constructing a new wall panel for 144 MHz. W5HV is on 27.1 MHz, and has four-element 20-meter rotary and full gall. EIV and NPX are planning on 2 meters. W5NJU is a member of AREC, ACL has been making repairs on his 75-meter rig, and with 600, KZU is teaching school and helping with week ends with 150 watts to a T-40. NHQ is mobile with 40 watts to 0.06, 700 watts to p.p. 813 on 72 meters. NGK has 125 watts to 72-40 on 40-meter e.w. MAW is working 75 p.p. 813, 700 watts on all bands except 100 meters. FFX working VKY, EK1AR, and K7M is active on 14-Mc. phone, 7-Mc. e.w., and 3.8-Mc. mobile. 4RZU now is in San Antonio. RIH reports 7 Mc. is rough. RJU has a new Federal 1-12 e.w. rig on 4-meter. SHR, a new Advanced Class. RWP has a new SII transmitter on all bands. RWS is doing lots of measuring on 28 Mc. with a four-element extra-light spaced beam. EIV is on 75 meters with flex power with a new Class A licensor. FCW is on most bands with 220 watts to p.p. 812. LI has a 10-meter exciter and rotary amplifier. SIA has new 6-meter license and needs more 'phone-match' traffic. BEX is working on a new mobile. QDF is doing well on 7-Mc. with 50 watts and working VKY. QED is putting out on a signal for 7 Mc. UIN is on 28-Mc. phone with low power, 25 watts to 823A. SAEN, under FV, works on 28-Mc. Channel 1. BEX: EJT, EJF, OIC, GIP, GZV, KTV, LSP, LVE, MF, OXT, PT, QCB, QCB, QCB, RAL, RNX, RRS, RSD, RT, SAA, SEM, SOL, SUN, AH, THU, UI, USA, KS, FAC, FK, and FSS, RAL and RT have been appointed AEC. Trailing, W5STT, 1332, MN 1186, TRZ 299, PPA 22, QSA 220, RSI 205. RRI 115, Q6M 106, 4RZU 55, 1RZ 65, FNN 4, NPX 1.

NEW MEXICO — SCM, Robert W. Freeborn, W5WXE — SEC; PLX, RM: NEX, EAZ, EBA, RT, and FV, a new Chapter of SCPT. A State picnic will be held this spring and a State hamfest this fall with the Sandia Base Radio Club serving as host. MSG came through again in the November Newsletter, with 4 measurements averaging 17-7 p.p.m. CVI has an 813 on 3.8-Mc. phone. NSH is back on 3.8-Mc. with 300 watts to TR60X. ERM, RRM, and SPM active on 144 Mc. AEC, 6620, and 6620, another OMA/XYL team, have moved to Las Cruces. They hold OBS appointments, and are active on 440 Mc. RMK has new multi-band 813 phone rig. WWV is active in 3.5-Mc. e.w. net with 300 watts from Sandia Peak. AQR is planning 2 nets on 70MC and starting the new rig. EIV, K7R, 420 was made on 7 Mc. only. EIV has 45 watts to 807 on 3.8-Mc. phone. SMH is moving permanently to Ohio. FV has moved to Albuquerque to handle business with LVG. QOD is working on 22 and hopes to be out of the Army in August. RCF has new jr. operator. The Santa Fe and Los Alamos Clubs held a joint meeting

(Continued on page 103)
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CANADA

MARITIME — SCM, A. Al Crowell, V/EIGQ — 88EC: FQ, RM: OM, EC: EK. It is our sad duty to record the passing of an old-timer, Cecil Landry, ex-10-AR and C-10-AR. The HARs new officers are RP, pres.; IM, vic-pres.; and WJ, sec-treas. QL continues to head the traffic list. ET lost his 29-Mc. beam in a heavy gale and repaired the bits for a band opening. WAH has been giving the old 3.5-Mc. phone a whirl. OM finds time between the M.T.N. and E.T.N. to work in a bit of phone on 14 Mc. NN, a new ship, working on 14 Mc. in the Naval Radio School Q.V. at F.H.M.C.S. Stad. Lp has been on 14 Mc. IC, BC, ME, PT, MK, MA, and TV have been active in A.F.A.R.S. QW has been heard going after DX on 3.5-Mc. phone. QN, Q5, and BC have been taking advantage of the openings on 50 Mc. The Halifax gang is watching for JASRG, ex-1UC, now on from Kure, Japan. MZ is on from WOLR, Chicago, near 14.2 Mc. YV has been very active all month handling emergency traffic between Cape North and North Sydney in connection with a missing aircraft in Labrador. AAL is back on the air on 75-meter phone after being off for many months while his Harvey-Weles TX was being repaired. APR is a new YN663 designation in North Sydney and works 3.5-Mc. c.w. CR is busy constructing a super 50-Mc. TX. WE is back from Newfoundland and on 3.5-Mc. c.w. HC had a recent contact on 50 Mc. with WCSN, Traffic: VE1YV 227, FO 183, MK 127, AAK 62, OM 41, HT 37, ABJ 32, DJQ 20, XO 20, AL 10, PO 15, DB 8.

ONTARIO — SCM, G. Eric Farquhar, VE3A1 - GI struggles with 6-meter receiver. DQZ visited Florida and kept in touch with home through AJL, BIR, IA, WE, and WAE. BV enjoyed traffic from home via IA while on a trip to New York City. VD has a new Zapp. RV starts his fortieth year in radio this year. KAO is on 98 Mc. radio this year. EAO is on 20 Mc. in a short while accounts for 16 countries. EAP bobs and repairs needle of meter in grid-dipers! A very successful tracking-race was held at EAB's location. DGQ, DNO, ABP, and BV are heard on 7 Mc. The Frontier Radio Assn. of Windsor enjoyed the showing of AARL TVI

ONTARIO SECTION QSO CONTEST

A QSO Contest, open to all Ontario Section amateurs, sponsored by the Ontario Phone Club, will be held on two consecutive Sundays, March 16th and 23rd, 1953, from 10 A.M. to 10 P.M. each period. The purpose of this Contest is to enable c.w. and phone operators to become more familiar with both types of operation. Two awards will be made. The c.w. award will be known as the “Sparton Radio Trophy” and the phone award as the “Columbia Record Trophy.” Both trophies, donated by Spartan of Canada, will be suitably engraved with the winner’s call and the year of presentation. Permanent possession of the trophy will be given to the person winning in each category. Following are the rules: Frequencies from 3500 kc. to 3725 kc. will be allotted for c.w. operation, 3500 kc. to 3800 kc. for c.w. to phone operation. 3725 kc. to 3800 kc. for phone to phone operation, 3765 kc. is allotted to mobile phone stations. No replicators will be used and one point for contact for phone to phone, phone to c.w. and vice versa, provided contacts are made in the portion of the band above designated. Any station may operate phone or c.w., provided his operation takes place in the proper portion of the band. Judges of the contest will be: C.W. — VE3HBP. Phone — VE3FQ and VE3YJ. Contest log should be sent to E. Kimble, % Spartan of Canada, Limited, London, Ontario, up to midnight March 31, 1953.

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(Continued on page 108)
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420 watts Phone, 420 watts CW. Incorporates some of the latest TVI protective features. Efficient performance on all bands — 10 to 160 on phone and CW. Provisions for ECO. Complete with tubes, meters, and one set of coils. Low Down Payments.

KIT FORM $475.00
WIRE-TESTED $495.00

NEW WRL
165 WATT
GLOBE CHAMPION
TRANSMITTER
More Watts Per Dollar

KIT FORM $329.50
WIRED $349.50

WRL 1952 CATALOG
IT'S NEW! IT'S FREE!
Send For Your Copy — TODAY —
Contains everything new in radio and television. Jam-packed with bargains.
LIBERAL TRADE-INS
LOW DOWN PAYMENTS
PERSONALIZED SERVICE

GIANT RADIO REFERENCE MAP
Just right for your control room walls. Approximately 28" x 36". Contains time zones, amateur zones, monitoring stations. Mail coupon today and... 25c
CU ON 10-20 & 75 METERS

WRITE FOR DETAILED SPECIFICATION EQUIPMENT SHEETS
WRITE WIRE
PHONE 7795

NEW LOG BOOK
For mobile or fixed stations.
Spiral binding — turns up — lies flat. Full column log listing all FCC required info. Log will accommodate 1,325 stations. Front and back covers show "Q" signals, phonetic alphabet, and amateur international prefixes. 25c

World Radio Laboratories, Inc. 746 West Broadway Council Bluffs, Iowa

Please send me:

[ ] New Log Book [ ] Globe King Info
[ ] New Catalog [ ] Globe Champion Info
[ ] Radio Map [ ] Used Equipment List

Name__________________________
Address________________________
City_________________ State________
Mo. Al was licensed in 1947 and became the first amateur in Hamilton to belong to the DX Century Club. He was a member of the Air Force Amateur Radio System, holding call CHRSB in No. 4 Area. He held NAC, WAS, and WAVE certificates. Greatly interested in his radio club, of which he was a past vice-president, he did much work in operating the monthly bulletin. He is now interested in all phases of emergency work. He never missed a Field Day. As an Emergency Coordinator he did much work with the mobile rig and his mobile has become a pattern for newcomers to copy. Traffic: (Des.) VESIA 238, ATR 182, BUR 170, WY 151, IL 218, AHO 168, BAM 101, AER 81, BI 234, VJ 43, GI 29, DGZ 28, KM 21, PH 19, SG 18, VD 15, VJ 6, OJ 2, AVS 1. (Nov.) VE3BMC 69, AER 66.

QUEBEC DIVISION

QUEBEC — SCM, Gordon A. Lynn, VE2GL — It is with regret that we record the passing of George Alec Awcock. VE2AA, suddenly on Dec. 22nd. LO reports continued activity in PQM and adds comments about traffic-handling. AKJ too is active in PQM and TRN. AB participated in the Frequency Measuring Test Nov. 26-27. AAO has been appointed Official Observer. Call him for frequency checks. CA reports the buses are all out of his new 8S3-A rig and it is working very smoothly. Pavilla, his XYL, was very busy with traffic in November and also arranged a wedding for one of the boys coming out of the North Country on the CGS N. B. McLean, the young lady having visited her relatives and staying to share the friend and completing arrangements. XR is on again from new TFI in Dorval, Nov. 27th. VE3R/SR, now on his way to Goose Bay, TH is on from Moosonee, half way between Seven Islands and Goose Bay, on 75 and 200 meters, QTH is Dorval, and VE3SK is in Montreal to Quebec City. MO is back at St. Lamberts and evening the situation as regards a sky wire, after completing an engineering course and obtaining his degree. The Quebec New Year’s International QSO Party was held Jan. 4th on 3960 kc. with a number of VE5s participating, and with VE5J being master of ceremonies. KE1 set up a station in Ste. Anne’s Military Hospital the Saturday preceding Christmas and handled a large volume of greeting messages, using BH’s rig and calls, without assistance from his home QTH. Traffic: (Dec.) VE2BBA 147, SD 106, CA 88, A0 54, LQ 27, AKJ 22, AMB 21. (Nov.) VESCA 70.

VANALTA DIVISION

ALBERTA — SCM, Sydney T. Jones, VE3MJP — LQ still skeds VE2AOJ and reports fairly consistent results. HJ is doing a land-office business in relaying traffic for the boys in the North Country. YM has a new 150-watt rig about completed. EA has overhauled the mobile rig. UP puts out a real good signal on 3.8-Mc, ‘phone. VK has a new rig under construction with high power in mind. EO now has crystal on Alberts. Phone Net frequency, LQ and LQ achieved good results in the November Frequency Measuring Test. KS has rebuilt his rig and is heard on 3.8-Mc, c.w. with a real good signal. CA has put in a good turn on 200 meters. To RF, the official amateur paper in VE5-Land. HJ has new power plant and hopes to have a new long-wire antenna installed. OC rebuilt the sound power plant. The results are noticeable. Congratulations to EO on reaching the old-stager stage. MA is reported to have run up a nice score in the recent S5 Test. As my map is not complete, I would suggest May Ist I wish to express my appreciation for your loyal supports during the past four years. I am again offering my service and expect to continue operating without SCMS 1027. Your patronage and appreciation would be appreciated. Traffic: VE5HLM 123, OD 92, MJ 49, TN 29, AJ 24, QC 12, NB 13.

BRITISH COLUMBIA — SCM, Will Moorhouse, VE7US — The BCARA held its "Open Forum" 51 meeting in Red Cross Headquarters under the auspices of the VARG. The 5 O’clock Net Q5Ys to 3707 kc. for future operations. The 3755-ke. frequency is AR5C and “contact frequency” in B.C. The SEC is busy with a SEC activity, Red Cross, and c.d. Both groups have amateur participation in their books, also RCMC have listing on hand.能力不足

BURSTEIN-APPLEBEE CO.
1012-14 McGee St.
Kansas City 6, Mo.
Send your 1952 catalog to:

Name: ________________________
Address: ________________________
City: __________________________ State: ______
FREE
BUSTINE-APPLEBEE CO.
INCORPORATING 21 PAGES OF DOLLAR-SAVING BARGAINS!
TERMINAL has an eye on Spring... ...and 'MOBILE'!

WHIPS ● MOUNTS ● CO-AX ● LOADING COILS

Master Mobile

AERIALS

MOUNTS: #132-J (Jr. Body Mount) ... $4.17
#140-J (Jr. Bumper Mount) ... 4.17
#132 Standard Body Mount ... 8.75
#132X Heavy Duty Body Mount ... 9.85

WHIPS TO 

#9-96-T Silicon Chrome (96") ... $3.75
#106-96S Stainless Steel (96") ... 4.50

FIT MOUNTS:

#113 (100 Mc to 165 Mc) ... $3.95
ROOF TOP #113 (140 Mc to 165 Mc) ... $3.95

ALL "MASTER MOBILE" ACCESSORIES IN STOCK
RADELCO MB-2 Body Mount ... $4.26

MALLARD "HI-Q" Loading Coils: 20 meters, $8.95
75 meters, $7.95

MOBILE TRANSMITTERS

SONAR

SR-9

2, 6 or 10 meter models, 6 watts,
power filter network, low power con-
sumption. Crystal controlled output.
6 tubes, built-in relay, compact.

For Fixed-Station use: Power Supply (117V-60 cycle, AC, 325V at 190 Ma, 6.3V at 6A) complete with tubes, stand-by switch and auxiliary outlet. PS-117, $30

(MOBILE transmitters and receivers also available for VHF, commercial and aircraft frequencies. Write stating your requirements.)

MOBILE RECEIVERS

SR-9

9-tube super-het, net a converter.
Self-contained, with noise limiter,
voltage-reg. oscillator; better than .5 mcw sensitivity. 2, 6 or 10 meter models.

mallard MOBILE CONVERTER

10, 20, or 75 meter models. Features:
"slug-tuned" coils, high sensitivity, sta-
bility. Very popular.

hallicrafters

EMERGENCY RECEIVERS

115V, AC-DC. For police and fire calls,
etc. Easy to operate.
S-81 (150-174 Mc, FM) ... $49.50
S-82 (30-40 Mc, FM) ... 49.50

POLICE ALARM

115V, AC-DC

PR-31 (30-50 Mc, FM) ... $44.95
PR-8 (150-163 Mc, FM) ... 44.95
AR-1 (108-132 Mc, AM), aircraft band 49.50

STANCOR

MOBILE TRANSMITTER KIT

25 watts, 2E26 final, pp 6V6
modulator. Less tubes and acces-
(see "QST", January issue)

NEW! "ROTHMAN SYSTEM" OF MODULATION
Rothman Modulator ... $24.50
Rothman (Mobile) Modulator ... 19.50
Rothman Speech Amplifier
(for Hi-Impedance mikes) ... 29.00
Both

LOOK!

JOHNSON "Viking" TRANSMITTER
No. 240-101 Now available for optional use of 829 B or RAYTHEON RK 4022/321
Complete Kit (less tubes) ... $209.50
Complete Kit with tubes ... 244.92
Completely wired with tubes
and air tested ... 298.50

TERMINAL RADIO CORP.
Distributors of Radio and Electronic Equipment
85 CORTLANDT STREET • NEW YORK 7, N. Y.
Phone: WOrth 4-3311
Cable Address: TERM RADIO

109
His rig’s for sale. His beam is down.
There are holes burned through his socks.
McGoo had just one weakness —
He trusted Interlocks.

Strays

Amateurs interested in servomechanisms —
control devices which are elaborately combined in complex electronic “brains” — may obtain a treatise on this subject prepared by two authorities in the field, William J. Deehrake and Albert C. Ball. This “servoeman’s primer” on servo systems, 265 pages which include diagrams, tables, photographs and graphs, is available for $2.00. Orders should be addressed to the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., accompanied by check or money order payable to the Treasurer of the United States.

Answer to QUIST QUIZ on page 10
LOOK STEINBERGS LOOK

SUPER SPECIALS

JACK BOXES

(A) BC-345, 3½" x 3½" x 1½" aluminum, 2 standard open-circuit jacks, 3-position switch, 6-contact banana plugs and jacks.
(B) BC-1346, 4½" x 4½" x 2½" aluminum, 1 standard open-circuit jack, 1-3 circuit mike jack, 150,000 ohm volume control, 3-position switch, 11-contact banana plugs and jacks.
(C) BC-213, 5½" x 2½" x 2½" aluminum, 1 standard open-circuit jack, 1-3 circuit mike jack, 150,000 ohm volume control, 4-position switch, 6-contact banana plugs and jacks.

YOUR CHOICE 30¢

CONDENSER SPECIAL

75 mmf, 4250 peak voltage, ceramic button insulation, adjustable spacing, straight-line capacity, precision construction, ¾" long, ¾" wide, shaft ¾" x 1", adjustable tension, double-bearing 89¢

8/8/8 MFD. 500 V. D.C.

Triple 8 mfd, 500 working volt D.C. oil-filled condenser, common negative, solder terminals, hermetically sealed, 5" ¾" x 2¼". A one-time buy... $1.95

GRID BIAS CONTROL

2500 ohm, 25 watt Clarostat potentiometer, perfect grid bias control for panel mounting, excellent heavy-duty P.A. speaker volume control, TV focus control, worth $5.20 list, brand new... 69¢

PHOSPHOR BRONZE AERIAL

125 ft. of the finest aerial wire obtainable. 42-strand phosphor-bronze with linen center. Will not stretch, very high tensile strength, diameter approximately same as No. 14 copper, very flexible. Excellent for transmitting or receiving antenna, control cable, guy wire.
Regular list $4.95............... 90¢

MINIMUM ORDER $2.00.
Send 20% deposit with COD orders. Please include sufficient postage or instruct us to ship by Express Collect. Overpayment will be refunded by check.

Steinbergs
633 WALNUT STREET • CINCINNATI 2, OHIO

ELMAC-A54
Under-dash Mobile Xmtr.

VFO or Crystal control. Direct-reading. VFO on all bands—75, 20, 11, 10. Plate modulation. Completely band-switching, face or CW, x 50 Watts max. Input. Power required: 300-500 V.D.C. at 250 ma., 6.3 V AC or DC at 4.5A. Uses 3-6AG5, 6A5, 6C5, 1A2DA, 2-6.6G, 607, (Included). Only 7½" x 7½" x 12", 14½ lbs.
For carbon mike input........................ $139.00
For Dynamic or crystal mike.................. $149.00
Power Supply, 110 Volt AC.................... $39.50
ELECTRO-VOICE 210 Mobile Carbon Mike $16.50
ELECTRO-VOICE 600D Mobile Dynamic Mike... $23.10

MORROW 3-BAND CONVERTER

• No Images or Birds
• Automatic Noise Limiter—Built In
• F-Microvolt Sensitivity—All Bands
• Antenna Trimmer on Front Panel
• Beautiful Grey Hammertone Finish
• Drift-free, Pre-calibrated Oscillator
• Full Width Dial—Calibration Accuracy 1½
• AVC On Preselector, No Strong Signal Blocking
• LF, Amp. with 4 Tuned Circuits, Output 1525 Kc.
• Complete with Mounting Hardware, Manual
• Case—Height 4", Width 7½", Length 6½"

$64.95

HI-Q. 20 coil to base load 96" whip.... $6.95
HI-Q. 75 coil to base load 96" whip... $7.95

MASTER MOBILE UNITS

All-band center-loaded antenna for 75-20-10 specify coil wanted, less mount............. $8.75
100-965, Stainless Steel 96" threaded whip........ $5.25
9-961, Silicon-Chrome 96" threaded whip........... $5.75
100-605-60", "All-Band" top section only........... $4.95
132, Tapered spring universal body mount...... $8.75
132J, Heavy-duty universal body mount...... $9.85
132J, Junior model universal body mount...... $6.17
140, Tapered spring bumper mount............ $6.55
140X, Heavy-duty bumper mount............. $7.05
140J, Junior bumper mount.............. $4.17

Your order will receive my personal attention and will be shipped the same day order is received. We distribute all top-flight amateur lines... let us know what you need.
73, Isle Burton, W8WHE

111
Twenty Watts Mobile
(Continued from page 88)

Power Supply
Since an inexpensive dynamotor with sufficient power capacity could not be found, two vibrator supplies having an output of 100 ma. at 300 volts were obtained at a reasonable figure. This supply, with a conventional brute-force filter, works very nicely, since one unit is used for the r.f. section, while the other supplies the audio stages. The latter supply is set at 250 volts output because this is the maximum recommended manufacturer’s rating for the 2E30 tubes. The use of two supplies provides better regulation, because the current variation of the Class AB2 modulator is not reflected on the supply voltage for the r.f. stages. The two power units are housed in a $6 \times 6\frac{1}{2} \times 9\frac{1}{2}$-inch metal box mounted under the car hood.

Results from this installation have been most satisfactory on all bands, and it is hoped that others will find some of the features worth adopting.

Letters from TV Manufacturers
(Continued from page 87)
peculiar arrangement, we felt the fault was ours and spent considerable money correcting these receivers so that the interference problem was eliminated.

I can assure you that you will find our organization most cooperative toward solving any such problems, should they continue to arise.

We are well aware of the steps that are being taken by other manufacturers to incorporate adequate selectivity in their v.h.f. and u.h.f. receivers. We naturally will continue to develop our front-end circuits so as to be as good as, if not better than, our competition. We appreciate your offer to perform cooperative tests on our receivers and should the occasion arise where we feel it is necessary, we will certainly take advantage of your kind offer.

— R. B. Passow,
Product Manager, Television Division

HALLICRAFTERS

. . . We are currently producing and engineering high-frequency transmitters as well as TV receivers and communications sets and are therefore very close to the problem of interference concerning both receivers and transmitters. All 1951 and subsequent Hallcrafters TV receivers employed tuners with tuned antenna input circuits, and the majority of the same production has in addition i.f. filters at the antenna. All 1952 receivers have i.f. filters at the antenna. In certain cases high-pass filters may be required in addition. When this is certified by the local TVI committee, arrangements are now in process so that the cost of the filters and labor will be accomplished at no charge to the TV set owner or the local amateur. We are forwarding current production TV sets for your test purposes and it would be a privilege to have our engineers come to Hartford for consultation. You may recall that during the FCC Bridgeport test we made available our u.h.f. receivers and converters for TVI testing with your engineers. Please depend on us for hearty cooperation at all times in this important problem.

— Harold Adler,
Director of Engineering

EMERSON
I received your letter . . . together with enclosures, and have submitted same to our Engineering Department for their attention and information.

— Benjamin Abrams, President
(Continued on page 114)
### SPECIALS
- Rack panel cabinet - 83/4" panel space $11.00
- Double Vee antennas ................ 3.88
- Stacked dubl vees with Q bar ....... 8.71
- 100 ft. coil, 300 ohm lead .......... 2.19
- RG/59 coax cable, 72 ohm, per ft. .06
- #14 enamel, 100 ft. coil .......... .95
- #12 enamel, 100 ft. coil .......... 1.25
- #10 enamel, 100 ft. coil .......... 2.45
- 1/25W. neon with leads .......... .08
- 2½W. organs ................ 10 for 1.50
- Pilot assemblies with dimmer ....... 1.19

### ALUMINUM CHASSIS
- 7x9x2 ..................... $1.03
- 7x11x2 ..................... 1.06
- 7x13x2 ..................... 1.20
- 9x16x3 ..................... 1.76
- 9x17x3 ..................... 1.91
- 9x18x3 ..................... 2.03
- 9x17x3 ..................... 2.45
- 9x9x7 ..................... 2.82

### STEEL CASES
- Black Crackle Finish
  - 4x4x2 ..................... $ .70
  - 4x5x3 ..................... .80
  - 6x6x6 ..................... 1.10
  - 12x7x6 ................... 2.13
  - 13x9x7 ................... 2.88

### AMPLIFIER FOUNDATION CHASSIS
- With 6" High Louvered Cover
  - 5x10x3 ................... $2.48
  - 6x14x3 ................... 2.75
  - 10x12x3 ................ 3.45
  - 10x17x3 ................ 4.13

### MODULATION TRANSFORMERS

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Output Tubes</th>
<th>Ohms Impedance</th>
<th>Max. M.A.</th>
<th>For Specific Applications</th>
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<tr>
<td>A-3008</td>
<td>PP6A45QS, 6V6, 6F6. Single 6A6, 6N7, 58</td>
<td>1000 c.f.</td>
<td>4000-5000 Imp 70 10 2½ 2½ 2½</td>
<td>Price: $12.12</td>
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<td>A-3109</td>
<td>PP2A3, 6A3, 6B4, 6L6, 45, 46, 59</td>
<td>6000 c.f.</td>
<td>3000-6000 Imp 80 25 3½ 2½ 2½</td>
<td>Price: 5.00</td>
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<td>A-3110</td>
<td>PP6A4 507, RK41, HY65, HY61, HK4</td>
<td>6000-3800 c.f.</td>
<td>4000-5000 Imp 175 150 60 4½ 3½ 5½</td>
<td>Price: 8.53</td>
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### UNIVERSAL MODULATION TRANSFORMERS

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<th>Type No.</th>
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<th>Pri. M.A. Per Side</th>
<th>Sec. Impedance</th>
<th>Max. Sec. M.A.</th>
<th>Watts</th>
<th>Dimensions</th>
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### POLYSTYRENE ROD AND TUBING

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### ROD 12" LENGTHS

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<td>.40</td>
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<tr>
<td>3/8</td>
<td>.57</td>
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</tbody>
</table>

Both Rod and Tubing also available in 48" lengths to order.

---

**Sarkes Tarzian Center Cooled Power Rec-**

tifiers, Full Wave Bridge Type. Maximum Input 52V, AC——output 20-40V, DC.

**Write for circular on other stocks**

**Dc to Ac Converter. 6V DC-110V AC-60 cycles 40-45 watts. Will fit into cigar lighter of any car to supply power for portable radios, phonographs, electric shavers, fluorescent lights.** 9.95

---

**LEEDS KITS**

- 145K Signal Tracer .... $19.95
- 221K V.T.V.M. .......... 25.95
- 315K Signal Generator (De luxe) ... 39.95
- 320K Signal Generator .......... 19.95
- 322K Signal Generator .......... 23.95
- 360K Sweep Generator .......... 34.95
- 400CK Conversion Kit (Push-Pull 5" Scope) 8.95
- 425K 5" P.P. Scope .......... 44.95
- 511K Multitester .......... 14.95
- 526K 1000 ohm per volt Multimeter .... 13.90
- 555K 20,000 ohm per volt Multimeter .... 29.95
- 625K Tube tester .......... 34.95
- 950K Resistance Capacitance (Bridge & R.C.L. Comp.) 19.95
- 1040K Battery eliminator & charger .......... 25.95
- 1171K Resistance decade .......... 19.95
- P75 RF Probe (Xtal type) for VTVM .......... 5.95
- P76 RF Probe (Scope) .......... 5.95
- HVP-1 Hi-Voltage probe .......... 6.95

Write for circular on wired instruments.
Save hours of hard, tedious work...cut accurate holes in chassis for sockets, plugs, controls, meters, panel lights, etc., with Greenlee Punches. In 1-1/2 minutes or less make a smooth hole in metal, bakelite or hard rubber up to 1/16" thick. Easy to operate. Simply turn with ordinary wrench. Write for details.
Greenlee Tool Co., 1865 Columbia Ave., Rockford, Ill.

RAYTHEON
... We are taking up your suggestions with our Engineering Department, and you shall hear further from us.
—H. C. Mattes,
Exec. Vice President

RCA
... It is the desire of the Radio Corporation of America to cooperate with any organization whose objective is to improve radio and television service to the public.
I appreciate very much your recognition of RCA's leadership in recognizing the problem of television interference. I can assure you that we will continue to take the same attitude that we have in the past and to consider all the designs from the standpoint of the problem which you have pointed up.
—C. B. Felstege,
Vice-President and Technical Director

WELLS-GARDNER
I was very happy to receive your letter regarding interference in the television field, and I believe that it is very commendable that your organization is taking an active part in helping keep the industry out of trouble on these matters.
I am referring your correspondence to Gordon T. Bennett, our Chief Engineer, who will contact you direct should any assistance be required.
—Robert S. Alexander,
President

Temporary and Semi-Permanent Antennas
(Continued from page 41)

In some cases a thimble cannot be used, especially if the line makes a sharp bend over a narrow crotch, since the change of diameter may be too great to permit the line to pass even with Scotch tape over the joint.
The range of conditions under which success may be achieved with care is rather wide. One type of condition is that where a tall tree is surrounded by a number of other trees. An arrow placed over a desired portion of this tree may fall far beyond, pulling the line over several trees. It is possible, with care, to withdraw the arrow to a position where it falls below the desired branch, bringing the line down with it. This feat may be accomplished, after the arrow has been allowed to touch the ground, by wrapping its tail assembly with some more Scotch tape, continuing the wrap back to the end and making a smooth joint between the line and the rear of the arrow. Now it is possible to withdraw the arrow without its snagging on the way up. In withdrawing the line, a sudden change of tension is felt when the arrow has been drawn through the top of one tree and falls alongside the next. When the arrow has fallen alongside the correct tree the line may be released so that the arrow falls to the ground. It is now possible to splice the next heavier line to the initial line and proceed with the job.

Another interesting situation is that requiring a very-high-angle shot, such as when erecting a vertical antenna in a grove of trees. Under some conditions, this is the only kind it is feasible to erect. A high crotch to which there is a clear
(Continued on page 116)
UNCLE DAVE'S
BARGAIN CORNER

50 Watt sockets similar to National XM50 @ 2 for $1.50. Each.......................... $ .79
15 mmfd air trimmer cond. similar to National PSR. Each.......................... .35
25 mmfd air trimmer cond. similar to National PSR 25. Each.......................... .40
100 mmfd air-trimmer cond. similar to National PSR100. Each.................. .95
10 mfd 600 V oil condensers. Each........................................... 2.25
15 mfd 1000 V oil condensers. Each........................................... 5.95
3 gang ceramic rotary switches, 2 circuit 5 position. Each gang.................. .95
1 gang bakelite wafer switches, 4 circuit 3 position. Each..................... .35
1 gang bakelite wafer switches, 1 circuit 4 position. Each..................... .35
72 ohm antenna lead-in wire 1 kw rating clear polyethylene similar to Belden 8210. Per ft. Per C.......................... 5.00
3' Bakelite Black knobs flange type with pointer—similar to ICA 1172. Each.......................... .30
2 Industrial Instrument decade boxes Model DR14 total resis. 9000 ohm 1% accuracy in steps 9 x 1000. Each.......................... 17.00
1 Industrial Instrument Model DK2A Capacitance decade box all mica cond. 1% accuracy .2% P.F. total capacity 1.11 mfd in .001 steps.............. 70.00
1% accuracy total resistance 99900 ohm in 9 x 1000, 10000, 100000 ohm steps................................ 37.50

Calling All Hams!

Johnson Viking Transmitter Kit........................................... $209.50
Wired and tested, less tubes, crystal or mike.......................... 259.50
National HRO-50T1 less speaker........................................... 383.50
Speaker................................................................. 16.00
National NC-183-T less speaker........................................... 279.00
Speaker................................................................. 16.00
National NC-125T less speaker........................................... 149.50
Speaker................................................................. 11.00
Hallcrafters S-38B........................................................... 49.50
Hallcrafters S-40B........................................................... 99.95
Hallcrafters S-53A........................................................... 79.95
Hallcrafters S-72........................................................... 109.95
Hallcrafters S-72L........................................................... 119.95
Hallcrafters S-76........................................................... 169.50
Hallcrafters S-77........................................................... 99.95
Hallcrafters S-80........................................................... 44.50
Hallcrafters S-81........................................................... 49.50
Hallcrafters S-82........................................................... 49.50
Hallcrafters SX-62........................................................... 289.50
Hallcrafters SX-71........................................................... 199.50
Hallcrafters R-46 speaker for SX71-SX82 and S-76...................... 19.95

WE ALSO CARRY FULL LINE ON SONAR EQUIPMENT,
MASTER MOUNT ANTENNAE, BUD, BARKER & WILLIAM-
SON, ELDICO, LYSCO, HARVEY-WELLS, FAR-METAL,
MILLEN, NATIONAL, E. F. JOHNSON, AND MANY OTHERS.
PHONE AND MAIL ORDERS ARE SOLICITED AND EX-
PERTLY HANDLED. YOUR INQUIRIES ARE WELCOME.

USED EQUIPMENT

National NXT30 transmitter complete with tubes and NTE exciter and NSA speech amplifier 30 watt with coils 10, 20, 40, 80, 160 meter........................................... $125.00
Hallcrafters HT-9 transmitter with coils for 10, 20, 40, 80, 160 meter bands and 11 crystals.......................... 375.00
Bud VFO-21 variable frequency oscillator.......................... 42.00
Meissner 150-B transmitter with full set of coils including 10 meter band also exciter and buffer doubler.......................... 325.00
Hammarlund Super Pro SP-400X complete with power supply and speaker—LIKE NEW.......................... 300.00
National HRO-5 with power supply, speaker and ABCDEF coils; also is equipped 100 kc calibrator and NBFM adapter—VERY GOOD SHAPE.......................... 225.00
RME-70 receiver with DB-20 preselector built into one cabinet.......................... 125.00

FOREIGN ORDERS SOLICITED. WE TAKE TRADE-INS.
MISSILE
TECHNICIANS
for FIELD TEST POSITIONS
in New Mexico "The Land of Enchantment"
ON
GUIDANCE FLIGHT TESTING SERVOMECHANISM
TELEMETERING TEST EQUIPMENT
AIRBORNE ELECTRONICS EQUIPMENT
* IDEAL WORKING CONDITIONS
WRITE: FIELD TEST DIRECTOR
P. O. BOX 391
HOLLOMAN AIR FORCE BASE
NEW MEXICO

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RADIO and TELEVISION
Over 20 years N.E. Radio Training Center. Train for all types FCC operators' licenses. Also Radio and Television servicing, FM-A.M. broadcasting transmitters at school. Send for Catalog Q.

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271 Huntington Avenue
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AERONAUTICAL OPERATORS • TECHNICIANS
ELECTRONIC ENGINEERS
Excellent opportunity with 20 year aeronautical communications firm for FCC licensed line and telegraph operators and technicians. Also need advanced technicians and practical research personnel (licenses not required) for quality control work in electronics. Domestic and foreign assignments available - liberal foreign allowance. Fam background desirable.

BOX 2802, WASHINGTON 13, D. C.

run is first sighted. Many trial shots may be necessary before correct placement is achieved, because the necessarily awkward body position may cause wavering of the bow.

The antenna itself, if it is to stand more than a few days, should be mounted with a spring in one of the supporting lines to counteract the changing tension caused by the swaying of the trees in a high wind and by the ropes getting wet in storms. A pulley and rope with a counter-weight is even better than the spring, since it affords a constant pull and can accommodate itself to large changes in the distance spanned by the antenna. A bucket of bricks or sand is a simple counterweight; a hook set in concrete is a more elegant one.

The reader is warned to use great care in first learning how to handle a bow with free-flying arrows such as the target arrows commonly available. If he is a novice he will be amazed at the distance which these arrows will fly with the bow only partially drawn. Needless to say, misdirected arrows in a crowded community with small yards constitute a hazard.

World Above

(Continued from page 61)

less than 20 ma. With grid leak values of 3000, 70,000 and 40,000 ohms respectively, in the 6F6 stages, the first tube's plate runs at 150 volts and the second at 200. Interwound grid and plate coils are used in preference to capacity coupling, to achieve the most efficient transfer between stages, making it possible to develop 2 ma. grid current in the 832A under load.

WES newsmaker W7BYK, Marysville, Wash., reports catching several 50-Mc. band openings during the winter season. W7's DYD KQG KO and MIG are the old standbys on 6 in that area, and WTP1M has recently rejoined them after a tour of duty in the Army. W7PAW is now on 6 in Seattle, operating on 50.5 Mc. Do they tune the band in Washington?

W6LLE, Westboro, Wia., continues his skeds with W6BEN, 190 miles, successfully on 144 Mc., though there is more frequent rough going in the winter months. Even W6RYN, only 50 miles away, shows considerable fluctuation. W6LLE uses a 6Q7 crystal-controlled converter to receive WBEN, who runs 300 watts input. His signal hit deep valleys before readability on about one-third of the skeds in December. Good readable signals were received on 14 days.

W6CFL, Los Angeles, reports completion of a 2400-Mc. cavity that was made entirely by hand, without lathe work of any kind. With ideas taken from a surplus cavity, it features an adjustable choke to allow for maximum output across its tuning range. Flick's problem is now an accurate means of checking frequency. He would like to correspond with others who are interested in 2400-Mc. experimental work.

YL News

(Continued from page 58)

... W1BCU, W1MCW, W1QON, W2WBN, W3QOF, W3PYI, W3UDU, W4LAS, W4LKM, W4GCD, W8ATB, W8IDJR, and VE8DEX arise at daybreak or before each Thursday to chat on 75 'phone. Stimulated by coils made by their OMs, the gals enjoy reasonably QRM-free ragchewing at the ghastly hour of 6:30 A.M. EST. ... Because of ill health, the president of the YLRL New York City Club, W2QWL, has not been active on the air recently. ... The Ladies Auxiliary of the Rochester Amateur Radio Association has a membership of thirty. The club's five licensed YL's are W2e, POT UT9F WBN ZRO and WOW (president). With a new bug and transmitter in the shack, WSSP hopes to be on all bands soon.

(Continued on page 118)

116
**Scotty Says**

Spring is just around the corner, so get ready for that mobile rig with these items. Remember your M-85. See Dec. 1951 QST, page 36, for details.

**W2LAL**

---

**Lyso**

**Mobile Transmitters**

10-11, 20, 75
Meter Bands
All With Tubes

- P21202 – Lysco A123T, 10-11 meters... 33.55
- P21209 – Lysco A114T, 20 meters...
- P21310 – Lysco A175T, 75 meters...

---

**Gonset Converters**

**Tri-Band Model**

6, 10-11, 20, 75
Single Band

- P21229 – Gonset 3005 Tri-Band... 47.60
- P21226 – 10-11 meters... 44.75
- P21225 – 5 meters... 44.75
- P21227 – 20 meters... 44.75
- P21228 – 75 meters... 44.75
- Gonset 3001 Noise Clipper... 9.25

---

**Sonar Receiver or Transmitter**

MB-26 XMT

- SR-9 Receiver... 72.45
- Sonar MB-26 Transmitter... 72.45

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**Johnson Viking I Transmitter Kit**

Includes all parts, cabinet and complete instructions... 209.50

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**Johnson VFO Kit**

160 thru 10 Meters
With parts and instructions, but less tubes.

- P21199 – VFO Kit... 42.75

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**3-Speed GI Record Changer**

Special!

Plays 7, 10 and 12" at 33 1/3, 45 and 78 RPM.

- 15 x 12 1/4"... 16.95

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Free Lafayette Radio.

**Radio Wire Television Inc.**

NEW YORK 13, N. Y.
100 SIXTH AVENUE
REctor 2-6503

BOSTON 10, MASS.
110 FEDERAL STREET
HUBbard 2-7850

NEWARK 2, N. J.
24 CENTRAL AVENUE
MARKet 2-1661

BRONX 58, N. Y.
542 E. FORDHAM RD.
FORDHAM 7-8813

117
ASTATIC ACCOMPLISHES NEW HIGH SENSITIVITY IN A SINGLE BUTTON CARBON HAND MICROPHONE

THE MODEL 10MS

Here is the resistance to jolts and abuse, to high temperatures and humidity, of a carbon mike, PLUS HIGHER SENSITIVITY. This and other refinements make the new Astatic 10MS the ideal unit for a host of applications. Write today for complete details.

THE Astatic CORPORATION

GROUND RADIO OPERATORS WANTED

United Air Lines has openings for ground radio operators at New York, Chicago, Cleveland and Washington, D. C. — Must have second class Radio license in good standing and be able to pass typing test of 40 words per minute at end of 90 days of employment. Attractive starting salary with periodic increases. Applicants may apply by writing United Air Lines Personnel Administration, Hangar No. 5, Stapleton Airfield, Denver 7, Colorado.

GO MOBILE WITH The AT-1 Transmitter

The AT-1 was war-born in Canada for use in aircraft. It is a self-contained, attractively finished unit of excellent design and manufacture, measuring 12½ x 16 x 14 and weighing but 20 lbs., on its own shock mounted base. Operative over the frequency range of 1.5-20 mc in 2 bands by means of continuously tuned and tuned coils fitted with sliding contacts, the AT-1 has a built-in antenna matching network enabling mobile operation from a whip on 80, 40 and 20 meters.

Circuitwise, either VFO or crystal controlled oscillator starts in 807 which drives a second 807 while a third 807 is used to screen grid modulate the final. A 6J5 slide tone oscillator (which can be altered to a stage of anode) and a 616 antenna current indicator rectifier complete the tube line up. This rig is powered by a 12 volt motor generator producing 500 V at 200 ma. Relays perform the function of remote starting while a meter and associated switch enable accurate knowledge of tune-up and operation.

You would normally save almost $40.00 for the dynamotor itself. You can buy the complete AT-1 with instructions for but $35.

THE OVERBROOK COMPANY

Overbrook 81 Massachusetts

... W6KXT (formerly W5PTP) is expecting an OA4 call.
... G3GOX is a new YLRL member from England.
... With five Jr. ops about, WSHL concludes that evening operation is most comfortable. Arlie works 75 and 10 'phone and 40 c.w. W7NW, W7QGF, W7PTC, and Betty Lee Gorton, who is awaiting her call, are active

in the newly-organized Lake Washington Amateur Radio Club of Washington. ... Harmonics editor W1RTB is expecting her first Jr. op. in June. ... Fifty Japanese orphans enjoyed Christmas thanks to the efforts of the Los Angeles YLRC and the U. S. Marines. During a traffic sked with JA2M1B and JA21B, W6UHA learned of the children's sad plight. The L. A. YLRC unofficially adopted the boys, raised funds, and sent huge boxes of clothing and presents. On Christmas Day the Marines helped St. Louis distribute the gifts by helicopter. An account of the event was later broadcast by the Voice of America as an example of generous American spirit.

YRL Growth

YLRL Secy.-Treas. Peg Wells, W1BCU, reports that a check of YLRL records for 1951 reveals the following:
Members in good standing for the year totaled 375. Forty members reside outside of the United States or its possessions. The Sixth District claimed the biggest membership with a total of 53 YLs. The Second District ranked second with 42 YLs.

Indications are for the greatest membership ever in 1952. Have you paid your dues for the new year? Send $1.00 to W1BCU at 343 Fisher Street, Walpole, Mass. YLRL invites licensed YLs the world over to become members.

Single Sideband

(Continued from page 67)

low like W2SHN and W9OHM for the technical help and the glad hand given to a newcomer. We're sure he is speaking for many more when he says that — if there is one place in ham radio where you can receive a warm welcome and all the help you need — it is among the s.s.b. gang.

Although W5FNA hasn't succumbed yet himself, he is proud to let us know that W5MIL is the first s.s.b. station on in San Antonio, operating both 20 and 75. Come to think of it, where is all the 'Texas representation? Just to start a small war, we hasten to point out that California is well represented, with W6s BAY EDD EDJ FIR GGM IMZ KNH LRQ UOC/ mobile VSF W1ZQ and W1JE6/6 all active on 75, according to GGM at Santa Cruz. BAY EDD GGM and KNH are using the Signal Slicer (GE Ham News, July, 1951) with excellent results. They like it because it is useful with c.w., a.m., n.f.m. or s.s.b. A couple of them have made the local oscillator crystal-controlled, which should make it even better.

W6FIR is ex-W1TRY, and he uses a voice-controlled W1JE6 exciter followed by an AB1

(Continued on page 180)
RUGGED...

but RESPONSIVE!

Here's a microphone that delivers double value! Unusual response, because the Turner 9D is engineered for maximum response to voice. Many years of service, because the 9D is built to take hundreds of hard knocks without affecting its sterling performance. Hang it, hold it, or mount on any stand. Make your next microphone a Turner 9D!

Model 9D Dynamic .................. List price $28.50
Model 9X Crystal .................. List price $23.50

Write for complete literature

In Canada: Canadian Marconi Company, Toronto, Ontario and branches.
Export: Ad, Auriema, Inc., 89 Broad Street, New York 4, New York

THE TURNER COMPANY
917 17th Street, N. E. Cedar Rapids, Iowa

Microphones by TURNER

Crystals licensed under patents of the Brush Development Company.

BALUN COILS!

These bifilar balun inductors are specially designed for use with Collins 32-V series and similar transmitters—see "The Impedance Matcher" as described in CQ Magazine for May 1951. Two coils mounted on an 8" square plate serve as a compact, highly efficient all-band (80-10 meters) unit for matching feed line systems to both transmitters and receivers. Full instructions included with each inductor.
BUY OF A LIFETIME!
TRIED AND PROVEN THE WORLD OVER

LETITINE MODEL 240
TRANSMITTER WITH MOBILE CONNECTIONS AND A.C. POWER SUPPLY

This outstanding transmitter has been acclaimed a great performer throughout the world. It is excellent for fixed station, portable or mobile operation. Even if you have a transmitter of your own you can’t afford to miss this wonderful buy direct from our factory, ready to operate.

The 240 is a 40 watt zener power TV receiver. Send for 160 to 10 meters, complete with 0314x6 cabinet, 200 watt power supply, MOBILE connections, meter, tubes, and crystals and coils for 40 meters. It’s for 6-VQ condenser, 6517 crystal mixer, 6N7 crystal mixer, 304A REV. 2 socket, 6146 mod., 5U4G rect. Weight 40 lb. 90-day money back guarantee, price $79.95.

$25 deposit with order — balance C.O.D.

For 80, 20, and 10 meters $2.01 per set. Coils for 160 meters $3.60. Equipped for CAT 2374 kc. $84.95.

LETITINE RADIO MFG. CO.
62 Berkeley St.
Volley Stream, N.Y.

COMPLETE RADIO TRAINING!
Prepare now to accept a responsible position in Commercial Radio! New developments will demand technicians with thorough basic training, plus a knowledge of new techniques discovered during the war. Training open to high school graduates, or those with high school equivalency. Course 6 to 18 months’ duration in RADIO AND ELECTRONICS. Approved Veteran training in Radio. Write for particulars.

DEPT TN
VALPARAISO TECHNICAL INSTITUTE
Valparaiso, Ind.

No other Semi-Automatic Key so EASY on the Arm!
Order YOURS Today!

VIBROPLEX
WORLD'S FINEST BUG
Twice as easy as hand sending

5 Smart Models:
Super Deluxe Presentation, Original Blue Racer, Lightning Bug, Champion $89.95 to $129.95

Never tire your arm. There’s no nerve strain. Adjustable to suit any hand. PATENTED JEWEL PRESENTATION assures smooth, easy action, easier operation, better signals. Whether you choose Vibroplex Super Deluxe Presentation, 24-karat gold-plated with base top and SUPER-SPEED CONTROL MAINSPRING that lets you send from dead slow to top speed, and requires no additional weights for fastest sending — or one of the other models — you’ll get the finest semi-automatic key your money can buy. In Vibroplex you have a very practical feature for faster... easier... better keying! Left hand models one dollar more. At dealers or direct. FREE catalog.

THE VIBROPLEX CO., INC.
833 Broadway
New York 3, N. Y.

829-B driving Class B 813s... W6KNH has just completed a new exciter that has the works: crystal-lattice filter, voice control, carrier insertion, and bandswitching to 75, 20 or 10... W7AVE has been on with low power, but didn’t have much luck finding CAL, LWB, KSS and the other W7s, probably because he was crystal-controlled around the low end of 75.

Here is a very nice summary of the VE3 gang, sent in by VESABF: AAL, ADB, ATG and E1 use 10-kc. filter jobs; ABF, HF and QG use W1JEO crystal filters; ATI and YE use lattice crystal filters. ATI, QG and YE use 811s in the final; HF uses a pair of 810s, and ABF has a 504. These fellows hang out around 3780, with occasional excursions to 3995 for W contacts.

Across the pond, we hear from G3FHL that the s.s.b. gang put on a good show at the RSGB Exhibition in London, where they demonstrated the rigs of G3s BVA, CU FDG CWC and FHL. The selectable-sideband receiver of G2IG was also on hand. They feel that they accomplished quite a bit in the way of familiarizing the Q gang with s.s.b. techniques and with the tuning procedure when using an ordinary receiver. A number of visitors admitted that they were very surprised to find "how easy it was," and one heckler sent along his young daughter to ask the demonstrators, "What's the good of transmitting s.s.b. if no one can read you?" That sounds just like this side of the water!

DL1KV was kind enough to send along four issues of Das DL-QTC (Sept., Dec.) that contain the series of articles he and DL3GL have written on s.s.b. If you are a collector of s.s.b. literature you will want these, since one issue has the most complete bibliography of practical s.s.b. articles that we have ever seen.

We would like to put more practical hints and kinks on s.s.b. in this column, so if you have run across any tricks that might help someone else to get his rig running or running better, please pass them along. We can get the space if we can get the material. — B. G.

Correspondence

(Continued from page 61)

here are stacked Yagi antennas 50 feet high, if you mean what I mean.

— Arthur B. Hale, jr., W4AWS

"SS"

10 Clark Street
Glen Ridge, N. J.

Editor, QST: I have become so thoroughly disgusted with these "CQ SS" week ends of late that I have almost given up amateur radio after about 47 years at the key.

The "ham" bands, especially 40, are cluttered up with a lot of rotten-listed "CQ SSers" who don't know how to use a bug in the first place and one can hardly understand their call letters. I for one am shunning contests forever.

I am not the only one who is disgusted with these affairs as many of my amateur buddies likewise do not go in for this trashy business of cluttering up all amateur channels

(Continued on page 188)
MAKE THIS YOUR HOME FOR IMPORTANT WORK UNDER IDEAL CONDITIONS

- TV RECEIVER DESIGN ENGINEERS
- ELECTRONICS ENGINEERS
- FIELD ENGINEERS
- TEST & INSPECTION ENGINEERS
- LAB. TECHNICIANS


YOU BENEFIT AT BENDIX RADIO:
- from high wages, a modern, air-conditioned plant, paid vacations and holidays, group insurance and a good chance for advancement.
- Housing immediately available in the beautiful suburban and country areas that surround the Bendix Radio plant.

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BALTIMORE-4, MD. Phone: TOWSON 2200

Antennas . . .

Premax Antennas are standard equipment for all Amateur installations, Mobile Rigs for land or marine, Civil Defense, CAP, Aircraft and other installations.

Available in telescoping Verticals, in Beam Elements, in Base-Loaded and Center-Loaded Whips, in Telescoping Center-Loaded Marine, in VHF for mobile and land based stations.

Ask your jobber for the special Premax Bulletin showing all types of successful Antennas. If he doesn't have it, write direct.

"LOADED" MOBILE

VHF FOR CIVIL DEFENSE AND OTHER LAND AND MOBILE

BEAM ANTENNAS

GROUND RODS

PREMAX PRODUCTS
DIVISION CHISHOLM-RYDER CO., INC.
5202 HIGHLAND AVE., NIAGARA FALLS, N. Y.
with nonsense. It has become so bad that one cannot get any enjoyment out of ham radio. . . .

— Albert Edwin Sonn, W6GC

208 So. Main St.
Swanton, Ohio

Editor, QST:
Have just completed making out my Sweepstakes summary sheets and want you to know that of all the contests that you sponsor the Sweepstakes is by far the best one for low power and limited equipment.

It is the one contest where there is plenty of activity, lots of stations to contact and best of all, unlike the big DX contest, the competition is more equally spread out. This gives the low-power gang a chance to work lots of new districts and states. . . .

— Alfred Vaske, WSFHD

160-25 Reisley Blvd.
Jamaica, N. Y.

Editor, QST:
Don’t know when I’ve enjoyed myself as much as during the 18th SSB . . . .

— Don Miller, W2MGB

4801 Stuart Ave.
Richmond, Va.

Editor, QST:
... I am completely disgusted and burned to a crisp after trying to get a little traffic off this past week end, it being the first week end of the rat race called Sweepstakes.

Now I realize that a lot of guys get a kick out of these activities and I am not downing them for it, but it seems like that they could show a little respect for the few fellows that are interested in handling traffic, especially from overseas, and trying in our own way to justify our very existence. When a regular member of a traffic net cannot take a minute out from swamping numbers or being off on another band, he is likely to go home. I think it is time to get mad. Then, one station that I know of had about twenty messages and could not get a station to relay any of them. I am sure that there were others like myself, with low power, that could not even work through the QSOs from the kilowatts to handle it. I have operated contests and I would like to know in what way they increase the operating ability or the efficiency of the equipment. . . .

— W. E. Sampson, jr., W4NAD

HAM SPIRIT EXEMPLIFIED

3202 Haspel St.
Elmhurst, L. I., N. Y.

Editor, QST:
Recently I placed an ad in QST for a local ham operator to help me with code and theory.

The response was unbelievable. The letters, phone calls and post cards were pouring in from OMs, YLs, regular ops, Novice Ops and fellows that are in the same boat I am.

You may be interested to hear that one letter was received from as far south as Richmond, Va., suggesting that I get in touch with a local ham that is in my vicinity just one town away.

For anyone trying for the Novice or any class license, I certainly recommend that an ad of this kind be placed in QST. I feel sure that if he receives half the response I did, he will be on the air much sooner and with many new friends.

— David M. Turner

RADIO MECHANICS WANTED

United Air Lines has openings for line radio mechanics at New York, Chicago, Denver, San Francisco, Los Angeles and Seattle. Also have openings for Radio Shop Mechanics at our modern maintenance base in San Francisco. Must have second class radio-telephone license. Attractive starting salary with periodic increases. Applicants may apply by writing:

UNITED AIR LINES PERSONNEL ADMINISTRATION
Hangar No. 3, Stapleton Airfield, Denver 7, Colo.
GONSETGRAM

TO ALL AMATEURS EVERYWHERE

GONSET COMPANY SOON WILL MARKET TRANSMITTER FOR MOBILE OR FIXED STATION USE. NEW 6L46 TETRODE RUNS 50 WATTS ON CW, 35 WATTS PLATE MODULATED PHONE. CONTINUOUS COVERAGE 1.7 TO 30 MC. PROVISION FOR CRYSTAL OR CARBON MIKE. INTEGRAL SPEECH CLIPPING IN CLASS AB MODULATOR PERMITS HEAVY MODULATION WITHOUT SPLATTER YET REQUIRES NO ADJUSTMENT. OUTPUT MATCHES 10 TO 600 OHMS BALANCED OR UNBALANCED. VERY COMPACT. COMMERCIAL APPEARANCE AND VERSATILITY

SIGNED GONSET COMPANY
BURBANK, CALIF.

RADIO and TELEVISION ELECTRONICS
in all Technical Phases
New Classes (Day & Evening) Start
FREE PLACEMENT SERVICE for GRADUATES
For Free Catalog write Dept. ST-52
RCA INSTITUTES, INC.
A Service of Radio Corporation of America
350 WEST 4th ST., NEW YORK 14, N. Y.

LEARN CODE!
SPEED UP Your RECEIVING
with G-C
Automatic Sender
Type S
$24.00 Postpaid in U. S. A.
Housed in Aluminum Case, Black Instrument Finished, Small—Compact—Quiet induction type motor, 110 Volts—60 Cycle A.C.
Adjustable speed control, maintains constant speed at any Setting. Complete with ten rolls of double perforated tape. A wide variety of other practice tapes available at 50c per roll.

GARDINER & COMPANY
STRATFORD — NEW JERSEY

Evans RADIO
Service to hams — “YOUR FRIENDLY SUPPLIER”
by hams. Nationally accepted brands of parts, tubes and equipment. Trade-ins and time payments. Write WB1FT.
10 HILLS AVENUE - CONCORD, N. H.

Quartz Crystals
Made to your specific specifications. Accurate to the minutest tolerance. Exacting in performance—with thorough dependability.

Whether one or a million, you get prompt shipment. Made by craftsmen with a quarter century experience.
Send us detailed description and quantity for prices.

MICHAEL STAHL, Inc.
215 Fulton Street New York 7, N. Y.
HAM-ADS

(1) Advertising shall pertain to radio and shall be of a nature of interest to radio amateurs or experimenters in their pursuit of the art.

(2) Any radio 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.

(3) The rates to the nearest 30¢ per word, except as noted in paragraph (5) below.

(4) Remittance in full must accompany copy. No cash or check will be held for any advertisement.

(5) Advertisements cut-off rate is 50¢ per word, except as noted in paragraph (1) below.

(6) A trade date of 25th of the second month preceding publication date.

(7) Advertisers should send to the Editor only those material they desire to appear in this column regardless of which rate may apply.

(8) No advertisement 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, the publishers of QST are unable to vouch for their integrity for the grade or character of the products or services advertised.

QUARTZ—Direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill, 1714 Second Ave, New York City.

MOTOROLA—Electronic components and equipment bought and sold, WBSCO, Rainie Hicks, 204 E Fairview, Tulsa, Okla.

OSL, 100, $1.95 up, Samples, 10¢, Griffen, WBS3W, 1042 Pine Street, Madison, Wisc.


OSL, Ltd., Meade W. dkSXX, 1507 Central Avenue, Kansas City, Mo.

Equipment 2-meter beams. Riverside Tool Co., Box 87, Riverside, Ill.

WANTED: Your surplus radio receivers, transmitters, ARCS, ARC-1, ART-13, We buy anything. What have you Tom Allen, 1544 Central Ave., Evanston. Ill.

OSLSI Tantrum, Little Rock, Mississipi.

WANTED: Indices to QST volumes 6 to 19, both inclusive. Also "Pink Skies" by A. B. Hulse, 136 South 3rd St., St. Louis, Mo. 30¢.


ELIMINATE TVI. Shield your rig. 20 gauge heavy plated bright steel. Perforated 75 0.53 holes per in. Easily cut forms and soldered. Sold per 25$ 24", 2 for $1.50; five for $5.00. Sample, dime in stamps. Republic Television, Inc., Dumont, N.J.

EMERGENCY VHF. 144-MHz transmitter. 25W with mod. 1100kHz AM. Total $100.

FOR SALE: 2-meter beams. Riverside Tool Co., Box 87, Riverside, Ill.

WANTED: Your surplus radio receivers, transmitters, ARCS, ARC-1, ART-13. We buy anything. What have you Tom Allen, 1544 Central Ave., Evanston, Ill.

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FOR SALE: 2-meter beams. Riverside Tool Co., Box 87, Riverside, Ill.

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