UTC was the largest supplier of transformer components in World War II. Present UTC production is on a similar basis. Illustrated below are a few of the thousand military types in UTC 1950 production.
A leader in police-radio and other communications work, the GL-2E26 will give your portable or mobile rig modern v-h-f performance—with ace dependability.

Right now, in all likelihood, your home is protected by "prowl cars" relying on the widely used GL-2E26 for assured radio contact with headquarters. Here's steady performance that brands this fine G-E tube "EXTRA-RELIABLE." Plug it in your new mobile rig with confidence!

For work above 30 mc, the GL-2E26—up-to-the-minute in concept and design—is definitely as good as they come ... and lower, much lower, in price than most. You can buy three GL-2E26's—one for driver, plus a pair for push-pull final—for less than you'd pay for one standard 50-watter!

And the tube has power! At right is mention of a small mobile rig that will bring you plenty of QSO's while you're driving along ... which uses a single GL-2E26 for final. Up to 40 w CW and 27 w phone: these are the tube's substantial input ratings.

Also, low grid-to-plate capacitance makes the GL-2E26 easy to apply and operate. And (neatly circumventing a common v-h-f problem) shielding is handled by a short metal sleeve which so surrounds the tube's input that no external shield is required.

Visit your G-E tube distributor to inspect the GL-2E26, and learn the economy price. Or write Electronics Department, General Electric Company, Schenectady 5, New York.

ELECTRONIC TUBES OF ALL TYPES FOR THE RADIO AMATEUR

GENERAL ELECTRIC

MARCH-APRIL HAM NEWS

featured a simple emergency-portable rig with a GL-2E26 for the final stage, small enough so you can tuck the unit in the glove compartment of your car! For CW, the whole bag of tricks is compactly housed in a 4-by-5-by-6-inch metal box. If you want phone, May-June Ham News told you how to build the companion modulator. However ... this is a low-frequency 70-80 meter rig, so no yardstick of the GL-2E26's ability to operate up to 125 mc at max input, in transmitters designed for v-h-f.
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CONTENTS

"It Seems to Us ..." .................................................. 9
Disaster Communications Service Rules Proposed .............. 10
In QST 25 Years Ago This Month .................................. 10
Silent Keys .................................................................... 10
Crystal-Controlled Converters for V.H.F. Use
   Edward P. Tilton, W1HDO, and C. Vernon Chambers, W1JEQ 11

The "Mountaineer" — A Hiker's Portable
   Robert W. Vreeland, W6YBT 17

Another Inductive Coupling System for Rotary Beams
   Robert E. Muma, W8ORI 20

ARRL Conventions ..................................................... 24
Happenings of the Month ............................................. 25
Fall V.H.F. QSO Party ................................................ 27

A Simple Voice-Operated Keyer for Automatic Break-In
   Operation ................................................................. 28
   J. L. Flanagan, W1SIT

A Two-Control VFO Rig with Bandpass Exciter
   C. Vernon Chambers, W1JEQ 29

U.S.A. Calling ............................................................. 32
United States Naval Reserve ........................................ 33

Safety and Convenience in Transmitters
   Nathan K. Bale, W9FXZ 34

Hamfest Calendar ........................................................ 36
High Claimed Scores — 1950 Field Day ......................... 36

On the Air With Single Sideband ................................ 37
A Dual-Crystal "Q5-er" ................................................. 38
   Reginald A. Titt, ex-G3CMJ

New S.W.R. Bridge for Coax Lines ................................ 39

Working DX ................................................................. 40
   Byron Goodman, W1DX

Push-Button Power Control Circuits
   Vincent W. Hansen, W9FUL 44

The World Above 50 Mc ........................................... 46
I.A.R.U. News ............................................................. 49

How's DX? ................................................................. 50

16th ARRL DX Contest .............................................. 53

Correspondence from Members .................................... 57

Operating News ........................................................ 58
With the AEC ............................................................. 62
Station Activities ....................................................... 64

WWV—WWVH Schedule .............................................. 84
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</tr>
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2111 Edgewood Ave., Los Angeles, Calif.

West Gulf Division
DAVID H. CALK, W5BHO
7790 Joppa St., Houston 17, Texas
Alternate:
“It Seems to Us…”

MOBILIZATION

The United States has begun small-scale mobilization because of the decision of the United Nations in the Korean situation. This will affect the personal lives of many of us, because it is a precept of the amateur that he forms a reservoir of trained personnel against the event of emergency. Those of us in military reserves may receive calls to active duty; those in industry will find stepped-up production schedules making the 40-hour week temporarily a thing of the past; those on the home front will be gearing for participation in civilian defense communications plans as they materialize. Whatever your part in communications as an amateur, carry it through in the highest traditions of the amateur fraternity.

We hear an occasional rumor that amateur radio may soon be shut down. At this moment of writing (July 28th), it is purely rumor. Should the U.S. become involved in total war, certainly there will be considerable restriction of normal amateur activities with probable shutdown except for bands in which authorities may decree we can operate to furnish wartime auxiliary communications services. Since no one knows exactly the nature of the services which may be needed, no one knows what frequencies may be involved. Your League officers are in close touch with Washington in this matter and will be consulted in connection with any steps affecting us. At this writing, however, there are no restrictions of any kind in operation or in contemplation for amateur radio.

But watch your conversations on the air, especially with voice. Steer clear of discussions about developments in the international situation; let the newspapers do that. Don’t talk about your job or changes in it if at all related to mobilization. Confine international contacts strictly to technical matters and small talk. Let’s have no incidents which might cause unfavorable comment.

About the time this issue appears, it is expected that at least a preliminary plan will be issued by the National Security Resources Board for civilian defense preparations. This will permit amateurs who have been standing by with emergency communications plans to follow through with their municipal authorities to tie in amateur facilities in accord with the over-all plan. It is a move we have been awaiting, for it will furnish the opportunity to demonstrate again the services we can perform. Every amateur should make the most of it; the first step is to be registered with your local Emergency Coordinator. Write your SCM if you do not know his name.

1950-STYLE

Have you heard that gang of s.a.b. stations around 3999 kc. working rapid break-in? If you haven’t, you’re really missing something. They use voice-controlled transmitters and receivers, so they don’t throw any switches manually to transmit or receive. The result is a real ear-opener. Actually, it’s the closest thing to a bunch of fellows getting together at a hamfest or the club that ham radio has ever had, and it makes the old monologue-style ‘phone QSOs sound like something out of the dark ages. These fellows don’t need any “master of ceremonies” or “net control” station — he couldn’t keep up with them anyway.

Of course you don’t have to use s.a.b. to enjoy some of the advantages of voice break-in operation — the lads with controlled-carrier and voice-operated relays can come close to duplicating it, although they generally lose out when more than one station is transmitting at the same time on the same frequency. On s.a.b., the carriers are held down to practically nothing, and you can copy several stations on the same frequency at the same time, if you’re good at picking out voices. Roll your receiver up to the frequency some evening and do a little eavesdropping — we think you will be as envious as we are.

This technique wasn’t a bonus of s.a.b. The gang worked for it. In the traditional ham manner they discussed it on the air, tried out a lot of circuits, and they still argue as to the best methods. But now they have something, an operating technique that we think is worthy of 1950-style amateur radio.

1 See p. 25 this issue.
Disaster Communications Service Rules Proposed

In early August FCC issued a Notice of Proposed Rule Making to set up a Disaster Communications Service in the frequency band 1750–1800 kc., as a culmination of proceedings started toward that end in its 1944 hearings, and more specifically provided for in the revised Part 2 of its regulations which became effective July 1, 1949.

It is proposed that the service be set up to "provide communications in connection with disasters and other incidents involving loss of communications facilities beyond those normally available." A primary use of the frequencies will be for liaison between established individual or network stations handling disaster communications on their own regularly-assigned frequencies, although applications will be considered from groups not now having radio facilities. Authorization will be granted only to applicants who demonstrate that they are an integral part of a locally-coordinated disaster plan. Any presently-licensed station (including amateurs) thus eligible may be authorized to operate in the disaster service upon the filing of a notarized letter of application plus satisfactory proof of integration with the local disaster plan.

Assigned call letters of presently-licensed stations will be used also in the new service. Communication in the DCS may take place only when competent local authority determines that a pending or actual disaster warrants activation, or when he schedules training operations and tests. The competent local authority is the head of the disaster communications plan or the individual in charge of the net control station.

Organization of the service will be left largely to local groups interested in providing such service. It is obvious that heavy reliance is to be placed on amateurs, for example, amateur operator licenses are valid for use in DCS, so are commercial licenses, but only within the terms of authority granted.

From 1750 to 1765 kc. there are 15 one-ko. c.w. channels; there is then a Scene of Disaster channel 7 kc. wide, 1765–1772 kc., available for voice or c.w.; then four 7-ko. voice channels, 1772 to 1800 kc. Frequency tolerance is 0.005 per cent and rather strict attenuation figures for harmonic and spurious emissions are proposed.

This is the culmination of a long effort, and at least in part results from the request of the League back in 1945 urging the establishment of such a service in 1750–1800 kc. It will provide the tools whereby the work of amateurs in disaster communications may be expanded and, perhaps more important, coordinated with that of police, fire, utilities, etc. It is not intended specifically as a civilian defense measure, though of course at the present time a great deal of use will be made of the service by the present gearing to defense needs.

Note that this service has not been established but only proposed. Comments on the proposed rules may be filed by September 15th.

More next month.

25 Years Ago

September 1925

... Greater emphasis on straightforward low-loss receiving circuits — not "pseudodynamics" — is urged by William H. Adams.

... Methods of adding regeneration to the popular Hazeltine neutrondyne receiver, thereby improving signal strength and sensitivity, are detailed by Assistant Traffic Manager A. L. Budlong.

... Amateur transmitters are a minority factor in causing interference to broadcast reception, according to investigations by prominent utility companies.

... Stray r.f. in the neighbors' housewiring can be eliminated by connecting small by-pass condensers across the line, reports Malcolm H. Romberg.

... By following the simple conversion outlined by W. H. Raring, S11F, d cid trolley car ventilating motors can be made into synchronous converters for supplying 1100 volts d.c. plate supply.

... The master-oscillator power-amplifier rig behind the stable driftless signal from W9EZK described by W. E. Hoffman. Type UV-202 tubes with battery plate supply are used.

... Eugene G. Woodruff, 8CMF, describes a practical Leclerc Wire system for accurately measuring short waves.

... Lieutenant Fred H. Scholl reports via W2CM—W5CWP that equipment breakdowns have temporarily interrupted the short-wave tests from the U.S.S. Seattle. Ed Willis, GTS, is operating a similar station aboard the U.S.S. Relief, also participating in the Pacific cruise of the Fleet.

... New apparatus announcements herald "precision" 10-per-cent accuracy molded-bakelite capacitors by Sangamo, "midnet" low-minimum-capacity variable condensers by Hammond, and a metalized glass-film grid leak by Durban.

... The following have been named Canadian division managers: W. M. Sutton, 83NF, Ontario; W. R. Pottle, e4PA, Winnipeg; and William Rowan, c9GF, Vancouver.

... Well-known stations described this month are Paul G. Watson's 4ZD-4XX, Savannah, Ga., L. J. Kroger's 3APV, Chevy Chase, Md., and 2Z2-5XX, Oberlin College, Ohio.

... For code practice, a vacuum-tube audio oscillator is to be preferred over a buzzer, states William S. Halstead, president of the Haverford (Penn.) College Radio Club. His working model uses a "hard" 201-A.

Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

W1GHI, Ray C. MacGinnis, Stratford, Conn.
Ex-W1IHUN, Myron A. Tong, Quincy, Mass.
W1MRN, Leroy P. Mansfield, Wolseley, N. H.
W2ARU, ex-W5JFN, Fred A. Nield, New York City
W2EPO, Sanford Major, Williston Park, L. I., N. Y.
W2NBS, George E. White, Jersey City, N. J.
W2NFD, Harry Hayward, Newburgh, N. Y.
W3DBQ, Herbert M. Wallace, Baltimore, Md.
W3RTT, Frank E. Sorensen, Pittsburgh, Penna.
W3OG, Dr. John H. Leigheuner, Butler, Penna.
W4RZ, Millard S. Alexander, Atlanta, Ga.
W5QWS, Leon W. McCright, Irving, Texas
Ex-W7CSP, Richard Rose, Everett, Wash.
W7FYA, Glenn A. Perkins, Kallis, Mont.
W9EEW, John D. Wilkinson, Waukesha, Wis.
GM3DSS, Robert Smith, Glasgow
VX7XG, C. B. Oldham, New Town, Tas.

QST for
Crystal-Controlled Converters for V.H.F. Use

An Improved Receiving System for 28, 50 and 144 Mc.

BY EDWARD P. TILTON,* WIHDQ, AND C. VERNON CHAMBERS,** WIJEQ

In building a multiband receiving device for v.h.f. use one soon discovers that conventional methods of band changing leave much to be desired. Plug-in coils or the best available bandswitches build up circuit capacitance beyond that tolerable for 144-Mc. work, and by-passing and coupling problems multiply when more than one band is attempted with a single tube and circuit line-up.

A plug-in r.f. unit is usually the next consideration, but this becomes an unwieldy project if tunable oscillators are used. A crystal-controlled oscillator and a fixed-tuned front end (r.f. amplifiers and mixer) simplify the mechanical and electrical problems involved, and make it possible to design tuned circuits that will be at maximum effectiveness for each frequency range desired. Tuning over the band is then, of course, done at the intermediate frequency, with the receiver with which the converter is to be used.

This approach has other obvious advantages. It is difficult to build a satisfactory degree of stability into a tunable v.h.f. converter, even if it is designed for one band. We have gotten along for years with makeshifts, the unsatisfactory nature of which is never fully realized until one has used crystal-controlled receiver oscillators for a while. It is axiomatic that the best signal-to-noise ratio can be achieved only with narrowband techniques; it is when we try to squeeze the i.f. passband down to crystal filter proportions that we become acutely conscious of the shortcomings of even the best tunable v.h.f. oscillators. The three-band converter system shown here was designed for optimum performance at 28, 50 and 144-Mc., within the limitations of amateur receiver technique, yet the cost and complexity are held to reasonable proportions.

Basically the converter is made up of two units, each on a standard-size chassis. The base unit contains the power supply, i.f. amplifier stage, gain control, and all other parts that need not be changed in moving from one band to another. The r.f. assemblies are complete front ends, one for each band, arranged to plug into the base unit in one simple motion. Connections to the power supply and the i.f. amplifier are made through a 4-prong plug at the rear of the r.f. chassis. This plug-in construction holds down the physical size of the system, and permits building one or more of the r.f. sections, as needed.

Front-End Design

In the interest of low noise figure and broad response, the now-familiar cascode\(^1\) circuit is used in the converters for 28 and 50 Mc. A glance at the circuit diagram, Fig. 1, and the photographs will show that these two units are practically identical, except for the factors governing frequency. A triode-connected 6AK5 with inductive neutralization works into a 6J6 grounded-grid amplifier. The functions of crystal-controlled oscillator and mixer are combined in another 6J6. The mixer plate circuit is included in the plug-in unit.

A similar circuit arrangement could have been used effectively for 144 Mc., but the push-pull 6J6 set-up was selected because it gave promise of

---

approximately the same performance as the cascode at this frequency, but with one less tube. The push-pull circuits have the added advantage of being inherently balanced. If coaxial line is used in the antenna system the single-ended input circuit of the cascode amplifier would be preferable. Should the constructor wish to use such an arrangement the circuit would be similar to that of Fig. 1, and information on parts values can be found in the 1950 edition of The Radio Amateur's Handbook, Fig. 12-7.

Where an oscillator of fixed frequency is used and the intermediate frequency is made variable, special problems arise that are not encountered with the more common fixed-i.f. and variable-oscillator arrangement. The front-end circuits must be made broadband, to reduce the need for adjusting them as the i.f. is varied. This broadband characteristic increases the likelihood of interference from stations operating in the intermediate-frequency range. When the i.f. is left on one channel we select a frequency that is free of interference; if unwanted signals appear it is merely necessary to shift the i.f. slightly. With the crystal-controlled converter, the system must be capable not only of responding to a band four megacycles wide, but it must be able to reject signals on all frequencies other than the desired r.f. ranges.

The response curves of the converters are such that little change in gain is noticed in tuning across any of the bands. This is achieved through the use of overcoupled circuits between the r.f. and mixer stages, and by slug-tuned coils in the mixer and i.f. amplifier plate circuits that are resonated by the tube and circuit capacitance only. The mixer plate winding, $L_6$, in the 2-meter converter is loaded by $R_4$ to broaden the over-all response further. In all three converters the only adjustment required in covering the bands is a slight repeaking of the input circuit of the r.f. amplifier. This is not critical, however, and it is probable that the selectivity of the antenna system will account for more variation in response across the band than will the converter circuits themselves.

Interference from stations operating in the 7- to 11-Mc. range is reduced by the use of a bandpass coupling circuit ($L_6$-$C_6$, $L_6$-$C_3$ in Fig. 1) between the second r.f. and the mixer in the converters for 28 and 50 Mc. This coupling system provides good transfer at the signal frequency, and fairly high rejection in the i.f. range. Using conventional coupling initially we ran into trouble with i.f. interference, and the bandpass system was found to be necessary. The inductive coupling in the 2-meter converter serves a similar purpose.
Bottom view of the 28-Mc. plug-in unit. At the left is the tuned input circuit, followed by the 6AK5 r.f. stage, with its slug-tuned plate and neutralizing windings. At the middle of the chassis is the 6J6 grounded-grid stage, with its bandpass coupling to the mixer grid. Oscillator components are at the upper right. Parts arrangement in the 50-Mc. converter is similar.

Selection of Crystal Frequencies

A wide variety of crystal and intermediate frequencies can be used if only one band is to be covered with a crystal-controlled converter, but the choice narrows down in a multiband job. It is desirable that all bands start at the same receiver dial setting, and the crystal frequencies should be chosen so that they will be obtainable readily from dealers' stocks, or on order with a minimum of delay. A workout with a slide rule and some crystal manufacturers' catalogs resulted in the solution shown in Table I.

![Table I](image)

<table>
<thead>
<tr>
<th>Band</th>
<th>Crystal</th>
<th>Injection</th>
<th>I.F.</th>
<th>Freq. Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Mc.)</td>
<td>(Mc.)</td>
<td>(Mc.)</td>
<td>(Mc.)</td>
<td></td>
</tr>
<tr>
<td>28 - 29.7</td>
<td>7.0</td>
<td>3rd</td>
<td>21</td>
<td>7 - 8.7</td>
</tr>
<tr>
<td>50 - 54</td>
<td>8.6</td>
<td>4th</td>
<td>43</td>
<td>7 - 11</td>
</tr>
<tr>
<td>144 - 149</td>
<td>6.9</td>
<td>4th X 4</td>
<td>137</td>
<td>7 - 11</td>
</tr>
</tbody>
</table>

Low-cost crystals are used in a regenerative triode oscillator circuit, working on an odd overtone of the crystal frequency. In the 28-Mc. converter a 7000-kc. crystal oscillates on its third overtone. Fifth-overtone operation of an 8500-kc. crystal furnishes the injection voltage in the 50-Mc. unit. A 6800-kc. crystal oscillates on its fifth overtone in the 144-Mc. converter, the frequency being multiplied again by 4 in the second 6L6 triode section. Note the term "overtone." — in this circuit the frequency on which the crystal oscillates is not necessarily an exact multiple of the marked frequency. It is close enough for ordinary calibration purposes, however; there was less than 100 kc. discrepancy at 137 Mc. in the 2-meter job, even after the 20 times multiplication of the crystal frequency. The difference from the multiple of the marked frequency in the other two units is hardly noticeable.

Harmonic-type crystals might have been used, but the desired frequencies were not readily available, and the cost would have been materially higher. Conventional operation of lower-frequency crystals, making up the multiplication with additional stages, is not recommended because of the difficulty in avoiding numerous birdies from crystal harmonics. In the circuit shown no frequency lower than the overtone at which the crystal oscillates can be heard.

Layout

The units are built on aluminum chassis of stock sizes. The base is 8 by 5 by 13 inches (ICA 29003), and the r.f. units are 1½ by 5 by 9½ inches (ICA 20001). The only metal work required is the making of small aluminum guide plates for the front and rear of the converter chassis, and the mounting bracket for the interconnecting socket at the rear of the base unit. Ventilation holes are cut in the sides of the base unit, and two 1⅛-inch holes are cut in the top surface of this chassis to provide greater clearance around the major coils of the r.f. assemblies, when they are in the operating position. The placing of the power supply and i.f. amplifier components on the base unit is not critical, though the arrangement shown in the photographs works out nicely from a mechanical standpoint. Chief consideration here is to avoid mounting parts on the outside walls of the units, thereby preserving to the fullest degree the deep-but-narrow form factor. This shape takes up a minimum of high-priority space on the operating table.

Care should be used in mounting the socket and plug on the base unit and converters, respectively, in order that they may line up exactly. When the job is properly done it is merely necessary to place the converter unit on the base, with the front edge tilted upward slightly, slide the plug into the socket, and then drop the converter in place. The converter assemblies should be kept free of parts in the portion that is over the rectifier tube socket, in order that no components be damaged in the plugging-in operation.

Looking at the converters for 28 and 50 Mc. from the front we see the tuning condenser for the r.f. input circuit, followed by the 6AK5 and 6J6 r.f. stages and the 6J6 mixer-oscillator, in that order. The 6AK5 plate coil, the neutralizing coil, and the mixer plate coil are slug-tuned, resonating with the circuit capacitances only.
Fig. 2 — Wiring diagram of the 144-Mc. crystal-controlled converter.

C₁₀, C₉ — 5.5-mfd., per-section butterfly (Johnson 5MB12).
C₈, C₉, C₁₀, C₁₁, C₁₂, C₁₃ — 0.005-mfd., disc ceramic.
C₁₄, C₁₅ — 75-ohm Twin-Lead neut. capacitors (see text).
C₁₆ — 50-mµfd., ceramic.
C₁₇ — 50-mµfd., air trimmer (Millen 26050).
C₁₈ — 100-mµfd., ceramic.
C₁₉ — 5-20-mµfd., ceramic trimmer.
R₁, R₂ — 150 ohms, 1/2 watt.
R₃, R₄, R₅, R₆ — 1000 ohms, 1/2 watt.
R₇ — 2200 ohms, 1/2 watt.
R₈ — 0.22 megohm, 1/2 watt.
R₉ — 3300 ohms, 1 watt.
L₁ — 5 turns, No. 18 enameled, 5/16-inch diam., 1/4 inch long.
L₂, L₃ — 6 turns No. 18 enameled, 3 turns each side of center tap, with 3/8-inch spacing between sections, 3/8-inch diam. Adjust turn spacing as needed.
L₄ — 5 turns No. 18 enameled, 3/8-inch diam., close-wound and center-tapped.
L₅, L₆ — 1 turn hook-up wire wound around L₄ and L₅; 75-ohm Twin-Lead used to connect between the two coils.
L₇ — Slug-tuned plate coil (CTC LS3 5-Me. coil with 20 turns removed).
L₈ — 11 turns No. 20 tinned, 1/4-inch diam., 11/16 inch long, tapped 4 turns from crystal end of coil (B & W 3003).
L₉ — 3 turns No. 18 enameled, 3/8-inch diam., 3/8 inch long (B & W 3002).
J₁ — Crystal socket for antenna terminal.
P₁ — 4-prong male socket.

Condenser-tuned circuits are used in the r.f. input, second r.f. plate, and mixer grid circuits. The difference in position of the r.f. tuning condenser, C₁, in the two converters is the result of an improved parts arrangement used in the 28-Mc. job. Mounting of this condenser on the front wall of the converter chassis is recommended for both units.

Note the alternative input circuit for the 50-Mc. converter, shown in Fig. 1. This includes a 100-Mc. trap for elimination of f.m. interference. If the converter is to be used in a location near to f.m. broadcast stations this trap is necessary to prevent the second harmonic of the injection frequency from beating with the f.m. signals and producing spurious responses in the 50-Mc. band.

In the 2-meter converter the r.f. and mixer tubes are in line at the right side of the chassis, as viewed from the front, with the oscillator-

Bottom view of the 144-Mc. converter. Across the top of the photo, left to right, are the input circuit, the push-pull r.f. stage, the push-pull mixer, and its slug-tuned plate circuit. Oscillator and multiplier components are at the bottom of the picture.

QST for
multiplier at the left. This layout makes for symmetrical arrangement of the push-pull circuits. All the r.f. coils are self-supporting, so that their length and coupling can be adjusted readily. Link coupling of the injection voltage is accomplished with single-turn coils around the multiplier-plate and mixer-grid windings, connected by a short length of 75-ohm Twin-Lead.

**Adjustment and Operation**

Putting these converters into service once the mechanical work has been completed is a much simpler process than that involved in aligning a receiver of the gang-tuned variety. Work on the r.f. sections is made easier if a patch cord is made up so that the r.f. units can be removed from the base and kept in operating condition. The only portion of the procedure that may be troublesome is that involved in getting the crystal oscillator to work properly, and on the right overtone. The important factor here is the amount of regeneration, controlled by the position of the tap on the oscillator coil, \( L_7 \). The process is the same for all three converters, but the tap position may be somewhat more critical in the 50- and 144-Mc. units, as a higher-order overtone is used.

The proper position for the tap is that at which oscillation takes place only at the third or fifth overtone, as the converter requires. If the tap is too high on the coil oscillation will be on random frequencies, determined by the setting of \( C_1 \), rather than controlled by the crystal. If the tap is too low on the coil no oscillation at all will develop. The \( L/C \) ratio in the tuned circuit is also fairly critical, for best operation, but if the values given in the parts list are followed no trouble should be encountered on this score.

To check operation of the oscillator insert a meter in series with \( R_a \), apply plate voltage, and rotate \( C_1 \) until a sharp dip in plate current occurs, indicating oscillation. There may be a tendency to self-oscillation at the minimum-capacity end of the tuning range, but this may be disregarded if it disappears quickly as the condenser is turned toward maximum capacity. Crystal oscillation should occur somewhere between half and maximum capacity. It is helpful if a receiver is available for listening on the fre-

---

**Fig. 3** — Wiring diagram of the power supply and i.f. amplifier unit for use with the crystal-controlled converters.

- \( C_1, C_2 = 10-\mu f d. \) 450-volt electrolytic.
- \( C_3, C_4, C_6 = 0.005-\mu f d. \) disc ceramic.
- \( R_1 = 2500 \) ohms, 10 watts.
- \( R_2 = 1 \) megohm, 1/2 watt.
- \( R_3 = 10,000-\)ohm wire-wound potentiometer.
- \( R_4 = 68 \) ohms, 1/2 watt.
- \( R_5 = 56,000 \) ohms, 2 watts.
- \( R_6 = 39,000 \) ohms, 1 watt.
- \( R_7 = 2200 \) ohms, 1/2 watt.
- \( R_8 = 1000 \) ohms, 1/2 watt.
- \( L_1 = 10\)-hy. 50-ma. filter choke.
- \( L_2 = \) Slug-tuned plate coil (CTC LS3 5 Mc. with 10 turns removed).
- \( L_3 = 15 \) turns No. 32 enam., scramble-wound at bottom end of \( L_2 \).
- \( J_1 = 4\)-prong female plug.
- \( J_2 = \) Coaxial-cable jack.
- \( S_1 = \) S.p.s.t. toggle switch.
- \( T_1 = \) Power transformer, 275 v. each side c.t. at 50 ma.; 6.3 v. at 2.5 amp.; 5 v. at 2 amp. (Thordarson T-22R30).
frequency of oscillation (indicated over $L_7$ in the diagrams) to see whether or not the crystal is controlling the frequency. If the frequency changes markedly or if pronounced hand-capacity effects are present, move the tap toward the low end of $L_7$ by one turn and try again. A fraction of a turn change may be necessary in some instances, to achieve crystal control without random oscillation. It is also possible that the wrong overtone may develop. With incorrect values of inductance and capacity this type of circuit may produce oscillation on any odd overtone, so a wavemeter or receiver check should be made to be certain that the proper injection frequency is being used.

Next a rough alignment of the r.f. and i.f. circuits should be made. This can be done on noise, with the receiver set at the approximate midpoint of the frequency range to be tuned, or if one has a signal generator the process is made easier. This need be nothing more than the crystal oscillator in the transmitter, using the proper harmonic, of course.

Adjustment of the neutralizing coil is the next step in the converters for 28 and 50 Mc. This is not a critical procedure, and only a slight change in noise figure (probably not noticeable in ordinary operation) will result unless the value of $L_3$ is very far off. A simple way to do the job is to cut off one heater pin from a 6AK5 to be used as a neutralizing tube. Disconnecting the 6.3-volt lead from the 6AK5 socket will serve the same purpose. Tune in a strong signal with the converter working normally, then put in the dummy tube (or cut off the heater) and adjust the core in $L_3$ for minimum signal, changing no other adjustments at the time. Optimum setting of $L_3$ can be made only with a noise generator, adjusting for lowest noise figure, but the procedure outlined above provides a satisfactory approximation.

Neutralization of the r.f. amplifier in the 2-meter converter is done in the same way, except that the length of the Twin-Lead neutralizing capacitors, $C_5$ and $C_6$, is trimmed for minimum signal feed-through. An approximate setting can be made by starting with a length slightly more than 1 1/2 inches and trimming until oscillation stops.

Final adjustment of the converters is now in order. The aim here is uniform response across the band. Knowing that best results will be obtained with the first r.f. circuits tuned on the noise, we attempt to get our broad response with the mixer and i.f. adjustments. Peak all circuits in the 10- and 6-meter converters at one end of the band, then move the receiver to the other end of the band and repeak either the mixer or i.f. amplifier plate winding for maximum response. Receiver noise is satisfactory for this test. If the response is not sufficiently broad, correction can be made with the bandpass circuits in the second r.f. plate and mixer grid circuits, stagger tuning these and the i.f. coils until reasonably flat response is attained. All this is best done with a 300-ohm resistor connected across the antenna terminals, to eliminate antenna resonance effects. If the response is flat with this set-up, variation in noise over the band with the antenna on may be disregarded, since it is a function of the antenna itself. Absolutely flat response is not important, for the over-all gain of the system can be adjusted by means of the i.f. gain control. It should be set so that, with the antenna connected, the normal noise level just starts to read on the meter. Turning the gain beyond the point at which noise becomes a limiting factor effects no improvement in signal readability.

The flatness of response in all converters can be varied by adjusting the r.f.-mixer coupling. In the 2-meter unit the coupling between $L_3$ and $L_4$ should be increased to the point where it is unnecessary to change the setting of $C_4$ to cover the entire band. There will be a slight amount of repeaking of $C_1$ necessary in all converters, though it should not make more than about one 8-unit difference from one end of the band to the other, and it will have a negligible effect on the noise figure. A resistor is connected across the mixer plate coil in the 2-meter converter to assure uniform response across the band.

It will be noted that no external oscillator injection coupling is used on the converters for 28 and 50 Mc. The common cathode of the 6J6 takes care of this, but as separate tubes are used for mixer and oscillator-multiplier in the 144-Mc. job link coupling is required. It is not critical, however, and a single turn around $L_3$ and $L_4$ is all that is needed.

At this point you may be through, and ready

(Continued on page 88)

QST for
The "Mountaineer"—A Hiker’s Portable

Light-Weight Compact Transmitter-Receiver for 80 C.W.

BY ROBERT W. VREELAND.* W6YBT

There are a few regions in California’s Sierra that have not yet been spoiled by road building, and I suppose the same holds true for many other parts of the country. Although most hikers will argue that even the smallest radio unit is too much to add to the pack, few hams who contemplate a vacation trek are willing to leave all gear at home. By taking advantage of some of the newer midget components and applying careful design, both size and weight can be substantially reduced. The rig shown in the photographs measures 3 by 8 by 9 inches and weighs 9 pounds complete with batteries and antenna. It includes a 2-watt transmitter and a tunable crystal-controlled superhet receiver.

To simplify the circuit and to bring the size and weight down, it was deemed advisable to confine transmitter and receiver to c.w. operation in a single band. Although 40 meters has a better range in daylight, 80 meters seems to be the best all-around band for work in rugged country. Using the latter band, we have worked up to 250 miles at night and 20 miles during daylight hours with a quarter-wave antenna and two watts input.

The Circuit

The circuit is shown in Fig. 1. In the transmitter, a triode-connected 1U4 Pierce crystal oscillator drives a 3A4 final amplifier. Parallel plate feed is used in the amplifier and the antenna is coupled directly to the output tank circuit, $C_{2}L_{1}$. Coupling is adjusted by means of the tap switch, $S_{1}$.

$R_{1}$ and $R_{2}$ are voltage-multiplier resistors used in conjunction with the 1-ma meter, $M_{A_{1}}$, to check transmitter filament and plate voltages respectively. When $S_{1}$ is in the downward position, the meter reads filament voltage with $S_{2}$ in the downward position, and plate voltage with $S_{2}$ in the upward position. $R_{3}$ is a 30-times current-multiplier shunt and the meter reads amplifier plate current when $S_{1}$ is in the upward position. When desired, amplifier grid current can be read by connecting a 1-ma. meter across the pin jacks $J_{2}$ and $J_{3}$. $R_{3}$ and $R_{4}$ are the oscillator and amplifier grid leaks, while $R_{5}$ is the screen resistor for the amplifier. $C_{9}$ is a feed-back condenser. Both oscillator and amplifier are keyed in the common negative high-voltage lead.

The neon bulb, $N_{E_{1}}$, is in a side-tone oscillator circuit consisting of $C_{2a}$, $C_{3a}$, $R_{21}$ and $R_{22}$. It is keyed with the transmitter and not only provides a means for monitoring keying but also serves as a warning indicator when the batteries are getting low by the change in pitch.

The output tank circuit of the transmitter serves also as the input circuit of the 1R5 converter in the receiver section. This not only is a matter of space economy but it also obviates antenna change-over. In the receiver tuning system, the 80-meter c.w. band is divided up into four overlapping segments of approximately 120 kc. each. The i.f. oscillator section of the converter is crystal-controlled at four selectable fixed frequencies and the tuning is done in the i.f. stage which covers a range of approximately 400 to 520 kc. $C_{12}$ is the tuning control. The small frequency range provides a reasonable rate of tuning without the need for an elaborate dial. This is a point usually neglected in compact receiver design.

The crystal switches of receiver and transmitter sections are ganged so that by proper sequencing of the crystals, the receiver is always switched to the frequency range in which the transmitter crystal lies. Thus, the input circuit of the receiver is tuned automatically to the proper frequency in the process of tuning the transmitter. For the i.f. range mentioned above, the receiver-crystal frequencies should be 4010, 4110, 4210 and 4310 kc. Then, by dividing the dial scale off into 12 segments, it can be made to read in terms of kilocycles within the 100-kc. frequency band in use. As the tuning condenser increases from minimum to maximum, the dial should be marked 0 at the end of the first seg-

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Fig. 1 — Circuit diagram of the hiker’s portable.

C1, C2, C7, C9, C10, C11, C15 — 500-μfd. ceramic (Centralab Hi-Kap).
C3 — 50-μfd. ceramic (Centralab Hi-Kap).
C4, C5, C6, C14, C16, C24 — 0.0005-μfd. disc ceramic.
C6 — 100-μfd. variable (Hammarlund APC 100-B).
C8, C12, C22 — 50-μfd. ceramic (Centralab Hi-Kap).
C13 — 50-μfd. variable (Hammarlund APC 50-B).
C14 — 8-μfd. 150-volt electrolytic.
C17, C18 — 0.01-μfd. disc ceramic.
C21 — 0.5-μfd. paper.
C24 — 0.001-μfd. ceramic.
R1 — 2000 ohms, 1 per cent (IRC DCF).
R2 — 0.2 megohm, 1 per cent (IRC DCF).
R11, R34 — 0.24 megohm, ½ watt.
R4, R5 — 0.1 megohm, ½ watt.
R6, R20 — 2200 ohms, ½ watt.

R5 — 30-times meter shunt (adjust experimentally).
R7, R10, R25 — 2.2 megohms, ½ watt.
R8 — 15,000 ohms, ½ watt.
R9, R26 — 33,000 ohms, ½ watt.
R22 — 2 megohms (RC M13-139).
R28 — 50,000 ohms (Centralab N-114).
R30, R31 — 0.47 megohms, ½ watt.
R24 — 5000 ohms (IRC PQ 11-114).
R29 — 39 ohms, ½ watt.
L1 — 49 turns No. 26 d.c.e., ½-inch diam., close-wound, tapped at 6, 8, 11, 15, 21 and 30 turns (for quarter-wave antennas only, tap at 4 and 5 turns and omit taps at 21 and 30 turns).
B1, B2 — 45-volt B battery (Burgess Type XX30).
B3 — 67.5-volt B battery (Burgess Type XX45).
B4 — 1.5-volt battery (Burgess Type 2F).

F1 — ½-e amp., 250 v.
I1 — Dial lamp, 2 volts, 60 ma.
J1 — Open-circuit jack.
J2, J3 — Insulated pin jack.
MA1 — Milliammeter, 1-ma. scale.
RFC1, RFC2 — 750-ohm, 33-ma. r.f. choke (National R-33).
RFC3 — 1-mh. 50-ma. r.f. choke (National R-50).
RFC4 — 25-mh. 100-ma. r.f. choke (Miller 967).
S1, S2 — D.p.d.t. toggle.
S3 — 2-circuit 5-position ceramic wafer switch (Centralab 1405).
S4 — Single-circuit 6-position ceramic wafer switch (Centralab 2501).
S5 — 3-circuit 3-position wafer switch (Centralab-2507).
T1 — 455-ko. i.f. transformer (Miller 12-C1 with condensers removed).
ment and 100 at the beginning of the last segment. The extreme ends of the scale, below 0 and above 100, represent overlap on the adjacent bands covered with other crystals. In the fifth crystal-switch position, connection is made to a pair of crystal sockets on the panel so that any special pair of crystals may be plugged if it should become desirable.

The 1U4 i.f.-detector is regenerative and is operated in the oscillating condition for c.w. reception. Regeneration is controlled through adjustment of screen voltage by means of $R_{18}$. $C_{14}$ is made large to reduce scratch noise when adjusting regeneration. A 1U4 is used also in the audio amplifier. $R_{9}$ is the audio gain control. It is ganged to $R_{13}$ which simultaneously varies the bias on the signal grid of the converter tube. Bising voltage is developed across $R_{18}$ by virtue of the fact that it is in series with the negative high-voltage return to filament.

The first section, $S_{3A}$, grounds the antenna in the "Off" position, completes the i.f. detector screen voltage divider circuit in the "Receive" position, and turns on one side of the transmitter filaments in the "Transmit" position. In the "Transmit" position, it is necessary to open the i.f. screen-divider connection to ground, since otherwise 45 volts would be applied to the transmitter-tube plates through $R_{18}$ and $R_{13}$ even with the key open.

The second switch section, $S_{3B}$, turns the receiver filaments on in the "Receive" position and the second side of the transmitter filaments on in the "Transmit" position. The third section, $S_{5C}$, connects negative B to the receiver through the converter gain control, $R_{18}$, in the "Receive" position, and to the key in the "Transmit" position.

A single crystal headphone is used. Since the key is in the common plate-supply return, a keyed battery voltage gets to the headphones through the positive B lead even when the receiver is turned off. The resistance-capacitance filter in the output circuit is for the purpose of reducing clicks.

The entire unit operates from a 1.5-volt A battery and 157.5 volts of miniature B battery. The receiver operates from a 112.5-volt tap. The drain is about 25 ma. for the transmitter and only 3 to 6 ma. for the receiver.

Construction

The unit is built into a box beat up from sheet aluminum. It measures 2 1/2 inches deep, 4 3/4 inches high and 7 3/4 inches long and is open at the back and bottom. The tubes and most of the other components are mounted on an inverted "I"-shaped shelf. This shelf is 23 1/8 inches high with the other two dimensions to make a snug fit in the case. Angles are bent inward at each end of the shelf so that it may be fastened in place with screws through the ends of the box. Many of the connections between the parts mounted on the panel and those on top of and underneath the shelf can be made before sliding the shelf into place, while others can be made through the bottom opening. When the wiring is complete, the bottom is closed with an aluminum cover and a felt dust gasket. Holes are cut in this cover for the key cord and the power connector. An "L"-shaped bracket fastened to the bottom holds the headphone when it is not in use.

The outer case, which holds both radio unit and the batteries, is made by cutting a 3 × 8-inch aluminum chassis to a length of 9 inches with the open end at the top. A removable cover, also made of aluminum sheet, holds the key and the key-click-filter components. When the unit is not in use, the cover is held in place with a pair of luggage clasps. A war-surplus thermos carrier makes a handy carrying case.

The unit is usually operated with a quarter-wave antenna and a ground counterpoise consisting of eight 35-foot radials. For portability, the counterpoise wires are wound on a 200-ft. 16-mm. movie reel. The 65-foot antenna can be kept wound up in a plastic chalk-line reel (Montgomery Ward). Insulated indoor antenna wire (Belden No. 8014) is used for both antenna and counterpoise.

Adjustment and Operation

A 39-ohm 2-watt carbon resistor may be used as a dummy load. The transmitter should be loaded for a final-amplifier plate current of about 16 ma. at about 3750 kc. Battery voltages should be checked. The total B-battery drain should be about 25 ma. Grid current to the 3A4 should run about 0.2 ma.

The keying should be checked by listening on a receiver. When the 1U4 oscillator tube is pulled (Continued on page 66)

Rear view of the r.f. unit. The transmitter crystals are in the upper left-hand corner. The receiver crystals are immediately below, underneath the shelf. The tubes, from left to right, are the 1U4 oscillator, the 1U4 detector, the 1RS, 3A4 and the 1U4 audio. Hidden by the tubes, above the shelf, from left to right, are the crystal switch, the i.f. transformer, the control switch, the tank coil and the antenna-loading switch. Other components are underneath the shelf. The power plug is at the right and the key cable to the left. The bracket is for storing the headphone.

September 1950
Another Inductive Coupling System for Rotary Beams

A Coupling Method That Is Independent of the Matching System

BY ROBERT E. MUMMA,* W8ORI

In the usual inductive coupling system for facilitating the rotation of beam antennas the output loop is part of the driven element. There are many times when it is not convenient to make the output loop a part of the antenna system — for instance, when the “plumber’s delight” type of beam is used. The coupling loop design to be described has been adapted so that the loops can be inserted anywhere in a transmission line carrying r.f. power. It consists of a single-turn input or primary loop and a single-turn output or secondary loop, shown as \( L_0 \) and \( L_s \) in Fig. 1. Each loop is tuned with a variable condenser. The transmission line from the transmitter is connected across the tuning condenser \( C_p \) for the primary loop, and the transmission line to the antenna is connected across the tuning condenser \( C_s \) for the secondary loop. In both cases a balanced type of transmission line is shown.

The design of this antenna coupling system is easily followed by means of an example. Suppose that the system is to be designed for your latest 20-meter three-element beam, which is tuned to 14.2 megacycles and is being fed with 300-ohm Twin-Lead. Experience has shown that a \( Q \) between 5 and 10 for the coupling loops will bring the dimensions within reason and make the tuning broad enough to cover the entire band. Since we must start with some number, let us assume that the \( Q \) is 5.

The equivalent circuit for each of the loops in Fig. 1 is shown in Fig. 2. \( L \) is the inductance of the loop, \( C \) is the capacitance of the tuning condenser, and \( R \) is the impedance of the transmission line, which is assumed to be a pure resistance.

\[ Q = \frac{R}{X} \]

(1)

When \( R \) is 300 ohms and \( Q \) is 5, \( X \) will be 60 ohms. The losses in the loop and in the condenser are assumed to be negligible in comparison with the 300 ohms shunting the tuned circuit. With these loops tuned to resonance \( X_L \) and \( X_C \) will both be 60 ohms. Then

\[ L = \frac{X}{2\pi f} = \frac{60}{2 \times 3.14 \times 14.2} = 0.673 \text{ mH} \]

(2)

and

\[ C = \frac{1}{2\pi f X_e} = \frac{10^6}{2 \times 3.14 \times 14.2 \times 60} = 187 \text{ mH} \]

(3)

Knowing the diameter of tubing available to make the loops, and the inductance desired, the diameter of the loops can be determined from the nomogram* shown in Fig. 3.

The dual beam for 20 and 10 meters. A "T" match is used on the 20-meter driven element, while the 10-meter antenna is fed through a delta match. Both antennas are inductively coupled to 300-ohm transmission lines.

QST for
copper tubing is used, the diameter of the loop will be found to be 11 inches.

In this case, 250-\mu f.d. variable condensers can be used to tune the loops. The voltage rating required will be determined by the impedance of the transmission line and the input power. With 500 watts of unmodulated r.f. power in a matched

![Equivalent circuit of a coupling loop.](Image)

300-ohm transmission line, the peak voltage across the condensers will be approximately 550 volts. The voltage across the condensers will rise to twice this value with 100 per cent modulation. Since the peak voltage may rise to several times this value during the tuning-up process, when standing waves appear on the transmission line, it will be well to make the initial tuning adjustments at reduced power.

The spacing between the loops for the maximum transfer of power can also be calculated, and the loops mounted permanently on stand-off insulators before the tuning operation. Letting \( k \) represent the coefficient of coupling for the maximum transfer of energy, it can be shown that

\[
    k = \frac{1}{\sqrt{Q_s Q_p}}.
\]

(4)

\( Q_s \) and \( Q_p \) are the Q's for the secondary and primary loops, respectively. Since the same type transmission line is connected to both the primary and secondary loops and the loops themselves are the same, \( Q_s = Q_p \). Therefore

\[
    k = \frac{1}{\sqrt{Q^2}} = \frac{1}{Q} = 1/5 = 0.2.
\]

For the general case when any two inductances are coupled, let \( k \) represent the coefficient of coupling. Now

\[
    M = k \sqrt{L_p L_s}
\]

(5)

where \( M \) is the mutual inductance between the two loops, \( L_p \) is the inductance of the primary loop, and \( L_s \) is the inductance of the secondary loop. Since the inductances of these two loops are equal, this equation reduces to

\[
    M = k \sqrt{L^2} = kL = 0.2 \times 0.673 = 0.135 \, \mu H.
\]

The spacing between the loops can be determined, in terms of the mutual inductance, from the following formula:

\[
    M = 1.27ND
\]

(6)

where \( M \) is the mutual inductance in microhenrys, \( D \) is the diameter of the loops in inches, and \( N \) is a factor depending on the diameter of the loops and the spacing between the loops. Solving for \( N \),

\[
    N = \frac{M}{1.27D} = \frac{0.135}{1.27 \times 11} = 0.00966.
\]

From Fig. 4 it will be noted that the value 0.00966 for \( N \) corresponds, with sufficient accuracy for these calculations, to a ratio of 0.28 for \( r_2/r_1 \). The diagram in Fig. 4 is a vertical section through the two coupling loops, with \( r_2 \) being the vertical distance or spacing between the loops and \( r_1 \) the diagonal distance from one side of the lower loop to the opposite side of the upper loop. If \( Y \) is used to represent the ratio \( r_2/r_1 \), then

\[
    r_2 = \frac{DY}{\sqrt{1 - Y^2}}
\]

(7)

Using the value 0.28 that has just been determined for \( Y \), and 11 inches for the diameter of the loops, \( D \), the spacing between the loops, \( r_2 \), can be found:

\[
    r_2 = \frac{11 \times 0.28}{\sqrt{1 - (0.28)^2}} = 3.2 \, \text{inches}.
\]

Construction and Tuning

All of the data are now available to make an efficient set of coupling loops for 20 meters, when using a 300-ohm transmission line. The copper tubing should be formed into as perfect a circle as possible, with the ends approximately one inch apart. The variable condensers should be connected to the open ends of each of the loops with as short leads as possible, because these leads are part of the inductance. The condensers should be mounted in weatherproof containers.

![Nomogram for calculating dimensions of a single-turn loop.](Image)
that will permit adjustment after the condensers are mounted. This can be accomplished by slotting the condenser shaft and leaving a hole large enough for a screwdriver opposite the end of the shaft. This hole can be covered with waterproof tape after each adjustment.

A simple weatherproof cover can be made by mounting the variable condenser on a screw cap that fits a glass jar large enough to accommodate the condenser. The glass jar can be removed when adjusting the condenser, then replaced and sealed with a rubber ring under the lid after the adjustments are completed. This type of weatherproof covering can be mounted on the beam structure by fastening a bracket to the lid. Regardless of the type of covering used, all steel parts should be painted to prevent rust.

The writer's installation, using metal cans to cover the condensers, is shown in one of the photographs. It will be noticed that a set of 10-meter coupling loops is mounted coaxially with the 20-meter loops. Because of the difference in frequency, these two sets of loops operate independently of each other.

Before installing the system in a transmission line, be sure that the antenna has first been matched to the line. The tuning procedure consists of tuning the secondary loop for maximum current in the transmission line to the antenna, and tuning the primary loop to eliminate standing waves on the transmission line back to the transmitter. If the spacing between the loops is correct, it will be possible to adjust the condensers so that the s.w.r. on the line to the transmitter is minimum at the same time that maximum current flows in the line to the antenna. This will not be possible if the loops are too close together or too far apart.

The current indicator for the transmission line to the antenna is shown at \( J \) in Fig. 1, and consists of a short length of transmission line with one end shorted and a dial lamp connected across the other end. The length of this coupling loop will depend on the current required for the lamp and the power delivered by the transmitter. The indicator can be fastened to the transmission line with short lengths of adhesive tape, and removed after the adjustments are made.

In tuning the primary loop for minimum standing waves on the transmission line, a twin-lamp indicator, shown as \( SIW \) in Fig. 1, is probably the
The only precaution that should be followed is to keep the twin-lamp at least three feet away from the coupling loops. Also, if the section of transmission line on which the twin-lamp is mounted is closer than 1/4 wave-length to the antenna, the line should be perpendicular to the antenna. The primary and secondary loops both may have to be tuned several times before the correct adjustment is achieved, since any great change in capacity required to tune one loop will affect the tuning of the other loop.

It might be well to point out that if the length of the driven element is not such as to be resonant at the operating frequency, it may not be possible to match the line to the antenna properly. When this is the case it may not be possible to tune the loops correctly, because of the reflected reactance.

The transmission line may be matched to the antenna using any of the standard methods. The delta match is too well known to require description here, but the author believes that better use of the "T" match could be made if it is considered as a folded dipole. It is doubtful if an impedance transformation greater than four to one can be obtained with a "T" match using the same diameter conductor as the radiator and spaced not more than four inches from it, regardless of how long it is made. More satisfactory results can be had by using a smaller conductor for the "T," and making it roughly 1/16 wave-length long. The match can then be achieved by adjusting the spacing between the "T" and the radiator. The "T" match for the radiator in my 20-meter three-element close-spaced beam is 10 feet long and uses tubing 3/16 inch in diameter. The spacing is 1 1/4 inches (center to center) from the radiator, which is 1 3/4 inches in diameter.

Loops for other frequencies and other transmission-line impedances can be made by using these same equations. If a Q of 5 is used for calculating a set of loops for 10 meters the system will tune broadly enough to cover the entire 10-meter band without serious standing waves appearing on the transmission line, providing the antenna itself is flat over such a range. The higher the Q's of these loops, the more sharply they will tune, and also the farther apart they will have to be spaced to prevent overcoupling.

While the above calculations are based on the use of a balanced type of transmission line, it should not make any difference whether the center of the loop is at ground potential, as it is with a balanced transmission line, or whether one end of the loop is at ground potential, as it is with a coaxial line.

With low-impedance lines a Q of 2 or 3 should be tried, in order to keep the dimensions of the loops and the capacities of the condensers within reason. The lower Q will require closer spacing, as the calculations will show.

Also, it is possible that a certain amount of impedance matching can be done by connecting transmission lines of different characteristic impedance across the primary and secondary loops, respectively, and calculating the spacing between the loops on the basis of the resulting Q's. The
difference in $Q$ between the primary and secondary loops will be taken into consideration when using equation (4).

As a matter of interest, the calculated values for loops of $\frac{3}{4}$-inch tubing to be used at various frequencies with various line impedances are listed in Table I.

The W8ORI Dual Beam

For those who may want the information, a sketch of the author's dual beam is given in Fig. 5. There are three elements on 20 meters and four elements on 10, with all elements in the same plane. In both beams the reflector is 0.15 wavelength from the driven element and the director is 0.1 wavelength from the driven element (actually, the spacing for the 20-meter reflector is a little short). The parasitic-element lengths were set by formula, while the driven elements were adjusted to obtain a flat transmission line. It will be noticed that the 20-meter driven element is approximately 12 inches longer, and the 10-meter driven element 6 inches longer, than the lengths given by the usual formula. This may result from the fact that the two driven elements are located so close to each other, although the tuning of one has no appreciable effect on the tuning of the other.

The 20-meter elements consist of a 12-foot section of aluminum tubing $\frac{1}{4}$ inches in diameter with a 12-foot section of 1-inch aluminum tubing telescoped into each end. The 10-meter elements consist of a 12-foot section of brass tubing $\frac{3}{4}$ inch in diameter with a 3-foot section of $\frac{3}{4}$-inch brass tubing telescoped into each end.

The delta and "T" matching sections for the 10- and 20-meter beams, respectively, are made of $\frac{3}{4}$-inch copper tubing and extend toward the rear of the antenna. In connection with the earlier remarks about "T" matching, it may be of interest to mention that in the first attempt at matching the 20-meter beam the "T" section was about 11 feet long and was spaced 3 inches (center to center) from the driven element. The twin-lamp showed that the match was poor, regardless of adjustments to the length of the "T" section. The spacing was then changed and by experiment it was found that a center-to-center spacing of $4 \frac{1}{2}$ inches gave a good match. The length of the "T" was not at all critical, but the spacing was.

ARRL

Conventions

HUDSON DIVISION

Asbury Park, N. J., Sept. 30th-Oct. 1st

The huge Convention Hall and the beautiful Berkeley Carteret Hotel on the boardwalk at Asbury Park, New Jersey, will be the setting for the 1950 Hudson Division Convention. The dates are September 30-October 1, 1950.

One of the main attractions will be a large radio show featuring exhibits and displays by manufacturers showing all the latest equipment presently available to hams. The armed services will have a display of the latest developments in radio, radar, and electronics.

Traffic men, DX hounds, v.h.f. enthusiasts, and rag-chewers alike will find ample subject matter of their particular liking among the many technical talks that will be given by outstanding personalities. Amateur teletype will be in operation keeping an up-to-the-minute log of registrants. Just consult the teletype printer in Convention Hall to see if your friends have arrived.

Saturday night there will be dancing in the Crystal Terrace Room of the Berkeley Carteret Hotel, Sunday A.M. there will be a hidden-transmitter hunt on ten meters with an award for the outstanding ham-engineered installation. There will be meetings of the MARS, Quarter Century Wireless Association, and an invitation into the Royal Order of the Wouf-Hong.

Oh yes, the YLs and YLs will be amply provided for. So gals, don't bring your knitting. There will be a fashion show, dance recital, and plenty else to keep you occupied.

Registration is $1.50 for advanced registration and $4.00 extra for the Sunday banquet. If you want until you arrive, registration is $2.00. Just drop your letter and remittance to W. F. Kennison, W2BFTG, P.O. Box 927, Red Bank, New Jersey.

NEW HAMPSHIRE STATE

Concord, N. H., Sept. 17th

The thirteenth annual ARRL New Hampshire State Convention and Hamfest will be sponsored this year by the Concord Brasspounders (W1OOC) and will be held in the Masonic Temple in Concord, N. H., on Sunday, September 17th.

Registration will be at 10:00 A.M. and the FCC will commence giving Class A and B examinations at 11:00 A.M. This will be the time to get that advanced ticket. Also scheduled is a two-meter treasure hunt, so don't forget that mobile gear. ARRL meetings, QSL card contest, gadget contest, etc., will complete the program.

Banquet at 6:00 p.m., family style, menu not yet determined. Get your tickets in advance from W1BFT, Box 312, Concord, N. H. The price will be $3.75.

SOUTHWESTERN DIVISION

Santa Barbara, Calif., Sept. 9th

The Southwestern Division ARRL Convention will be held in Santa Barbara, Calif. on Saturday, September 9th, under the auspices of the Santa Barbara Amateur Radio Club. Convention Headquarters will be the Hotel Mar Monte on East Cabrillo Boulevard on the water front.

There will be plenty of technical talks and discussions, mobile rig contests, code speed contest, hidden transmitter hunt, radio parts show, etc. Among the speakers will be ARRL President George W. Bailey, W2XEL. To wind up the convention there will be one of the famous Chris Fripp’s Barbecues at the Veterans’ Memorial Building.

The registration fee of $4.00 covers all official convention activities, and may be sent to H. A. Lloyd, P.O. Box 929, Santa Barbara, Calif. Those wishing hotel or motel reservations should include an extra $3.00 deposit with their registration.

The Massachusetts State Convention, scheduled for September 23rd, has been canceled because a large portion of the sponsoring Hilltop Amateur Radio Club has been called to active duty in the Marine Corps.
CIVILIAN DEFENSE PLANNING

A stepped-up study of planning for civilian defense is now in process under direction of the National Security Resources Board, in which the President has lodged over-all responsibility for coordinating U. S. resources. A general meeting of the communications group was held July 7th, under the chairmanship of Paul Larsen, director of the civilian mobilization office, attended by the military, other government agencies, and the industry, including President Bailey and Communications Manager Handy on behalf of ARRL.

The discussion treated many phases of civilian defense and how communications can implement the program. The trend of thinking seems to be that which was embodied in the Hopley report, i.e., to place primary responsibility on states and municipalities, with the Federal Government furnishing the basic plan and guidance as well as training a skeleton staff which would then be sent to the states to mobilize and build regional and local organizations. At present, exercises are being conducted in typical cities to examine the problems in connection with possible enemy attack, as a guide for further planning.

The facilities of amateur radio were again offered by the League, and the eventual plan is expected to include ample provisions for the volunteer emergency communications services which amateurs can furnish. At the moment efforts are directed to study and planning, with at least a pattern plan available in early autumn. No mobilization of workers or training exercises are immediately contemplated. Amateurs should, however, keep closely in contact with ARRL field organization officials, particularly their local Emergency Coordinator, so that we shall be ready to go when we get the green light.

Also under discussion at the meeting was the frequency band 1750-1800 kc., which FCC earlier this year began actual planning as a Disaster Communications Service band, per U. S. proposals at the 1947 Atlantic City conference. It was agreed that civilian defense communications would have a very vital need for this band, perhaps in the manner proposed at a June FCC conference (also attended by the League): for intercommunication or liaison channels between the various services (amateur, police, government, etc.) providing disaster communications.

E.A.R.C.

After some postponements, the Extraordinary Administrative Radio Conference has now been called to begin September 25th at The Hague, Netherlands. In general, it may be said its objectives are twofold: first, to study the work of the Provisional Frequency Board and, if possible, complete a new world-wide station list to accord with the Atlantic City directive for frequencies below 27.5 Mc.; second, to decide on dates and procedures by which the Atlantic City allocation table below 27.5 Mc. may be brought into effect. In the process of accomplishing these objectives the conference will undoubtedly consider the work of the various regional and special service meetings (aeronautical conferences, high-frequency broadcasting conferences, Inter-American Radio Conference, etc.) which have met since 1947, and whose work in many cases has been in line with the broad general objectives outlined above.

As can be seen, the principal work of the EARC will involve amateur radio only to the extent that the establishment of effective dates for implementing the Atlantic City table below 27.5 Mc. will determine when we begin use of the band 21,000-21,450 kc. and lose the use of 50 kc. at the high end of the 14-Mc. band. However, there is the possibility that there will be an examination of the Region II action in connection with our 3500-4000 kc. band, the "legality" of which has since been challenged. The conference may also run into difficulties in setting up a new frequency list and formulating a date or dates for implementation of the table. With these considerations, the Board at its May meeting directed that the Secretary attend the conference on behalf of the League and amateur radio, and Secretary Budlong will be leaving for The Hague in mid-September. Arrangements are under way for the Netherlands amateur society to represent IARU.

As we write in late July, the Korean situation has not yet altered plans for the conference.

ANTENNA HEIGHT RULES

Some time ago the Federal Communications Commission, apparently as a result of concern expressed by aeronautical interests over rapidly-sprouting broadcast (standard, television and f.m.) antenna structures, began consideration of tightening up its rules governing construction, marking and lighting of antenna towers in the vicinity of airports; recently it published the text of proposed new Part 17 to cover the subject in exhaustive detail. While the new rules obviously were designed with broadcast and other commercial stations in mind, a study by the League indicated that their strict application to amateurs 'would bring about some intolerable situations—for example, in certain cases requiring the painting and lighting of a ten-foot antenna mast; on July 3rd, therefore, the League

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1 QST, Jan., 1949, p. 34.
2 QST, September, 1949, p. 35.
filed comments on the Commission proposal, pointing out that undue restrictions would result if any attempt were made to apply the rules to amateur stations, and requesting that the text be clarified as necessary to exclude amateurs from the provisions.

**P.C.C. REORGANIZATION**

FCC is in the process of completing a revision of its internal operating set-up, primarily to create bureaus devoted to specific classes of radio services which will be practically self-sufficient and include legal as well as administrative and engineering talent. Amateur radio comes under the over-all jurisdiction of a new (effective August 1st) Safety & Special Radio Services Bureau headed by Col. Edwin L. White, an old-time ham and for years an aviation specialist in FCC. Under this bureau, the old Radio Operator & Amateur Division disappears, being succeeded by the State-Local Government and Amateur Division, and we are happy to say that George K. Rollins, W3GA, head of the old division since its formation by then Chief Engineer Sterling, W3DF, in 1947, has been appointed chief of the new division having responsibility for amateur matters.

New chief of the Amateur Branch of the division is Ivan H. Loucks, W3GD, a ham since the early 20s (ex-SAC, SABO, SSTS, 4G1D, W9ON, W3GYW) and a long-time employee of FCC, having started as a radio inspector with the Department of Commerce in 1931. What he didn’t know about amateur radio from his own hamming he certainly learned in his stints at the Grand Island monitoring station and the Philadelphia field office, as well as postwar duties as chief of the radio operator branch in the old division. Like his predecessor chief of amateur matters, WA1QQR, OM Loucks is from Rochester, N. Y., and has a splendid record of Navy service: his dates from 1929 as RM3c, a commission in 1935, active duty during World War II — primarily in the Pacific theater in connection with the Okinawa campaign and later the Bikini atom bomb tests but also including an assignment as DCO of the Potomac River Naval Command — and at present the rank of Commander in charge of a Washington electronic unit. W3GD operates mostly on 40 and 20 c.w., with occasional flings on 10-meter mobile phone.

Robert W. Percy, WA1QQR, former chief of amateur matters, now has the long title of Chief, Application Advisory Branch, Administration Analysis Division (of the new bureau) and the job of handling special engineering and legal problems in connection with the processing of applications of all types. WA1QQR has done yeoman service for amateur radio in the past few years and we wish him continued success.

**N.F.M. EXTENSION**

FCC has extended until July 31, 1951, unless sooner amended, authorization for the use of narrow-band frequency and phase modulation in 2880–3000 kc., 14,200–14,250 kc., 28.5–29.0 Mc., and 51.0–52.5 Mc. When matters in Docket 9205 are finally settled, it is expected that suitable provision for u.f.m. will be a permanent part of new regulations.

**ELECTION NOTICE**

To All Full Members of the American Radio Relay League Residing in the Central, Hudson, New England, Northwestern, Southeastern, Rocky Mountain, Southwestern and West Gulf Divisions:

An election is about to be held in each of the above-named divisions to choose both a director and an alternate director for the 1951–1952 term. (In the case of the alternate director, West Gulf Division, the winning candidate will take office immediately to fill the present vacancy.) These elections constitute an important part of the machinery of self-government of ARRL. They provide the constitutional opportunity for members to put the direction of their association in the hands of representatives of their own choosing. The election procedures are specified in the Constitution and By-Laws, and a copy of the Constitution & By-Laws will be mailed to any member upon request.

Nomination is by petition, which must reach the Headquarters by noon of September 20th. Nominating petitions are hereby solicited. Ten or more Full Members of the League residing in any one of the above-named divisions may join in nominating any eligible Full Member residing in that division as a candidate for director therefrom, or as a candidate for alternate director therefrom. No person may simultaneously be a candidate for both offices. Inasmuch as all the powers of the director are transferred to the alternate in the event of the director’s death or inability to perform his duties, it is felt that as great importance to name a candidate for alternate as it is for director. The following form for nomination is suggested: (West Gulf nominations of alternate director candidates should paraphrase the example to read "for the unexpired remainder of the 1948–1949 term and the 1951–1952 term.")

**Nominating Committee**

The American Radio Relay League West Hartford 7, Conn.

We, the undersigned Full Members of the ARRL residing in the Division, hereby nominate: 

of , as a candidate for director; and we, also nominate, of , as a candidate for alternate director, from this division for the 1951–1952 term.

(Signatures and addresses)

The signatures must be Full Members in good standing. The nominee must be a Full Member and must have been both a member of the League and a licensed radio amateur operator for a continuous term of at least four years immediately preceding receipt by the Secretary of his petition of nomination, except that a lapse of not to exceed ninety days in the renewal of the operator’s license and a lapse of not to exceed thirty days in the renewal of membership in the League, at any expiration of either during the four-year period, will not disqualify the candidate; provided that if a candidate’s membership was interrupted by reason of service in the armed forces of the United States between September 2, 1939 and May 8, 1947, shall not be deemed to be disqualified so far as concerns continuity of membership if within those dates he resumed his League membership within the 101 days following his release from active military
duty. He must be without commercial radio connections; he may not be commercially engaged in the manufacture, selling or renting of radio apparatus normally capable of being used in radio communication or experimentation, nor commercially engaged in the publication of radio literature intended, in whole or in part, for consumption by licensed radio amateurs. Further details concerning the eligibility are given in By-Law 12. His complete name and address should be stated. The same requirements obtain for alternates as for director. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon EDT on the 20th day of September, 1950. There is no limit to the number of petitions that may be filed on behalf of a given candidate but no member shall append his signature to more than one petition for the office of director and one petition for the office of alternate. To be valid, a petition must have the signature of at least ten Full Members in good standing: that is to say, ten or more Full Members must join in executing a single document; a candidate is not nominated by one petition bearing six valid signatures and another bearing four. Petitioners are urged to have an ample number of signatures, since nominators are occasionally found not to be Full Members in good standing. It is not necessary that a petition name candidates both for director and for alternate but members are urged to interest themselves equally in the two offices.

League members are classified as Full Members and Associate Members. Only those possessing Full Membership may nominate candidates or stand as candidates; members holding Associate Membership are not eligible to either function. Voting by ballots mailed to each Full Member will take place between October 1st and November 20th, except that if on September 20th only one eligible candidate has been nominated, he will be declared elected.


Full Members are urged to take the initiative and to file nomination petitions immediately. For the Board of Directors:

A. L. BUDLONG
Secretary

July 1, 1950

SPECIAL ELECTION NOTICE

To All Full Members of the American Radio Relay League Residing in the Dakota Division:

A special election is about to be held in the Dakota Division to choose an alternate director to fill the vacancy occasioned by the unfortunate death of Robert A. Kimber, WB8LE. Election procedures are generally as described above. Nominating petitions are hereby solicited; they must reach the Headquarters office by noon of September 20th. The term to be filled expires January 1, 1952. For the Board of Directors:

A. L. BUDLONG
Secretary

July 1, 1950

By special arrangements with publishers in Buenos Aires, each year there is a Spanish-language edition of the ARRL Radio Amateur's Handbook. The 1950 Spanish edition recently appeared and we have copies available here at ARRL Headquarters. They are $4.00 per copy, postpaid.

September 1950
A Simple Voice-Operated Keyer for Automatic Break-In Operation

BY J. L. FLANAGAN,† WISIT

Considerable interest currently exists among radio amateurs regarding voice-operated keyers for automatic break-in 'phone operation. Automatic break-in or talk-to-talk operation of the transmitter is or will be of particular interest to operators who wish to get every watt of power possible out of their final amplifiers. Using a voice-operated carrier, the transmitter is turned on only for the length of time necessary to transmit the desired speech message. The final amplifier may then be operated in a slightly overloaded condition for these relatively short periods without seriously impairing the life of the tube. Since the carrier is turned off when no speech is being transmitted, the over-all efficiency of transmission is improved.

sufficient to produce cut-off, to appear at the grid of the third tube. The third stage has a sensitive relay in its plate circuit and is normally conducting with no signal input. Thus the relay is energized, the transmitter contacts held open, and the receiver contacts held shut by the plate current passing through the relay coil. When the third tube is cut off by the rectified signal, the transmitter contacts close and actuate the main keying relay of the transmitter. The receiver contacts are opened at the same time and the receiver placed on stand-by. The integrating time or time constant of the R-C filter in the diode stage has been selected so that the transmitter contacts remain closed while the operator is speaking at a normal conversational rate. The

![Wiring Diagram of Voice-Operated Transmitter Control](image)

There have been numerous electronic and electromechanical circuits, varying widely in complexity, devised to accomplish automatic keying. We wish to offer here an extremely simple arrangement which has been found to function very well and to compare favorably with other schemes of automatic keying.

The speech signal is fed into the circuit as shown in Fig. 1. The first stage is a conventional Class A amplifier, transformer coupled to a diode rectifier in the second stage. The speech signal is rectified by the diode and passed through an R-C filter causing a negative voltage, speech input to the circuit may be obtained from a modulator driver stage, and a signal of about 1 volt r.m.s. is required to operate the unit.

None of the elements employed in the circuit requires special comment except the sensitive plate relay. The relay used here was taken out of a surplus AN-CRW-2A remote-control aircraft receiver. It is a single-pole double-throw type with a d.c. resistance of approximately 8000 ohms, and can be energized by a current of about 2 ma. Any sensitive relay of this general nature should serve equally as well. The restraining spring on the movable contact will, in general, have to be adjusted to give the proper make and break characteristics.

† 41 Grozier Road, Cambridge, Mass.

28
A Two-Control VFO Rig with
Bandpass Exciter

120 Watts — F.M. or C.W. — 80 to 10 — with fewer controls

BY C. VERNON CHAMBERS,* WIJEQ

PART II

(Part I of this article appeared in the August issue of QST.)

Having covered the circuit details and construction of the transmitter proper, we can now proceed with a discussion of adjustment. In addition, an antenna tuner will be described.

Coil and Filter Construction

Coils $L_3$ through $L_{10}$ all make use of 1-inch Millen No. 45000 forms. $L_9$ is a conventional winding close-wound on the outside of the form. Coils $L_7$, $L_8$ and $L_{10}$ through $L_{12}$ are constructed so as to allow variable coupling between the sections of the filters. To do this, first coat the form with a light covering of ordinary face or baby powder. Then wind a band of either Scotch or masking tape, sticky side out, around the form. The gummed surface of the tape will hold the turns of wire in place as they are wound and the finished winding, including the tape, may be slipped off the form, coated with coil dope and put away to dry while another winding is being made.

Inductors $L_4$ through $L_6$ are commercial windings mounted inside the forms. The forms are prepared for the windings by cutting slots from top to bottom along two opposite sides. This operation can be performed most conveniently with a hack saw. The leads from the coils inside the forms ride in the slots so that the coupling can be varied readily. The Miniductor windings as well as the larger coils can best be cut to size with a sharp knife. The plastic strips on the Miniductors are sandpapered down to make a snug fit inside the form but one that is loose enough to permit the upper coil to slide for adjustment.

To keep the coil-to-condenser leads short in the 28-Mc. coupler, the coils are mounted in a self-supporting manner right at the terminals of the capacitors. After testing the transmitter, the spacing between the two coils is made permanent by means of a strip of polystyrene held in place with Duco cement.

The couplers may be preassembled before they are mounted in the chassis. The strips of ¼-inch insulating sheet which support two couplers are each 1¾ by 4 inches in size, while those for the single-coupler units measure 1¾ by 2 inches. Each unit requires five mounting holes — one for the No. 8 brass screw which holds the coil form in place and four for the No. 4 screws which anchor down the two trimmer condensers. Holes drilled at the corners of each unit pass the screws which fasten the units to the chassis. It is also advisable to drill a hole under the adjustment screw of each trimmer condenser.

One of the amplifier tank coils, preferably $L_{16}$, should have an adjustable end turn. This can be accomplished by breaking through two of the three supporting strips. The rear view of the transmitter shows $L_{16}$ with one of the end turns pulled away from the other four turns.

Power Supplies

The power-supply requirements are 300 volts at approximately 150 ma. and 600 volts at 200 ma. A negative bias of 45 volts for the 829-B power tube may be obtained from any convenient source. Because the frequency-control circuit of the transmitter is protected by a VR-150 regulator tube, it is not important that the low-voltage supply have exceptionally good regulation.

Adjustment and Operation

Before power is turned on for the initial test, it is advisable to disconnect one end of the 829-B screen resistor, $R_{28}$, so that the screen voltage will not be applied until the amplifier circuit is ready for testing.

The most useful and practical test equipment

* Technical Assistant, QST.

The antenna coupler matches the transmitter in appearance and in its ability to change bands rapidly.
consists of a calibrated receiver and a high-resistance voltmeter. In making grid-voltage measurements, a 2.5-mh. r.f. choke must be attached to the end of the negative probe to obtain true readings. If a vacuum-tube voltmeter is available, so much the better. The receiver is used to monitor the frequency of the oscillator signal as the tuning range is adjusted, by means of the band-set capacitor, $C_{38}$, to cover 1.685 to 2.0 Mc. The voltmeter, connected across the 6AG7 amplifier grid leak, $R_{29}$, provides means for checking the performance of the first bandpass coupler. The coupler should be adjusted to match the performance indicated by the curves shown in Fig. 2 as closely as possible.

The simplest method of tuning the couplers starts with the two coils separated as far as possible and the two trimmer capacitors adjusted to give maximum voltage across $R_{29}$. The operating frequency should be approximately 3.7 Mc. during these adjustments. Coupling between sections of the coupler is now increased until the grid-voltage curve begins to resemble that of Fig. 2. Slight readjustments of $C_{41}$ and $C_{44}$, and further adjustment of the coupling should result in a dip in grid voltage at 3.7 Mc., voltage peaks at 3.5 and 3.9 Mc., and a rapid decrease in voltage at points outside of these last two frequencies. The attenuation at frequencies remote from the desired range can be determined by varying the oscillator frequency over a large spectrum by means of the band-set capacitor, $C_{38}$.

The second bandpass coupler is lined up in a similar manner. However, this adjustment this time is made with the coupler switched to the S29-B grid circuit and the amplifier grid meter is used as the indicating device. The response curve should be similar in shape to that of Fig. 2, although the reading will be registered in terms of grid current rather than voltage. Amplifier grid current should be 16 to 18 ma. at the peaks of the curve and should fall off not more than 1 or 2 ma. at the center of the band.

The voltmeter should now be connected across the doubler-circuit grid leak, $R_{18}$, and the bandswitch set at the 7-Mc. position. $C_{38}$ may now be adjusted until the grid voltage at the 6N7 grid follows the general pattern of the preceding circuits. With $C_{38}$ properly adjusted, the grid voltage should average approximately 100 volts across the 3.37 to 3.7-Mc. range.

Adjustment of the 14-, 27- and 28-Mc. couplers and the associated compensating capacitors is now carried on step by step. Each coupler is switched first to the amplifier grid circuit, lined up for the bandwidth indicated on the circuit diagram, and then switched over to the following doubler stage so that the compensating capacitor may be adjusted.

Testing of the final amplifier is straightforward. However, it does take a little time to get accustomed to the tuning of the plate tank circuit. This circuit tunes to 3.5 and 14 Mc. with the condenser set at nearly full capacitance. Resonance of the tank at 7, 27 and 28 Mc. occurs with the capacitor set well toward minimum capacitance. A 100-watt lamp bulb, connected directly across the output jack, makes an excellent dummy load for preliminary adjustment of the output coupling circuits.

Aside from the checks made with any power amplifier, there is one adjustment that requires attention. It is essential that the tank does not resonate at 3.5 and 14 Mc. at the same setting of $C_{38}$. The same condition at 7 and 28 Mc. must be avoided. This double-resonance effect is objectionable because it results in amplification at the fourth harmonic when the amplifier is tuned to either 3.5 or 7 Mc. The adjustable turn of $L_{16}$ will permit an alignment of the tank to prevent this.

A current and voltage table shows the approximate operating conditions for the low-level tubes. Under full load, the S29-B grid current and grid voltage should average 12 ma. and 70 volts, respectively, and the screen should draw about 30 ma. at 200 volts. The amplifier may be loaded to a plate current of 200 ma.
Testing the Audio Section

The power amplifier should be turned off (do not forget to remove screen voltage) while the audio system is undergoing the first test. After a microphone has been connected to \( J_1 \) and the low-voltage supply turned on, the output signal of the transmitter should be monitored by means of a receiver. Modulation should be applied for this test and, with the receiver tuned to an n.f.m. band, the deviation control should be adjusted for a clean-sounding well-modulated signal. It must be remembered that this adjustment holds for one band only and that the deviation control requires readjustment when the transmitter is switched to another band. Less deviation is needed for the higher-frequency bands. More extensive information on aligning n.f.m. units is given in the ARRL Handbook.

Total cathode current for the two audio tubes is approximately 1.5 ma. and about 0.5 volt is developed across the cathode resistor of each stage. Plate voltage for the speech-amplifier tube is roughly 30 volts and 25 volts should be measured at the screen-grid pins of both 6AK5s.

Testing the 100-Kc. Oscillator

Power for the 100-kc. crystal oscillator may be obtained only by turning on the transmitter supply. However, the transmitter can be disabled during the test by opening the key. \( S_2 \) must be switched to the crystal position and a receiver should be tuned to a harmonic of the crystal. A short antenna connected to the oscillator-output terminal at the rear of the chassis may be necessary if the receiver is tuned to a high frequency and if the transmitter is enclosed in the cabinet. When the circuit appears to be working normally, the oscillator may be brought to zero beat with one of the WWV frequencies by means of \( C_7 \).

Plate and screen potentials for the 6SH7 should be 150 and 50 volts, respectively. One volt should appear across the cathode resistor, \( R_6 \), and the cathode current is 1 ma.

The Antenna Coupler

The circuit diagram of the antenna coupler is given in Fig. 3. The unit makes use of a convenient bandswitching coil assembly and a switching system which permits rapid transfer of the antenna feeders to the correct impedance points on the various coils. The feeder switch has a section, \( S_{1C} \), devoted to the job of shorting out one of the tuning condensers when high capacitance is desirable. The circuit as shown is wired for high-C operation at 3.5 Mc. Laboratory tests have proved that resistive loads ranging from 10 to 3000 ohms can be successfully matched with this parallel-tuned circuit.
Construction of the Coupler

A 7\(\frac{1}{2}\) by 8\(\frac{1}{4}\) chassis deck serves as the base for the antenna coupler. The panel consists of a sheet of Preswood measuring 10 by 12\(\frac{1}{2}\) inches backed up by a sheet of aluminum. The tuning condensers are mounted on feed-through insulators at the front of the chassis and the coaxial-cable input jack is at the rear of the deck.

The B & W turret shown in the rear view of the coupler appears in modified form. The 3.5-Mc. coil was eliminated from the assembly and all of the input links were removed from the remaining coils. Two turns were also cut from the 28-Mc. coil. However, all of this was done to permit operation of the tuner with the bandpass trans-
mitter and the particular set of load impedances listed above. It is therefore suggested that the turret be first installed in the original form so that a wide range of circuit values will be available should they be needed.

Using the Coupler

Although the tuner is designed to make band changing as simple as possible, there is nothing unusual about the manner in which it is operated. It is necessary only that the feeder taps be positioned for proper impedance matching and that the input links provide adequate coupling to the power amplifier. There are several methods of making these adjustments. They can be made in the usual cut-and-try manner, using the amplifier plate meter and r.f. meters (if the latter are available) as indicators of proper loading. However, this may not result in best impedance matching. It is preferable to follow the procedure outlined in a recent issue of QST.\(^1\)

\(^1\) Grammer, "Eliminating TVI with Low-Pass Filters," QST, February, 1959.

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U.S.A.
Calling!

U. S. Air Force Reserve

Individuals without prior military service may now be commissioned in the U. S. Air Force Reserve, provided that they have certain qualifications listed below. Former officers of the Army, Navy, and Air Force may be appointed or reappointed in the Air Force Reserve, and subsequently, request active duty. Former airmen who do not have Reserve status may be enlisted in the Reserve in their former grades and volunteer for active duty in those grades. The following opportunities are open to individuals without prior military service, former personnel of the Armed Forces of the United States, and all members of the Air Force of the United States (seeking appointment in a grade higher than that currently held), except Regular commissioned officers of the USAF and USAFR or ANGUS officers on extended active duty in an Air Force of the United States status. Officers holding commission in the Reserve Forces of the Army of the United States, Navy, Marine Corps, Coast Guard, Coast Geodetic Survey, and Public Health Service may not apply for appointment in the USAFR under the provisions of Air Force Regulation 45-18, 23 Sept., 1949, until they have obtained a conditional resignation from their commissions.

1. Communications Specialist — Applicant must possess a college degree in electrical, communications, or radio engineering with a minimum of two years of progressive responsible experience with industry in the communication and/or electronics field in any combination of the following: the installation, maintenance, and repair of airborne and/or ground communications equipment involving experience in wire and radio communications, electronics, engineering, miscellaneous electrical and/or telecommunication engineering, including telegraph, telephony, cable, alarm and signal systems, traffic controls and their equipment such as switchboards, dial systems, teleprinters and facsimile transmitters and/or installation, management and operation of radio stations, telephone systems, and navigational aids or systems. The applicant must currently be employed in one of the above specialties.

2. Design and Development Officer — Applicant must possess a college degree within one of the following or associated fields, with civilian experience to demonstrate that he has acquired a thorough knowledge of the physical and mathematical sciences underlying that field. A minimum of one year’s experience is required, and the applicant must be working in the field for which applying at the time of application.

Electronics
Geophysics
Engineering
Nuclear physics
Metallurgy
Basic physical sciences

3. Photographic Equipment Engineer — Applicant must possess a college degree in engineering with a minimum of three years’ experience in the design, manufacture, or repair of cameras, or in the manufacture of optical instruments.

4. Production Inspection Officer — Applicant must possess a college degree in the field of mechanical, electrical, or chemical engineering with a minimum of two years’ civilian experience in industrial design production.

5. Special Investigations Technical Officer — Applicant must possess a bachelor degree in the engineering or physical-sciences field and a minimum of two years’ experience in any one of the fields listed below:

Electrical and sound engineering
Analytical chemistry

(Continued on page 83)

QST for
GOVERNOR EARL WARREN of California was the guest of Naval Reserve Electronics Platoon 12-19 (K6NAZ) during an Open House held in conjunction with the Fourteenth Annual Youth Day celebration at Winters, Calif., April 29th. Governor Warren and his secretary, Lieut. Cmdr. W. S. Mailliard, USNR, were among the hundreds of visitors to the unit. An additional feature of the Youth Day activities was operation of amateur station W01HI in an Air Force mobile radio truck. Messages were accepted from the visitors. Sgt. Thourot, USA, manning W01HI, and Cmdr. B. R. Snow, USNR, W6LTU/K6NAZ, passed traffic to local W6s EXP, OUE, GMP, HWU, ITS, and GHV, who relayed via the Gypo Net (160-meter 'phone), the Mission Trail Net (75-meter 'phone), and c.w. outlets on 160, 80, and 40 meters.

Nineteen radio amateurs provided a communications network for the 48th Annual Championship Regatta of the Intercollegiate Rowing Association at Marietta, Ohio, on June 17th. Lieut. Cmdr. Carl J. Anderson, USNR, W8VZ, electronic officer of Naval Reserve Electronics Company 4-4, was in charge of operations. The following amateurs of Marietta and Parkersburg, W. Va., manned stations on 29.6 Mc. from 1:00 to 6:30 p.m. at strategic points indicated: W8VY, press car on the observation train; W8AWI, IBA steward's car on the train; WARNH, Camp; W8FPC, judge's barge at the finish line; W8DEDE and W8ACO, press tent at the finish line; W8MIT, referee's boat; W8FOG and W8EVO, crew boats. Equipment was furnished by the Marietta Naval Reserve unit, Naval Reserve Organized Battalion 5-10, Wheeling, W. Va., and individual amateurs. The Wheeling battalion organized a cruise for the occasion. The L88(L) 65 came down from Wheeling, anchored in front of the finish-line bradford circle, and provided loudspeaker service for the spectators. The 14th Marine Reserve Communications Company of New York strung a line along the Ohio side of the river course, from the two-mile mark to the finish line. This company provided telephone lines at several points along the course, which described the progress of the races over the line. Two sound trucks and the L88(L) 65 were served by this set-up.

Naval Reserve Electronics Platoon 9-1, Zion, Ill., set up a portable ham station at Boy Scout Camp, fifteen miles from town, where some 350 Scouts were participating in the annual Lake County Camporee, June 9th-11th. K9NAB/9, operated by W9GYP, maintained schedules with members of the Lake County Radio Club for possible emergency traffic when no telephones were available at the camp. Contacts were with W9FRL, W9RBA, W9VLA, and W9HP on 160-meter 'phone.

Here and there: Congratulations go to CRE Paul W. Andrew, USNR, W6GUR, who stood highest in the code contest at the Fresno Hamfest, sponsored by the San Joaquin Valley Radio Club on April 29th. ... Capt. John L. Reimartz, USNR, ex-W1QP-W3RB, long a familiar figure in Naval Reserve and Amateur Radio circles, is now located in Burlingame, Calif., where his present station, K6BJ, is a control for a network of radio amateur-Reservists.

... Another old-time ham who continues active in the Reserve is Capt. Thomas R. Pennybacker, USNR, W1VZ.

... The Naval Reserve Emergency Mobilization Control Truck, First Naval District, participated in the armed forces display at Boston Common in connection with the Boston Jubilee and Armed Forces Day, during the period May 14th through 22nd. Amateur operations, under K1USN/1, were supervised by Lieut. J. J. Golink, USN, W1USUT. ... The Denver (Colo.) Radio Club holds its meetings (normally on third Wednesday evening each month) at the Naval Reserve Training Center, Denver Federal Center. ... K6NAZ, Naval Reserve Training Center, Lubbock, Texas, took part in an emergency communication demonstration conducted by the South Plains Radio Club on May 7th. Traffic was exchanged between K5NAZ and low-power (12 watt) portable stations operated on 10 and 75 meters in Abernathy, Texas, by club members. ... K5NRH, Naval and Marine Corps Reserve Training Center, Houston, has received a certificate of membership in the South Texas Emergency Net. ... On May 28th, an emergency communication test was conducted by the ARL Emergency Corps of San Mateo County in conjunction with Naval Reserve Electronics Company 12-7 (K6NAZ). The exercise was conducted under simulated disaster conditions in the San Carlos-Belmont area. Seven mobile radio units transmitted reports to a receiving center in the San Carlos fire station. A dispatch report originated by the San Mateo County Chapter of the Red Cross to the President of the American National Red Cross in Washington was relayed.

(Continued on page 99)
Safety and Convenience in Transmitters

A Novel Constructional Design for Ham Rigs

BY NATHAN K. BALE, W6PBXZ

During the past decade or so, many forms and types of amateur transmitter construction have been suggested in QST and other publications. Most of them have had something to offer in the way of original ideas. However, very few of the designs have been directed primarily toward two most important factors, namely, safety and convenience in servicing and adjustment. Few are the hams who wish to keep close company with an electric chair in disguise, and struggling to reach an inaccessible part buried under a chassis never improved one's temperament. Think of the time, energy and patience wasted in disconnecting wires, unscrewing bolts, and tediously pulling out a heavy chassis merely to make some small experimental change in circuit or component. With a little thought and some planning, these handicaps can be quite readily overcome.

The type of construction used in the 250-watt all-band rig shown in the photographs is not expensive and all of the material is of standard make, usually available in hardware stores, supply houses, and metalworking shops. The design can be fitted to accommodate many existing rigs with only moderate alterations. The outstanding features are that the transmitter is completely enclosed as a measure of safety and that all servicing and changing of plug-in coils can be made conveniently and safely from the front. Any unit can be quickly removed if a major operation becomes necessary. The cost of this enclosed structure is no greater than that of the usual open-rack job. It is practically dustproof and the cabinet provides a good measure of shielding against direct radiation. The finished product is neat and professional in appearance.

Frame Construction

The dimensions are based upon the measurements of a kitchen utility cabinet of the type sold in all department stores and mail-order houses. They are available in several different sizes. This one is 64 inches high, 25 inches wide, and 12 inches deep — large enough to accommodate a good-sized transmitter.

The cabinet is strengthened by an interior framework of angle iron. The shelves must be pried out first, of course. Holes are cut in the sheet-metal bottom of the cabinet to allow the vertical members of the frame (2 × 2-inch angle stock) to run from the floor level to the top of the cabinet. These two verticals should be spaced apart a quarter of an inch more than the width of the panels to be used. If the panels are of standard
19-inch width, the two uprights should be spaced 19½ inches. They are bolted to the sides of the cabinet, using spacing blocks or sections of small-diameter pipe between the cabinet wall and the angle iron, if necessary, to make the panel space suitable, as shown in Fig. 1.

The framework should be placed far enough to the rear of the cabinet so that the doors will clear any projecting parts that may be mounted on the panel fronts. To improve the appearance from the front, any space between the sides of the cabinet and the vertical members can be covered with strips fastened to the angle stock. I used aluminum, as the photographs show, and it makes a good-looking job.

The bottoms of the uprights are joined by a length of 2 × 2-inch angle stock and crosspieces of 1½ 1-inch angle iron are bolted to the verticals so that the top edge of each crosspiece will come about ¾ inch below the bottom edge of the panel above it. If desired, the vertical members may be drilled at some standard interval so as to provide for future modification.

**The Hinged Panels**

The bottom edges of the panels are hinged to the crosspieces, as shown in Fig. 2. The hinges are of the “slip-pin” type, miniature versions of the common door hinge. To remove an entire unit from the rack, all you have to do is slip out the two pins and the panel is free. The original hinges on the doors of the cabinet should also be replaced with hinges of this type (or removable pins substituted in the original hinges), so that the doors can be removed if desired while working on the transmitter.

Each panel is fitted with a drawer pull to facilitate opening and is held securely closed by a standard friction catch. The male part of the catch is fastened to the panel at the center of the upper edge, while the matching female part is attached to the crosspiece above. To hold the panels in a horizontal position while they are open, a cord fitted with a hook is attached to the panel after it has been opened. The other end of this cord is fastened permanently to the framework.

Several large socket-punch holes should be made in the back of the cabinet near the top to provide ventilation.

Ordinary panel-and-chassis construction may be followed, providing the depth of the chassis behind the panel is less than the panel height. If the chassis depth is greater, it may interfere with the unit above when it is hinged outward. However, components can be made much more ac-

The components and wiring of this transmitter are readily accessible from the front. Safety interlocks make it impossible to expose dangerous high-voltage points with the power on.

The exciter power supply. A typical example of chassisless construction.
High Claimed Scores — 1950 Field Day

Listed below are high claimed scores reported for the Fourteenth ARRL Field Day, June 24th-25th. These are subject to checking and grouping according to the number of transmitters in simultaneous use at each station. Complete FD results will be published in a later issue.

Class A

(Listings show call used in FD, claimed score, and number of simultaneously-operated transmitters.)

Mid-Cities Amateur Radio Club. W6G1AL/6 19,773–12
Garden State Amateur Radio Assn. W2GBA/2 18,552–8
Concord Braggumpounds. W1OC/1 15,492–9
Northwest Amateur Radio Club. W91T/9 11,916–8
Tri-County Radio Assn. W2OM/2 11,727–7
Frankford Radio Club. W3FRY/3 10,575–5
Glory Valley Amateur Radio Club. W4FP/2 9099–4
Associated Radio Amateurs of Long Beach. W6HIO/6 9882–7
North Suburban Radio Club. W2AP/9 9720–7
Oakland Radio Club. W6QJ/9 6070–2
Potomac Valley Radio Club. W6USA/3 9099–8
Central Jersey Radio Club. W2AL/1 8838–4
Lakehead Amateur Radio Assn. W6V2D/3 8533–6
Ingleswood Amateur Radio Club. W6MRS/6 8091–5
Somerset Hills Radio Club. W6HXM/2 7641–6
West Side Radio Club. W6EJ/3 7597–8
Hammond Amateur Radio Club. W6BBN/3 7578–10
St. Paul Radio Club. W9RA/4 7448–2
Amateur Radio Club of Holbrook. W6GM/6 7550–7
Beaver Valley Amateur Radio Assn. W5GJY/3 7425–6
Society of Amateur Radio Operators. W6AEX/6 7392–7
Soledad Amateur Radio Club. W6GER/6 7184–8
Hollis Amateur Radio Club. W6MJG/6 7155–9
West Seattle Amateur Radio Club. W7RT/7 7155–9
(one call group)

Electric City Radio Club. W6IKX/3 6696–7
Mike and Key Club of Santa Monica. W6VB/6 6507–5
Ridgewood Radio Club. W2ZFT/2 6490–6
York Radio Club. W6WCW/9 6393–5
Mohicans Amateur Radio Club. W9AB/9 6318–5
Cedar Valley Radio Club. W6BYP/9 6309–3
Egyptian Radio Club. W9RED/9 6013–4
Clinton Amateur Radio Club. W6EBR/3 6048–5
Northern New Jersey Radio Assn. W2DAY/2 6039–4

Class B

(Listings show calls of operators at each station, call used, and score.)

W1s ORP HFO. W1ORP/1 4247
W2s JBQ BFA. W2JBQ/2 4172
W6s GTM HGM. W6GTM/6 2097
W6s QFH ZWN. W6QPE/6 2754
W6s WFAU. W6WFAU/9 2558
W8s QV EBJ. W8GW/8 3511
W3s MG MUF. W3WMC/3 2433
W6s CA FYO. W6SCA/5 2139
W8s URT IU. W8URT/9 1953

Class C

W4MBA/6. 4077 W4FEX/6 1201
W6KNH/6. 2119 W5DAM/5 1147
W6SCX/6. 1468 W2VBE/2 1147
W4JUC/6. 1417 W6XEB/6 1093
W6EPX/6. 1390 W6WVD/6 1093
W2GFG/2. 1350 W6LBN/6 1028
W6UG/6. 1323 W2HE/2 1028
W2BRJ/2. 1233

Class D

W9DUA. 389 K2CC 138
W9RO. 230 W8HIM 138
W8TZO. 163 W8HY 104

HMFEST CALENDAR

NEW JERSEY — Sunday, September 10th, at Walworth Park, Haddonfield — South Jersey Radio Association Hamfest. Two-meter transmitter hunt, games, pony rides for the kiddies. Bring the whole family. In case of rain affair will be held September 17th.

QST for
Some of the single-sideband gang who use big tubes have wondered what the FCC interpretation on the s.s.b. power limit is. We are pleased to quote the following from a Commission letter addressed to the League:

The following . . . may be considered as a presently acceptable method for determining the d.c. plate power input to the final r.f. stage of a single-sideband amateur transmitter:

The maximum d.c. plate power input to the radio frequency tube or tubes supplying power to the antenna system of a single-sideband suppressed carrier transmitter, as indicated by the usual plate voltmeter and plate milliammeter, shall be considered as the "input power" insofar as Sections 12.131 and 12.130(d) of the Commission's rules are concerned, provided the plate meters utilized have a time constant not in excess of approximately 0.25 second, and the linearity of the transmitter has been adjusted to prevent the generation of excessive sidebands. The "input power" shall not exceed one kilowatt on peaks as indicated by the plate meter readings.

T. J. Slowie
Secretary

A number of new ones have popped up in the last few months, but unfortunately many of them seem to be much better with a soldering iron and microphone than with a pen. How about some reports from you hounds? We would like to get your call down on the record, so you can show your grandchildren at some later date how you were one of the first on s.s.b.

It may take a little time, however, before Denny at W2URX, Glen Cove, N. Y., will be showing his grandchildren how he pioneered the stuff. Oh, he's on the air with a rig all right, doing quite nicely with a W2UNJ exciter driving AB3 807s to 120 watts on 75 and voice-controlled with a pair of 692Bs for duplexing. His problem is that he's only 17 years old, a senior in high school, and it may be a few years before he has any grandchildren! But he sure makes it tough on some of the smart oldsters who steer clear of s.s.b. because "you have to be an engineer to make it work." Denny has made enough direct comparisons of his 120 watts s.s.b. and 120 watts a.m. to be completely sold on the carrierless stuff. Best DX is W6CH.

Those on the track of their s.s.b. WAS will do well to look for W5RKH in Detroit, the first one on from Michigan. Ed uses a phasing rig ending up with p.p. 813s in the final, running 300 watts on 75 and 20. He says that W1JBO/9 is on s.s.b. in Indiana with a six-tube portable rig using a crystal filter. The thing winds up in an 807 and the filter has 38 db. sideband suppression — we'll try to get more dope for you on this job next month.

Another one for the WAS seekers is W6AHM at Great Bend, Kans. John uses a phasing rig made up from ideas gathered from several articles, and the exciter drives the 807 in his LHT-17 on 75 meters at present. The exciter is built on an 11 by 7 by 3 chassis and has push-button control for sideband selection and carrier reinsertion. It took two weeks of spare time to construct, and John says it gave less trouble than anything he ever built. He's sure that anyone buying a commercial phase-shift network could align a s.s.b. exciter with only a receiver and its S-meter.

Bob of W3KPP, in Pittsburgh, has been on 75 for a few months, running 40 watts to an 807 in a filter rig. During that time he has worked about 40 s.s.b. stations in all W districts except the seventh. While this isn't the lowest-powered 'phone rig that has been on, it certainly has a record that hasn't been equaled, to our knowledge. Or is that sort of performance routine for a 40-watt a.m. rig?

W2SNQ in West Orange, N. J., uses a phase-shift exciter on 5.2 Mc. and a 9-Mc. VFO for 20- and 75-meter operation. The exciter ends up with a 6AQ7 that drives Class A 304TLs in the final. The exciter unit is all miniature tubes, except for the 6AQ7.

Faithful readers of QST may recall some of the circuits Hank Keen, W2CTK, of East Hempstead, N. Y., used to dream up. Hank has had a phase-shift rig on 75 since April, using a quartet of screen-modulated 807s running about 200 watts peak input. The audio amplifier before the phase-shift network has 250-cycle high-pass and 3000-cycle low-pass filters and a clipper, and a pair of 6L6s does the modulating. The antenna is a 30-foot vertical resting on a pop bottle and fed by a buried coaxial line. Hank confirms the almost universal observation that it is nice to be able to reinsert carrier at the transmitrer, until that great day comes when all ham operators can (1) identify, and (2) tune in a single-sideband signal.

W4OLL has a new Class B 304TL which he says "really works up to the limit." He is still using his filter, but has plans for working on a crystal-lattice filter at 163 kc. in the near future. . . . VE7VP worked VE2CP (14,370) when VK2AC was also at the station. VK2AC, you may recall, has a crystal-filter s.s.b. rig on 7 Mc. — it is described in the June, 1950, issue of Amateur Radio (Australia). . . . G2NX (14,360), who also uses a crystal-filter rig, was heard by VE7RV. . . . The June 18th Newark (N. J.) News carried a nice story and picture of the s.s.b. rig at W2ESP, which prompts us to point out that a s.s.b. station makes a good news story for any local paper, with consequent favorable publicity for ham radio. The angle of the extended range possible with s.s.b. is a natural, particularly if you can give the reporter some before-and-after figures.

If your stumbling block on a s.s.b. rig is the matched resistors and condensers for a phasing

(Continued on page 30)
A Dual-Crystal "Q5-er"

More C.W. Selectivity with Two Filter Crystals

BY REGINALD A. TITT, * EX-G3CMJ

Most readers will be familiar with the characteristics of the single crystal filter and also well aware of its weaknesses. The width of the skirts of the response curve and the fact that the rejection slot permits the elimination of only some of the adjacent interference are both reasons for the present interest in cascaded low-frequency i.f. stages and double- and triple-conversion jobs.

However, these disadvantages of the single crystal filter can be overcome and most of the advantages of the conventional "Q5-er" can be obtained by a simple modification of any existing crystal filter, resulting in a near-perfect response curve for c.w. reception. No outboard attachments are needed, no additional power supplies have to be found, and the modification is done inside the crystal filter assembly of your present receiver, leaving everything quite neat and tidy. No new parts are required, apart from the purchase of two i.f. crystals, and thus the over-all cost is low.

The response curve of the normal single crystal filter is familiar to everyone, taking the form of a sharp peak with a rejection notch on one side or the other, depending upon the setting of the phasing condenser. If we take two such filters, one being the mirror image of the other, and superimpose them so that the peaks are close together but not quite coincident, the resultant curve has a narrow passband and steep sides. The rejection notch of one crystal furnishes one steep side, and the rejection notch of the other crystal supplies the other steep side. A response curve of this type approaches the ideal for c.w. reception. Fig. 1 shows such a curve, plotted from readings made on an RME-45 with and without the dual-crystal Q5-er.

Practical Considerations

To convert an existing filter, it is only necessary that two crystals be used in the usual filter circuit, as shown in Fig. 2. The two crystals should be identical except as to frequency. Within limits, the frequency separation determines the width of the response curve. In practice it was found that a pair of crystals around 300 cycles apart is about right for c.w. reception. To obtain this separation, 455.15- and 454.85-kc. crystals would be paired in a nominal 455-kc. i.f. amplifier, although one could use crystals several kilocycles away, provided they differed by about 300 cycles and the i.f. amplifier were realigned on the new mid-frequency. Crystals in the i.f. range can be obtained from crystal suppliers inexpensively. Surplus crystals should work satisfactorily, but they were not tried and consequently no definite statement can be made about their performance.

The conversion of the filter in my RME-45 was done by removing one of the resistors connected to the variable-selectivity switch and replacing it with the second crystal, as shown in Fig. 3. This makes it possible to switch in one, two, or no crystals. In practice the single crystal is virtually never used, as its performance does not compare with the dual-crystal Q5-er.
In Fig. 3, C₁ is the normal phasing condenser, while C₂ is a small condenser that may be added to balance the capacity of the second crystal holder. In the RME this balance is arrived at by adjusting C₂ until the receiver noise is at a minimum. (This is a tricky adjustment, since the noise level is very low with the dual filter.) The little dip between the two crystal peaks is not noticed in practice, and it may even be flattened by adjustment of the phasing condenser. The phasing condenser can still be used for its normal purpose, and its effect is to change the contour of the skirts of the curve, allowing some additional rejection of very strong unwanted signals.

The i.f. stages should, of course, be aligned to the mean frequency of the filter crystals, and here the displaced 455-ke. crystal from the filter can be used in a simple oscillator circuit as a handy signal generator, provided, of course, that your two new crystals straddle the frequency of the old one.

That's all there is to it. No more expense, and no more trouble. This is not a new idea, although on this side of the Atlantic this use of crystals in pairs seems to have been neglected.

**New S. W. R. Bridge for Coax Lines**

For anyone who uses coax cable, whether to feed an antenna or as a circuit link, an s.w.r. bridge is practically an "indispensable." Heretofore it has been necessary to make your own, but there is now available a commercially-built version, put up in a small package which makes it a convenient instrument to use. Based on a design by John Smith, W2TW, it is of the resistance type and may be adapted to either 52- or 75-ohm line.

As shown in the accompanying photograph, the container is a rectangular shielding case fitted with coax terminals on both ends. Socket-type binding posts are provided on top for connecting a 0-1 ma. meter (you use your own meter) and a plug fitting the posts is furnished. The case measures 4 3/4 by 2 1/4 by 1 3/4 inches. As assembled, the bridge is set up for 52-ohm line, but a calibrated 75-ohm resistor is mounted inside the case and can readily be substituted in the circuit when 75-ohm line is to be checked. A calibration curve showing standing-wave ratio against meter readings on a 0-1 scale is furnished.

The new bridge is made by James Millen Manufacturing Co., Malden, Mass.

**Strays**

W and VE radio amateurs professionally employed as movie projectionists or stage hands and affiliated with IATSE are requested to forward their name, call, and mailing address to Amos Kamaga, W6BAA, 628 Capuchino Drive, Millbrae, Calif., for listing in a directory to be published by International Projectionist and Independent.

An informative 12-page circular, Soldering and Soldering, which describes in detail types of solders and soldering procedures, has just been published by the National Bureau of Standards. The three classes of solders treated are soft solders, precious-metal solders, and common brazing solders. The selection of fluxes, which can be as important as the choice of solder, is also adequately discussed. Copies of this publication, known as Circular 492, Soldering and Soldering, are available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 15 cents each.

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**NATIONAL CALLING AND EMERGENCY FREQUENCIES**

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<th>C.W.</th>
<th>'PHONE</th>
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<td>7100 kc. (day)</td>
<td>3875 kc.</td>
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<tr>
<td>3550 kc. (night)</td>
<td>14,225 kc.</td>
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<td>14,050 kc.</td>
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During periods of communications emergency these channels will be monitored by stations of the National Emergency Net for personal-inquiry traffic. At other times, these frequencies can be used as general calling frequencies to expedite general traffic movement between amateur stations. Emergency traffic has precedence. After contact has been made the frequency should be vacated immediately to accommodate other callers.
The term “DX” is derived from the radio abbreviation for “distance,” and in the cold gray dawn of amateur “wireless” it meant just that. In those days of spark, “working DX” was raising someone in the next town or as far away as a thousand miles, depending on the power available. But with the development of c.w. and the higher frequencies — “short waves” then — international communication became possible, and “DX” came to mean working stations in other countries, across an ocean, and even on the other side of the world. The term still means any extraordinary range, such as working across the continent with only a watt or two, or covering several hundred to several thousand miles with v.h.f. equipment, but this article will consider “DX” as it is understood by most: the working of foreign stations.

The lure of DX is as old as amateur radio itself, whether it be the original desire to work just a little farther than other stations, or the present competitive concept of collecting a few more different countries than the next fellow. Disregarding the competitive side, there is a wonderful thrill of satisfaction just in knowing that the signal from your station has carried thousands of miles to some distant receiver where the country and people and everything else are foreign, except the common bond of amateur radio. You begin to realize that the world is big — and that there are other kinds of people. The operator you are talking to may be relaxing after supper, while you are just sneaking in one last QSO before heading for work. He may be dressed in shorts, in a muggy tropical climate, while you worry about the ice forming on your antenna. He may apologize for his weak signal on the grounds that all of the radio gear in his shack was packed inland 600 miles by native bearers. Or he may turn out to be a friend of that “foreigner” you went to school with. Few operators crash the ranks of the legendary “super DX men,” just as few athletes ever reach the champion class, but almost anyone can enjoy the satisfaction of working stations in foreign countries, unless he is handicapped by an “impossible” location. But fortunately, such locations are rare, and even small indoor antennas have been used with good results by persistent operators.

As in any radio operating, under adverse conditions it is generally the station with the best signal that gets through, but high power and superb antenna systems are far from essentials in working DX. While a cool kilowatt and a high-gain antenna are nice to have, as they are in any type of operating, for DX it is far more important to be able to spot your transmitter frequency exactly where you want it in the band. Also, if you have to throw more than one switch to go from “receive” to “transmit,” you will be wasting valuable time and motion and thus jeopardize your chances of raising the DX station. Naturally you will want a good receiver, situated so that your hand won’t cramp up after a few excursions up and down the band. In fact, your operating position should be just as comfortable as you can make it, because DX chasing takes time. Another useful device for chasing DX is a loud alarm clock or a bad case of insomnia, because often the queer hours (your time) are the most productive ones DX-wise.

Bands and Times

Obviously, for success in working DX you have to be on the air at the times that the paths are open to foreign countries. Knowing what times and bands are best is something one gains from snooping and experience and swapping information with other DX-minded operators. You can expect to find some DX on 3.5 Mc. in the winter over a darkness path. East Coast amateurs work Europe and Africa around midnight, and occasionally Oceania will come through just before dawn. West Coast amateurs find the best time for Oceania and Asia to be in the early-morning hours before dawn.

The DX on 7 Mc. is best during the winter, spring and late fall. It is quite possible to work all continents on this band, although it isn’t as easy as on the higher frequencies. The signals follow the darkness paths, but one or both ends of the route can be in dawn or dusk. Dawn and dusk periods generally provide chances to work the greatest distances, but any of the dark hours may offer opportunities to work DX.

The 14-Mc. band bears the brunt of most DX operating, because DX often can be worked practically around the clock. The best times for any particular path depend upon the time of the year, with the summer months offering the greatest number of “open” hours and the winter the fewest. However, the winter, fall and spring months often provide the best signals over difficult paths, particularly when the band is just “opening” or “closing” during the dawn and early-evening periods.
The 28-Mc. band is the low-power man's friend, because excellent signals can be put through with little power when the band is "open." The band is at its best during the winter months over daylight paths. A three-element rotary beam is a big help because it confines the radiation to the necessary low angle. Beams aren't an absolute necessity, of course, but they are very useful, and on this band they don't require much space. The band isn't good every year, though, and during the summer it is generally worthless for DX.

For any particular locality the best times for working DX vary so widely with the year and time of year that it is possible only to lay down the very general rules given above. However, there are several ways to obtain more specific information. One is to ask a local amateur who is quite active in DX work. Another is to do a lot of "snooping" on a band and find out for yourself, or to see when the locals are calling DX. If they are hearing it, the path is open, although the DX signal may be weak and you may not spot it at first. If you miss hearing several stations that are being called by locals, your receiver or receiving antenna may be at fault and will bear investigation. However, don't get too excited if you don't hear all the rare stations some particular local station calls. He may have a better antenna, a better location or more experience than you.1

Antennas

A knowledge of your antenna pattern and the direction of maximum radiation is quite useful in appraising your chances for success in working DX. The subject is covered well in other literature,8 and is beyond the scope of this discussion. To apply the information, however, you should acquaint yourself with the true direction of the various areas of the world with respect to your station. A globe and a piece of string will give you this information, or you can use one of the "great circle" (azimuthal) maps that have been drawn for various parts of the country. Some of these maps are reproduced elsewhere,2 or you can buy one centered on Washington or San Francisco from some marine supply stores. The latter are prepared by the U. S. Navy Department, Hydrographic Office. The A.R.R.L. Amateur Radio Map is centered on Kansas.

If you use a rotary beam, you can use a great-circle map on your direction indicator, to have the necessary information at your fingertips at all times. If you have a 14-Mc. rotary beam, the best path is not necessarily the shorter one as indicated on a great-circle map, and it is wise to swing your beam 180 degrees and check by listening before you decide your beam is aimed correctly. This holds true most frequently for long-range paths over 8000 or 10,000 miles. On 28 Mc., the daylight path is practically always the correct one, although during the spring and fall equinox periods signals may come "the long way around" over distances of up to 16,000 miles or so.

Common DX

It isn't too difficult to work stations in foreign countries where there may be hundreds of active amateurs, such as England, Argentina, Brazil, South Africa, Australia, New Zealand and the like, particularly when there are a number of them "coming through" at one time. Although almost any foreign station may get several replies to his "CQ," your chances of raising him are much better than if a score or more stations call him, as is often the case when a "rare" piece of DX calls "CQ." So far as actual distance is concerned, these common stations represent just as good DX as a rare station at a similar distance. You will find them to be just as good operators as your W and VE friends, and often some very interesting rag-chews will develop. You will get a broader slant on conditions in other parts of the world through contacts with these foreign stations, and you will help to generate international goodwill by your exchanges of experiences and opinions. You can never tell when one of these foreign amateurs may get the opportunity to visit your country and, if he does, he is almost certain to visit you for a personal QSO if he has pleasant memories of your over-the-air chat.

Your first job in working a DX station is to hear him. If you are on a band at a time when DX is likely to be coming through, listen around for a while to see what you can hear. Find out what the other fellows are working, and check any signals that aren't so loud that they are obviously W stations. Look in the "holes" and look near and under the Ws. Investigate signals with peculiar characteristics and a hollow or fluttery sound, but don't expect all DX signals to sound as though they have traveled a million miles. Since the DX signals represent only a small percentage of the signals you will hear (except at certain times on 28 Mc.), you have to look a little more carefully than when you are willing to work the first W you hear who isn't smothered by QRM. Make notes of the frequencies and signals of the DX stations you hear, so that you can

September 1950 41
keep track of a number of them. Remember that many foreign countries allow amateur operation only in the low-frequency halves of the 7- and 3.5-Mc. bands.

If the DX station you first elect to call is in the middle of a QSO, note carefully if he gives any indication of how he plans to tune. On e.w. he may say "15" or "10," meaning he will listen "up 5 kc." or "down 10 kc." from his frequency. If he doesn’t indicate where he plans to start tuning, he is probably going to listen near his own frequency first, so that’s where you want to call him. Not right on his own frequency, because a long call by you may cover him up if someone else raises him, but anything from 500 cycles to several kilocycles to one side, if you’re on e.w. Don’t expect this article to tell you which side — that’s where chance enters the picture — but if you’re the only station calling, or if he likes your signal the best, you will raise him. On phone, your best bet of course is to call him on or near the frequency he indicates as the start of his tuning. If he doesn’t mention where he is tuning, call him from somewhere near the edge of your subband or from some hole where there is a fair chance of your not being covered up by other Ws.

When calling near the frequency of the DX, it isn’t necessary to make your call a long one. Time your call to correspond with what you guess it might take you to tune across 5 or 10 kc. once or twice. If you can work break-in, you will save a lot of unnecessary calling time.

If you don’t raise the DX station, find out whom he did come back to, to get a check on his listening habits. Govern yourself accordingly the next time you call him, but in the meantime check up on some of the other DX stations you have spotted. One of them may be calling CQ or just finishing a QSO.

When the DX station you elect to call is just finishing a QSO, you know where his receiver is tuned — to the frequency of the station he’s working. Put your transmitter on or within a few hundred cycles of this frequency — you have to guess under some skin conditions — but not right on top of the DX station. Give the DX station a short call when he has finished — as indicated by the "SK" in his transmission — and you have a good chance of raising him. If he doesn’t come back to anyone, try another short call. A long call is unnecessary, because you know where his receiver is tuned.

Some calls never stand a chance. For example, if you are on the East Coast, there will be times when the Europeans you call will only come back to W6s, even though the Europeans are loud at your location. This merely indicates that the Europeans are more interested in working W6s than they are W1s and W2s and W3s, so the smart — and courteous — thing to do is look for some DX that is interested in you. Don’t start rebuilding your antenna!

Often you will be able to raise DX by calling "CQ DX," but you have to exercise some judgment as to when to use it. It is quite productive on 28-Mc. "phone and e.w., especially when the band is just beginning to open on some particular path, and it will work on 7 and 14 Mc. Obviously, however, if every W station calls "CQ DX" at the same time, many are going to be doomed to disappointment. You also have to reconcile yourself to the fact that you can’t be combing the band for DX while you’re calling "CQ," so the time may be wasted. If you have an outstanding signal you may get a fair percentage of replies, but don’t overdo it unless you want to be tagged a "CQ hound." If you do call "CQ DX," be prepared to work any DX station that calls you, otherwise it won’t be long before you will be accused by the far-off stations of having "tin ears" and they won’t bother to call when they hear you.

The duration of a QSO with a DX station depends entirely on the foreign station. If many stations are coming through from his country, you aren’t being selfish by holding a long rag-chew, if the DX station indicates his willingness to talk. However, on 3.5 Mc., where there are seldom very many DX stations coming through and the "open" time is relatively short, it is only common courtesy not to hold him, since he is probably as anxious to work as many stations while the band is good as the other stations are eager to work him.

In general DX operation of this nature, you may occasionally be requested by a foreign station to handle some third-party traffic to someone in this country. It is forbidden to handle third-party traffic except with Canada, Chile, Ecuador, Peru and United States possessions and occupied territory, and so you may have to decline as gracefully as you can. However, when you do run across some permissible long-haul traffic, by all means accept it and expedite its delivery in every way possible. Traffic of this nature represents real service and is often the first word the addressee has received from the sender in months.

You may run across an expedition that is licensed to work amateurs. (QST and the W1AW bulletins carry up-to-the-minute information on such ventures.) If the expedition is from one of the countries with which we have a traffic agreement, you can handle any expedition traffic that comes your way. Such opportunities for service are welcomed by most operators.
However, one should be careful not to work any station signing a non-amateur call, no matter how alluring the letter combination, unless it is definitely known that the station is licensed to work amateurs, since this can be cause for a citation by the FCC and a black mark on your record.

Rare DX

The term "rare DX" is, of course, only relative. To an operator who chases DX only a few hours a year, any foreign station is "rare." On the other hand, someone who is out to work as many different countries as he can, for self-satisfaction or an ARRL DX Century Club Certificate or other operator award, may consider some country he hasn't worked as "rare," once he has a good start toward his goal. A PK or VS6 may be a choice prize to a W1 or VE1 who doesn't hear very many, but the W6 who has a dozen cards from those countries considers them routine.

There is only one thing that makes rare DX harder to work than common DX over approximately the same path and distance, and that is competition. When a rare DX station calls "CQ," he is likely to be called by at least five or ten stations the first time. Such a commotion in the band is bound to attract attention, and by the time the DX station has finished his first QSO there may be from twenty to fifty stations lined up to call. To get the DX station to come back to you obviously requires skill, patience and luck.

The principles outlined under working common DX also apply to working the rare ones, but with a few more refinements. First you have to hear the station. You do this by spotting him (you hope) during his opening CQ or by hearing him being worked or called. It will take you longer to locate the rare ones because there are fewer of them on the air, and if extra-special DX is your objective you have to resist the temptation to call something that isn't rare for you. Just combing back and forth through the band until you spot something of interest requires considerable patience. Stations capable of putting outstanding signals into far corners of the world sometimes raise rare stations on a "CQ DX," but the odds are all against it. The time-proven approach is to listen, listen, and listen again.

Choosing the frequency for calling the rare DX station isn't an easy matter, because you are likely to be up against considerable competition. Finding out for sure where the DX station is listening will raise the odds in your favor a little, because some operators calling DX get into a rut and always call right on the frequency of the DX station. If the DX is smart, he won't come back to a station exactly on his own frequency because he knows that soon the whole pack will be calling him there and blanketing him. However, if the DX station insists on replying to stations exactly on his own frequency, you have no choice but to call him there, because that's where he's listening. If he signs "3D5" or "U10," swing down (or up) to the indicated spot and call. Your chances will be good, because it isn't likely that everyone will call from exactly the same frequency, and you may be the one to be in the clear. Break-in is generally impossible to use with a DX station that is being called on his own frequency by many stations, but it is useful to have for the smarter DX operators who only work stations off their own frequency.

The length of the call will vary considerably, since it will depend upon the operating and tuning habits of the DX station. Good foreign operators are quite likely to reply to a short snappy call, while less-experienced ones may sometimes wait out the majority and answer the longest call, when all of the calls are made on practically the same frequency. This latter practice is unfortunate, because it doesn't take long for the other Ws to notice it and lengthen their calls, too. All of this is just a waste of time that could easily be avoided by the DX station tuning around until he finds someone in the clear who makes only a short call. There is no dead-sure way to raise the rare DX station, but it will help if you study his listening habits and govern yourself accordingly.

In working rare 'phone DX, the technique is much the same as for common DX, except that here again the competition is much keener and you have to be more observant. Find out where the DX station listens, try to guess how he tunes, and your percentage of QSOs will go up. In going after the rare ones, you will have quite an advantage over your less-accomplished competition if you can speak several languages other than English. French and Spanish are generally the most useful.

Occasionally you will run across a rare DX station that is being "passed around" or "booked." The practice consists of a W, who is QSO the rare station, asking the DX to "please listen for my friend W-so-and-so on X frequency." There was a time when such a practice could readily be condemned — the QSO might give the friend his coveted WAC or similar award — and there is certainly no objection today if the DX station is a common one, and not being waited for by scores of others. But to request a rare DX station to "look for a friend" is generally an open invitation these days for the waiting stations to show no respect or cooperation and to call the

(Continued on page 98)
Push-Button Power Control Circuits

BY VINCENT W. HANSEN, W6FUL

It has always seemed to me that hams were missing a good bet in not adapting the pushbutton motor starter circuits to transmitter control. Electrical locking relays offer a degree of simplicity, flexibility, and compactness not easily achieved by other methods and, in addition, protective devices for both the operator and the equipment are easily included in the system.

Fig. 1 — The basic circuit of the electrical lock-in control system. Momentarily pushing the "On" switch will close RY1, and the relay will remain closed until the "Off" button is pushed.

The operation of the basic circuit can be easily understood by referring to Fig. 1. A normally-open ("On") and a normally-closed ("Off") push button are wired in series with the hot lead to the relay coil. Then a set of light-duty contacts on the relay is wired across the normally-open button. Pushing the "On" button closes the circuit to the relay, energizing the relay and closing the contact that then shorts out the "On" button and holds the circuit to the relay. Additional contacts on the relay close the controlled circuits. Touching the "Off" button interrupts the current to the relay coil and the relay drops out. The holding contact opens and the relay will remain open until the "On" button is again depressed. By wiring protective interlocks and overload-relay contacts in series with the relay coil, instead of the power-transformer primaries, you can eliminate the need for heavy contacts and wiring in these circuits. Since only a momentary interruption is required to open the control relay, RY1, manual resets on overload relays are not necessary. Simple normally-closed relays can be used, and the reset will be automatic. Fig. 2 shows the basic circuit modified to include these protective devices and also remote push-button stations. Any number of remote stations may be used if all "On" buttons are in parallel and all "Off" buttons are in series. Operation of each station will be independent. The circuit can be closed at one station and opened from another if desired.

A practical controller using this circuit is shown in Fig. 3. It is designed to operate in a 115-volt line supplying three high-voltage supplies and one bias supply. Individual toggle switches are provided for each supply, with neon indicator lights for the filaments and each high-voltage circuit. A line-disconnect switch, S1, is also provided. This switch must be capable of handling all the current drawn by the transmitter. If your supplier doesn't have what you want, try the nearest motor repair shop. The circuit provides time-delay protection for the high-voltage supplies, provision for safety door interlocks, overload protection for any number of circuits, a remote station for operation of the send/receive relay, a push-to-talk circuit, and an auxiliary terminal to supply voltage for operating an antenna change-over or receiver-silencing relay or both. The entire unit was mounted on a 3½-inch panel, with a 3-inch-deep sheet-metal channel serving as a dust cover and terminal mount. Surplus antenna relays were used for RY1 and RY2. These have two heavy contacts and one lighter one. The heavy contacts were connected as a single double-break contact and placed in the hot side of the a.c. line. The third contact was used as the holding contact. One relay energizes the filament and bias bus and the time-delay relay, while the second energizes the high-voltage bus. Pushing the "On" button will close RY1, which will lock in and supply current to the filament and bias terminals and the time-delay relay. Pressing the "Send" button will close RY2, which will lock in and supply current to the plate power supplies through their individual switches, S4, S5, and S6. But RY2 will close only if all interlocks are closed and the time-

Fig. 2 — The lock-in circuit is well suited for duplicate control push buttons and where interlocks and/or overload relays are used. In the basic circuit shown here, RY1 will close when either "On" button is pushed only if the circuit marked "Door Interlocks and Overload Relays" is already closed. The relay will open when either "Off" button is pushed or if the interlock/overload circuit is opened.

* Willmar, Minn.
delay contacts have closed. Operation of any overload relay or opening of any door interlock will drop the plate supplies from the line. Touching the "Receive" button will open the plate relay, and touching the "Off" button will remove the entire transmitter from the line. The "Off" button opens the plate relay by opening the time-delay contacts that are in the $R_y$ coil circuit. The time-delay relay must be a type that opens as soon as its voltage is removed. A straight thermal relay will hold its contacts closed so long as the element is hot and cannot be used.

The "Push-to-Talk" switch, $S_y$, disables the locking circuit on the plate relay and connects a line to a switch on the microphone. $R_y$ will now stay closed only when the "Send" button or switch on the microphone is held closed. With this form of operation, an overload will cause chattering of the relays until the push-to-talk switch is released. If this is considered a disadvantage, manual reset overload devices, of course, may be used.

The circuit shown in Fig. 3 is presented merely as an example. Each station will probably require its own adaptation of the basic circuit. If no time-delay relay is desired, the locking lead for $R_y$ can be lifted from the junction of $R_y$ and the "On" button and returned to the "hot" filament and bias bus through another fuse. If 3-wire service is used, the control circuit shown would be placed in one 115-volt leg, with $S_y$ in the "hot" side. If a 2-wire line is used, a d.p.s.t. switch should be used at $S_y$, so that both sides of the line will be opened and there will be no need to observe the proper polarity.

One possible variation, which may appeal to a number of operators, would be to eliminate $R_y$ and its associated circuits and to substitute a large "Main Power" switch for the purpose. This switch might be one of the circuit-breaker type available on the surplus market. The push-button control would be used for the transmitter power supplies and the auxiliary circuits.

It should be obvious, of course, that the hold-in contact does not have to be on the heavy-duty relay but can be on a small relay. The coil of the small relay would be connected in parallel with that of the heavy-duty relay.

This control circuit has been in use here for three years now, and it has definitely proved its versatility. We would be lost without it. Give it a try — we think you will like it, too.

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**Strays**

W1RUM is H. W. COLLINS!

The July issue of Senior Prom (formerly Calling All Girls) carries an interesting article on amateur radio by Amelia Lobenz, W2OLB, entitled "Come In, W2OLB." Amelia has also authored a new teen-age adventure book, Kay Everett Calls CQ, which is to be published soon. The book already is a Junior Literary Guild selection for older girls.
The World Above 50 Mc.

CONDUCTED BY E. P. TILTON,* WIHDQ

Though it was a little slow in getting under way, the 1950 v.h.f. DX season has been without equal in past v.h.f. experience. After a disappointing month of May, 50-Mc. sporadic-E skip became a daily matter in June, and continued at full speed through July. When skip DX was lacking, there was aurora effect or tropospheric bending to keep the v.h.f. fraternity busy.

A heartening increase in 50-Mc. activity in many areas and widespread openings produced considerable interference on several occasions, as stations in all directions at distances of 300 to 1300 miles came in simultaneously. When double hop appeared, as it did frequently, permitting contacts up to 2500 miles or more, the resulting turmoil was something to behold.

On 144 Mc. there was nothing to match the extreme DX of June, when the 1200-mile record was set by W5YY and W8WXV, but frequent aurora periods provided the 2-meter gang with some fine chances to rack up new states. With the news getting around that aurora is not by any means the rare phenomenon on 144 Mc. that we once thought it to be, more of the gang are getting set for c.w. operation, and learning the signs that warn us of impending openings.

The picture can be drawn briefly by examining the 50-Mc. WAS box and the 2-meter standings, and comparing the records with those of a year or so ago. Every call area now has 50-Mc. men with at least 45 states worked, and with the exception of W6 and W7, where the reason lies in the size of the states involved, the 2-meter states totals run to two figures. Scores of 2-meter men now have DX of 500 miles or more to their credit, and at least 13 of those listed have equaled the figure that was the recognized record up to just a year ago.

Double-hop openings during July helped to boost the 50-Mc. totals, moving at least one more call into the listing at the head of the 50-Mc. WAS box. Nevada, represented by W7TJY at Gardnerville, was the big one as far as W9ZHL was concerned. On the night of July 26th, the 27-day recurrence of June’s big session, these two got together, making 48 on 50 for W9ZHL. He is now holder of 50-Mc. WAS award Number 5. W7TJY also raised the temperatures of numerous East Coast operators this same evening, by being the first Nevada station to be heard in W1, 2 or 3 during a sporadic-E opening. Montana and Utah now remain the only holdouts, neither having ever been heard in the northeastern part of the country on 50 Mc., as far as is known.

*V.H.F. Editor, QST.

Fall V.H.F. Party — Sept. 23rd-24th

We’ve all been going strong this summer, and new recruits have come to the v.h.f. bands in considerable numbers. It is easy to hold their interest when things are hot, but if v.h.f. operation is to secure any permanent benefit from this influx of enthusiasm, these summer soldiers must be sold on year-round activity.

The September V.H.F. Party has become something of an institution, already, because it gives the gang a shot in the arm just at the time that their interest might otherwise be tending to slacken.

The September Party is our chance to demonstrate the value of the v.h.f. bands for work under normal conditions. If openings of any sort come along that week end they can be regarded as dividends, but anyone who hears down during this contest is almost certain to have real fun if there is appreciable activity in his vicinity. If occupancy is low in your territory, this is your chance to get it started upward. Plan now to be on deck, and get everyone you know who has v.h.f. gear to do likewise.

The contest rules, appearing elsewhere in this issue, are as simple as ABC. Reporting forms are available on request, to simplify record keeping. Send for yours now — then use them, even if you work only one station. We want to know who is taking part, and how they are making out, even though there can be only one section winner.

Watch Out for Aurora

Many chances to work hard-to-get states and nice DX are going by the boards because not enough fellows are aware of aurora reflection. This phenomenon occurs more frequently than most of us have realized, and it is not necessarily confined to the spring and fall months. February through April and September through November are the major aurora periods, but all during the summer aurora has been showing up on both 50 and 144 Mc.

In some cases there was a woeful lack of v.h.f. activity. On July 11th, for instance, your conductor noted typical wavy short-skip signals on 25 Mc. at 3:45 p.m. On 50 Mc. a commercial harmonic coming from the south went fuzzy when the beam was aimed north (no amateur activity noted at that moment) so we went on to 144 Mc. Nothing was heard until about 7 p.m., when W8WXV was raised, for what was probably the first Ohio-Connecticut aurora QSO on 144 Mc. Then, for a few moments, two of the called numerous CQs without result. W1-W8 QSOs could have been made by the dozen during that period, yet there was not another signal to be heard at either end.

Later that evening the aurora resumed, and from about 11 p.m. on the few fellows who were in on it were having a field day. W2SPK, Glen Falls, N. Y., reported reception of W4AO, Falls Church, Va., W3YP, Allen-town, Pa., W8WXV, Shilo, Ohio, W2RPO, Tomsanda, N. Y., W3QKI and W3NOJ, Erie, Pa., and W9G7T. These areas are seldom or never heard on ground wave from Glen Falls, indicating the possibilities open to the fellow who makes the most of aurora openings.

W8WXV, one of the most consistent aurora DX chasers on 144 Mc., says that extraordinarily good conditions for DX on 10 provide a tip-off. If he hears DX coming through unusually well, or later than usual at night, he checks the foreign broadcast stations in the 15-22 Mc. region. When a roar develops on them he loses no time in getting started on 144 Mc. Every time there is pronounced aurora effect on 28 Mc. there is something doing on 144, though too often it is only the unintelligible roar of phone stations, the operators of which are blissfully unaware that they are being heard at distances of 500 miles or more.

Two-meter signals reflected by the aurora are seldom strong. The best heard by W8WXV are no more than 50 db. above the noise, or 54 to 6, depending on your 8-meter. Only a few run more than 5 to 6 db. over the noise, and the
character of the signal makes it seem even weaker. Aurora signals are best described as a "whisper superimposed on a rush" so they are not always easy copy. Those of us who are a little weak on e.w. operation need not worry on this score; however, the nature of aurora work requires short sending, and most of the v.h.f. gang are no hotshots with a key, so the chances are that slow code speed will be no handicap in this work.

Aurora seems to develop most frequently in the late afternoon or evening until early evening. There may be a fadeout then, with a repeating again around 10 or 11 p.m. Sometimes openings develop quickly and fade out in a matter of minutes; other more pronounced disturbances may run for several hours at a stretch, recuring over a period of two or three consecutive days or nights.

Most ionospheric disturbances are predictable in advance, and the latest information on anticipated ionosphere storms is transmitted nightly by ARRL over the New York quarters Station, W1AW, during the regular bulletin periods. Sent on both phone and e.w., on all bands from 2 to 160, these warnings are effective as much as three weeks in advance, and are corrected whenever short-notice warnings are available.

There was aurora again early in the evening of July 24th. W8WXY was heard in QSO with W1JZY around 8 p.m. Then the writer raised W2EBV/S, Lockwood, Ohio, followed later by K7LX, Middletown, Mich. Michigan is believed to be the first Michigan-to-W1 QSO on 144 Mc. W3KWL, Farrell, Pa., was heard S5. Again, there were several strong 'phone carriers, but none of them was intelligible, or even clearly heard. W5RRI reports having W2EBV and W9OOP, both over 600 miles, W2E8F, W3s REU and IWL, W8s WXY and WRN, and W9s HXJ, EHU, and UCH.

Don't forget that aurora is great stuff for the 50-Mc. man, too, with a coverage of 100 to 700 miles or so providing an ample opportunity for working those close-in states, so hard to collect by any other medium. And remember that appearance of aurora may be a tip-off on a chance to work South Americans on 50 Mc. the following morning. The fall DX before last was just that kind—be the first to work into South America this fall!

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

**Bolts Tail, South Devonshire, England** — A new European 144-Mc. record was set on June 28th, when GBY worked DL5PM, Munich, Germany, a distance of 470 miles. A series of contacts starting at 2100 GCT included ON4H, ON4HN, Antwerp, 370 miles, DL3PM, and F3JR and FS4Q, both of Lille, France, 310 miles.

**Grenada, B.W.I.** — We may yet have that long-sought 50-Mc. contact with the Virgin Islands. W2PGG sends word that he is revamping a DM-30 for 50 Mc., and working on a 50-Mc. beam. He promises to be on before the September V.H.F. Party.

Another prospect is PJ5RP, Aruba. Harry would like very much to try 50 Mc., but available equipment gives little promise of doing a job on that band. He would like very much to borrow (with a view to buying, should 50-Mc. work be promising) any 50-Mc. spar or parts that any interested party got in touch with Harry Duddard, Aruba Trading Company, Aruba, N. W. I.

**Toronto, Ontario** — An impromptu gathering of the v.h.f. fraternity on the Toronto area, for the purpose of entertaining visiting visitors Bill and Helen McNatt, of The V.H.F. News, also served as an opportunity for getting an informal v.h.f. organization underway. To be known as the Southern Ontario V.H.F. Group, the v.h.f. operators around Toronto plan a series of meetings of an informal nature. The first will be held on Sept. 16th at 8:30 P.M., at VE3AGW's Riverside Lodge, Oakville, Ont. All amateurs active on 50 Mc. and up are invited. For further details, see VE3SA EAH, DAN, AIR, AGW, or ANY.

**Ashland, Ohio** — In receiving aurora signals on 50 Mc., recently, W8NQD discovered, quite by accident, that the readability of some voice signals distorted by the aurora effect is improved if the i.f. of the receiver is left on and tuned carefully to zero beat. Has anyone else tried this?

**Onitsha, Kan.** — V.H.F. activity in Central Kansas has, in the past, been largely a matter of getting set up for business and then waiting for band openings to some other part of the country where contacts could be made. Now, however, with the improved equipment in use and the greater activity around the state, W8HIF is finding both 50 and 144 Mc. fine when they are not open. On 2 meters WZ8KP, Wichita, 105 miles, can be worked with good signals. W9DPR, 135 miles away in Greenleaf, is worked on occasion, and W9FFE, Abilene, and W8PDK, Salina, are worked easily. On 50 Mc, W6s PKD, MGV, and QD8 are always good. Several good contacts have been made with W9QI, 110 miles to the west, and BPL, Fredonia, 190 miles, comes through well when ground-wave conditions are favorable.

Los Angeles, Calif. — In order to promote regular v.h.f. activity by providing a continuing incentive, Tom Wing, W6MKV, is sponsoring a contest, beginning Sept. 1st. One is a marathon affair, with a large trophy to be presented to the operator who works the greatest number of miles on 144 Mc. and higher bands during the contest period, Sept. 1st through Dec. 31st. The competition is for fixed stations only, and other fixed stations may be worked only once during the contest period. Portable or mobile stations may be worked more than once, provided that a different location is used by the portable or mobile each time. They may be counted no more often than once per 24-hour period. Score is computed by adding the airborne mileage of each contact, applying a multiplier of 5 for contacts on 220 Mc. and higher bands.

The second is an activity award, with smaller trophies to be awarded to the operator in each ARRL section in California making the greatest number of contacts in the contest period. The same station can be worked once each month during the contest period. The multiplier of 5 applies to contacts on 220 and higher. Both these contests are for single-operator fixed stations only.

The third is for portable or "expedition" stations. An award in this section will be added to the one above. No multiplier applies to these contacts. The winner will be the operator or group of operators of the portable station making the longest distance contact with a fixed station during the contest period. No multiplier applies.

The contests will be run again, concurrently, every four months, with a 3-time winner keeping the award permanently. Decisions by the Board of the Two Meters and 2-Meter Standings

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<thead>
<tr>
<th>Call</th>
<th>States/Areas</th>
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<tr>
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September 1950
Down Club of Los Angeles to be accepted as final. Mileage to be based on Geological Survey maps of California. Contestants limited to stations within the borders of California.

Cocktuit, Mass. — Reading in these pages of W1D1's 950 QSOs on 50 Mc. in 1950, through May, W1SNK sends along his 3-meter record. In the last six months of 1950, Dick made 1351 contacts on 144 Mc.

Tulsa, Okla. — Don't always judge the effectiveness of a 2-meter array by counting the elements. W9DPU took the 16 directors off his 48-element array and netted an improvement in performance. This bears out your conductor's experience with large phased arrays. More elements contribute only if they help to sharpen the pattern of an array. A large number of driven elements, with reflectors, will have a sharp pattern already, leaving very little to be done by adding a set of directors.

Warren reports 2-meter activity throughout Oklahoma, with W5s KGJ at Drumright, HXX, Watonga, HTZ, Cromwell, IOW, Ada, HLD, Oklahoma City, and CPM, Hobart, on almost daily, after 03:30 A.M. and 9 P.M.

Wilford, W1z. — Wondering what the reliable range on 144 Mc. would be from your location? You never know until you try — it may surprise you. For some time now W9PFE has been keeping regular schedules with W9TKL, Waitegan, Ill., some 200 miles to the southeast, and W9FHS, Climax, Minn., about 140 miles to the west. During June contact was made with W9TKL 21 days out of 28 trials. W9FHS or W9FHS were logged 22 days in the same period. These daily tests soon disclosed that other stations farther away were hearing W9PFE. W9ZIB was added to the daily schedule, when it was found that the two were hearing each other quite regularly, and this 240-mile path was covered 13 times in 21 trials. W9BFX, McLean, 380 miles, showed up when conditions were at peak.

For Vertical Areas Only

A rotatable antenna can be a nuisance, especially during a v.h.f. contest, when it is often necessary to swing a sharp beam around again and again, just to work stations within a radius of 25 miles or so. And, if the truth were known, about noticeable gain, as a result of lowered radiation angle, without introducing horizontal directivity. While there is nothing new in the idea, we feel that 2-meter operators in the vertical-polarization areas could make good use of the vertically-stacked system shown in the adjacent sketch. The dimensions are those used by W2GYY, Scheenstad, N. Y., who has been using this type of antenna for some time with good results. It will not match the performance of large phased arrays, of course, but it has its uses, particularly in v.h.f. contests, net operations, and general local operating. Freed of the need for rotating mechanisms, the average ham can put up such an antenna higher than he might place a rotary array, and height is often an important factor in extending the local range.

The system can be made and supported in a number of ways. W2GYY makes his solid enough so that it can be supported at the cold ends of the phases sections. These low-voltage points can be fastened to the supporting pole without insulation, and may be grounded for lightning protection. A triple stack can be fed at the middle of the center section with 500-ohm line without serious mismatch.

Somewhat similar arrangements in a 220 Mc. at W1CTW, Arlington, Mass. Call reports that installation of his stacked-dipoles system in a high outside spot resulted in good coverage in all directions as he had formerly had with an 8-element double Yagi indoor beam that had to be rotated for nearly every contact.

(Continued on page 100)
CONGRESS HIGHLIGHTS

A twenty-fifth anniversary Congress of the International Amateur Radio Union was held in Paris on May 18th-20th, under the sponsorship of the *Revue des Emetteurs Français*, with nearly 100 delegates representing some 15 member-societies. W. A. Scarr, G2WS, president of the R.S.G.B., was elected president of the Congress, following welcoming speeches by M. Georges Barba, F8LA, president of R.E.F., Prince Louis de Broglie, secretary of the *Académie des Sciences* and president of honor of the Congress, and Gen. Gilson, chief signal officer of the French army.

Agreeing that band planning as a principle should be accepted, the Administrative Committee, under the chairmanship of S. K. Lewer, G6LJ, made recommendations based on the R.S.G.B. plan which calls for subdividing the principal amateur bands as between 'phone and c.w. use. After considerable discussion, the committee rejected the A.R.R.L. suggestion, conveyed by letter, that representation at international conferences be at the national level, choosing instead to recommend that participation should be on an international basis through I.A.R.U. since many societies do not enjoy the close contact with their government regulatory agency that A.R.R.L. does. A proposal to move I.A.R.U. Headquarters to a European society was discussed at length and resulted in the committee recommending that A.R.R.L. be continued as the headquarters society but that a bureau should be established to represent the interests of members in Region I (Europe, Africa, part of U.S.S.R.); R.S.G.B. was invited to accept the responsibility for such a bureau. Member-societies, finding themselves agreed that the number of international amateur contests should be reduced, were requested to submit their plans for eliminating and combining contests to the Region I bureau so that a coordinated plan could be evolved and put into operation sometime in 1952.

Technical Committee meetings, under the chairmanship of Lt. Col. P. Revirieux, F8OL, discussed improvement in the use of the crowded amateur bands, reduction of interference to television and aural broadcasting, and collection and correlation of propagation data. Concerning voice operation, the committee recommended that audio equipment provide attenuation at 4000 cycles of at least 28 db, with reference to the response at 1000 cycles, and that there be no measurable energy radiated more than 10 kc. from the carrier center; maximum deviation for n.f.m. was recommended as 2.5 kc.

NEW ZEALAND

The 1950 VK/ZL International DX Contest sponsored by the N.Z.A.R.T. and the W.I.A. will be held in two sections: September 22nd-24th and October 6th-8th for c.w., Sept. 29th-Oct. 1st and Oct. 12th-15th for 'phone. Starting and ending times for all the dates are 1201 GCT and 1159 GCT, respectively. Open to any amateur station in the world, participants may use any assigned amateur band. Only one contact per band per week end with any one station is permitted and separate 'phone and c.w. logs must be submitted by stations entering both sections. Operators at multiple-operator stations must each submit separate logs.

Serial numbers must be exchanged and acknowledged. The serial number of 5 or 6 figures will be made up of the RS or RST reports plus three figures which may begin with any number between 001 and 100 for the first contact and which will increase in value one for each succeeding contact. Fifteen points will be scored for the first contact on a specific band with any VK/ZL district, fourteen points for the second contact with the same district, and so on to the fifteenth contact with that district which will score one point. Each successive contact with the same district will then score one additional point. This scoring procedure will be repeated on each band used.

Logs must show in this order: date, time in GCT, band, call of station contacted, number sent, number received, points. Separate logs must be submitted for each band. An analysis sheet by bands of districts contacted and points garnered plus the usual summary sheet and declaration of adherence to rules must be attached. Send logs to N.Z.A.R.T., Box 489, Wellington, N. Z., marking the envelope VK/ZL Test, so that they reach there no later than January 14, 1951.

FRANCE

In order to encourage communication with countries of the French Union, R.E.F. has established a new certificate, the DUF. The certificate will be composed of four parts, each based on a certain number of contacts with French Union countries in the different continents. QSL cards will be submitted to the member-society of the I.A.R.U.; these will be checked and the applicant's eligibility for the award certified to the R.E.F., which will thereupon issue the certificate. A.R.R.L. Headquarters will supply details on this new award upon request.
How:

The annual 28-Mc. DX boom season is close at hand. The kilocycles in this portion of the amateur spectrum take such a mauling during W/VE cooler months that perhaps it is for the best they are allowed to recuperate outside midyear.

Despite the possibility that the band will not be quite as hot as during previous seasons we expect to witness the completion of many DXCCs thereon. In this connection much mail begins to point out a thing or two for the attention of operators at DX locations who intend to give Old Ten another go.

As we all know, the 28-Mc. range is fairly extensive compared to our lower frequency assignments and the number of Wa active and listening for DX on the band reaches a mountainous peak. Indeed, so great is activity that even a short phone CQ or QRZ by a DX station is likely to be answered by dozens of plaintive calls from below 28,500 all the way up to and past 29,000 kilocycles when the DX operator fails to indicate his tuning procedure. The resultant din can and does knock out many otherwise perfectly solid QSOs.

Operators of DX stations who make a habit of specifying a limited range of frequencies to be immediately scanned by their receivers (“I shall tune approximately 28,650 kilocycles, etc.”) prevent such chaos. Many do use this technique and report effective results.

DX operators out for rare DX themselves and having no intention of tuning the U. S. ‘phone subband should state so. While such an announcement may nettle a few ulcers-Went boys, the majority will appreciate the courtesy of saving them wasted time and vocal energy.

And, say, Forty and Eighty are due to start stepping out again. As many foreign amateurs are restricted by regulation to the proximity of the lower band edges it would be kind of fellows not interested in working this DX to help out with an upward QSY when the bands are in an open mood. Your DX-happy brethren will thank you a meg.

What:

The roaming DX Spotlight, formed by many numbers of vartiety bees, seems to have centered upon St. Pierre Island during the past month or so. FP8AC (WOSAD) was supplanted by FP8AF (WB3VNY) according to K4AAA.

Those of us with this new country on our check-off lists certainly have an accolade in the direction of the pioneering and enterprising spirit of the gang who made it possible. K2ZTP is making a last effort for the juicy ones before returning to W6RQM and hasn’t really been talking to himself. FP8FGJ (14.00), FP8FSQ (14.055), FP8FYB (14.021), BQ4AG (14.039), CB4AF (14.025), CR6AQ (14.063), GD3FAC (14.032), DU1CB (14.057), DU1DO (14.055), HHSVE (14.007), HZ3AB (14.007), KC6GC (14.061), P28E (14.061), 5TT (14.007), 4K6 (14.055), 6NL (14.010), VP55B (14.040), VPYNU (14.116), V28 1A (14.060), IC (14.118), V6BBO (14.046), YG5I (14.004), YG6F (14.055), YG6J (14.001), YMA (14.019), 2FLE (14.060), UD6AE (14.110), and Z6MAK (14.050). This includes not only dipole plus a 75-A receiver, W9ABA, caught up with new ones AP2N (14.145), G4BFR on Sakhaline Island (14.260), VP4AO (14.100) and others while awaiting slow pace cards from CR8UP, HZ3KE, UQ3AB, and Z61PW. The new vertical at W6NN secured much nice DX in preliminary tryouts, with M3IM the main attraction. W8DAG is intrigued by the E91A (14.007) A. C. whom he persuaded to take time out from local European contacts. This would be No. 101 for ksus but we must bear in mind IFI’s remarks in “Itidahm.” Vks 1PG (14.060), 9MR (14.090), 9WL (14.125), VQ8 3K1F (14.075) H3BP, ZG6BP (14.120), Z61P (14.075), and FQ8AA (14.100) kept W6ZZU quite satisfied and Stan still pursues the elusive VQ4BW (14.105-120) of the Chagos. W6ZBY finds break-in operation a boon to DX operation if merely for the purposes of saving unnecessary calling with its attendant QRM. The ground-plane contraption helped Jack to PK6 4VD (14.100), 5CC (14.100), 5SR (14.080), C3WW (14.054), VP7NN, and KI4YQ (14.120). C4RNZ speaks of Macy and Fraz as YL operators of C9CI, V55AX, C3DD, DU1VVS, HP2RO, KB6AJ, and K6AF QSLs are awaited by W6GBP and Joe recently added VP1AA, YO1CAG (14.001), H4BBF, PK3JF and the unstable 8-meter of AC4BN. W2WL added FM7WF (14.040) after quite a battle and K00DI can’t figure out the XE2MK near 14.100 who gave him QTH as near Nanking plus a Japanese QSL address. W7AJ, whom you’ll remember was Rice’s former boss, W7CL, reports Art & conditions being the nuts. When not wound up in a.m. and TV work in the sunny state, Joe adds to his DX total of 132 countries with S7 confirmed. After straying to six meters for a time, W6FXN had a visit from W6ANN that hopped him up for another go at twenty. TA3FAS (14.075), W8BFE/ K76 (14.120), H1BC/Trieste (14.020), OA8A (14.085), VQ2AB (14.120), DU6TV (14.100) and an FFS were scored. W4OEL has been off the air for a few months butCQ dates the receiver on FB2ZZ (14.050), FT6AC (14.010), FT6AC (14.010),
OY3GO (14,020), MD7XP (14,012), CRAEE (14,004), KB6AM (14,192), VR2BT (14,058), FJ7YBY (14,059) and several PEs and Y6s. W50NL supplied KG6FBA, G3MBA, P5DQ, R60X, H3C2KD, and 815B6, all with Arkansas QSOs and W9BQE ran into ZE3JO (14,050-100) who is ex-G2SO. FQQV/QC continues to push a creditable signal through around 14,040 kc, and TA3AA holds his own on 14,030. As W2TXB we have some skethy numbers in SV7ST (14,020), M3SRM (14,060), U05KAA, and VK9MR. SV7ST represents Crete, by the way, and SV8WY vouches for his authenticity.

The latest Spitzenberg attraction, LA9JB (14,050 660), is receiving much attention at my listening post... The DXer of the No. Calif. DX Club adds the following as currently active: VR4AA (14,100), ZEE2A (14,110), F5KBAI (14,088), PE50V (14,115), and XU1NK (14,020). That last one sounded like old times, eh?

This same group indicates some elegant ‘phone items: HR1PA (14,260), VQ5RD (14,341), Z32s KN (14,318), SY (14,342), F8BMM (14,285), Y84MF (14,247), and CP39E (14,300). As usual, XE1AC singing plains of cream off the A3 milk supply. AI sweeter voices with PK4DA (14,105), PJ5RJ (14,357), PK7HR (14,186), EASA (14,305), EA9AI (14,314), S16V (14,317), SP5SB (14,121), VR2BJ (14,206), KJ6AJ (14,225), K6WAP (14,224), ZC6DIH (14,348), G5ZRS (14,189), HLIUS (14,284), FA3ZHI (14,234) and 3V8BB (14,308).

W2TXB’s voice successes include VR3C (14,168-380), ZE32A (14,305), U04R (14,175) and 5Q6PW while W1PSF’s lads JA6LZ and W1TDA sired two Jims... W6SQA captured VQ5CB (14,321) and adds TA3GVY, DX1DC, ZC6JM, HS168, VU2ZT, OE13AA, FO5AD, VR1C, K6MD, CN8EE, ZM6AA, PK1BR, and some FO8ESE, all mostly inhabiting the high end of 20.

An interesting note arrives from K4AAAA anent one easty. Among other Rare DX stations intending to give us a band this season is friend TA3FA and Dennis. Jim is all set for the QRM to lift so that he may be instrumental in completing W100-meter WACs. We won’t be beautifully surprised to see it done this season, either.

F8PAC enabled W4RR to check off his 81st eighty-meter country and Gexas is all set to collect the remaining 19 when OM QRM eases up. W2USBH was started when G927R (3506) came back to him in mid-July.

As for forty, W3DGM has been exploring the third layer to the tune of ZB2I, VQ8UW, and ZD4AB, all near the low edge... F-20. Conditions were obviously less than perfect, but W4XKL tells W6DLL he’s still passing out Kangaroo Island QSOs on 7035 kc. With his 6L6... W4MCM wasn’t behind the door when SW7WH (7059), VP5BF (7019), K9SC (7020), ZL2B (7019), and K9ADP (7018) were passed out. The 450A of W7MKM came to the attention of FO1SAI (7020), ZK1ZK mobile-marine in the Cooks, VR2AA, and U7RZ (7050) of the South Orkneys.

These notes were out from his WAB hunting and W7LFU swapped up K6JAJ, JA2DD (7015), JA2CT, UA8AF, L6AIEP, 7AZ, and the aforementioned HK4DP and ZK1AZ.

Ten had succumbed to the epidemic of short skip just prior to this writing, sounding more like 75 in the dead of winter. But W2ZVS managed to work CR4AC, QQ2R, EA4DA, ZE82KH, ZD4AH, and many South Americans during the snow sell. CR4AC hangs out on about 28,370. The DXer specifics PZ3RD (28,360) and PZ8RN (28,000) are outstanding. At that about winds up our kilo-cycle ride for this month.

Where:

Although the address of the headquarters of The Radio Society of East Africa has changed to P. O. Box 5081, Nairobi, Kenya Colony, the KSEA QSL Bureau remains as before, P. O. Box 1313 of the same city. The Asociacion de Radio-Amadores de Oriente announces a QSL bureau to handle cards bound for CM6G/S48 station at P. O. Box 698, Santiago de Chile... "The Local News" section of this QST, page 102, includes corrections and additions to the list of world QSL bureaus.

C3CL
P. O. Box 1, Taipei, Taiwan, China

CN8EEX
Navy 214, Box H, FPO, New York, N. Y.

CE3AA
APO 405, 5PM, New York, N. Y.

C4XCV
Box 37, Montevideo, Uruguay

DL6DQ
W. Kneschkam, Trier, River Mosel, Nagerstrasse 12, French Zone, Germany

EA4ADA
Box 220, Madrid, Spain

EA6EC
Juan L. Gomula, Ave. Antonio Maera 13,
Box 14, Palma Mallorca, Spain

FK8AI
Barrie, P. O. Post Office, Cayucos, French Guiana

ex-HH1KE
A. F. Janowitz, O, Wies Rd. No. 1,
Bedford, N. Y.

HP1FI
I. Ceilid Fidance, P. O. Box 721, Panama,
Republic of Panama

HP1TP/HP2
Box 2105, Cristobal, Canal Zone

HS1AS
vu Signal Corps, Bangkok, Thailand

HI2AU
(Via ARRL)

KG6C/X3O
Navy 824, FPO, San Francisco, Calif.

KZLAF
Box 448, 37th Reoan. Scdn, APO 937,
150% State, Wash.

MK6AA
Unit 82, Navy 824, FPO, San Francisco, Calif.

MD8DA
(Via RSGB)

MJ3IM
APO 405, 5PM, New York, N. Y.

ON4EE
E. Ellard, 73 Rue Elise, Brussels, Belgium

PK1BR
P. van de Riviere, 135 Dagoway, Bandoneo,
Java

PK4YD
Medusa, Sumatra

PK5GC
% conditions, Indonesian Airways, Band-
termas, South Borneo

PK5JT
% Garuda, Indonesian Airways, Band-
termas, South Borneo

PK5RU
21, British Consul, South Borneo

PK6LN
Box 70, Macassar, Celebes

PK6NL
Post Office, Biak Island, Netherlands, New
Guines

VP8UL
Box 148, Bridgerton, Barbados, B. W. I.

VQ2VR
40 Geddes St, Nkna, Northern Rhodesia

VR2BZ
J. B. Hogg, Lausale Bay, Fiji Islands

V8AG
J. J. Alvarez, 3 Minied Ave., Kowloon,
Hong Kong

YUIAGC
P. O. Box 189, Ljubljana, Jugoslavia

ZE2KY
W. O. Brett, RAF, Kuma, North Bula-
ways, Southern Rhodesia

ZK1AZ
Thor Quardendorf, Raraton, Cook Islands

ZM6AIK
Box 177, Aria, British Samoa

31AA
(to DLAND)

4X4AP
R. Biegen, 38 Jacotinsky St, Tel-Aviv,
Israel

4X4AE
A. Keshish, P. O. Box 4099, Tel-Aviv,
Israel

4X4AL
E. Livny, 1105 Ayakony St., Tel-Aviv, Israel

Our QTH sleuths this month include W4D ODW JCT, W6S C3X DFZ ZVS, W3JTC, W6s LVY NUI OEL, W6s FFW FXN ONL, W6s EAY ETJ GBP ZBY, W7s KSA LIF, MKW, W6s QC ZUZ, W6s ABA CFT IVN KOK NN, W8VI, KZ5IF, and the No. Calif. DX Club’s DXer.

September 1950

51
Tidbits:

KV4AA intrigues us with word that a group of PY fellers intend to operate some ham radio on Trinidad Island during September. This isn't the VP4 job; Brazil's Trinidad is roughly about 500 miles east of the mainland near the juncture of the 30°W and 20°S parallels, a rugged deal like Ascension or St. Helena. There will be a flurry of amateur activity in Spanish Guinea ere long according to XE1AC. This will most probably be of the A3 denomination so we had all better brush up on our Español. The whereabouts of former YK1VL and JA2AS is sought by W2QHI. Bowy recently added the Maritime Mobile (S0 QSLs) and W4A certificates to his wallpaper collection and notes that CSS now appears to be an additional A3 prefix. 4X4CI is interested in forming a worldwide QRP club and desires to hear from parties with allied ideas. Write Bob Avigor, 4 Nachicht-Benjamin St., Tel-Aviv, Israel, in this regard, and XE1A. We hope there is some, somewhere in the tale that, for some reason, PEs 4DA, 5HL, and 6CS have had their equipment confiscated and are thus QRT. W9ABA reports that W6WKU has returned to W9 after rolling up 175 countries out west. Bugs was glad to work the new legitimate VR1C after having been fooled by a phoney one during mid-49. HPR2B informs us that he is just now becoming familiar with c.w. and thanks all the DX crew for their patience and QSOs. W5GPE has heard that OX3BR is showing off for home and G2MI tells W2AOW that RAF ham activity in Iraq (YI) has been resumed. The power station on St. Pierre must be on the ropes by now. Bill Or, W6WVR, has been relieved at FP5BC by Lyn Ballard, W3BVN, signing FPAF8. Some day Joeva's cataclysmic prophecy may come true. He envisions a frightful day when all W/VHE guys get the same DX-exursion idea at the same time. W6 and others will be c.w. independent. At this writing we dunno, either. With 210 confirmed, W3JTC takes time out to give us some pitch on DLAND's first session in Monaco as 3A1A. Ford put in about six hours contact - hopes there is some which were not DXA, MYX, PE0, W3A GID, GRP, W4NNN, W6HGW, and W9XYO. W3JTC made the grade, himself, and says that Ford had intended to linger a week or longer in 3A1, cutting his stay short because of circumstances beyond his control. DLAND wonders why some stations don't indulge in Monaco operation inasmuch as the city of Nice is but a mere seven miles away. Despite rumors to the contrary, I1PL maintains there has been no legit DX (Yadnam State) operation since the war. Chris and 11HR tried vigorously to obtain permission for Vatican operation but after months of negotiating the results were negative. "I plan to rebuild my rig in 1950 style; the future XYL doesn't like these 'keysawers,'" writes I1PL. You women, are the same all over. W2ZXY of the Coast Guard is glad to see that his buddies made hay in getting VIR1C on the air. Johnny notes that KH6LX and W6XCV (now W28XV and W2AIG) were at Balboa Atoll in early 1948 but found the amateur radio possibilities fraught with red tape. W2ZXY has held the calls KH6LK, KH6KU, and W2JCT. Further re VIR1C, W2V1P notes that one of the operators hails from Sioux City, Iowa, and has been seeking 'phone or c.w. schedules with stations in that vicinity. W6DITY wonders if some of the 14-Mc. a.a. doings to which we have referred periodically are not due to TVC. Most of all, particularly poor design and/or construction can radiate wobbly rough harmonics from the horizontal oscillator circuits well up into the h.f. range. These may be identified as such by checking their spacing 115 to 120 cycles. We learn through Gerald R. Andrew, an associate of W1NLM, that the newly instituted Braille Technical Press for the blind will include an amateur DX column. We shall be proud to help distribute DX information free from this corner. W3DLI sends us a sample segment of the No. 40 antenna wire used by VK5XK of Kangaroo Island. The latter works WO on 80 with the stuff. Hams who are QRT because of neighborhood skywire prohibitions may be missing a boat on locating such invisible hair's braid here. W16YYU assures all contacts QSLs as soon as his log returns from Heard Island. Ron tells W9OKK that his last name is Oat and not Oats as widely published. W3BAC displays the lack of QSLs he has received through 15 June, 1950, by writing Alex at the address listed in the "Where" section. ZS6VMO, the station set up at the Voortrekker Monument unveiling on Monument Koppie last December, has had DX thru to Europe. Because of poor conditions prevailing at the time, just 30 of these were of a DX nature. The lucky stations have received QSLs of unique design and their own cards will remain permanently on exhibit at the museum. The "Asociacion de Radio-Accionados de Oriente" in Cuba has several familiar DX calls on their officers' roster: president CO8DF, vice-president CO8UV, secretary CO8BC, vice-secretary CO8DL. If you haven't heard, the "La Panama de Radio Aaccionados" will furnish a certificate of merit to anyone submitting proof (QSL) of contacts with 20 HP stations. Even though they're becoming more numerous this should be a tough one to crack. W9CIGN believes that a band of DXers has all been paid and he hopes to resume activity in the near future. DLAND hinted to W9AM that there may be another 3AIA session in store for us in early September. Made official by French authorities according to the No. Cali, DX Club's DXer are the following prefixes: French Antarctica and the Comoro Islands, F8S; Clipperon Island, FOS; Coriscas, FC. - U. S. "phone DX men will be interested to note that FOC stations have been forthcoming in instances where conditions were allowed to converse with noncitizens at DX points via ham radio. Anything new in regulations along this line may be kept up to date by regular listening to W1AW bulletin. Don't overlook the announcement of the coming VK/2L DX Contest on page 49 of this issue.

You may recall that shortly after W1DX's erudite yarn concerning a fictional ZD9AA appeared in a past QST a real ZD9AA put in his appearance on 14 Mc. Now Joeva stirs up all night in the dark of the moon turning the two-meter range for flying saucers.

J. Escalante, DU1VSS,
is one of the more active Manila amateurs on 10- and 20-meter 'phone and c.w.
16th ARRL DX Contest

**PART I: Final Results — C. W. Section**

How high can scores go in an ARRL DX Contest? That question comes to mind each year when we analyze entries in these periodic contests of DX operating skill. And each year we say to ourselves in answer, "This is it. We've reached the leveling-off point. It's impossible for scores to go any higher!" We've been wrong every time! Scores do reach new heights from contest to contest. All of which proves that impossible goals have just not appeared on the DX Contest horizon, at least not for the experienced DX operator who comes up annually with new score records or the neophyte who keeps improving his performances in an attempt to break into the top score brackets. It all adds up to the fact that these contests are great builders of operator-station performance. If DX is your meat, you'll continue taking part and become more skilled as time goes on; if you're new to DX operating, you just haven't been indoctrinated in the game until you've come through your baptism of fire in an ARRL DX Contest!

The c.w. portion of the 16th ARRL DX Competition conformed perfectly to the pattern just outlined. Its enthusiastic participants produced new score, contact and multiplier records. In addition, the contest was one in which sportsmanship and clean operating were outstanding. There were fewer disqualifications for out-of-band operation than last year; 45 contestants were tagged off frequency compared to 62 in 1949.

In accordance with a long-standing policy, competition for awards was confined to participants within each ARRL mainland section and in each country outside the W/VE/VO area from which qualifying entries were received. The total number of c.w. contest reports received was 1065 (770 W/VE/VO, 295 foreign). Awards are being given to 67 entrants in the W/VE/VO area and to 75 contestants outside the U. S. and Canada. The calls of all awards winners are listed in the accompanying score tabulations.

**Highlights**

In the U. S.-Canada area, W3LOE set a new score record with 434,073 points, to outclass the previous high of 309,450 points made in the 1949 contest. Bob also topped all previous W/VE/VO contest reports by making 563 QSOs and shared honors with W8BHS and W4KFC for being the first to go over the 500 mark.

The following tabulation lists the high scorer in each U. S. and Canadian licensing area:

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<tr>
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<td>W3LOE</td>
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<tr>
<td>WB3TC</td>
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Outside the U. S.-Canada area, the top scorers in each continental area were as follows: Asia — JA2C 159,432; Africa — EK1AO 242,304; Europe — GW3ZV 357,186; North America — XE1A 726,530; Oceania — KH6DJ 517,824; South America — CE3DZ 296,140.

Top contact totals outside W/VE/VO: KV4AA 2544, XE1A 2500, GW3ZV 2018, KH6DJ 1984, ON4QF 1673, ZL1BY 1615, ZL1MB 1599, KH6MG 1531, OK1FF 1498, CE3DZ 1474, E8I 1384, VK2EO 1384, FASHG 1296, HC1PK 1220, EK1AO 1149, FASHG 1097, ZK5PA 1071, ZZ5YF 1056, JA2C 1022, PA6EP 1021, KL7PB 1013, CE2DDY 1010, GWS 1006, ZS6CT 1006, PY2AJ 1005.

The highest multiplier reported from outside W/VE/VO was that of XE1A, 97, which sets a new record. Juan used all bands from 160 through 10 meters, and certainly did a noteworthy job of approaching a possible multiplier of 114 for operation on these bands. Other high multipliers: KV5AA 91, XE2N 91, KH6IJ 87, KH6MG 79, ZK5PA 77, HC1PK 74, EK1AO 71, VK2EO 71, PY2AJ 69, LAY7 68, CE3DZ 67, ZL1BY 67, KS4AC 64, KL7PB 62, CE2DY 61, KX6BA 61, VP6S 61, E8I 60, FASBG 60, OK1FF 60, ZL1MB 60.

**Disqualifications**

The following entrants are deemed ineligible for c.w. score listings or awards in the 1950 DX Competition. In each case the disqualification is for off-frequency operation as confirmed by a single FCC citation or advisory notice or two.
accredited ARRL Official Observer measurements: W18AQ E, GVK OCW RWS, W2s AW CGJ TVA, W3s GHS OCW WU, W4s IA OWE, W6s OYI M2K, WSQZV, W9s AEW DUY, W9YCR, VE1s EK IO NN ZS, VE2s NI OL, VE3s ABF HD, VE4XO, VE6MC, VE8MF, DL1OA, DL3CO, E4ACN, F3CX, F8EJ, G2AJ, G6CIN, HAIV, LA4P, OK2OL, PA9VB, PK400, SP5ZP, Y08RI.

**Sidelights**

Antennas, as always, were important in DX Contest operations. Here’s a list of those in use at W3LOE: 27 and 28 Mc. — three-element rotary; 14 Mc. — four-element rotary; 7 Mc. — double-section 8JK for Europe and Southeast Pacific plus two half waves in phase for South America; 3.5 Mc. — single-section 8JK for Europe and Pacific coverage. The W2s really go in for high-gain 28-Mc. antennas: W2AW, W2FBA, and W2VQM employed eight-element jobs on that band. If the Europeans looking for U.S. contacts on 7 Mc. missed working W2FBA, it wasn’t his fault; he used a four-element fixed array at all times! ... X0P1A undoubtedly holds the all-time record for QSOs-per-hour in any contest; in this he had 91 contacts from 11:08 to 12:07 A.M. CST, February 11th! Juan’s best minute netted five contacts at 11:17 A.M. the same day. ... The most elaborate homebrew receiver used in the contest was probably that of W3FYS — a 24-tube job. None of your manufactured receivers for W3LOE, either; he used a 15-tube double-conversion job and a 16-tube single-conversion superhet. W8DX, Michigan award winner, also believes in “rolling his own” receiver; the DX arrived at his shack via a composite, triple-conversion superhet with variable cut-off and low-pass audio filter. ... W6AM worked X1P1A on all six bands from 160 through to 10. ... GW3ZV, top European scorer, believes in having a few good antennas for the contest. His layout supported a three-element rotary and a Sterba catus for 28 Mc., a four-element rotary on 14 Mc., vee beams on 3.5 and 7 Mc., and a 900-foot-long receiving antenna! ... October QST will contain Part II of the 1950 DX Contest results: the phone scores, outcome of the club competition, and photographs of leading performers in both the c.w. and phone portions of the contest. — J. M.

**C.W. SCORES**

**Sixteenth International DX Competition**

Operator of the station first-listed in each section and country is winner for that area, unless otherwise indicated. ... Asterisks denote stations not entered in contest, reporting to assure credit for stations worked. ... The multiplier used by each station in determining score is given with the score — in the case of U.S. — Canada this is the total of the countries worked on each frequency band; in the case of non-W/VE/VO entries it is the total of the U.S. — Canada districts worked on each band. ... The number of contacts established is next listed. ... The letters A, B, and C approximate the input to the final stage at each station: A indicates power up to and including 100 watts; B indicates over 100 watts, up to and including 500 watts; C indicates over 500 watts. ... The total operating time to the nearest hour is given for each station and is the last figure following the score. ... Example of listings: W3BES 404, 124-294-513-C-86, or final score 404,127; multiplier 249; 543 contacts; power over 500 watts; total operating time 86 hours. ... Stations manned by more than one operator are given without listing single-operator station listings in each section or country tabulation; calls of participants at multistation operations are listed in parentheses.

**ATLANTIC DIVISION**

**E. Pennsylvania**

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**QST**
AMATEUR OPERATING

108 Sias Ave., Newport, Va.

Editor, QST:
After an experience last night, I appreciate much more than on first reading the article "Basic Operating Procedure" in July QST.

I had a message from New York City and as I couldn't make the local net I thought I'd try raising New York City on 80 meters. After about 15 minutes of calling CQ NYC and signing KX — with listening breaks — I was happy to hear a W2 calling me. Greetings and signal reports were exchanged, my RST being 589X. Then he asked if I said I had a message for N.Y.C., "the QRM bad here and not sure what you said." After a SSB report I replied I had a message. Then he said, "Sorry, GM, but can't handle your message as I have to get to bed." So back to CQ NYC with a W1, VE2, VE3, W8, and W9 calling. I was beginning to wonder if the GM shouldn't just call QC and sign KX. KX Finally a W2 called in. After establishing contact, his offer to help was accepted and my life and tax went to him.

I sure hope that more will read the article and apply it to their daily operating.

Bob Scott, W1RNA

COULD BE!

27 Wine St., Atlantic City, N. J.

Editor, QST:
"Fine Business" on the article in July QST by Goodman. I'm just wondering how many hams are writing in to know if the story about "The Loneliest Ham in the World" is true. I enjoyed the article, but anyone who would actually believe such a load of blarney must be nuts.

Oh, yes — by the way — is it actually true? If so, I'd appreciate some info on that antenna system!

Jim Caste, W6YSP

S.S.B.

Glen Cove, N. Y.

Editor, QST:
I have been on s.s.b. for about three months, and find that in that time I have realized more operating pleasure than at any time in my amateur career... I use a voice-control system of my own design that makes for wonderful two-way work with others similarly equipped.

In case some think that one must be an engineer to have the know-how to build and operate a s.s.b. rig, I should like to state that I am 17 years old and will be a senior at Glen Cove High School. My father is not a ham or an engineer. I became interested in s.s.b., built up a rig, and that is all there is to it. I guess the reason that most of the s.s.b. boys are engineers is that they realize fully the advantages of s.s.b. which the average ham does not.

— I. Dennis Shapiro, W6URX

FAIR PLAY

P.O. Box 3093, Rochester 14, N. Y.

Editor, QST:
Some operators who do not raise a particular DX station after two or three calls have the bad habit of breaking out with a long CQ right on the frequency. For those of us whose work is almost entirely DX, and who have learned to wait patiently for a chance, such a practice in DX is not good operating technique and, to say the least, is poor sportsmanship. As I see it, either the CQ'er hopes to raise the DX with the CQ or assumes a "t' heck with you" attitude. In many cases the length of the call and the mad pounding of the key reveals that attitude.

Why not play the game right? Conditions may be wrong for one but right for the others, so to those whose ears get red not because of prolonged listening, I say: If you can't take it, move out, blow, say, get lost somewhere!

— Chas. J. Otero, W2UPH

QSL BUREAUS

28-19 214th St., Bayside, L. I., N. Y.

Editor, QST:
I have just had a very interesting experience with one of our QSL bureaus. W28N, H. W. Yabnel, is the station of which I write, and his very efficient way of taking care of QSLs entrusted to him.

It was two years before I woke up to the fact that possibly some of my long-overdue cards might be there.

My contact with W28N resulted in eleven cards representing seven countries being forwarded to me. My amazement was furthered by noting the two-year-old dates.

Please pass along my sincere good wishes to ARRL QSL Bureau Manager W28N.

— H. Bryce White, W2YAN

[Errata Note: There is a QSL bureau in each of the W and VE call areas, all ready to send you any foreign QSL cards that may have come via the ARRL QSL Bureau system. All you have to do is send your district QSL manager a stamped, self-addressed envelope which is 4 1/2 by 9 1/4 inches in size. See page 32 of July QST. Please note that cards unclaimed for more than one year may have to be destroyed for lack of storage space.]

“FD” COVERS

64 Whitten St., Dorchester, Mass.

Editor, QST:
Who happened? I await my issue of QST for July with bated breath and near fainting spells each time the mailman rang. Then lo and behold it arrived. Boy, was I disappointed! What happened to W1CJD’s cover cartoon of the Podunk Valley Radio Club at the conclusion of Field Day? The suspense is killing me!

— Walter E. Szuminski, W1RTW

POLITICIANS WANTED

West Middletown, Ohio

Editor, QST:
As yet I have not been troubled with TVI but there are plenty who have. If the manufacturers would incorporate the right kind of filters in the receivers it would only increase the cost five or ten dollars per set and the public would buy just as many. Why should the amateur run over next door and install a filter in the lead-in of his neighbor’s TV set and stand the expense himself when it should have been taken care of when the set was built? Let auto ignition or something else knock the picture off the screen of his set and he merely readjusts the darn thing and says nothing, but let him suspect one of us amateurs is doing it and he is ready to kill us.

The amateur in general is a very intelligent person and deserves more credit than he has been getting, simply because the public doesn’t understand him. He usually is a harmless sort of a fellow who minds his own business and is in deep thought most of the time working out some kind of

(Continued on page 106)
Fall Activity Inviting. Whether you're interested in the National Traffic System and participation through your section net, or in DXCC, code-proficiency awards, contests, CD Parties, v.h.f., or your new mobile, the advent of the new season can be greeted with enthusiasm. ARRL offers the time-tested recognitions for your operating activity in the different lines of natural interest, and in addition, the customary major contests with their ability to increase individual pleasure and operating efficiency. With September we should be able to bid farewell to summer QRM and enjoy communications on all bands of amateur interest, working with better signal-noise ratios and crisp, clear signals for either casual QSOs or for the purposeful net operation that spells nationwide capabilities in handling communications.

It's too early to tell for sure whether this year's FD topped all previous records. A number of the reports were 10 to 20 per cent over those of the preceding year. This can be interpreted to forecast either improved FD organization and operating efficiency or an increase in the number of stations afield. Operating activity has its seasonal ups and downs and the emphasis changes to mobile and portable operations in summer. Here we are at the start of a new radio season — a clean page in the logbook on which to write new radio progress and accomplishments.

Suggestions for Bonus Credit for Mobile in FDs Requested. One of the greatest Field Days in ARRL history is now a memory. Along with the reports of successful results are some ideas for the '51 FD. There seems considerable point in having a bonus of some kind for club work with a club's own mobiles or other mobiles in the locality. Ten points might be added after multiplier, for contact with each mobile at distances over, say, 1/4 mile. Units could deploy as they might in actual emergency, might report by message to the Class A set-up of portables. All other FD work would be as usual. Chief significance is the idea, that any club testing with one or more Field Day mobiles of its group has a tested, operative nucleus for emergency communications. This would mean realistic preparedness, if and when we have more Vaunports, Texas Citys, and South Amboys!

Let us know if you support the principle of making this a more direct emergency exercise in the course of future FDs that keep all the regular factors, please. Such score component for the Class A club-portable entry would of course be limited to a fixed amount. Alternative suggestions and comment will be appreciated to add meaning to our '51 Field Day. This is to solicit any further ideas.

One Strong Facility. Geographically our potential in emergencies is that of the number of active licensees! Analysis of the Simulated Emergency Test results focuses attention on our local and regional capabilities for rendering emergency communications. Actually what we can do depends on individual operator-and-equipment readiness. Are you, as an individual, identified with organized emergency work? The ARRL Emergency Coordinator has the prime duty of centralizing amateur effort, serving on communications committees where invited by the Red Cross. He has the duty of familiarizing different agencies that will need communication with the channels to assure that necessary 'phone calls for assistance come his way. You as an individual operator have the chance to serve best, the opportunity to get your share of the jobs to be done (as there are messages to be placed), if you are lined up with him in advance. Our effective, dedicated to and practised by tests in handling communications, are not so numerous as to permit too many to assist particular agencies to the exclusion of everything else in an emergency.

We depend on operating as one strong facility; the priority for each assignment depends on the degree of public interest or necessity in it. So we urge; Join the ARRL Emergency Corps. Contact your Emergency Coordinator. Hold an AEC card, Full or Supporting group. Build on this principle of the one well-organized facility. Make it strong through your support and identity with it.
Got Your Mobile Unit Card? Several times this past season we have had occasion to emphasize the importance of mobiles in disaster service roles. Texas City, Vanport, and South Amboy pointed up the desirability of every ARRL Emergency Corps group having an adequate number of mobiles to deploy quickly to strategic points for any emergency communication need. Emergency coordinators are now authorized to issue any licensee of an amateur station who holds the regular currently-endorsed Emergency Corps registration-identification card a Mobile Unit card on tinted stock, provided he can demonstrate in operation a workable mobile unit to tie in with fixed-station amateur facilities.

Another assist for AEC members is available through emergency coordinators. Designed to be as versatile as the press card used by reporters, Emergency Radio Unit identification strips on white cardboard will be issued to use on appropriate amateur equipment, or on cars containing either portable or mobile emergency installations, during simulated tests or actual emergencies.

Any and every radio amateur who is active should become a Full or Supporting member by registering in the AEC. Upon registration ask your emergency coordinator for the Emergency Radio Unit identification or the Mobile Unit card if you have a real emergency-powered portable — or a mobile equipment in operation.

Net Data Requested of NCSs. As explained under Traffic Topics, net registration cards are going out to all nets registered last season, and every NCS of a 'phone or c.w. net, whether previously registered or not, is requested to send this form (or postcard or radiogram if you haven’t such a form) reporting data, frequency, and time of resuming (or new) fall net schedules. This is to assure a correct listing in the Net Directory now being compiled. This is all by way of providing League coordination and correlation of information to create and help maintain national integration of our provisions for traffic exchange.

September Frequency Measuring Test. Give each of the fall activities a whirl. Increase your skills. Aim to hold Code Proficiency and other League awards, and at least one appointment for operating activity. Try your hand in the September Frequency Measuring Test announced elsewhere in these columns. Don’t miss the fall (Sept. 2nd-3rd) V.H.F. Party. Follow the ARRL Activities Calendar each month and note the special announcements as they come up. Drop a line to the SCM about the CD appointment you’re qualified to hold.

Ray Woodward, W1YV, has been for many years an outstanding official observer and consistently a leader in the ARRL Frequency Measuring Tests. The rack at the left of the HQ-120, shown in this shot of his operating position, contains a continuously-running temperature-controlled secondary frequency standard, harmonic amplifier, and an interpolation oscillator that reads directly in cycles.

September 1950

ARRL ACTIVITIES CALENDAR

Sept. 9th: CP Qualifying Run — W60WP
Sept. 20th: CP Qualifying Run — WIAW, W7QD
Sept. 21st: Frequency Measuring Test
Sept. 23rd-24th: V.H.F. Contest
Oct. 8th: CP Qualifying Run — W60WP
Oct. 14th: Simulated Emergency Test
Oct. 17th: CP Qualifying Run — WIAW, W7QD
Oct. 21st-22nd: CD QSO Party (c.w.)
Oct. 28th-29th: CD QSO Party (cphone)
Nov. 4th: CP Qualifying Run — W60WP
Nov. 16th: CP Qualifying Run — WIAW, W7QD
Nov. 18th-19th, 25th-26th: Sweepstakes Contest
Dec. 2nd: CP Qualifying Run — W60WP
Dec. 18th: CP Qualifying Run — WIAW, W7QD

CODE-PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW/W7QD will be made on September 20th at 2100 EST. Identical texts will be sent simultaneously by automatic transmitters. Frequencies of transmission from W1AW will be 1857, 3555, 7215, 14,100, 28,060, 32,000 and 160,000 kHz. W7QD will transmit on 3554 kHz. The next qualifying run from W60WP only will be transmitted on September 9th at 2100 PST on 3590 and 7248 kHz.

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, 15 through 30 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, Monday through Friday, at 2130 EST. References to texts used on several of the transmissions are given below. These make it possible to check your copy.

Date Subject of Practice-Text from July QST
Sept. 6th: An Accessory for C.W. Reception, p. 11
Sept. 8th: All-Driver Arrays, p. 14
Sept. 9th: Qualifying Run, 2100 PST, from W60WP only
Sept. 12th: An All-Band Crystal-Controlled Receiver, p. 18
Sept. 14th: Basic Operating Procedure, p. 20
Sept. 18th: A New Country Code, O.C., p. 29
Sept. 20th: Qualifying Run, 2130 EST, W1AW, W7QD
Sept. 22nd: Technical Topics, p. 28
Sept. 25th: The Loneliest Ham in the World, p. 39
Sept. 29th: More Effective Speech Amplification, p. 50
TRAFFIC TOPICS

By the time you read this, many net managers whose nets were registered with us last year will be receiving new net registration cards for the 1950–51 season. We hope that you will return these cards promptly, or as soon as fall and winter net planning has crystallized. We have no way of covering nets not previously registered, or nets incompletely registered last year, except by requesting all traffic and emergency nets, especially those operating on 100, 80 and 40 meters, to register the details of their operation with us so that the information can be co-ordinated into our net directory card file for subsequent compilation of a cross-indexed net directory such as we had last year, and for complete up-to-date records of traffic and emergency net activity at this headquarters.

Whether or not your net has previously been registered, be sure that we have the latest dope on your net operation so that our records and the net directory will show the latest data. Here is the information we need, as provided for on our net-registration card: (1) name of net; (2) net designation (as used on air, so it can be identified when heard); (3) net frequency; (4) days of operation; (5) times of starting and ending net sessions (be sure to indicate the time zone); (6) direct coverage (i.e., by stations who actually report into the net regularly); (7) starting date (if not continuous); (8) call of net manager; (9) name and call of person submitting the information.

Only nets who register after September 1st will be included in the net directory. If your net is still on summer schedule at that time, you can either delay your registration until the net adopts a "permanent" winter schedule, or register according to your summer schedule and correct your registration when the winter schedule goes into effect. It is planned to produce one complete net directory, about the first or middle of December. QST listings, necessarily less complete than the mimeographed directory, are planned for November (1950), January, March and May, 1951, QSTs, and can be used to supplement and correct the mimeographed directory as required.

Those traffic nets participating in the National Traffic System will be interested to know that studies are in progress for the issuance of certificates to NTS members, including a new registration card: (1) name of net; (2) net designation (as used on air, so it can be identified when heard); (3) net frequency; (4) days of operation; (5) times of starting and ending net sessions (be sure to indicate the time zone); (6) direct coverage (i.e., by stations who actually report into the net regularly); (7) starting date (if not continuous); (8) call of net manager; (9) name and call of person submitting the information.

The following made the BPL for 100 or more operation plus deliveries:

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<th>Call</th>
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<th>Red.</th>
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<td>245</td>
<td>242</td>
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FREQUENCY-MEASURING TEST, SEPTEMBER 21ST

All amateurs are invited to try their hand at frequency measuring. W1AW will transmit signals for the purpose of frequency measurement starting at 9:30 p.m. EST (6:30 p.m. PST), Thursday, September 21st. The signals will consist of dashes interspersed with station identification. Those who will follow a general message sent to help listeners to locate the signals before the measurement transmission starts. The approximate frequencies used will be 3565, 7124 and 14,113 kc. About 4½ minutes will be allowed for measuring each frequency, with long dashes for measurement starting about 9:30 p.m. It is suggested that frequencies be measured in the order listed. Transmissions will be found within 5 or 10 kc. of the suggested frequencies.

At 12:30 A.M. EST, September 22nd (9:30 P.M. PST, September 21st), W1AW will transmit a second series of signals for the Frequency-Measuring Test. Approximate frequencies used will be 3565, 7174 and 14,144 kc.

Individual reports on results will be sent to all amateurs who take part and submit results. Copies of this report are sent SCM's also, so eligibility for QC appointments is known.

When the average accuracy reported shows error of less than 71.43 parts per million, or falls below limits of 71.43 and 33.7 parts per million, the participants will become eligible for appointment by SCM's as Class I or Class II observers, respectively.

This ARRL Frequency-Measuring Test will be used to aid qualification of ARRL members as Class I and Class II observers. Present observers not demonstrating the requisite average accuracy will be reclassified appropriately until they demonstrate the above-stated minimum required
accuracy for these classes of appointment. Class I and Class II OOs must participate in at least two Frequency-Measuring Tests each year to hold such appointments. SCMs (see address, page 6) are open for initial applications for Class III and IV observer posts, good receiving equipment for phone and c.w. bands being the main requirement. All observers must make use of the cooperative notice (mail) forms provided by ARRL, reporting activity monthly through SCMs, to warrant continued holding of official observer appointment.

QST To Report Results

Any amateur may submit frequency measurements on one or all frequencies listed above. No entry consisting of a single measurement will be considered eligible for the QST listing of the top results in this FMT; at least two readings and preferably more should be submitted to warrant QST mention. Order of listing will be based on the over-all average accuracy, as compared with readings submitted by an independent professional frequency-measuring organization.

MEET THE SCMs

Richard F. Czekiwitz, WIATO, recently elected as SCM of San Francisco, received his first call back in 1926. An enthusiastic participant in ARRL contests, he was 1949 c.w. winner for the San Francisco section in both the DX Contest and the Sweepstakes. He is a past-president of the San Francisco Radio Club, is currently vice-president of the Northern California DX Club, and also is a member of the Hi-Frequency & Mobile Society of San Francisco. SCM Czekiwitz holds DXCC, WAS, WAC, WBE, and BERTA certificates, postwar. At present he is working on a 'phone DXCC.

An entire room in his home is devoted to amateur radio. Equipment consists of a Collins 310-B3 exciter directly driving p.p. 4-250As to a lw input on all bands. The transmitter is completely shielded, uses Faraday screening of output and vacuum-condenser by-passing to eliminate harmonics. All circuits are fully metered, including separate screen meters. Receivers are a Collins 76A-1 and an SX-28. Antennas are a 14-Mc. three-element and 28-Mc. three-element rotary on the same boom, a dipole on 7 Mc., and a short-end-fed wire on 3.5 Mc., loaded by a BC-610 automatic-tuning unit. While W6ATO gets out well on 3.5, 7, 14, 27, and 28 Mc., the most-used band is 14 Mc.

Although a nonparticipant in sports now, he formerly played basketball and soccer and was a sprinter, as well as playing the quarterback position on various small football teams.

SCM Czekiwitz is employed by the Western Pacific Railroad as chief clerk in the Telegraph Department.

WIAW OPERATING SCHEDULE

(Effective Sept. 1, 1950)

(All Times Given are Eastern Standard Time)

WIAW will change to its fall-winter operating schedule on September 1st, superseding the summer plan and previous announcements. Mimeographed master schedules showing complete WIAW operation in EST, CST, MST, FST or GCT will be sent to anyone upon request.

Operating-Visiting hours:

Monday through Friday: 1500-0300 (following day)
Saturday: 1900-0230
Sunday: 1430-2200

WIAW will be closed from 2300 September 3rd to 1500 September 5th in observance of the Labor Day holiday.

General Operation: Use the chart below for determining times during which WIAW engages in general operation on various frequencies, "phone or c.w. Note that since the schedule is organized in EST, certain morning operating periods may fall in the evening of the previous day in western time zones. WIAW will participate in all official ARRL operating activities to the extent feasible, utilizing Friday general-operating periods for this as well as scheduled Sat.-Sun. time as practicable.

Official ARRL Bulletin Schedule: Bulletins containing latest information on matters of general amateur interest are transmitted on regular schedules:

Frequencies:

C.W. — 1887, 3555, 7215, 14,100, 28,000, 52,000, 146,000 kc.

"Phone — 1887, 3590, 14,280, 29,000, 52,000, 146,000 kc.

Times:

Sunday through Friday, 2000 by c.w., 2100 by "phone.
Monday through Saturday, 2330 by "phone, 2400 by c.w.

Code-Proficiency Program: Practice transmissions are made on the above-listed c.w. frequencies, starting at 2130, Monday through Friday. Speeds are 9, 12, 18, 25 and 35 w.p.m. on Monday, Wednesday, and Friday, and 12, 20, 25, 30 and 35 w.p.m. on Monday and Thursday. Approximately ten minutes of practice is given at each speed. Next certificate qualifying run from WIAW and WFTQD is scheduled for Sept. 20th; from W6OWF, Sept. 9th.

WIAW GENERAL-CONTACT SCHEDULE

(Effective September 1, 1950)

WIAW welcomes contacts from any amateur station. Starting September 1st, WIAW will listen for calls in accordance with the following time-frequency chart.

<table>
<thead>
<tr>
<th>Time</th>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
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<tr>
<td>0200-0300</td>
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<td>29 Mc. **</td>
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<td>1857</td>
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</tr>
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</table>

* Starting time is approximate. General-contact period on stated frequency begins immediately following transmission of Official Bulletin which begins on the hour.
** Operation will usually be conducted on 29,000-ke. "phone, but 28,000-ke. c.w. will be used occasionally.
For many years the ARRL Emergency Corps has been dedicated to service to the public and to the nation in time of emergency. This purpose has been well carried out, and we have a long and proud history to show for our accomplishments. The emergency-mindedness of the amateur has increased, and with it the public consciousness of our existence and availability, so that civic, state and federal relief agencies and organizations are now working with us in their emergency communication facilities.

Thus it is that now, with a new and much more serious kind of emergency facing us, many local civilian defense agencies are turning to their amateur contingents, among others, to plan for the ultimate; and said amateur contingents are anxious to assist this war to the greatest extent possible. In the event of enemy attack or war, what frequencies will be available for use of the ARRL Emergency Corps to assist in providing supplementary or parallel civilian defense communication facilities?

We cannot answer that question, fellows — not at this writing, anyway. In time of war, the military is responsible for national security. We can bank on it that casual amateur communications will be silenced, but to what extent amateurs will be reactivated to work into civilian defense plans is still to be worked out. Studies on all such matters are being made in Washington, and your League is maintaining constant contact with officials concerned with communications. The ultimate shape and size of the communications plan, and the extent to which amateurs, as amateurs or as participants of another service, will be utilized, cannot be predicted with certainty.

Meanwhile, this is no time to let our AEC organizations slide downhill. Admittedly, it is impossible to make definite plans locally until definite plans are made nationally — that is, as far as equipment is concerned. But there is still plenty of room for good local reorganization, planned emergency drills, etc., now more than ever before with emphasis on efficiency and discipline. Emergency communication has always been a serious business, but now it becomes infinitely more serious and difficult, and all amateurs who guard these frequencies are vitally necessary personnel, a thinking personnel, which will be utilized.

Got your "Official Mobile Unit" card? If you are the owner of a mobile rig and are registered with your local EC, you are eligible for a tinted card (similar to the regular AEC membership card) bearing the designation "Official Mobile Unit." You are also eligible for a placard bearing the inscription "EMERGENCY RADIO UNIT" in large black letters, for display on your mobile unit or inside your vehicle. The latter is also available to amateurs registered with the AEC who have built composite units for use in emergency work, at the discretion of the EC.

Your EC is authorized to issue this material to deserving members of his local organization, in addition to the regular AEC membership card. The "Official Mobile Unit" card must be endorsed once each year to preserve its validity. See your EC for details.

Last year during Field Day, many West Virginia amateurs who were preparing to participate found themselves involved in the real thing — a flash flood in Petersburg. This year, believe it or not, the same thing happened. The exact locale changed slightly, but aside from that we could almost rerun last year's write-up of the affair.

An unprecedented deluge began about 8:30 P.M. on Saturday, June 24th, and continued on through the night. The waters of tiny Middle Island Creek and the Monongahela River and countless other small streams plumbed outside their banks, sweeping all before them. Hardest hit were the towns of Smithfield, Cairo, Weston, West Union, and Beren. At least seventeen people were counted dead after the first day.

W4NEG, who is a staff writer for a Charleston, W. Va., paper got in touch with W8FQQ, who contacted Bill Dixon of the Kanawha Valley Amateur Radio Association, and the entire amateur contingent in Charleston and surrounding areas including the Charleston Amateur Radio Club was alerted for emergency duty. W5AUI was active in hard-hit Weston and was able to portray the extent of the damage by radio. Brig. Gen. Charles R. Fox, adjutant general of West Virginia, sent relief as a result of messages relayed by radio. W8KWI of Charleston moved his mobile unit into the West Union area and the Mountaineer Amateur Radio Club of Fairmount had set up in the Smithfield area and handled the news part of the emergency traffic that could not be handled by regular communication lines.

Brig. Gen. Fox, in a statement to the Charleston Gazette, said, "The work of the amateur radio operators was magnificent in this disaster. Relieving much of the overloaded communication system, they performed a great service to the state." Unusually favorable publicity was also received. Among the other operators who participated were W5BTY, W5BFWI, W5CNF, and W5GBF. Thanks to W4NEG for the report.

AEC members in Muskingum County, Ohio, were given a chance to show their stuff in early June when a deluge struck the vicinity of Rossieville and caused severe communication and power outages. W5OVE, the local AEC, was called at about 1:15 A.M., Saturday, June 10th, by a friend who asked if the water at Rossieville was up to his parents' house yet. This was DIVH's first intimation of trouble. He immediately called the local AEC, and in a few minutes they had decided which disaster plan to use. They picked up W8AZR, and from his mobile unit alerted W8INS to man the control station in Zanesville while they took off for Rossieville. They had not yet reached Zanesville when a general power failure occurred in Zanesville and the control station went off the air for a short time until emergency power could be hooked up. Arriving in Rossieville, they made contact with W5BYV, another mobile operator on his way down, and had him watch for traffic. They then flew back to Zanesville, about 7:00 A.M., W5OTM was able to get his mobile into Crooksville, about three miles further south, after having had to use various routes to get into town.

The execution of the prepared disaster plan resulted in 78 messages being handled for the Red Cross, the Ohio Fuel Co., The Ohio Bell Telephone Co., the Ohio Power Co., and a few others with priority traffic. The Zanesville Red Cross was so impressed that they wrote a letter to FCC in appreciation of the ham's fine work. The Muskingum County AEC was ready to do a job and they did it.

On the evening of July 8th, 10"4 inches of rain fell in parts of southeastern Nebraska. The result was that York and Beaver Crossings were particularly affected. Shortly after midnight Sunday morning (July 9th), W5EU, Nebraska SEC, was called by the local radio station and asked if he could get in touch with York, Nebraska. At the time when most people are in bed, EUT expressed some doubt of his ability to do so, but nevertheless went on the air to try. Several general calls to the Nebraska gang were fruitless, although W5FCY in Kansas City and W5DDE of Denver offered assistance, the latter indicating that he could perhaps make contact via the police system. Meanwhile, EUT received a call from the York newspaper indicating that the lines from York to Omaha were still intact but that York was isolated from surrounding areas. W5EUR, who helped to set up the net, was advised to call W5RWW at Giltner, who had a mobile rig. EUT then called W5OZO at Dwight, but got no answer. He then called W5LEF at Brainard, who agreed to go to York immediately and set up a transmitter.

By 4:00 A.M., things started rolling. W5FCY broke in on the Nebraska net frequency (3983) to tell W5EU that W5RWW was calling him. RWW was near York and worked several instructions. He was instructed to proceed to the fire barn and assist W5RWW as soon as the latter arrived; this location, although taking some water, had been chosen as headquarters by the city. W5BHU at Denver relayed traffic through W5EU. W5RWW was requested to get on the air and stand by. W5BHU/mobile broke in and said he would call in when he got home.
About 5:00 a.m., W8LEF/B came on the air with W8RWV at the microphone, who said that W8LEF/B simulated was at the airport installing a transmitter in a plane. A transmitter was also being installed in a National Guard "duck," W8EJX came on the air and got the Lincoln gang coordinated, and there were quite a few of them active by that time. W8AOF volunteered to fly equipment to the scene, if needed. W8/DJ, HQQ and EDI were all standing by awaiting instructions. W8/DJE was dispatched to Cresent to assist W8FJA who was operating from his home. W8FJA was dispatched to Riga, where he was able to relay information and reports to the fire station, W8LEF/B, W8/J, and W8/JJ went to Milford and thence to Beaver Crossing to assist W8/HQ. W8AOF was soon heard on the air. In the good reporting back to HQ, W8/J acted as part-time control station for the Nebraska net, and handled some inquiry traffic to and from York.

It was a wonderful display of cooperation and every one of the gang did an excellent job. Losing sleep, taking the risk of being bogged down in snow-covered, everyday nevertheless stuck to the job until there was no further need for their services. Other amateurs assisting were W8/GYM, QOU, BIA, BS, EDI, LTE, YUP.

W8/RUT, P.A.M. Neb.

Smart little Sam was quite a ham;
He had a kilowatt to work every band.
Smug and complacent, he thought he was "it,"
Until the time that the big storm hit,
And all the town's victims of TVI

Thought "Now is the time he can help you and I."
But sad to relate, at this critical hour,
Sam did not have emergency power.
They said, "Sorry we bothered you,
We better go call on lo-power Stew."

With satisfaction as his only pay,
Stew through to save the day.

Said he, in answer to the flattery,
"I did it all with my little old battery."
So they erected a statue on City Hall Tower.
To good old Stew and his emergency power.
W8/JQ in "Hamateur News"

On February 8th, VPSB/R on South Calais Island was heard attempting at a W4 with the notator that the SS Marland was on fire at South Calais and needed assistance. W2QHH heard the call on 14-Mc. e.w. and, since VPSBR was apparently not getting any answers, informed KP4QG of the message. KP4QG then called the Coast Guard to get some action started toward relief. Meanwhile, W2QHH remained on the air to maintain contact with VPSBR, who seemed to be slipping over nearer points. Later on, conditions changed so that VPSBR and KP4QG were able to communicate directly, and W4JQ, W4OPG and KP4QG also came on to assist in relaying information where needed. The owner of the vessel was notified and he arranged to dispatch a plane to the crew of the boat, who were stranded. This information was passed from W4JQ to W4OPG to VPSBR.

Canadian and American amateurs assisted in maintaining communications during a raging fire which swept the mill town of Colebrook, Quebec. V62TC, operating unable just outside Cabano, and VE2VR, activated a network which stretched from 90 miles east of Montreal to Presque Isle, Maine, and was instrumental in acquiring the aid of the Red Cross and the Army. Hrivicevul Launch was represented by VE2/AC, Charlesbourg by VE2/ZZL, Rimouski by VE2/F1 and Yarmicholle by VE2/XX. W1CNH was on deck in Presque Isle. All handled important official and personal-inquiry messages. When power failed in Cabano, W1CNH offered his good offices to get some power through from Presque Isle. This offer was accepted and within a short time several of the towns and villages surrounding Cabano had power, as well as a portion of Cabano itself. They are all trying to figure out how he did it.

On the rear cover of the booklet "Emergency Communications" there is a box which contains some basic rules on what to do before, during and after emergencies. We are glad to be able to say that the AEC in recent months has made great strides in observing the "before" and "during" axioms, but not so well on the "after" part of it, whether out of modesty or laziness we don't know. We submit that the matter of reporting your work, either to your EC, SEC, or SCM for consolidation, or direct to Headquarters is second in importance as the doing of the job itself. Even if you think that what you did is "nothing," let the person consolidating the report be the judge of that, and remember that although a report of your activities in an emergency may reflect embarrassing credit on modest little you, it will also reflect credit on the public-service record of amateur radio. Report your emergency work!

**DX CENTURY CLUB AWARDS**

**HONOR ROLL**

| W1PH | 215 | W2BNA | 224 | W3YXO | 217 |
| W6FVR | 235 | W8RES | 233 | W8MEK | 216 |
| G2FL | 225 | W8FWB | 223 | W8KOR | 216 |
| W8HGW | 225 | W8JNY | 221 |

**RADIOELECTROPHONE**

| W1FH | 194 | W8GREN | 174 | W1JX | 168 |
| W8RLG | 184 | W8SGW | 168 | W8BHI | 168 |
| W8/DL | 121 | W8EL | 171 | W8FC | 167 |
| W8/2A | 169 |

From June 15 to July 15, 1950, DXCC certificates and endorsements based on point counts with 100 or more countries have been issued to the amateurs listed below.

**NEW MEMBERS**

| L57GCD | 144 | W8B6Y | 104 | W2TNA | 101 |
| W8SIX | 114 | W8C6D | 104 | O2IW | 101 |
| W8SRX | 110 | GCGJ | 103 | W8JJU | 100 |
| W8GVX | 110 | MDSKX | 103 | W8SWSL | 100 |
| G8EY | 106 | W8PQX | 102 | W8YJE | 100 |
| W8ACE | 107 | G8FTP | 102 | G8BNE | 100 |
| G8CBA | 106 | W8NNH | 102 | W8HJU | 100 |
| W8DST | 106 | W8K3YC | 102 | W8JIK | 100 |
| W8/2G | 106 | H1Z | 102 | W8JBD | 100 |
| OM4AJD | 105 | G8HJX | 102 | W8E70 | 100 |
| W8/DCM | 105 | W8PNT | 102 |

**RADIOELECTROPHONE**

| V12AC | 111 | W8IJN | 105 | W8BQP | 101 |
| Z031O | 107 | W8ASQ | 103 | CTINT | 100 |
| W8UX | 105 | W8CQD | 103 | W8JRY | 100 |
| G8TA | 104 | H8AHU | 102 | W8KDL | 100 |
| W8SWL | 102 |

**ENDORSEMENTS**

| PY1AJ | 201 | W8SEP | 170 | CSDD | 135 |
| W8/2AL | 200 | W8USA | 170 | LAGU | 133 |
| W8CNQ | 189 | W8XJ | 170 | W4XY | 132 |
| W8NYN | 165 | W8CLX | 162 | SMGW | 132 |
| W8STG | 152 | W8BDR | 161 | W6AT0 | 130 |
| W8UQO | 155 | W8DMD | 160 | W8VDH | 130 |
| C6AG | 152 | W8JLY | 162 | SM4A | 130 |
| V8EGG | 150 | KY4AA | 152 | W8PVW | 127 |
| W8PNQ | 150 | W8CIB | 150 | W8IDT | 127 |
| W8EFP | 150 | G8BW | 147 | W6DE | 126 |
| W8PNX | 150 | W8ALX | 142 | V8EAG | 125 |
| W8WVN | 149 | W8CEX | 149 | W8AWJ | 122 |
| W8CYC | 147 | W8DET | 140 | W8EAY | 122 |
| H6FS | 140 | JAST | 140 | W9DUD | 120 |
| G6K | 138 | PASEF | 140 | W8NLM | 113 |
| G8R | 140 | K8HCD | 140 | W8HO | 112 |
| W8WZ | 140 | W8CEW | 140 | W8JIV | 111 |
| PG4DK | 140 | W8ADF | 140 | W8QQY | 110 |
| W8/2G | 140 | W8GBW | 140 | W8TNT | 110 |
| W8/2M | 157 | W8EV | 157 | W8KJO | 110 |

**RADIOELECTROPHONE**

| W1MCW | 140 | W8MKR | 130 | W9JW | 114 |
| H8BDS | 155 | W8SBS | 130 | W8CZB | 111 |
| Z6NY | 165 | W8XN | 130 | W8HJX | 111 |
| G8HR | 150 | W8BQ | 130 | W8D3K | 110 |
| HC2JR | 141 | HC2OT | 130 | W8ZZS | 110 |
| GBAY | 138 | G8K | 120 |

September 1980

63
**Station Activities**

![Image of station activities]

- All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

### ATLANTIC DIVISION

**EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES** — The section is mourning the passing of one of our most active hams, 3BQ, ex-8BQ, former SCM and Atlantic Amateur Club President. For DX and scores of other ham radio activities, 3BQ was always there to help out. He was a member of the Atlantic Amateur Club and was active in many other ham radio activities, including DX contests. He will be missed by all who knew him.

**MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Eppa W. Darne, WB3NT** — The Baltimore Amateur Radio Communications Society, Mobile Corps, is planning to meet this month to discuss the upcoming DX contests and the modular station setup. The group will also discuss the possibility of a modular station setup for the upcoming DX contests. The meeting will be held at the Baltimore Amateur Radio Clubhouse, 9636 York Road, on Saturday, September 18, at 2:00 PM. All interested amateurs are invited to attend.

**WASP**

**SOUTHERN NEW JERSEY — SCM, Dr. Luther M. Maxwell, W3ZJ** — The SCM is pleased to announce that the new station K3NY has been active on 20 and 21 meters with some good results. K3NY is located in the southern part of the state and is operating on DX and contest bands. The station is using a 100-watt transmitter and a 5000-watt linear amplifier. The SCM is looking forward to hearing reports from K3NY on their future activities.

**WEST VIRGINIA AND OHIO — SCM, Martin A. Clark, W7QGP — SEC SJV, Net Manager:** — The SCM is pleased to announce that the new station K7WY has been active on 20 and 21 meters with some good results. K7WY is located in the southern part of the state and is operating on DX and contest bands. The station is using a 100-watt transmitter and a 5000-watt linear amplifier. The SCM is looking forward to hearing reports from K7WY on their future activities.

**NEW YORK — SCM, Harold A. Clark, W7QGP — SEC SJV, Net Manager:** — The SCM is pleased to announce that the new station K2NY has been active on 20 and 21 meters with some good results. K2NY is located in the southern part of the state and is operating on DX and contest bands. The station is using a 100-watt transmitter and a 5000-watt linear amplifier. The SCM is looking forward to hearing reports from K2NY on their future activities.

**NEW ENGLAND — SCM, Robert W. Hink, W1KRS** — The SCM is pleased to announce that the new station K1RW has been active on 20 and 21 meters with some good results. K1RW is located in the southern part of the state and is operating on DX and contest bands. The station is using a 100-watt transmitter and a 5000-watt linear amplifier. The SCM is looking forward to hearing reports from K1RW on their future activities.

**ILLINOIS — SCM, Lloyd B. Hopkins, W9EBY** — Activities have been hard hit by vacations and numerous summer interests, so this report will be short compared to the usual one. The SCM is pleased to announce that the new station W9EBY has been active on 20 and 21 meters with some good results. W9EBY is located in the southern part of the state and is operating on DX and contest bands. The station is using a 100-watt transmitter and a 5000-watt linear amplifier. The SCM is looking forward to hearing reports from W9EBY on their future activities.
IT IS INTERESTING to note the increasing interest lately in the use of noise limiters for C. W. use. Of course, the value of these simple little devices for phone operation has been well established for some time. The usefulness of such a device was brought home quite forcibly to the writer while operating 80 meter C. W. (believe it or not!) at W1WB/'1 during the recent field day. The transmitter was a surplus job that left the receiver running while the transmitter was keyed. The head-phones clamped over our ears with huge rubber earlaps that must have been designed for ears much larger. Every time the key was operated, a terrific clatter rattled through our head like a rivet hammer in the subway. We tried removing the phones during transmission but with one hand holding the key on a knee and the other hand operating it, there was too much delay getting rid of the key and getting hold of the phones again. And you know how much time a C. W. man will allow you for such things during Field Day operation! In this instance, a noise limiter would have been worth while just to save wear and tear on the ear drums.

While a single-ended noise limiter with a fixed adjustment is satisfactory for phone operation, it is far from adequate for good noise-limiting with C. W. signals. At National, we recognized this fact years ago and that is the reason that the noise limiter used in the HRO-7 and HRO-50 has for many years been of the double-ended type with an adjustable rather than a fixed threshold.

Phone limiters usually are adjusted to clip the positive modulation swing at about forty per cent with one diode. Further, this adjustment can be made automatic so that this clipping level can be maintained as the signal strength varies. A second diode is not needed to limit the negative modulation swing as this is taken care of by the detector diode itself.

When receiving C. W. signals, conditions are considerably different. The operating level is now usually set not by the signal but by the strength of the injected BFO carrier! If a signal is being received that is many times weaker than the BFO injection, noise peaks can now go to several hundred per cent of the signal voltage in both positive and negative directions. The limiter which worked so well on phone is now almost useless. It is now necessary to clip both sides of the audio signal delivered from the second detector and to adjust the clipping level to match the amount of audio recovered. Only then can good C. W. limiting be obtained. The above is just what the HRO limiter was designed to do years ago. It also helps to keep key clicks from wrecking your ear drums and can be used as a C. W. AVC as mentioned in a recent OST article. If you C. W. men have not been using your limiter for these purposes, you haven't been getting the most out of your HRO.

Cal Hadlock, W1CTW
FARADAY SHIELDED LINKS

...for reducing TV and BC interference

Barker and Williamson offers amateurs an effective method of reducing harmonic or spurious signal radiations, normally transferred by capacity coupling, that are always present with a conventional open wire link.

These shielded links are adaptable to all conventional link-coupled circuits and with external antenna tuning units or, in conjunction with harmonic reduction filters of either the low-pass or band-pass type. Available for B&W HDVL, TVL, TVH and BVL Series.

For sizes available, write for descriptive sheet No. 605 to Dept. Q-90.

BARKER & WILLIAMSON, INC.
237 FAIRFIELD AVE., UPPER DARBY, PA.
Model 114-302 Two Bay Stacked Array for maximum distance. Also available are antennas for all TV requirements — Single Boys, Piggy-Backs and indoor antennas.

TV and FM ANTENNAS

All Amphenol antennas are engineered and perfected in our Development Laboratories. They will provide unsurpassed reception of FM and TV signals and assure long, trouble-free service.

TWIN-LEAD TRANSMISSION LINES


COAXIAL CABLES

Amphenol Coaxial "RG" cables are produced to standards that surpass Army-Navy specifications. Charts showing characteristics and dimensions are available upon request.

RADIO SOCKETS AND CONNECTORS

AN CONNECTORS

RF CONNECTORS

Catalogs of Amphenol products will be mailed upon request. Be sure your name is on the mailing list to receive our monthly magazine, The Amphenol Engineering News.

Met, Sacramento, AUQ; Walnut Grove, AY2; Dunsmuir, JDN; Paradise (U.S. Air), HBB; Rossville, GHP, RM; PV: OBS; AF, BYT, PAM; ZTV, OES; PV: GHEL, Oos; ZTV, YNM, BYT, GDO, VM, ODN; Nets: St. Rose, Emergency (early), AHO NGB; SWE Traffic, 29.4 MC, 29.4 MC, NCS, GDE ANCS. Mother Lode, WSI, NCS. Northern Area: Mt. Shasta Amateur Radio Club, K2F. At Lake Creek, using call NEM 6. OYJ is at Yreka. 73QQ visual Dunsmuir gang and showed his 28-Mc. mobile, CPT, IEO, HTS, and Dunsmuir Club worked 38 and 38.5 Mc. on the HPL, moved to new QTH to accommodate this new element 28-Mc. beam. GOO is at Alturas, OMR, HBF, PFI. IK2. 1IQ, MFD, and YNM assisted. Mt. Shasta AM, K2F. OMR reports plans rolling on hamfest at Mt. Shasta over Labor Day week end, Central Area: GERC held its first annual outdoor meeting June 18th at TSR's. 245 participated in F.D., at Colusa. Two new hams are BSN on Oroville on 7 Mc, 28-Mc. mobile, 100 phone and ZLZ on 7 Mc. at Chico. WCW is on 144 Mc, at Arlebuck, NQS has 818s in controlled-carrier modem modulation with 500 peak watts. HVA and JNNL are now SWS members. TKE is president of GERC. HML is promoting new ham inducted by President of Blind Association in Sacramento. Contact CKY for date of Calico Hamfest. Southern Area: EXP is at Alhambra Pt. earning his 28-Mc. SVS logs on 900 bands up to and now on 420. ASE is new president of Placer Radio Club; GHP, vec-pres.; Roland Amick, secy. P.R.C. meets first and third Fridays each month. PVH, the O, and GOO are now Class A. SUP had open house for visitor 7NNQ; GHG, QXG, UNT, ZFD, ASE attended. NBW moved to Chico, Placer Radio Club held picnic at Woodside Park, Rossville, in July. SARC held big F.D. at Penryn with 21 operators and calls N/5. WR drove from Portland to make SARC F.D. PVH hit 120 Mc. for SARC F.D. Sacramento Signal Depot gang, under SIG/6, held F.D. at Pine Mountain Lookout. QSO is chairman of 1950 California Fair Amateur Radio Committee. HIX is on 144 Mc. Trailer: WOZF 25.

SAN JOAQUIN VALLEY — SCM, E. Howard Hale, W6FYM — ECQ: AHE, CQI, GJQ, and HIF, OBS; GRO, E111, and OHTY, OES: PQS, OQ; GRO, OBS, GRO and GOE, HFP, ZFD. and ZK, father, daughter, and wife handled engine-to-home communication for Fresno Boy Scouts during the summer season. MGN ordered vitally-needed medicine for the NYT, through F.P.L., who then same via stage to Huntington Lake after receiving prescription number, name of druggist, etc. NSR has new rig with new 28-Mc. final. EQQ makes the station in 5 Mc. on 144 Mc. GJO and HIF are new ECQs for San Joaquin County and City of Stockton, respectively. Bakersfield, Fresno, Turlock, and Stockton Clubs are active. During Field Day, PJH was active during Field Day as a single entry from Camp Connell in Calaveras County. PSQ is working to fulfill his ambitions on 28 Mc. and including 10,000 Mc. BCL and FTY apparently were high scorer for the section in the last VHF Contest. SJV, section c.w. net should be well under way by the time this is in print, so if you wish to check in listen on 3745 kc. Monday through Friday at 7:30 a.m. LQK and GS report that the Bakersfield Club is going strong. GRO has added emergency equipment to its set-up. PVH got himself hitched. MKR, of Los Angeles, recently visited the SCM and is planning to attempt to organize v.h.f. activities in the northern and southern parts of the State. Please keep the monthly reports coming, same, we suppose. Trailer: WEGBO 6S, EXH 14, FYM 13, GQZ 2, NSK 2.

ROANOKE DIVISION

SOUTH CAROLINA — SCM, R. H. Holland, W4AZT — The Peaceful Amateur Radio Club of Columbia operated four transmitters in Field Day as 8IN. The Greenville Amateur Radio Club had three c.w. transmitters and ten operators under the call GZ to Field Day. The Charleston Radio Club operated one transmitter with less than thirty watts under the call HIII to Field Day, with individual Field Day stations operated by HII, ANK, OWM, LK, DFC, and K4USB. GCW was active in Field Day from Hwyss Mountain. ANH sends the following information from Charleston: TTR is on 27.4 Mc., NRC is on 7 and 28 Mcs.; LIK is mobile on 28 and 50 Mc. OWS also is mobile 28 and 144 Mc. IHP is operable in Charleston on 28 and 50 Mc. and 43ERP and 4DRN were visitors to Charleston. The Club is working on plans for a hamfest before Labor Day. KZ became Class 1 Observer with an accuracy of .00082 in frequency measurements. CMF and FRO are active on 50 Mc. NZF now has a Highpower beam. We would like to welcome JNL for the hams of Savannah, Ga., to Columbia. All Field Day stations had nice publicity in the local papers concerning activity and the Charleston Club had almost half a page. Most of the papers in the State welcome news of ham activity and we think they should be contacted on all unusual operation.

Trials: W4ANS 2A, AZT 27.

VIRGINIA — SCM, H. Edgar Lindauer, W4FF — Our retiring SCM, KFC, closed his final report last month with much praise of and thanks to the group, and through this column we acknowledge with enthusiastic thanks his sharing with us of a splendid personality and leadership which has
Tune your rig for peak output without creating interference

Use an OHMITE Dummy Antenna Resistor

- RUGGED VITREOUS-ENAMELED CONSTRUCTION
- IMPROVED FREQUENCY CHARACTERISTICS

Within their recommended operating frequency ranges, these superior dummy antenna resistors may, for all practical purposes, be considered "nonreactive" in performance.

Write for Bulletin 136

Here is the ideal dummy antenna resistor, designed to provide accurate measurement of R.F. power output (using R.F. ammeter) while keeping the signal off the air. Improved frequency characteristics result from a more effective proportionment of the d-c resistance, residual inductance, and distributed capacitance. In these units, residual inductance and distributed capacitance are kept to a minimum, making the natural resonant frequency as high as possible. Available in Type D-101, 100-watt unit, in 52, 73, 300, and 600-ohm values; and Type D-251, 250-watt unit, in 52, 73, 300, and 600 ohms.

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Here is the PERFECT MOBILE RIG
H-W BANDMASTER XMTRS have EVERYTHING required from 2 to 80 Meters

Over 3000 BANDMASTERS now in use around the world—it's the most popular and versatile small transmitter of the age.

YOUR BANDMASTER REMAINS MODERN BECAUSE—
It is PROTECTED by a continuous Technical Bulletin Service mailed regularly to all registered owners.

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Which provides methods of adding new features to your present BANDMASTER as they are developed. In this way no BANDMASTER becomes obsolete or outmoded.

3 BANDMASTER MODELS

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Simple inexpensive accessory kit converts Junior to Senior, Built-in antenna changeover and push-to-talk relay now available at small extra cost.

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SEE THEM AT YOUR SUPPLY HOUSE
Send Now for Latest CATALOG

Harvey-WELLS ELECTRONICS, INC.
SOUTHBRIDGE, MASSACHUSETTS

kept Virginia in the front line of activities. IA and KFC have consented to "carry on" temporarily with the VY Bulletin. Field Day activities brought out the guns in large numbers. The Virginia membership of PVRCS was well represented during Field Day at Fort George Mende, MD, WA3A/3, by CC, FF, IA, JAY, KPC, KFT, KVM, LH, MCI, Rl, and VE. WGO got started and slipped up 30 minutes before QRT. Thanks go to Lt. Richardson, OHIKB, officer in charge of 3OBA for auxiliary power, costs, and to Hookers, for characterizing Field Day activities of the Falls Church Radio Club, K4AY/4, at the Fire Tower Park Bandstand, in a way that accounted. MSF/4's Field Day QTH was Chantilly, Va. Other known club participants were ZV (Richmond Radio Club), KEDJ, (Lynchburg Radio Club), N10O (Norfolk). The Capital Mike and Key Radio Club slapped across the Potomac from Washington, D. C., as 3D/4/4, NNN, of PVRCS vacillating in Iowa operating portable was spanked quite a few during Field Day. NQV, 15-year-old young squire from near Annandale, took top honors in the 80 meter model airplane meet at Andrews Air Force Base. VYFV slipped long enough from house-building for a few Field Day QSOs. IOJ/4M recently purchased a 100-acre farm in Louisa County. Rumor has it that another antenna farm is being born with a 40-meter beam in the plans. KP4FKK is operating portable in Norfolk awaiting modifications. Your new SCC solicits your reports on activities. Trailing: (June) W4KFC 23, MILK 12, CVQ 9, IA 4, (May) W4FA 25.

WEST VIRGINIA—SCM, Donnese D. Morris, W3MJ — For the second straight year MARA members left Field Day to go to a flooded area, this time near West Union, where BG traffic was handled while communications were out. DFC and BYT continue to handle traffic through the summer heat. BOK and JML visit BWI at Spencer. PST was isolated during the flood and water got into his shack. KVQRA, with two transmitters and ten operators, reports a successful Field Day. CLX controls his high-recover rig from the operating point, two miles from the transmitter. GBF finds DX interest on 14-Mc. ex. The following stations were heard during the flood emergency handling traffic and doing a swell job: AJL, AYF, and AVW. BYV, BWK, CLX, CSE, CSF/8, ESR, FME, BWI, CNF, GBF, KBT, PQO, and VAB. BQ-HSA visited West Virginia amateurs while on vacation. FMU is recovering from a recent illness and is active on 7-Mc ex. DHT is changing to 83 ex. on his 29-Mc. phone rig. WSL and JML are sweating out DXCC qualifications. CKW is home from school and is active on all bands, 100 through 10 meters. West Virginia still needs OBS and AO appointments. Your applications will be appreciated. Trailing: W8RTV 35G, CKW 32, DFC 7.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, M. W. Mitchell, W0IZQ — SEC: KQH, HMO; CVWJ, ZVO, ZVO makes BPL again this month with a total of 638. MOM had a daily schedule with AJJ/8, who was operating at National Guard Camp. They handled 167 messages, 9 of which were newspapers. The newspaper and b. station KLMR were very glad to handle this news. Part of the time AJJ/8 operated from a jeep. A new station at Lasar is K2QWR. MHR and U1Z report that BJQ made a new ham in Greeley. He is engaged at KFA. KHF reports the Colorado Emergency Net still is functioning but attendance has dropped off considerably because of the summer activities other than ham radio. He still is working on the new rig and now has the experimenter working FB, but it has backing on the air. LJZ is in Great Yarmouth, Eng. TW/8, FKE, and AAB/9 were active in Field Day operating. The Denver Radio Club, with the call TW/9, operated in the vicinity of Cherry Creek Dam just outside of Denver. Emergency power was used with a total of 30 operators. AAB/8 operated one mile east of Littleton with six operators. FKE/0 operated outside the city limits of Grand Junction with 7 operators. AJU and SCCE visited yours truly. IQG visited NIX and MM0 in Yankton, S. Dak., and SCCE in Hobbs, N. Mex. The new exper is coming along fine. The Clapp oscillator is finished and tests show 100 eyes drift from cold start to full watts on Traffic: W8ZIO 588, MOM 100, MH/8, K2QH 2, LZY 1.

UTAH—SCM, Leon J. Zimmerman, W7FSF — LAB, the Ogden Radio Club, was on 10 November at the Ogden Central Depot with nine operators. LIU, Utah Amateur Radio Club, was located at the Salt Lake Air Base with about 30 operators participating. There was not much wind as usual but it was chilly by morning and the place resembled an Indian camp, as all the fellows had blankets thrown over their shoulders. OQZ now is being heard on 14-Mc, 'phone, but what is the matter, Natala, did you break your box? KUX is the call of an OP from Mom- tain, who has moved to Salt Lake City. Welcome to Utah, Erwin, JVA again is being heard on the air after a long illness. We wish you a speedy and complete recovery, Doc. Where are the traffic reports?

WYOMING—SCM, Marion R. Neary, W7KFM—FMQ, HNL, and KVQ attended the haulfest at North Platte, Nebraska, 144-Mc, is showing good prospects around Laramie, with contacts over the mountains into OWJW, at Cheyenne, and RKL, at Devine. BQ-HSA, 70 ex, in to see JGS and KFV on his way to W6-Land. The Field

(Continued on page 79)
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a NEW loudspeaker which for the first time spans the full frequency range of the ear!

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Day location of JDB near Laramie on U. S. Highway 30 at its highest point, 8000 ft., proved quite interesting with 3.85-Mc. phones from W6- and W8-land rolling in at 0600 Easter time. JDB is so near that to work, however, J19D was good from Riverton to Laramie and is operating 3.85-Mc. phone. G2G and P2G are looking for DX on 14 Mc. Wyoming's leading traffic man, DXV, is temporarily shut down due to the coming of the summer season and this winter will be operating 28.5-Mc. phone on the high seas. We'll miss those traffic reports. Traffic: W7DXV 38, OWZ 9.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Leland W. Smith, W4YE — Congratulations to the Amateur Radio Club for a most successful hamfest at Oxford Lake. REK, our country doctor, is turning in some fine DX reports. TJU reports that RBJ is the only active ham in Jasper. JAN is pounding on 28 Mc. ADJ is working 28-Mc. phone regularly. AIVM has had bad luck with his new transmitter and is starting all over again. KE flatly got stuck on 144 Mc. KBC has converted the ham shack into a photography lab. Officers of the newly-organized Tuscaloosa Club are ELK, AB1A, ALAB, J9B, IDK, OYB, J9D, and E9R. The Millionaire Club is QRT for the summer. HFL is putting in 105 hours on the job and still finds time to work 4 Mc. LAT and NWX are active on 28 Mc. BCU gets out as well from his "vacation special" as he does from the home shack. DAQ has new Collins 75-A receiver. FYA is a new ham in Concord, LFR turned out his plate transformer. KAPAN has left his CQ-802 for parts unknown. EWN has migrated to Macon. GN, OXW is back in Mobile. SLJ is working out swell on 50 Mc. GDE daily mediates his BC-406 with 496 Mc. Traffic: W4BFM 10, CEC 10, VE 9, REK 8, AT4 7.

EASTERN FLORIDA — SCM, John W. Hollister, W4WZ — Field Day went off without a hitch. Received reports from Jacksonville, Miami, West Palm Beach, Orlando, and Clearwater stations showed that miles of diversified equipment was installed. The states had a big day. Congratulations to all participants. The Guard has a new RM—OEC succeeds MNT. Please mail your reports to the SCM not later than the second day of each month. Here is something to grab on you, 28-Mc. phone men; A group in Jacksonville is starting an emergency new service. For 28 Mc., PA1X, NMC, PUL, NHA, WOA, RQ, BUB, and OBB are attending drills and it is desired to make it state-wide. (While you are over there checking in on a certain "long-time ago," LJM is new RO for K, of DC, and JEP 1963 is the SA, HUY, the retiring net MO, did a swell job. Key West and OLA are using a Telstar with another Signal Station 2400, a neat 60-watt on 7, 14, and 28-Mc. Receiver is in an NC-240D. A folded dipole is used. New Port Richey: RQ says IQV got his transceiver back so it is safe to bet him a visit some time next year (even at HUY's), Oakland: OCG really is working hard for the Guard. We schedule PL and 3CUL and needs outlooks in Florida. Punta Gorda: AFO and OUG were at the National Boy Scout Jamboree. Al and his son are quite active in this worthy work. Well, fellows, it's time for the Peninsular Net to get started every 0750 ke. Drop me a card for the dope because the Net will need help from all operators, slow or fast, new or old. There will be plenty of traffic to work again this season. Write ASR for National Traffic. System Information, Come on, gang, let's support these net activities. Traffic: W4JEP 73, KJ 35, OQG 22, OGI 18, FWZ 8, IDK 1.

WESTERN FLORIDA — SCM, S. M. Douglas, jr., W4WCB — If there is any question in your mind as to where these monthly reports are, ask yourself if you sent the SCM a report on your activities. With Field Day behind us we should look toward getting our emergency gear up and in a stand-by status, as the hurricane season approaches. Please advise the SCM of your plans, gear, etc. RON, of Crestview, is our newest ham. JFY visited AXP and they both the rig hot at Warrington. PAA has new FT-19, QCH is working lots of DX with his 14-Mc. beam. AJ reports working some DX on some 20-mc. also OCL, OUA, GSM, NAY, ACB, IQV, NQY, QB, and EIO were among the operators on Field Day. They were set up at Silver Lake, near Tallahassee. OTR and QB took their exam in Tallahassee recently. ACB has the 50-Mc. rig finished. TL keeps busy at the CAA office. IQV and DUE are new hams in Tallahassee. Traffic: W4AF XP 1.

(Continued on page 15)
June 22, 1960

Eitel-McCullough, Inc.
San Bruno, California

Gentlemen:

I thought it might be of interest to you to know that I have been using your tubes since the first 1007A's were produced, my 1007A's, which were purchased in 1947, are serial numbers 56 and 70. These tubes are still serviceable, although they were replaced in my transmitter with 2004A's.

As a member of the Chicago Area Mobile Radio Club, I frequently operate my home station on the high-end or the 2-meter 'phone band for contacts with other mobile stations. Harmonics from the old-style triode transmitter have made it impossible to operate during the television hours and made it necessary to consider tubes which would require less harmonic-producing driving equipment. By changing to 4-250's with a low-pass filter and the testing proper precautions regarding shielding and the use of low-pass filters, I am again able to enjoy the advantages of operating during television hours.

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the field house and the main club station. These circuits,
duplex on 144 and 27 Mc., were used to relay messages
to the main station for retransmission on 14, 7, 5, 3, and
3.35 Mc. The circuits were 147, 88, 88, 44, and 3.35 Mc. A total of 147
messages were handled in this manner during the year.
The Atlanta Radio Club now holds two meetings a month,
the regular meeting the first Thursday, and the informal
swap shop the third Tuesday. Field Day messages were
received from BOL, GSV, and AMQ. 30IC, 2BFK, LQO, and
LJOC were operators at main station for a very good job of
traffic handling. Traffic: W4MCM 158, AQL 147, D1Q 4, ZD 4.

WEST INDIES — SCD, Everett Mayer, KP4KD —
PRARC and BARC jumped into Field Day with both feet
but BARC got rained out. UW is building J-1 kw. PA. He schedules W2SMD, PRARC station.
Participants were ID, CB, HK, AZ, DJ, DJ, and mobilies
OO, FF, and JM. WJ2YH was a visitor to KP4J. All new
OSB at HAM. IAM, HJ4S, made grade on Class A, as did HF, Z6K registered in the AEC. The PRARC Board plans "On
The Air" meetings the 1st and 3rd Tuesdays of the month.
SCC reports 125 retclusi. They are operating the new Radio
Line at 114 tubes per watt. SCR-522 conversion 20 tubes 10 watts output.
KQ has 82SB in "constant modulation" system. KD is
active on 3.5, 7, and 14 Mc. KE is heard on 7 Mc. DJ reports e.w., AEQ net well attended while "phone AC
net attendance is poor. IF made a trip to Ramsey to give
exams to prospective there. UV works hard at getting

CANAL ZONE — SCD, Everett R. Kimmel, KZ5AW —
Atlantic and Pacific Emergency Nets combined to put
KZ5KZ/KZ2S on the air at Gamboa for ARRL Field Day.
Directed by NM, PA, RM, and WJ, more than thirty
KZ2S labored to make the first Canal Zone Field Day a very
satisfactory activity. The main operating point was
Durley, under a bit of canvas, ES and GT staged a separate two
man Field Day which developed into a battle with
QRM, QRM, and sandflies. Moths plagued the night operators
KZ5KZ/KZ2S. Next month MN and PA plan a Field Day
for the Atlantic Side. The Joint Mobile Band was alive with
ARRL as a regular phone net with members entitled
to net certificates. Apply to WJ for yours. RM PA wants
all H-Me. e.w., schedule for future Field Day.

SOUTHWESTERN DIVISION

LOS ANGELES — SCD, Virge A. Gentry, Jr., WS1VM —
SSEC: WOU, PAW, NIVK, RMA; CE, CMN, DDE, FYW,
103, and LDR. The trip here to Field Day will be held in Santa Barbara at the Mar Monte Hotel,
Sept. 9th. The price is $4.00 per ticket. Let's all plan to
attend so that we can show the Arizona and San Diego
sections that we in the Los Angeles section are good hosts
and can put on a real convention. Let's decorate our
automobiles so that the people of Santa Barbara will know that we
are having a convention. I'll see you there. WOU was ap-
pointed SSEC, replacing CSR, who was forced to resign be-
cause of business. ZVD was appointed EA in charge of the
Long Beach SEC. The former EC, AOT, had to resign
for business reasons. GYH has been keeping schedules on
7 Mc. with KBRICA since January of this year. The following
received QSO reports: ANM, HZL, and QLM. QLM and
NAX are the only YLs holding appointments in this sec-
tion. OKLA's new QTH is 046 Jefferson Ave., Los
Angeles 45. BUR rebuilt his speech amplifier. GE and LOVE
portable at Barton Field in the San Bernardino Mountains
in June. COZL, in Pomona, took traffic from them. Traffic
originated from the Campfire Girl's camp located in
the Barton Field Area. The Tri-County Amateur Radio Assoc-
iation announces new officers as follows: IA, KPE; COZ,
gy, gex; e-rays. BHI had his Collins 32V-I
modified to 32V-2. YV3 has a new jr. operator, ZGZ's best
Field Day DX was Haiti, DDE, FQR, YSK, and WT and
his XYL visited FYW. ISQ has a new 990-watt final. DLR is
jarring the bands with his new 240TH Field Day. Field
station 15/6 used GTN's 4300-car, and west and the
 closures to the east. Don all XYLs and SWLs in the
Southwest and Harbor Area of the AARL are urged to sign
up for an adult evening school class in code this fall at the
Redondo Union High School. Anyone interested may con-
tact FUT at 333 Eighth St. Atlantic Beach. YLs now
control traffic on 1.9 Mc. MVK is sponsoring three statewide
V.H.F. contests. The contests start Sept. 1st. The attributes
of each contest will be NVK. AMQ and others are
enthusiastic to contact WKO for rules and other details.
WKO is the contest chairman for the Los Angeles
section. His address is 509 Four. AMQ has had the displeasure of being forced to cancel
a large number of station appointments because of the ap-
pearance of failure to arrive. In such cases, reports and certificates for endorsement when they are due.
If an appointee is known to be absent, it is better for him to request temporary cancellation than to receive

(Continued on page 78)
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P.E.C. TRIODE COUPLATES
A Triode Coupler is a combination of three capacitors and two resistors bonded to a ceramic plate, connected by metallic silver paths fired to the base plate. It easily replaces the following components normally used in audio circuits when one tube is coupled to the grid of a following stage: Plate load resistor, grid resistor, coupling capacitor, plate r.f. bypass capacitor.

MIDGET No. 2 TRIODE COUPLATES
SIZE — 1/4" x 3/8" x 5/8" thick.
LEADS — No. 24 tinned copper, 1/2" long.
CAPACITOR RATINGS — 450 volts d.c. working, 800 v.d.c. flash test. Tolerances: 0.05 mfd. ±20%; 0.025 mfd. ±40%.
RESISTOR RATINGS — Tolerance ±20%, 1/2 watt.

CAT. NO. TYPE CONSISTING OF (Diagram A)
PC-70 MIDGET F2 C1 = 0.005 mfd. C2 and C3 = 250 mfd.
PC-71 MIDGET F2 C1 = 0.005 mfd. C2 and C3 = 250 mfd.
COUPLATE R1 = 500,000 ohms. R2 = 500,000 ohms.

STANDARD TRIODE COUPLATES (High Capacity)
SIZE — 1/4" x 3/8" x 5/8" thick.
LEADS — No. 22 tinned copper, 3/8" long.
CAPACITOR RATINGS — 450 volts d.c. working, 800 v.d.c. flash test. Tolerances: .01 mfd. +80% — 20%; .025 mfd. ±50% — 20%.
RESISTOR RATINGS — Tolerance ±20%, 1/2 watt.

CAT. NO. TYPE CONSISTING OF (Diagram B)
PC-80 STANDARD C1 = .01 mfd. C2 and C3 = 250 mfd.
PC-81 STANDARD C1 = .01 mfd. C2 and C3 = 250 mfd.
COUPLATE R1 = 500,000 ohms. R2 = 500,000 ohms.

P.E.C. PENTODE COUPLATES
A Pentode Coupler replaces the following components normally used in audio circuits when one tube is coupled to the grid of a following stage: screen resistor, plate resistor, grid resistor, screen bypass capacitor, plate r.f. bypass capacitor, coupling capacitor.
SIZE — 1 1/4" x 3/4" x .045" thick.
LEADS — No. 24 tinned copper, 3/8" long.
CAPACITOR RATINGS — 450 volts d.c. working, 800 v.d.c. flash test. Tolerances. .005 mfd. GMV; .025 mfd. ±50% — 20%.
RESISTOR RATINGS — Tolerance ±20%, 1/2 watt.

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P.E.C. Vertical Integrator Plates are widely used in television vertical integrator networks. Two forms are available — see wiring diagrams D and E. Each has only three external leads.

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LEADS — No. 22 tinned copper, 3/8" long.
CAPACITOR RATINGS — 450 volts d.c. working, 800 v.d.c. flash test. Tolerances: ±50% — 20%.
RESISTOR RATINGS — Tolerance ±20%, 1/2 watt.

CAT. NO. TYPE SEE CONSISTING OF (Diagram C)
PC-100 VERTICAL INTEGRATOR D C1 = .002 mfd. C2 = .005 mfd.
PC-101 VERTICAL INTEGRATOR E C1 = .005 mfd. C2 = .005 mfd.

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CALL Letters

City

State

ARIZONA — SCM, Jim Kennedy, W7MID — New Officers of the W7ADS is LYS, pres.; LAX, vice-pres.; KXQ, secy.; OQG, reg.; LVY, NAI, and KKR are on 160 meters. New calls in Winslow are OQG and APE. Old Pueblo Club election results are LVR, pres.; LPR, vice-pres.; JFQ, secy.; and OPQ, treas. A new call is on 144 MHz for OQX. New Class B hams in Tucson are NNO, NNT, NME, and N5T. 40-Mc. activity increases as KEF, UOG, FGG, SLO, OXW, and MAW get on. KFF, NSJ, NNO, and NNT served as operators in recent forest fire emergencies. F9E, ex-HAM, and a new call for K9M are in Kingman. 5RDB/7 has unusual dual conversion receiver, with crystal mixers, perking. Officers in RCA in Phoenix are OQG, pres.; LOR, vice-pres.; RLY, secy.; and K9Q, treas. Other new club in Phoenix is the Central Arizona group, which worked 121 stations on Field Day on 28 Mc, with just 18 watts. Naval Reserve stations in Arizona monitored 20 Mc. were constantly. For a free TV service lesson, tune in J2W on 14-Mc., 'phone, foxing 44QR's set. New SEC for Arizona is OQ, Mesa. Another new club in Mesa calls L5HM and has five-element 28-Mc. rotary. K9WW is on 144 Mc., QKH on 160 meters. Traffic: W7MOW 20.

WEST GULF DIVISION

NORTHERN TEXAS — SCM, Joe G. Bach, W5CDU — Field Day activities were plentiful and successful judging from the reports that have been received. From our predications, the number of mobile and emergency-powered fixed transmitters have increased considerably in the past year. The Northern Texas group released a list of the 9-10-11 at Pecos Kingdom. Several mobile and portable units were in operation and the following hams were reported: BFQ, L9N, H9N, 10Z, LQ, VFB, PFR, B2G, A9K, AQF, L1N, L1Q, L1X, Q50, L52, and L32. Field Day was on the usual schedule. The Abilene Club set up near Buffalo Gap for Field Day operation. The West Texas group had a combination Field Day and Club meeting at Abilene State Park. LRD had a rig working 7 Mc.; ATG worked 3.85 Mc.; and RJM set up on the 30-Mc. band. A number of mobiles were operating from 8 Mc. down. KEQ, LQF, LGY, Z6W, 10V, 10Y, 10Y, and 10Z, were all set up near Burn's Ranch. LQH, L2Q, L52, and L2Z, were set up at Pecos. 10W, L6N, L3Q, and L1Q, were all set up at Pecos. 10W, L6N, L3Q, and L1Q, were all set up at Pecos. 10W, L6N, L3Q, and L1Q, were all set up at Pecos.
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- NOT War Surplus

New low-cost, new lower price that's THREE BUCKS under our price 60 days ago and THAT was a bargain, too. Model MA-291 Carter Magneto is the 6-volt receiving type preferred for mobile rigs, cabs, police mobile, etc. PM field design, low drain, ball-bearing equipped. Input 6 VDC at 8 amps, output 250 VDC at 100 ma. 4800 rpm continuous duty. Only 5 1/4 x 3 1/4 x 2 1/4", weighs only 5 lbs. Used, good condition. Rush your mail order today. No more when these are gone! $6.95.

SAVE $10 ON THIS 400 VDC @ 200 MILLS POWER SUPPLY KIT!

Sensational value! Designed for receivers, xms, testers, oscillators, presellectors, monitors, amplifiers, etc., requiring well-filtered supply. Kit includes: power transformer, choke, two 10 mfd at 200 V oil-filled condensers, 374 rect. tube, metal socket, 7 x 11 x 2" aluminum chassis, bleeder resistor, switch, and instructions. Gives a well-filtered supply of 400 VDC at 200 mids with less than 1% ripple. Has secondary voltages of 0.3 V at 4.3 amps, 5 V at 3 amps.

GO MOBILE WITH THESE G.E. 6 VOLT DYNAMOTOR SUPPLIES

XMITING $8.95

Made by G. E., originally used in police cars. Base mounted, perfect for car or boat, filtered. In 6V at 22A, out 200V at 150 ma. 11" x 9" x 8", 36 lbs. Can be used to replace scarce PE-183. Used condition, but a real buy at $9.95.

30 MC I.F. STRIP

Easily worth $15 and brand new (taken from R-7/APS-2 scope). Excellent, completely wired foundation unit for 2 and 6 meter cascade converter, swell for fixed freq. 10 meter revr, FM revr or TV strip. Sockets for six 6AC7, two 6H6, 16SN7 tubos (tubes not included), plus 3 I.F. stages. UHF "input" and power receptacles, 13 x 5 x 2" enclosed aluminum chassis with bottom plate. $3.79.

24VDC/110VAC* BLOWER

*Excellent 110 VAC unit by inserting 70 ohm 200 watt series resistor (or 200 watt lamp). Brand new REDMOND blower removed from R-7/APS-2 scope for this bargain sale. Draws 1.38 amps; about 600 rpm; 4750 rpm; two 2" diameter filters; protective screen over 2" dia. intake; black crackle finish; 5 x 7. Ideal for darkrooms, cooling ham rig, exhaust fan, air conditioning, etc. Easily worth 2-3 times our LOW price of $3.75 each, 2 for $7.60.

1st FOR SELECTIVITY! 1st FOR SENSITIVITY! 1st FOR STABILITY!

Radio Shack Corp. crossed the Atlantic to bring American hams the 21 double-conversion superhet receiver in its price class — the Radiovision Ltd. COMMANDER. Features include: 1600 kc 1st I.F., 100 kc 2nd I.F. — 3 position selectivity; over 12 semi-circular band spread on 10 meters; 1-2 microvolt input for 50 milliwatt output; complete coverage 1.7-31 mc in 5 bands; panel bandspread, cat. adjustment against external freq. standard. Immediate delivery. Amateur Net Price $261.50, only $26.15 down. Write today for descriptive literature. Several territories still open for distributors; phone or wire today.

RADIO SHACK CORP.
167 WASHINGTON STREET
BOSTON 8, MASSACHUSETTS

83
feeder attached one-third of its length from one end, and results were excellent. Field Day was a huge success, with more and more locations than ever before. IF included KJ at Valois, UR at Lecheine ARC at Montreal, SY mobile, KF at the Citadel at Quebec, and QN at the Plains of Abraham, Quebec. Traffic: VESQN 182, GL 44, EC 27, NI 3.

**VANALTA DIVISION**

BRITISH COLUMBIA — SCM, Ernest Savage, VE7FB — MU has finished another large ship for lake traffic and worked mobile from Kelowna during the building. AFH was in town and reports he will be back on soon. ZP is building 7-Ma, w.w. rig. TF reports that working for a living seriously interferes with his amateur activities. AKG is reporting in from Prince Rupert and may be a permanent fixture there. TG, EC Victoria Area, reports much doing in the EC set-up. ABE owns a new HQ-190X and is heading for Prince Rupert to use it. ANX is re-building around a pair of 800s; let DC is planning to discontinue it as he has time to knock off DX on 14 Mc. AEG is a newcomer and is on 7 Mc. With Command transmitter and receiver, AEG is raising his beam higher. AZ is of the hospital and doing fine. AHF is sporting a four-element beam, ADB is building a double conversion receiver for winter’s DX. ADV now is VE5ADY in Melbourne on 14 and 28 Mc. UF reports he is too busy with traffic nets for anything else. The Delta ARC would like all members to be able to copy 20 w.c.m., so they can handle traffic if emergencies arise. OK’s SJK in the attic must be working as he lists 5Z2AA and VR1C. TF reports good TV at new QTH. AX’s ambition is 100 QSOs with 100 countries from 190 watts. Are you a BS2? See your SCM for information. The British Columbia Net reports traffic was handled by TM, AMO, 8 19, YT, CS, ACZ, and OD. Traffic: VEV7UT 108, 126, CS 114, TM 37, ACZ 33, OD 26, FB 15, YT 15, AEU 11, ZP 7, AMO 3.

**WWV—WWVH SCHEDULES**

For the benefit of amateurs and other interested groups.

The National Bureau of Standards maintains a service of technical radio broadcasts over WWV, Beltsville, Md., and WWVH, Maui, Territory of Hawaii, on the following schedules:

The services from WWV include (1) standard radio frequencies of 2.5, 5, 10, 15, 20, 25, 30 and 35 Mc., (2) time announcements at 5-minute intervals by voice and International Morse code, (3) standard time intervals of 1 second, and 1, 4 and 5 minutes, (4) standard audio frequencies of 440 cycles (the standard musical pitch A above middle C) and 900 cycles, (5) radio propagation disturbance warnings by International Morse code consisting of the letters W, U or N, indicating warning, unstable conditions, or normal, respectively.

The audio frequencies are interrupted at precisely one minute before the hour and are resumed precisely on the hour and every five minutes thereafter. Code announcements are in GCT using the 24-hour system beginning with 0000 at midnight; voice announcements are in BST. The audio frequencies are transmitted alternately: The 600-cycle tone starts precisely on the hour and every 10 minutes thereafter, every 4 minutes; the 440-cycle tone starts precisely five minutes after the hour and every 10 minutes thereafter, continuing for 4 minutes. Each carrier frequency is modulated by a seconds pulse which is heard as a faint tick; the pulse at the beginning of the last second of each minute is omitted.

Station WWVH, operated to provide coverage of the Pacific area, broadcasts on an experimental basis on 5, 10 and 15 Mc. The program of broadcasts on the three frequencies is essentially the same as that of WWV. Reception reports indicate that WWVH is received at many locations not served by WWV, thus extending the area served by standard frequencies and time signals. Time announcements in GCT are given from WWVH every five minutes by International Morse code only.

---

**Model 666 HH — The Basic Hand-Size Volt-Ohm-Milliammeter**

One of the "handiest" instruments for its size that ever came off Triplette's precision production lines. Its greater scale readability means faster, more accurate work. Special new type resistors provide greater stability. All the ranges you need. This is a basic pocket-size necessity for the electric technician.

**ONLY $22.00 AT YOUR DISTRIBUTOR**

FOR THE MAN WHO TAKES PRIDE IN HIS WORK

**Triplette**

TRIPPLETT ELECTRICAL INSTRUMENT COMPANY - BLUFFTON, OHIO, U.S.A.

In Canada: Triplette Instruments of Canada, Georgetown, Ontario

**SWITCH TO SAFETY!**
HARVEY
for variety for bargains

BC-221 FREQUENCY METER

These won't last long so order now for one of these famous new meters. They are just like new with original instruction sheets. Range 125-200 kHz.
With crystal check points in all ranges. Complete with crystal and tubes.
Special Price $79.50

GON-SET CONVERTERS

3-30 Gon-Set Converters 10-11 Gon-Set Converters 20 meter Gon-Set Converters 72 meter Gon-Set Converters. Shpg Wt. each $39.95

NEW Gon-Set Tri-Band Converter $42.50

SUPERIOR POWERSTATS

Smooth, efficient voltage control, 0-135 volts output from 15 volt AC line. Models also for 230 volt input. Write for free literature. Models for table and panel mounting.

Type 20, 3 amp. $12.50
1166, 7.5 amp, table model. $23.00
11667, 7.5 amp, panel model. $18.00
11265, 15 amp. $46.00
11565, 45 amp. $115.00

NEW COLLINS 75A-2

Double-conversion superhet with sensational stability, calibration accuracy and sensitivity ... all the good features of the 75A-1, plus many new ones. Get your order in now for September delivery. Price, complete with tubes $420.00; matching 10-inch speaker $20.00.

ANTENNAS

Complete line of Premax and Master Mount antennas and mounts carried in stock at all times. All Hy-Lite 6, 10, 20 meter beams as well as TV Yagis always in stock.

THE NEW SUBRACO MT 15X

The finest in mobile rigs available today. 30 watts power, class B 100% modulation, with push-to-talk and built-in coaxial type antenna relay. Xmit complete with tubes, coaxial antenna connector, mounting brackets, etc. Shipping weight 15 lbs. $87.50

BRAND NEW—MT15X for 20 meters $87.50

SUBRACO D5400

Dynomotor supply, 240 V, DC input, 400 V, at 175 ma. output. Complete with built-in control relay, filter, etc. Shpg. Wt. 10 lbs. $79.95

COLLINS 32V-2 $57.50

SELECT-O-JECT $24.95

HRO-50 $35.50

JOHNSON VIKING KIT $209.90

HALLICRAFTERS SX-71 $179.50

MILLEN 90651 Grid Dip Meter $55.00

MILLEN 90800 the ever-popular 807 exciter, complete with one set of coils, less tubes and power supply $42.50

ELDICO PRODUCTS

NEW IMPROVED GRID DIP OSCILLATOR KIT

The most valuable piece of test equipment in the ham shack is the Grid Dipper. Build one with this kit and save countless hours in building, improving and operating your rig. The GDO Kit builds an exact duplicate of the "GridDipper", now with regeneration, includes everything from the special handy case permitting one-hand operation down to a complete application and instruction book. With tube and internal power supply, range 3 Mc to 250 Mc in 6 steps, size 5¾" x 2½" x 3". Complete Kit $24.50

Eldico TVT-62 low-pass filter, kit... $7.99

Wired and tested.............................. $10.99

Eldico TVR-309 for Twinline or TVR-62 for coax, high-pass filter, kit... $1.98

Wired and tested, either type... $3.98

Brute Force line filter, kit... $5.98

Wired and tested.............................. $8.98

Cooper mesh shielding, 36" wide, min. order 6 sq. ft., per sq. ft. $0.85
Plus $1.50 per order for packing.

TR-1 transmitter kit.......................... $179.50

TR-75 transmitter kit.......................... $34.95

MD-40, 40-watt modulator kit............ $29.95

MD-40-F, same with power supply $39.95

MD-100, 100-watt mod. kit................. $44.95

Wired and tested.............................. $54.95

ELDICO HIGH VOLTAGE POWER SUPPLY KITS

Trans. Transformer

Kit No. Output Price only
HV-1500 1500 v. 350 ma. $29.50 $19.95
HV-2000 2000 v. 500 ma. $49.50 $39.50
HV-2000SF 2000 v. 700 ma. $59.95 $49.50
HV-2500 2500 v. 500 ma. $99.95 $69.95

Electronic Bug, automatic dos and dashes

EE-1, kit form................................. $21.95
Wired and tested............................. $27.95
EE-2, with integral monitor, kit form .. $29.95
Wired and tested............................. $39.95

Telephone: Luxemburg 2-1500

NOTE: All prices are Net, F.O.B., N.Y.C. and are subject to change without notice.

HARVEY RADIO COMPANY INC.

103 West 43rd St., New York 18, N.Y.
Converters for V.H.F. Use

(Continued from page 15)

for the best reception you’ve ever experienced, but there may be another job, depending on the receiver with which the converter is used. It is well known that some communications receivers are prolific sources of TVI. These same receivers may make life miserable for the user of a fixed-frequency converter as the result of their strong oscillator harmonics. With several receivers tried these crystal-controlled converters had no birdie problem, but with one other the 2-meter job has several strong birdies that can be pretty confusing when one tunes the band after a CQ. The treatment takes on the aspects of a TVI job, using traps and filters in the same way as in a transmitter but the job is simpler in the case of the receiver because there are no high-power considerations.

The “Mountaineer”

(Continued from page 19)

out, the total B-battery drain should rise to over 40 ma. when the key is closed. The final should not oscillate when the key is closed. Be careful not to hold the key closed too long since, without excitation, the 3A4 may be damaged.

The station VFO may be used as a signal source for adjusting the receiver. The slug in $T_{in}$ should be adjusted to put 3750 kc. near the center of the receiver tuning dial ($C_{1a}$). The slug in $T_{1a}$ should be adjusted for proper feed-back.

A second chalk-line box contains 50 yards of 27-pound-test fish line. This line can be tied to a stone and thrown over a tree. The stone is then replaced by the antenna chalk box, and the antenna is pulled up. Next, the ground counterpoise is unrolled and the headphone and key are connected.

The channel switch and the receiver tuning dial should then be set. Set the meter switch to read amplifier plate current, close the key and load for 16 ma. (0.53 on the meter) at the plate current dip. It is wise to check battery voltages at this point. The tank circuit should not be retuned while receiving. Switch to “Receive” and adjust the volume and regeneration.

Although a wide variety of antenna lengths may be used, antennas about a quarter or a half wavelength long work best. If you don’t want to bother to prune the system to the correct length, a 500-µfd. tuning condenser may be added in series with the lead to the counterpoise.

Spare tubes, fuses, and an extra dial light should be carried. There is no table or tripod. Evenings are often so chilly that the rig is operated from inside a sleeping bag! One problem that we have not yet solved is that of an adequate source of light for copying messages. When considering a light, one should remember that mountain meadows produce an enormous supply of mosquitoes!
Your NEW 1951 ALLIED CATALOG is Ready Now!

212 VALUE-PACKED PAGES

YOU'LL FIND ALL THE NEW GEAR IN YOUR NEW 1951 ALLIED CATALOG

Send for the Leading Amateur Buying Guide

It's ready for you—the only Amateur Buying Guide that gives you complete selections of station equipment at consistently lowest prices. The new 1951 ALLIED Catalog brings you all the newest and best in receivers, transmitters, parts and station gear, ready for immediate shipment from the world's largest stocks.

Expert service by our seasoned ham staff—dollar-saving trade-in allowances, an amazingly liberal Time Payment plan—15 day trial on receivers—full 90-day guarantee—all these add up to the most reliable, money-saving service in Amateur Radio. Send for your 1951 ALLIED Catalog today—and get all these buying advantages.

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833 W. Jackson Blvd., Dept. 15-J-O
Chicago 7, Illinois

☐ Send FREE New 1951 ALLIED Catalog

Name..................................................................................

Address..............................................................................

City.................... Zone...... State....................

87
V.H.F. QSO Party
(Continued from page 27)

5) A "contestant" is a single operator working without the help of any other person. Results may be presented with names of all participating persons, for listing, but only single-operator scores will be considered for certificates.

6) Scoring: 1 point for completed two-way section exchanges on 50 or 144 Mc.; 6 points for completed two-way section exchanges on the higher v.h.f. bands. The sum of these points will be multiplied by the number of different ARRL sections worked, i.e., those with which at least one point has been earned. Reworking sections on additional bands for extra section credits is permitted.

7) A contact per band may be counted for each different station worked. Example: W1JSM (R., Mass.) works W1MP (Vt.) on 50, 144 and 220 Mc. for complete exchanges. This gives W1JSM 7 points (1 + 1 + 5 + 7) and also 3 section-multiplier credits. (If more Vermont stations are subsequently contacted on these bands they do not add to the multiplier but they do pay off in additional contact points.)

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

9) Award Committee decisions shall be accepted as final.

10) All reports must be postmarked no later than October 1, 1949, to be entered for awards. (See p. 56, May, 1948, QST, for form, or a message to Hq. will bring a mimeographed blank for report on this contest.)

Reporting
Submit contest logs to Headquarters immediately, even if your score is small, to help in cross-checking the claims of others. - F. E. H.

Two-Control Transmitter
(Continued from page 28)

This transmitter has been operated on 7 Mc. within three feet of a TV receiver in a fringe-area location without causing harmonic interference. With the harmonic trap detuned, there was a very slight trace of interference, but this disappeared completely when the trap was tuned to the offending harmonic. Up to the time of writing, there has been no opportunity to make similar checks with the transmitter operating at higher frequencies, but a sensitive rectifier-type r.f. indicator coupled tightly to the antenna coil shows no trace of TV-range harmonics with the transmitter running full power on either 10 or 20.

U.S.A. Calling
(Continued from page 28)

Age Requirements — All applicants must have passed their twenty-first birthday and on the date of appointment must not have reached the birth date indicated below for the grade for which applying.

Second Lieutenant... 28 Major .................. 45
First Lieutenant ....... 23 Lieutenant Colonel ... 51
Captain ................. 37 Colonel .................. 59

Interested applicants may write to George W. Bailey, 1 East 79 Street, New York 21, New York, for further information, including names and locations of others to whom application should be made, application blanks, etc. Many other opportunities, not listed, are offered to technical and professional specialists. If your specialty is not covered by the above list, write for further information, giving full details.
BOB HENRY, W0ARA, OFFERS YOU:

LOW PRICES: I sell to you as cheap or cheaper than you can buy anywhere.

COMPLETE STOCKS: Collins, Hallicrafters, National, Hammarlund, RME, Millen, Harvey-Wells, Meissner, Gonset, Meck, Johnson, RCA, all other amateur receivers, transmitters, beams, TV, AM-FM, high fidelity amplifiers and speakers, test equipment, tubes, parts, etc. I can supply nearly any equipment shown in any catalog or advertisement and at lowest prices.

BEST TRADE-IN ALLOWANCE: Customers in all parts of the USA trade with me because I allow so much. Tell me what you have to trade and what you want. I also buy equipment.

TIME PAYMENTS: You can order anything on terms. I finance the terms myself to save you time and bother. Customers everywhere in the USA find my terms best. Write for details.

QUICK DELIVERY: Mail, phone, or wire your order. It will be shipped promptly. I can be reached nearly 24 hours a day, 7 days a week.

TEN-DAY TRIAL: Try any communications receiver ten days — if you return it your only cost is shipping charges.

PERSONAL ATTENTION: The Butler store is run by Bob Henry, W0ARA, and the Los Angeles store by Ted Henry, W6UOU. We make the deals ourselves. We finance the time payments ourselves. That way we have the lowest overhead and can do more for you. That's why YOU AND I CAN DO BUSINESS. Write, phone, or visit either store.

73,

Bob Henry
W0ARA

HENRY RADIO STORES

Butler, Missouri

11240 Olympic Blvd.
LOS ANGELES 25, CALIF.

"WORLD'S LARGEST DISTRIBUTORS OF SHORT WAVE RECEIVERS"
DUAL PLATE XFMNR

815-0-815 volts, 250 Ma., plus 585-0-385 volts, 65 ma., 115 volt, 60 cycle primary, electro-static shield, upright mounting, fully shielded. A beautiful transformer with many applications. 5 1/4" x 4 1/2" x 5/8", 17 lbs. $6.95

PLATE TRANSFORMER

510-0-510 volt, 200 Ma. transformer, fully shielded, upright mounting, electro-static shielding, 4 1/2" high, 4 1/4" wide, 4" deep, 9 lbs. at less than half regular price... $3.95

10 HENRY CHOKE

10Henry, 250 Ma.choke, 100 ohms DC resistance, 3000 volt insulation, upright mounting, fully shielded. Check this price against ANY ad. 4 1/4" x 4" x 4 1/4", 9 lbs. $2.95

POWER SUPPLY SCOOP!

Utility power supply, 350 volts dc @ 50 Ma., 6.3 volts @ 2 Amps, black crackle chassis 6 1/2" x 5" x 2" Has choke and 2-section filter, AC switch and line cord, a wonderful buy, less No. 80 rectifier, only... $2.25

STEINBERGS

633 WALNUT STREET - CINCINNATI 2, OHIO

U.S.N.R.

(Continued from page 58)

via 144 Ma. by W6TFZ/6 (ARRL EC) at San Carlos City Hall to KG5AC, from where it was transmitted by Naval channels to San Francisco and thence to Washington. . . .

Electronics Company 12-9 (KG5NU) cooperated with the Humboldt Radio Club in an exhibit and demonstration of amateur radio and electronics at the annual Hobby Show at Eureka, Calif., on May 6th and May 7th. . . . Organized Surface Division 9-30 of Indianapolis (KG5R) won the communication trophy in the Ninth Naval District Reserve competition for the quarter ending June 30th... KG5N, Naval and Marine Corps Reserve Training Center, Corpus Christi, Texas, was participant in a test of amateur radio message-handling capabilities on April 27th. An officer from Naval Air Station, Corpus Christi, used a message for New York City for handling via land bands. A duplicate message had been filed for transmission by teletype. KG5RG relayed through W9GZ, Joplin, Mo., to W2PAJ, Brooklyn, N. Y., on 14-Mc. 'phone. W2PAJ delivered the message and transmitted a reply via W9GZ to KG5RG. Total time for delivery via teletype: 1 hour, 21 minutes; via amateur radio: 1 hour, 25 minutes. . . . Study classes for personnel desiring to obtain an amateur radio operator's license have been inaugurated at Naval Reserve Training Center (KG5AK), Pontiac, Mich., under the guidance of G. G. Carlson, W5EYL. Classes are held at 7:30 P.M. each Monday. Thirty-five students were enrolled by the first night, June 26th. . . . The Hutchinson (Kans.) Amateur Radio Club holds regular meetings, first and third Thursdays, at the Naval Reserve Training Center (K6NRY). . . . Electronics Company 1-2 (K1NRA), Malden, Mass., won the first Naval District pennant of the season for Navy Reserve organizations. This unit has been selected for organized status. . . . The Lake County Amateur Radio Club meets in the quarters of Electronics Company 9-186 (KG5NAK), Waukegan, Ill., . . .

"Open House" was the order of the day at many Naval Reserve Electronics units on Armed Forces Day, May 20th. . . . Operation of KG2AB was of considerable interest to visitors at Electronics Company 4-18, Princeton, N. J. Lieut. Cmdr. J. L. Richen USNR, K2AT, is commanding officer of this group. . . . Visitors to KG5AA, Electronics Company 12-39, Sonoma, Calif., were invited to file hamsgrams. . . . In addition to Open House, Electronics Company 5-10 (KG5AS) provided a mobile radio unit in the Armed Forces Day parade at Ashland, Ky. . . . Among other Electronics Companies holding Open House were 9-165 (KG5NAK), Waukegan, Ill.; 9-166 (KG5NAK), Downers Grove, Ill. . . . During the Armed Forces Day celebration at Pasco, Calif., Electronics Company 12-20 was sponsored with a float bearing the name "Dorado." Post No. 119, American Legion . . . Electronics Company 9-11, Hot Springs, S. D., provided the Navy portion of an Armed Forces Day exhibit of Reserve Units at Rapid City Air Base. . . . On May 18th and 20th the mobile Emergency Communications Unit of Naval Marine Corps Reserve Training Center, Indianapolis, Ind., was stationed on the World War Memorial Plaza as part of the display of military equipment. W9AK operated the unit under the Training Center's call, KG5R/9, to demonstrate use of the equipment under field conditions.

Single Sideband

(Continued from page 57)

job, drop a note to W2SNQ. W3KFP reports that SNO is offering tested sets of components for the phase-shift network of the W2UNJ-type exciter.

W8LRK writes to suggest that perhaps a combination of controlled carrier and s.s.b. might help to solve the problem of critical receiver tuning that scares off so many of the a.m. gang. The controlled carrier could be switched out, of course, after the receiving operator had been instructed in the carrier-reinsertion tuning technique. Anyone interested in trying it? — B.G.
NATIONAL CABINETS & SUB-BASES
THE BUY OF THE YEAR—We just purchased the entire stock from National. Steel cabinets and sub-bases. Of course, they are brand new and % of the A-V-E price. From list.

<table>
<thead>
<tr>
<th>CABINETS</th>
<th>Price</th>
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<tr>
<td>Type C-HRO-7, 19%&quot; w. 10&quot; h. 10&quot; d.</td>
<td>$6.00</td>
</tr>
<tr>
<td>Type C-NC-185, 19%&quot; w. 10%&quot; h. 15&quot; d.</td>
<td>$7.50</td>
</tr>
<tr>
<td>Type C-NC-173, 19%&quot; w. 10%&quot; h. 12&quot; d.</td>
<td>$6.00</td>
</tr>
<tr>
<td>Type C-NC-33, 16%&quot; w. 10%&quot; h. 12%&quot; d.</td>
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SUB-BASES

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<tr>
<td>B-NC-33</td>
<td>$1.05</td>
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</table>

These metal cabinets are exactly the same size for the latest tele receiver cases. Heavy gauge steel, with rounded corners, in blank form. Sprayed and baked in light gray enamel. Bottom and back removable.

RAYTHEON VOLTAGE STABILIZERS
Positive Stabilization +1/2% Input 95-130 volts, 60 cycles single phase; output 115 volts stabilized to ±1/2%. Output 6.0 or 1.2 volts stabilized ±1/2%.

<table>
<thead>
<tr>
<th>Output Net</th>
<th>Catalog</th>
<th>Cap. Wt. Gm.</th>
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<td>VR-816</td>
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</tbody>
</table>

GRID DIP METER
LYSCO "DIPMASTER"
3 Mc to 150 Mc frequency range; calibrated for use with various meters. Complete power supply and tubes. Really a good buy at $32.83.

RAPID ELECTRIC
SELENIUM RECTIFIER MODEL 507
SPECIFICATION
AC Input—110/120V, 60 cycle AC. DC Output—5 Amperes 0-7 Volts Duty—Continuous

FEATURES:
- Accurately calibrated voltmeter—Output current and voltage tapers control affecting smooth variation from zero to maximum—Full wave rectification with capacitor filtering for extra smooth (low ripple) DC power.

SUGGESTED APPLICATIONS:
- Battery charging (from 2 volt to 6 volt cells) at any current to 300 amp—Battery eliminator—substitute for dry or wet cells—Operate and control speed of model locomotive—DC power for hobby projects—Parts for model airplane—Supply for Analytic Chemist to do "on the Spot" analyzing—Ideal for Physic and Chemistry teachers and School Laboratories.

Our 28th Year
QUALITY—PRICE
DEPENDABILITY

TERRIFIC BURR
ting. Can also be used as a 15 volt, 6 amp. transformer.

SMOOTHING SWINGING PRICE EACH

CHOKES

| TYPE | $6.50 @ 10 amp. filament transformer upright-mounting $1.69 |

PLATE TRANSFORMERS
For Small Transmitters, DC Voltage Ratings are Approx. Values Obtained at Output of a 2 section Choke filter. Using Mercury Vapor Rectifier Tubes Pri. is for 115 V, 60 cy.

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<thead>
<tr>
<th>Type</th>
<th>Sec. Rms. DC</th>
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<tr>
<td>806</td>
<td>500-800</td>
<td>$5.50</td>
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<td>$9.00</td>
</tr>
<tr>
<td>812</td>
<td>1200-1600</td>
<td>$9.00</td>
</tr>
</tbody>
</table>

LYSCO EXCITE-TRANSFORMER
Model 600
De-TV1-ed
Conventional
VFO or XTL
35 watts input on 10, 11, 12, 20, 30 & 300 watts. Output 50 ohm coax.

MODEL 50
Model 50 Transformer designed to feed long wire antenna. Can be used on 115 V, 60 cy.

REMOTE CONTROL BOXES
For SCR 552's, Brand New in Original Packing; Consists of 5 push button switches, 5 Western Electric Pilot Assemblies, with Pilot Bulbs and Dimmer, and lever Switch all finished in Black Grecle. Order a few today for only .95.

BC 434-A
Used with radio compass receiver R6-ARN-7 Bendix
ADP-124A
T30-THROAT MIKE 10 for $1.00
FL-5-LAZY Q RADIO FILTER Unit. High Impedance $1.75.

FILAMENT TRANSFORMERS

<table>
<thead>
<tr>
<th>Type</th>
<th>2.5VCT @ 10 Amps</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>902</td>
<td>2500V 7500V Ins.</td>
<td>$2.79</td>
</tr>
<tr>
<td>903</td>
<td>2500V 7500V Ins.</td>
<td>$2.79</td>
</tr>
<tr>
<td>904</td>
<td>2500V 7500V Ins.</td>
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</tr>
<tr>
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<td>$2.79</td>
</tr>
<tr>
<td>916</td>
<td>2500V 7500V Ins.</td>
<td>$2.79</td>
</tr>
</tbody>
</table>

If not rated 25% with order, balance C.O.D. All prices F.O.B. our warehouse New York. No order under $2.00. We ship to any part of the globe.

LEEDS RADIO CO.
75 Vesey Street
Dept. Q 59
New York City 7
TABLE 18-III
Resistor-Condenser Color Code

<table>
<thead>
<tr>
<th>Color</th>
<th>Figure</th>
<th>Multiplier</th>
<th>Tolerance Voltage (%)</th>
<th>Ratio*</th>
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<td>1</td>
<td>100</td>
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<td>Brown</td>
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<td>10</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>Red</td>
<td>2</td>
<td>100</td>
<td>2</td>
<td>200</td>
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<td>Orange</td>
<td>3</td>
<td>1000</td>
<td>3</td>
<td>300</td>
</tr>
<tr>
<td>Yellow</td>
<td>4</td>
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<td>400</td>
</tr>
<tr>
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<td>Blue</td>
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<tr>
<td>Violet</td>
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<tr>
<td>No color</td>
<td></td>
<td>-</td>
<td>200</td>
<td>500</td>
</tr>
</tbody>
</table>

* Applies to condensers only.

---

Yes, it's from the Handbook —

near the table of color coding on transformer windings in Chapter 18, a few pages past the chart that tells which size drill to use; a sample of the many different kinds of information you will find.

It does seem that — no matter what you want to know — the answer is in the 605 page

RADIO AMATEUR'S HANDBOOK

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CHAMPIONS ENDORSE CANDLER WAY

Get skill, accuracy, speed with the highly endorsed Candler System. Learn to send and receive by telegraph or radio code. Government service and commerce need thousands of better trained operators. Air commerce, mail, freight, etc., demand expert, reliable operators. Good pay. Get the Candler System, the maker of champions. It teaches you the "hunch" of sound name, airmanship, speed, sending and receiving without strain. Adventure — good pay. Learn at home or wherever you are. Rush name today for free book.

CANDLER SYSTEM CO.


---

Working DX

(Continued from page 48)

DX station anyway. They have a point, of course — they have been waiting as long as the "friend," they are just as eager for the contact, and they have the right to a fair chance. If the foreign station is trying to work some particular state that he may need for WAS and is being "hooked up" for that reason, any decent W will respect the request and stand by, even though his impatient fidgeting may cost him a new seat to his trousers.

In the "rat races" that develop around a new and rare DX station, you will often hear W stations calling while the DX station is transmitting. This generally happens when the W hasn't heard the DX station come back to anyone, because the DX was smothered by QRM, and so the W gives another call. Even the best operators are occasionally guilty of it, and it is an excellent argument why the DX station should not answer Ws on his own frequency. There are some W stations that can be observed calling the DX station all through a QSO, when there is no QRM, and the one obvious conclusion that can be drawn is that they can't hear the DX station anyway. These actions soon acquire for the W the well-earned reputation of "hid." If they can hear the DX, they must believe that the operator of the DX station will suddenly stop in the middle of his QSO and listen for other calls!

Under similar circumstances you will sometimes hear Ws calling the DX on the frequency of the W station in QSO, while the W is transmitting. This blatant violation of all operating ethics and courtesy is a despicable practice, and fortunately, it is confined to a few who seem to feel they are above reproach. Their reputations among other DX-chasers is not particularly

enviable. The time to call the DX station is after he has sent "SKI" to signify the end of the QSO.

A highly-debatable point of ethics is how long a QSO should be with a rare DX station. Some W stations seem to go out of their way to stretch out the QSO, sending their full mail address (instead of a simple "Pse QSL via ARRL"), telling a ZD5 he is the first ZD5 QSO (when the ZD5 has only been on the air a week and is the first in the history of amateur radio), and to please QSL for DXCC, YMCA and RSVP! With (Continued on page 94)
**Terrific Newark Scoop!**

**Famous HALLCRAFTERS S-37 AM-FM RECEIVER**

Regular Price $591.75

Reduced to ... $249.50

LESS SPEAKER

**BRAND NEW! SMASHING VALUE! LIMITED QUANTITY!** Cover 130 to 210 Mc. An Amazing Buy! These famous HALLCRAFTERS S-37, High Frequency AM-FM Receivers are regularly priced at $591.75. Now you can get 'em Far Below Manufacturer's Cost! Applicable to all orders, Amateur Reception and Special Industrial Use. A pre-loaded gear drive with separate bandwidth dial provides easy tuning. Cover entire range of 130 to 210 Mc. No band-switching! 2 RF stages, tuning arc tubes, and intermediate frequency of 18 Mc assure high ratio of image rejection, high sensitivity and selectivity. AVC switch, ANL, RF and AF Gain Controls, Tone Control, Dual-purpose 5 and tuning meter, Compensated for frequency drift, 650 and 5000 ohm output. Beautifully built, shock mounted. Tubes: 3-D65, 7-A67C, 6A6Q, 6J7C, 26-A6M, 6L6H, 6L6Q, 6G7, 9A5. Black wrinkle steel cabinet 19‘W x 9½‘H x 14½‘D. S.c., Wt. 95 lbs. No. A20624, Special $294.50.

Only $24.95 Down—12 Months at $19.84

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**Model 700 Xmitter**

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2 Band crystal controlled, phone xmitter for 114/148 and 235/260 mc. 5 watts at 240 mc, 8 watts at 144 mc. Tubes used: RF—1-6AQ5, 2-6C4, 1-6H2. Modular—2-6A6Q in PP, Fil. voltage 6.3 at 3.33 amps AC or DC. Plate 300 V at 220 ma. Less tubes, power supply, crystal, tube. Big value. No. S-954, 12 lbs... $19.95.

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(A) Delivers 250 V @ 50 ma, 100 V @ 15 ma, 6.3 V @ 2.5 amperes, and 24 V bias. Full load is 94 db below 250 V, and 57 db below 100 V, 4½’ x 8 x 2”. Less 593 $37.80. Lb. No. S-9777 Special $6.95

(B) Output: 250-300 V @ 2-6 ma, or 280-320 V @ 5-8 ma. Filaments 6.3-6.3 V, adj. @ 1.5 ma. 3½’ x 10¼’ x 6”. Less 80 rect. 6 lbs. No. S-9778 Special $4.95

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**MILLEN 90651 GRID DIP OSCILLATOR**

In Stock—The most versatile Test Instrument for Amateur and Lab use. Frequency range 1½ to 270 Mc. Ideal for measuring harmonic content in the elimination of TVI. Transformer type power supply, plus provision for battery operation. Direct frequency calibrated, anti-backlash gear drive dial with uniform scale lengths. No. A19413, complete with tube and inductors, Net $55.00

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They went like hot cakes at $99.50. Now a lucky morphine allows us to offer them at $89.50. Quantity limited. Act fast! This lot may be the last of these famous frequency meters available. All fully reconditioned and tested. Perfect operating condition, fully guaranteed. Crystal-calibrated in all ranges. 125-250 and 200-400 KC. Ideal for use as signal generator and VFO. Complete with tubes, crystal and calibration book. No. S-1196 . . . $89.50.

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Radar, Communications and Sonar Technicians Wanted

For Overseas Assignments

Technical Qualifications:
1. At least 3 years' practical experience in installation and maintenance.
2. Navy veterans ETM 1/c or higher.
3. Army veterans TECH/SGT or higher.

Personal Qualifications:
1. Age, over 22—must pass physical examination.
2. Ability to assume responsibility.
3. Must stand thorough character investigation.
4. Willing to go overseas for 1 year.

Base pay, bonus, living allowance, vacation add up to $7,000.00 per year. Permanent connection with company possible.

Apply by Writing to:
C-3, P.O. Box 3552
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Men qualified in RADAR, COMMUNICATIONS or SONAR give complete history. Interview will be arranged for successful applicants.

"How's DX?"

"How's DX?"

That reports the latest in the world of rare DX. When you do run into something good, drop a card to the DX Editor telling of your work, because it is this collective interchange of information that makes up the department. Pertinent information on time, frequency and mailing address (if the latter is not in the Call Book), and personal items about the DX stations, all are welcomed.

When You Are DX . . .

If you are operating from a foreign country that is well represented by many amateurs on the air, your operating can follow the pattern of general operating mentioned under "Common DX" and normally associated with general rag-chewing and traffic handling. If for some reason or other you find you are suddenly much sought-after, by virtue of having the only signal getting through from your country or for some other reason, your operating may take on the form to be outlined presently for rare DX. But normally just ordinary good operating will take care of anything you are likely to encounter.

If you represent rare DX, by happening to be in a rare country, you are going to find that the DX men are all anxious for a chance to QSO. You might as well resign yourself to the fact that for some time you will be so eagerly sought-after

(Continued on page 90)
You'll look good alongside this new Collins combination and you'll feel even better when you sample the sensational savings made possible by our "SURPRISE" Trade-In Allowance on your used (factory-built) communication equipment. Best of all, if you order now, you guarantee yourself delivery from the initial factory production run of the 75A-2.* And you retain your present receiver until your 75A-2 is ready for delivery. So get your trade-in deal working right now. Wire, write, phone or use the handy coupon below.

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THE HOUSE OF "SURPRISE" TRADE-INS
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☐ O. K. Walter, Rush "Surprise" Trade-in offer on my
(describe used equipment)
for the new COLLINS ☐ 75A-2 ☐ 32V-2
☐ Rush Free Copy of your new 164 page Catalog.

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Shpg. wt. 75 lbs. Only $420.00 net
Spkr. in matching cabinet $220.00

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Convenient terms on your new equipment purchases

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SEND FOR YOUR COPY TODAY!
twice as easy as hand sending!

New Super Deluxe
Vibroplex

"presentation"

there's no arm-tiring effort, no nerve strain when you do your sending with this new, super deluxe vibroplex key. requires no special skill to operate. smooth, positive action. adjusts instantly to personal touch and style of sending. now you can send slower or faster than has ever before been possible. twice as easy as hand sending... 100% better! no wonder good operators prefer this easy-working key. other models in standard and deluxe finish. $12.95 up. left-hand models one dollar more. free catalog! order yours to-day!

24-k gold-plated base top $29.95

the vibroplex co., inc.
new york 3, n. y.

that you won't be able to work stations fast enough. you will be pursued by amateurs all over the world waiting to add your country to their lists. by good operating, you can give them all their opportunity in a minimum of time, and then settle back and operate in any manner you please. remember one very important point -- you are in control of the situation, and whatever you say and do will determine the actions of the stations chasing you.

if you are rare, your first qo will result in a number of answers, particularly if the band is open to the united states, canada or other area with a large amateur population. if during your qo you use "u" and "d" signals, you will keep most of the calling stations off of your frequency. if you don't use them, answer a station a few kilocycles one side or the other of your frequency. if you don't use "u10," "d5" and the like, you are going to be called on or very near your frequency, and the worst thing you can do is to reply to someone exactly on your frequency. if you do, everyone will be calling on your frequency after the qso. if you answer slightly off your frequency, the stations calling you after your first qso will be much better distributed, and several should be easy to copy. on phone, indicate where you will start tuning, as "listening down from 14.275" or "tuning up from 23.600." if you don't, the ws will generally cluster at the nearest edge of their subband, where the qrm is always bad.

the first station you work is going to ask you for a qsl card. he is also going to ask you for your mailing address, and so are a lot of others. if your country has a qsl bureau, it is sufficient to say "qsl via bureau." or, if you like, you can give the station your mailing address, with the request that he forward it to arrl and rsgb. in this way it will appear in qst and the rsgb bulletin and it will also be put in the radio call book magazine. when working stations in rapid succession, it is sufficient to give your address during every other qso -- the waiting operators will copy it during one of these times. if you are already listed in the call book, just say "qth ok in book." the less explaining you have to do, the shorter you can make your qso. you can also shorten your qso's by saving during your first transmission "will qsl via arrl," "will qso via bureau" or however you plan to do so. there is then no excuse for the station working you to go through the lengthy process of giving you his full address. remember that the longer you make a qso, the greater will be the number of w and ve stations waiting to work you. the shorter you can make each qso the sooner you will get the "one-man contest" portion of your amateur life out of the way.

if possible, your first reply to a call should include a signal report, an assurance that you will qsl, and information on how a card can be sent to you. in signing over, be sure to include the call of the station you are working, because

(continued on page 98)
We Have the Most Satisfied Customers

Ask the fellows who deal with me. They’ll tell you that WRL will allow you more for your present equipment—that WRL’s large volume of sales mean faster turnover and greater savings. Our customers know that we finance our own paper, eliminating all red tape. We will accept a low down payment and you can name your own terms. WRL buys more equipment—WRL sells more equipment. We offer the most personalized service anywhere.

NOW YOU CAN AFFORD TO OWN A BEAM

10 METER BEAM

Plumber’s delight 3 element beam quickly assembled; furnished with Gamma match. Extremely light; all aluminum construction; grounded antenna; very low priced. Furnished less mast and lead. Full instructions furnished.

Narrow spaced .... $14.75
Wide spaced ...... $15.95

Leo I. Meyerson
WØGFQ

NEW WRL “400” GLOBE KING TRANSMITTER

MORE WATTS PER DOLLAR
Efficient performance on all bands—
10 to 160 on phone and CW. 350
watts phone—400 watts CW. Provi-
sions for ECO. Complete with tubes,
meters, and one set of coils.

KIT FORM WIRED-TESTED
$379.45 $399.45
LOW DOWN PAYMENT

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Just right for your control room
walls. Approximately 28” X 36”.
Contains time zones, amateur zones, monitor-
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WRL 175 WATT GLOBE CHAMPION TRANSMITTER

MORE WATTS PER DOLLAR
R.F. Section a complete 175 watt
XMTR. Provisions for ECO. Automatic
fixed bias on Final and Buffer. Class
B Speech Modulator, 175 watt input
—10 thru 160 meter bands. Complete
with tubes, meters, and 1 set of coils.

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$279.00 $299.00
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Please send me:
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City: State:
you might have been covered by QRM when you first came back. Although it would appear to save a little time by not sending his call, actually it will pay off in fewer interrogations from stations breaking in to ask if you came back to them. Use “KN” to designate that you are QSO and do not wish to be called. The reply from the station you are working will follow practically the same pattern of information that you gave him. Acknowledge him, give your “73” and sign with an “SK” or a single “CQ DFT.” You have shown clearly that you are listening for new stations, and you will get plenty of calls. Don’t make the mistake of going back to someone who may have called during your QSO. This is an open invitation for everyone to do it the next time around, and you will soon find further QSOs impossible. If during several QSOs someone persists in calling you on the frequency of the station you are working, disregard him entirely and make a mental note not to answer any of his calls for a few weeks or months or years. Once you reply to this type of operator, all will be chaos, because a number of others will then try it. And be careful not to answer anyone calling on your own frequency during any operating period, because you will immediately move the QRM over on to you, the station that raises you may not hear you come back, and only confusion will ensue.

Don’t try to work more than one station at a time. In nearly all cases where this is tried, it results in the several stations being worked all coming back at the same time, which leads only to confusion. DX stations have succeeded in working several stations at once, but it requires superb operating and even then it is questionable if it saves time. You can economize on time by reducing remarks to a bare minimum. Your pursuers will realize quickly that you are an operator to be respected and will act accordingly.

If some W asks you to “LOOK FOR MY FRIEND W...” say “SORRY, TOO MANY CALLING.” If you don’t, you will find that everyone will call just the same, permitting no chance to pick the friend out of the group. It is much better to give everyone an open chance at you than to try to be a good fellow and do someone a favor.

Use “CL” to indicate when you are closing your station and abide by it, even though you hear scores of stations calling. Just before you sign, you can mention when you expect to be on the air the next time, and you can rest assured that a very short CQ at that time will bring a hearty response, if the same paths are open again.

These recommendations may seem rather cold-blooded and heartless, but they are things you will have to do to remain in control of the situation. Once you have worked and sent QSL cards to a fair number of stations, you will find that you are not smothered by calls as you used to be, and you can go your merry way and have

---

Signals of Distinction

TUNE across any ham band and certain signals stand out for their quality of sending. Every transmission by these "Signals of Distinction" has the crisp quality, the rhythmical precision that only automatic transmission can impart.

Eldico, pioneers in quality kits for the amateur, now presents an electronic bug that represents the cumulative efforts of W6OWP* and the Eldico staff. The Eldico electronic bug is the first instrument to be offered commercially that includes all the features recommended by the experts for precision keying. Look over the technical features, listen to the air, wiggle


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Eldico Electronic Bug. Self-completing type of automatic keying device. Features self-completing characters that automatically insure perfectly formed characters; continuously variable speed control for any rate of sending from 8 to 50 w.p.m.; separate control for weight of characters and ratio of dashes-to-dot length, allowing individual tailoring to your own fist; self-contained with built-in power supply in attractive block crackle portable case, complete with automatic key.

EE-1, complete kit including tubes and instructions... $21.95
EE-1, wired and tested. Electronic Bug ready to hook up to your rig........................................ $27.95
EE-2, complete kit including tubes and instructions and addition of integral keying monitor with speaker $29.95
EE-2, wired and tested. Electronic Bug with keying monitor, complete ready to operate.................. $39.95

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From practice keys for beginners to the very finest commercial equipment, perfect performance calls for Signal. Send for FREE descriptive literature today!

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Complete mobile package — nothing else to buy. Outstanding mobile signals use motorola equipment — backed by years of communication equipment experience — World’s largest producer of 2-way mobile equipment.

A mobile transmitter with a double feature FM or AM at flip of the switch, the MOTOROLA FMT-30-1-M-30 (27-30 M.C.). $130.00

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3-30 famous Gunset converter complete to connect to the P-69-13 or 18-ARS receiver. $39.95

P-327-E Fire wall load speaker . . . $5.00

The above comes complete with all necessary accessories and mounting hardware. Order direct or through the Motorola National Service Organisation member in your area.

Note: This Receiver and Transmitter is equipment which has been returned from the field, modified and rebuilt for Amateur Service.

For further information write to:

MOTOROLA INC.
Amateur Sales Dept. QST — September
1327 W. Washington Blvd. Chicago 7, Illinois
Attention: Harry Harrison, W9LX, Tel. Taylor 9-2200 Ext. 161

some fun in good rag-chews. Of course, you can have rag-chews when you first get on the air, if you announce that you plan to rag-chew for ten or fifteen minutes and stick to it. The stations waiting will respect your wish, but they will be watching the clock. However, you will make more operators happy (and speed the day when you can live your own life) by working stations in rapid succession during your early activity. You will find that some stations will call you several weeks or a month after you have worked you the first time, while you are still much sought-after, to ask you if you received their card, or to tell you that a card is on the way to you. After you have established the truth of the preceding sentence by working several of them, it is more desirable to reply only to stations you haven’t worked before, so that many stations will have a chance to add your country to their lists.

If you become disgusted with the tactics of some of the Ws you first run into, analyze your own operating. You may find that you have been at fault, by having answered a call on your own frequency or one that was sent before you had sent your “SK.” If such is the case, modify your operating and you will have no trouble. You are truly boss of the situation if you want to be!

50 Mc.

(Continued from page 48)

The collinear array can also provide a good answer to the dilemma of the eastern operator who wants to concentrate on horizontal polarization for 2-meter DX attempts, but who hates to pass up the regular activity that is available on vertical. A much better rotary array can be built if one doesn’t have to worry about two polarizations.

The World Above 420 Mc.

With feedline losses being what they are at 420 Mc., many of us have given thought to the idea of mounting transmitting gear up in the antenna. This approach is fine for simple oscillator-type rigs, but not many have tried it with multistage jobs. Our friends in Britain have a special incentive in this respect. Being limited to 25 watts input on 420 (G5BY is using an English tube similar to our AX-9003, running as a straight amplifier, mounted at the top of his tower. Some idea of the advantage in this arrangement can be drawn from field strength indications taken with the amplifier operating at the end of the 35-foot transmission line, and at the top of the tower. With the same operating conditions at each position, the normal set-up

(Continued on page 102)
No Matter Where He Is—Work Him!

PUT UP THE RIGHT ANTENNA

AIM IT WITH THE MAP

As soon as you hear a DX station you can see exactly where he is—because the country prefixes are not just listed in the marginal index; they're printed on the countries, themselves. You can tell his direction from you, and his distance. There's no question about which continent he's in—boundaries of the six continents are plainly marked. 267 countries are clearly outlined.

The time zones are plainly marked, too. Call areas of thirteen countries are shown. Principal cities are designated. There's a scale of miles, another of kilometers. Printed on heavy map paper measuring 40" wide x 30" high, in 8 colors that really stand out, this new ARRL World Map is easily read from your operating position. 267 countries are clearly outlined.

40" x 30" 8-Color Map
$2.00 postpaid anywhere in the world

BUILD IT FROM THE ANTENNA BOOK

A good antenna will take the place of hundreds of watts of power: power of your transmitter, power of the transmitter on the other end of the QSO. It will put your signal where you want it to go and it will bring in the signal you want to hear.

The 268 page Antenna Book with its 831 pictures and diagrams gives full instructions on how to build the antenna you've always wanted. It gives dimensions and shows radiation patterns. It tells how to match the transmission line to it, what you can expect from it.

Whether it's a rotary beam on 20, a 160 meter job in a less-than-80-meter space, a VHF multi-element affair or some other, the antenna you are going to put up is fully described in the ARRL Antenna Book.

268 page
Antenna Book
$1.00 postpaid in U.S., U.S. possessions, Canada.
$1.25 elsewhere

All prices in this advertisement are in U. S. funds

THE AMERICAN RADIO RELAY LEAGUE, INC.
32 LA SALLE ROAD WEST HARTFORD 7, CONN.
MORE SIGNALS PER DOLLAR
From Money Invested in an Antenna

Self Supporting
STEEL TOWERS
For Rotary Beams, FM, TV

ATTRACTION—NO GUY WIRES!
• 4-Pest Construction for Greater Strength!
• Galvanized Steel—Will Last A Lifetime!
• SAFE—Ladder to Top Platform
• COMPLETE—Ready to Assemble
• Easy to Erect or Move
• Withstands Heaviest Winds
(We will supply stress diagrams for your building inspector)

EASY MONTHLY PAYMENTS
Up to 12 Months to Pay!
All Vesto Towers are available on a special monthly payment plan which requires only 1/8 down. Write for free details.

IMMEDIATE DELIVERY
on all 7 popular sizes. Note the low prices for these quality lifetime towers: 32'-$347.75, 28'-$314.75, 25'-$212.75, 35'-$144.75, 44'-&$164.75, 50'- $192.75, 61'-259.75, 100'- $974.75. Towers are shipped to your home knocked down, FOB Kansas City, Mo., 4th class freight. Prices subject to change...so order now! Send check or money order—or write for free information.

WRITE TODAY FOR COMPLETE FREE INFORMATION AND PHOTOGRAPHS
The VESTO Company
101 Main St., Parkville, Mo.

BUY OF A LIFETIME!
TRIED AND PROVEN THE WORLD OVER
LETITINE MODEL 240

This beautiful transmitter originally sold for $98. Buy it direct from our factory for only $69.95, complete with instructions for TVI reduction. Even if you already have a transmitter of your own, this rig makes an excellent standby. You can't afford to miss this opportunity.

The 240 is a complete 40 watt Phone-CW rig, working all bands from 160 to 10 meters; complete with (3 x 14 x 8) cabinet, self contained power supply, meter, tubes, crystal and coils for 40 meters. Tube line-up: 6V6 exc., 807 final, 6S7 mikes amp., 6N7 phase inverter, 2 6L6s mod. TUGG rect. — weight 50 lbs. — 90 day guarantee. PRICE $69.95 $20 deposit with order — the balance C.O.D.
Coils for 80, 20 and 10 meters $2.43 per set. Coils for 160 meters $3.00.

LETITINE RADIO MFG. CO.
62 Berkley St.
Valley Stream, N. Y.

QSL BUREAU CHANGES
(Continued from page 49)

The last complete listing of foreign QSL bureaus was contained on page 49 of June, 1950, QST. The following changes to that list are noted:

Austria: QSL Bureau (U. S. Occupation Forces), APO 777A- 
% Postmaster, New York, N. Y.
China: M. T. Young, P.O. Box 84, Taichung, Formosa
Cyprus: MD3XEP, P.O. Box 451, Nicosia
France: R. E. F., 73, Rue Marcovall Montreuil (Seine)
Indonesia: P.A.P.L., P.O. Box 222, Surabaja, Java
Luxembourg: LXX1AB, 40 rue Trevires, Luxembourg
Malta: R. F. Gaeta, 20, Collegiate Street, Birkillara
Pakistan: P.O. Box 414, Lahore
Romania: A.R.E.R., P.O. Box 95, Bucharest
Southern Rhodesia: R.S.B.R., Box 1088, Bulawayo
Trieste: MP2AA, Major M. H. R. Carragher, HQ V. G. Police

AUSTRIA

U. S. occupation personnel in Austria have been granted licensing privileges, according to John E. Stanis, OE13AA/W7TKI. Of the fifteen licenses granted, five stations are on the air, operating mainly on 20 meters.

The OE13 stations are permitted to operate between 3500 and 2800 kc., 14,150-14,400 kc., and 28,100-28,700 kc. Rules are similar to those for the DL4s. Why the prefix 137 Mr. Stanis says it was selected by the Signal Officer to prevent confusion with the yet-to-be-legalized Austrian national stations which use the prefixes OE1-
OE59.

TANGIER ZONE

After many years of no radio regulation, the local administration has brought out a law governing the establishment of radio stations. A stipulation of the new law is that stations must pay a registration fee equivalent to approximately $140. No distinction was made between amateur and commercial stations, and attempts by the Tangier Amateur Radio Club to get this restriction eliminated for amateur stations has

(Continued on page 104)
HARRISON IS GONSET HEADQUARTERS!
FEATURING THE
NEW! SUPER-BANDSPREAD TRI-BAND CONVERTER

THE ULTIMATE IN MOBILE RECEPTION ON 10-11, 20, AND 75 METER PHONE!
- Low noise, high gain RF stage for "big receiver" sensitivity!
- High stability oscillator for minimum frequency drift!
- Over eight linear inches of bandwidth on 10-meter band (five complete revolutions of large tuning knob) Proportionally wide spread of 11, 20, and 75 meter bands!
- Covers 15 MC SWL band for good daytime BC reception in isolated areas.
- Edge illumination, plus color band, insures maximum dial readability. Calibration accurate better than 1/10 of 1%!
- Adjustable antenna trimmer for signal peaking.
- Four tubes: 6666 RF Amplifier, 6H6-High Gain IF, 6AT6-Low Noise Triode Mixer, and 6CU-Clapp Type Oscillator.
- Same size cabinet as famous 10-11- and 3-30 Gonsets.

Finest multi-band converter available for amateur mobile use. Also FB for use with any ham or BC receiver for "hot" dual conversion.
10, 20, or 75 meter reception!

New Gonsen Tri-Band Converter — $42.50
Send $42.50 with your order and we'll rush your new TRI-BAND to you by fastest special handling, special delivery. PREPAID!!
All Gonsen orders speeded out within one-hour after receipt!

IF IT'S GONSET — HARRISON HAS IT!

NEW! Universal steering post mount for all Gonsens $8.25
Lowest model Gonsen KX — $43.75
Continuous Coverage, 3 to 30 MC Converter $39.95
Famous 6, 11-11.5, or 20 meter Converters $39.95
LYSCO 16-Meter Mobile Radio — $33.95
Very Limited Quantity — Only $4.95

BUY IN MOBILE GEAR
SUBRACO MT-15X Favorite 16-Meter Antenna — Only $79.95
STANDARD X-18-250 Factory wired — $29.95
LYSCO MS-3108 Bandswitch — $24.75
Continental Coverage, 3 to 30 MC Converter $39.95
Famous 6, 11-11.5, or 20 meter Converters $39.95
LYSCO 16-Meter Mobile Radio — $33.95
Only $39.95
PREMAX new RS Universal Spring Mount, Beauty! $12.95
PREMAX new RS Universal Spring Mount, Beauty! — Only $12.95
MASTER MODEL Model 102 Universal Body Mount $12.95
Tuned Stainless Whip 5 and 6 wave $7.95
Center-loaded whips for 20, 40, or 75. Speedy

LYSCO'S TVI-LESS VFO TRANSMITTER

CO's Editor reports on the Lysco 600 Transmitter in the August QST. Be sure to read this interesting article. You'll agree that the Lysco Transmitters are excellent buys! Easily comparable as complete units or driven for high power stations.
TVI Suppressed Transmitter Model 600 — $119.95
Same — No TVI Suppression Model 500 — $109.95
Lyseo MOD-20 Matching Modulator for either above $39.95
(Send for literature including schematic diagrams)

AUTOMATIC KEY SUPER VALUE!
Buy a precision-built "bag" transmitter, and get the originial price list of desirable accessories! Dual Ratio for varying speeds — Positive contact alignment at all times — Super-flexible vibrator for feather-touch operation (Makes unbroken string of dots up to 20 seconds) — Noiseless weight stop — Undebugged ake — Heavy basic. A Terrific buy for old timer or beginner.
Very Limited Quantity — Only $4.95

JOHNSON VIKING I
ONLY HARRISON HAS THE DE-TIRED VIKING!
Here's America's newest fine quality transmitter, completely laboratory wired and tested, and incorporating TVI preventative measures. Completely operated to commercial standards, delivers 100 Watts phone or 125 Watts CW OUTPUT! Push-pull 807 finals, modulator Oscillator band switching — 8-20-40-80-120 meters — optimum final tank Q on all bands — oscillator keying for break-in — over-all circuit layout — precision for VFO — full selective, for 10 frequencies — dual power supply — all circuits metered. Entirely self-contained in desk cabinet, 11" x 17" x 21" wide. Supplied complete with tubes and instruction book — ready to operate. Only $298.50

AMAZING BEAM BARGAIN!!!
Famous Premax three-element, 10-meter beam with aluminum dual boom, fully adjustable seamless dural elements. T-tap, all hardware and instructions. All elements insulated—not a plumber's delight. Feed with coax, twinlead or open line. Makes DXing a cinch! List price was $50.00 Premax 6-0209, 3-Element beam SPECIAL $24.95

BC-22! AC POWER SUPPLY KIT
Regulated power supply kit for BC-221 frequency meter. All new standard parts (Thordarson, C-D, Ohmite, etc.) including chassis, line cord and complete instructions. Nothing more to buy. Fits snugly into base. Complete kit, less tubes. Price $22.95

EAT UP those WANTED to buy a Ham Gain in USELESS? SEND FOR LIST!
met with failure. Police action has been taken against several club members, according to John E. Terry, EK1DI, president of the group. The club is still attempting to obtain a more equitable set of regulations.

**SWEDEN**

Sveriges Sandareamatnorr will award a certificate to any amateur who can submit QSL cards confirming postwar two-way contact with each of the seven SM districts. European stations must submit two cards for each district. Send QSLs to S.A.A., Postgiokonton 62277, Stockholm 4, together with 10 international reply coupons.

**ROUMANIA**

Romanian amateurs are now grouped together in the "Short Wave Association of the Romanian People's Republic." Licensed by the Administration of Posts and Telecommunications, YO amateurs may use up to 50 watts output on 160, 80, 20, 15, 10, 6, and 5 meters and the higher frequencies, utilizing both radio-telephone and telegraph. Three types of licenses are issued in Roumania based on power output.

**DX Contest**

(Continued from page 50)

<table>
<thead>
<tr>
<th>San Marino</th>
<th>Barbados</th>
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<tr>
<td>I3SM/M1</td>
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**Mexico**

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**Turks and Caicos**

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**NORTH AMERICA**

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**French Oceania**

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<tr>
<td>5438-12.</td>
<td>152-A-9</td>
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(Continued on page 105)
Astatic presents the NEW SYNABAR unidirectional cardioid crystal microphone

Astatic's NEW SYNABAR MICROPHONE offers a new measure of clear-toned performance quality... and its perfection does not diminish through long service life, thanks to a new ruggedness of construction. Perhaps the outstanding engineering achievement incorporated in this newly perfected unit is the use of a special sintered metal to cancel out 15 db front to back, making the Synabar, for practical purposes, dead to sound from the rear. Excellent frequency range, from 50 to 10,000 c.p.s., is further enhanced by a Response Selector switch, which provides choice of ideal pick-up characteristics for either crisp voice or general voice and music. The Synabar's crystal element has a special METALSEAL protection against moisture or dryness. A high impedance microphone, it has an output level of -54 db. It has a satin chrome finish, is furnished with detachable concentric cable connector and 20 feet of single conductor shielded cable, and is available in models with or without off-on switch.

BUILD YOUR OWN GEIGER COUNTER!

It's EASY to build your own Search for Geiger Counter with this COMPLETE kit. Contains everything you need! Headset, tubes, batteries, metal case. Fully guaranteed! Sensitive to both beta and gamma radiation! Illus. instructions. FREE radioactivity specimens.

SCIENCE KITS LTD.

RADIO and TELEVISION
Thorough Training in All Technical Phases
APPROVED FOR VETERANS
WEEKLY RATES DAYS-EVENINGS
FREE PLACEMENT SERVICE for GRADUATES
For Free Catalog write Dept. ST-50
RCA INSTITUTE, INC.
A Service of Radio Corporation of America
350 WEST 4TH ST., NEW YORK 14, N. Y.

 Engineers who "talk test"... pick PEERLESS

Claims and counterclaims of quality are easy to make... but to the engineer, tests really talk. And indisputable evidence of Peerless Transformer superiority is found in the Square Wave Test... which reveals the slightest flaw in design and performance. Tests conducted by impartial engineers prove Peerless components have better power characteristics, flatter response curves, less intermodulation distortion and lower insertion losses. Send for the complete Peerless Catalog... giving full details on transformers that are really "best by test."

PEERLESS Electrical Products
1161 N. VINE STREET, HOLLYWOOD 38, CALIFORNIA • 161 SIXTH AVENUE, NEW YORK 13, NEW YORK
<table>
<thead>
<tr>
<th>Call Sign</th>
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</tbody>
</table>

**Correspondence**

(Continued from page 67)

A gadget that may prove to be a boon to his fellow-hams or to the manufacturer of radio equipment.

Then why shouldn’t he desire more recognition from our government and the general public at large? I have run into amateurs who have some kind of profession—doctor, lawyer, minister, grocer, etc.—but have never yet met one who said he was a politician. That’s it: politicians, and a lot of them, are what we need in our ranks. They seem to be able to get votes by getting bills put through to their best advantage.

—John G. Hunt, W8QIE

**Strays**

Very-low-frequency radio signals traveling completely around the world have now been detected by researchers at the National Bureau of Standards. The signals, transmitted from Naval Radio Station NSS at Annapolis, on a frequency of 18 kilocycles with a power of 350 kilowatts, were received at the National Bureau of Standards radio-propagation field station at Sterling, Va., about 50 miles away. Normal delay time for a round-the-world signal was more than a tenth of a second, and maximum signal intensity was observed at sunset.

The signals were received, with the aid of a large loop antenna 150 feet high, on a tuned-radio-frequency receiver. A dual-beam oscilloscope was connected ahead of the detector stage in the receiver so that the actual uncorrected r.f. envelope was displayed on the 5-inch screen along with an 18-kc. reference voltage. The delay time was measured by making a moving film record of the oscilloscope screen.

**SWITCH TO SAFETY!**

OFF
ANTI-CAPACITY SWITCHES
meet your needs for multi-circuit switching where a combination of quick break and low blade-to-blade resistance is required!

* For Making, Breaking, or Transferring Multiple Circuits in Radio, Television, P.A., Sound Recording Equipment.

Illustrated: New Federal Anti-Capacity 8 pole Double Throw Switch

The quick break feature of these Federal switches combined with the silver plated phosphor bronze blades and silver contacts make it possible to break high frequency A.C. as well as the A.C. and D.C. circuits usually encountered in sound, radio, radar, and test equipment. Can be easily adjusted for make-before-break, or break-before-make. Approved and used by the U. S. Navy, Army Signal Corps, and U. S. Forestry Service.

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No. 1425 - 2 P.D.T. (N.O.)
No. 1426 - 2 P.S.T. (N.C.)
No. 1427 - 2 P.S.T. (N.O.)
No. 12494 - 8 P.D.T. (N.O.)

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Dept. B, 38 West Biddle Street, Baltimore 1, Maryland

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Automatic Sender Type S

$24.00 Complete in U.S.A.


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 30c per roll.

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ACK RADIO SUPPLY CO.

Liberal Trade-in Allowances on your used Communications Equipment for the New COLLINS 75A-2

EASY TERMS

WRITE TODAY TO

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Tel. 4-0588 BIRMINGHAM, ALABAMA Tel. 4-0589

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TEST EQUIPMENT

The present emergency requires putting back into service both military and laboratory quality commercial test equipment. Interested in any TS, L, BC or other good pieces. Critically need TS-34's, TS-100's, TS-174's and any 1-200's, plus gear made by Boonton, General Radio, Stoddard, etc. Please communicate giving full nomenclature and serial numbers. Describe condition with your lowest cash price.

WESTON LABORATORIES

WESTON 93, MASS.

EASY TO LEARN CODE

It is easy and pleasant to learn or increase speed the modern way — with an Instructograph Code Teacher. Excellent for the beginner or advanced student. A quick, practical and dependable method. Available tapes from beginner’s alphabet to typical messages on all subjects. Speed range 5 to 40 W.P.M. Always ready, no QRM, beats having someone yell to you.

ENDORSED BY THOUSANDS!

The Instructograph Code Teacher literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have “acquired the code” with the Instructograph System. Write today for full particulars and convenient rental plans.

INSTRUCTOGRAPH COMPANY

4709 SHERIDAN ROAD, CHICAGO 40, ILLINOIS
HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in the field.

(2) No display of any character will be accepted, nor any solicitations, unless such is all or part capital letters he used which would tend to make one advertising section readable.

(3) The Ham-Ad rate is 30¢ per word, except as noted in paragraph (4).

(4) Remittance in full must accompany copy. No cash discounts allowed. In case of delay in payment of account, there will be a charge of 10 cents per word.

(5) Closing date for single run is the 5th of the second month prior to the publication date.

(6) A special rate of 5¢ per word will apply to advertising which is visible in the front section of the magazine in nature and is placed and signed by a member of the American Radio Relay League. The above applies to all new and renewal advertising.

(7) All advertising in this column regardless of which rate may apply.

(8) Because error is more easily avoided, it is requested that signatures and address be printed plainly.

(9) No exhibitor may use more than 100 words in any one issue nor more than one ad in one issue.

Please note the 7 rate on Ham-ads is available to ARRL members only.

QUARTZ - Direct importers from Brazil of best quality pure quartz crystals and piezoelectric crystals. Diamond Drill Carbon Co., 719 World Bldg., New York City

QSLs, SWLs, Meade, WBXCL, 1507 Central Ave., Kansas City, Kansas.


Estate W1AC: All in excellent condition. Postwar I-T 9x11 amplifier, 80-40-10-20-10 meters. Four 18:1, D104 with grip to talk mike stand. Price: $50.00. BC-45C, with roller control, 80, 40, 20 and 10 meter, $150.00. VFH152A BC-348-0 converted with AC supply and speaker. Lafayette chrome receiver, BC-45R-0, Tuner, 10 meter, 80, 40, 20, 15, 10 meter, 6 meter, 2 meter, 1 meter, 4200 watt, $39.25. KROE complete, $125.00. SX-33, $129.00. NG-173, 129.X, $192.00. BC-520, 649, R85-60, $69.00, SX-33, $29.05. VFH152A BC-109 on 10 for many other large stock trans. Free trials. Terms are financed by Leo, WBGQ. Write for catalog details.

Motorola transmitters, new, $100.00 used. $250.00. WBSCO, Hicco, 204 E. Fairview, Tulsa, Okla.

QSL's SWL's, For quality workmanship C. Frits, 1213 Briargate, Johnsville.

WANTED: 1 or 1 1/4 Wk, AC 110/120 volt 60 cycle generator. Belt drive. Also modulation transformer Thorlindson 1-14349. Condition and price list. First communication. E. Neilson, Box 67, Port Aransas, Texas.

IN54 Crystal, 676. BC-456 modulator, less tubs dynamos. As wk, see "Tabagorn", Amazing bargains. 114 5th St., New York, N.Y.

SELL: Complete outfit, due to death, Hallicrafters, Skytector Defiant D7, 125, 85 receiver, Sopwith, telegraph telephone transmitter IT-6, 25 watts. Also Astato microphone D104 A 125, 85 receiver. Also Beagle oscillator, complete with tube and equipment. $250.00. William Hayward, 10 Westbridge Drive, Babylon, L. I., L. N. Y.

SELL unused, perfect SX-24 with matched speaker, new 6 tube broadcast receiver in sealed carton, complete with battery supply, $25.00. Also heavy duty heavy duty 10 meter antenna. Both complete with 12" tubes. Bargain. 10BFP, 400'. Want: bug, 2X2 trans. or 14 meter for good camera. W2VRK, Zamia, 79 Sunset, Glen Rock, N. J.

SELL: Cut out: NC-2403, less speaker, 6 months old, $175.00. Also NC-2403 Viking emitter. Condition good, cut out NC-2404 Vibroplex original, wired and tested by Johnson factory $225.00. Also NC-2404, or both P.A. or both N.A. Arkansas. WBMM7, Williston, 1800 S. Main, Jonesboro, Ark.

SELL or swap: Amertron 680 volt 700 ma. plate transformer, kW output and 58 tubes with tubes. See N. Y. QST Dec. 11-11 converter. Smith Transoceanic portable for small communications receiver. Box 360, Salida, Colorado.

WANT to buy ham receiver A.1 condition. No junk. $75.00 top price. E. W. Janowski, 1210-18th St., Bay City, Michigan.

R. L. Brundage, General Manager, Radio Sales, Los Angeles, Cal. Reasonable prices. Call WR 8-6804, T. Diers, 88 84th St., Elmhurst, L. L. N.YC, N. Y.

BC-312K, bought new, converted AC, instruction manual, $60.00. Fred Kiefer, WLY1V, 5244 N. Ufer, Phila., Penna.


SALE: BC-454 electrically and mechanically perfect, completely converted. Write for details. Walter Becker, "78 Alphouse St., Rochester 21, New York W20ZB.

SELL: Original cartoons, never used: ""S"" X-10 IEFM exciter. Newly made, 40 meter folded dipole. Send $5.00 for send. W3XK, 214 Runnymeade, Jenkintown, Penna.

BC-222 transceiver, complete with batteries, micc, earphones, antenna, crystal and extra tubes: $45.00. ARC-4 transceiver, $100.00. R. Van Wuykheuse, WCRZ, 412 Humboldt St., Rochester, N. Y.

SELLING: W1KRU, 400 watt cw/phone 160 to 10 meters, VFO control, 100, 80, 40, 20 and 10 meter, $140.00. All parts over- $400.00, heater on 75 phone, NC-101X recently overhauled by National $75.00. Will deliver 100 miles Boston. BC-454A, 80-meter phone. Phone box in case for shipping, $45.00. Poi-tone trans 110/220 to 2200 KV, unused, $250.00. Headphones or small parts, $25.00. ABC, Graham. Mass. phone necessary. List 5 items and offer. W3XK, 214 Runnymeade, Jenkintown, Penna.

FOR SALE: HT-9 coils for 10-20-40-80 meters, $250.00. Would consider late model 5-inch scopes in trade. Loven Glass, Route 2, Dyersburg, Tenn.

FOR SALE: ART-13 in good condition, tested on air, not converted, less tubes and $25.00 for supply. $150.00. Also W2RH, with original power supply, less speaker, $120.00. BC-522A in good, clean condition, no tubes or power supply. $25.00. Other tubes new, used as needed $35.00. All for 600 dollars. $70.00. W. M. Meade, Box 672, Chico, Texas.

SELL: Collins TM-4R receiver in excellent condition: $250.00. Location, WAAS, 1499, Greensville, S. C.

QSL's, SWL's, Meade, WBXCL, 1507 Central Ave., Kansas City, Kansas.

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QSL's, SWL's, Meade, WBXCL, 1507 Central Ave., Kansas City, Kansas.
FOR Sale: Millen exciter T-19/ARC 5(4-4 Mc), 122 transmitter for 144 Mc All in good condition. Any reasonable cash offer. W1PQWX, 1331 Main, Waltham, Massachusetts.

FOR Sale: Ten-Ten, beards, $19.25 up; aluminum tubing, etc. Willard Radcliff, P.O. Box 247, Postfork, Ohio.

EUROPEAN Hams are in need of all types of old radio manuals. Hfdg a worthwhile cause. Send to DL4SU.

HAM-MINDED radio parts distributors are few and far between, but one of the best is Ewana Radio, 10 Hills Avenue, Concord, N. H.

BARGAINS in used receivers, transmitters, parts. National, Hammarlund, Hallenackers, RME Gon-Sayk, Leno, etc. Write for lists. Dessert Radio, 853 Buffalo, Fortland, Ind.


WANTED: Tuning unit CRR-47211 to 19 Mc for ATC aircraft transmitter or for cash. Have new CRR-47208 to pull or trade. Write for details. 112/280 volt unit. D. C. Flatt, WBUFT, Ohio, SEC, P.O. Box 82, Lockland, Ohio.

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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 who have had some training. Course lasts 18 months.

After training at Radio Training Write for Particulars.

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DEPT. TN

Valparaiso, Ind.

TRADING

TRADE BC-348-H for Hi-fidelity speaker, radio like Hallerakers S-35, best equipment or what W10UJ, 216 Hanover Ave., Corona, Calif.

FOR Sale: Sutliff power supply — 1000 volts, 150 Ma and 12 volts at 10 ma. 80 volt 60 cycle input in steel cabinet with 1.5 kv meter on panel, $25.00. H.O. New BC-454, 5-6 Mc receiver, converted with AC power supply, $10.00. New T-23 AR-5 VHF rig unrecovered complete with tubes (2-1625, a-373) 28 volt les sheaths for 832's only $20.00. R. H. Collins, W4CSC, Christiansburg, Va.

TRADE AN/ART13 Collins transmitter (unconverted) for HC-725A. Have RCA M1 steisoslco, instructions for first, $50.00. Pair 2A3 speech amplifier, clipper in factory-design chassis with cover, best offer, W5FGD.

FOR Sale: Closing out on first class equipment, like new, Collins 75A1. 1 Kw variable transformer with meter, M22 microphone, push-pull audio output, Banks, 401 steel tube rotator, selenium. Orval Hanson, W4HBA, Watertown, South Dakota.

FOR Sale: Complete, extras, converted, BC-452N, BC-453H, BC-211C, $140.00 or best offer. Also separate, W2DIEW, 526 W. 184th St., New York City, 1-9-46.

SSC: Measured resistors and condensers for phase shift networks and other specialized components. Available. Grady, W2SNO.


TRADE: SCR-522A, etc. for HRO coils or any reasonable offer. Large quantity. W4NEA.

WANTED: S-37 receiver, Will swap Sonar 680 or VHF-152. David Adlerblum, W2QAI, 14 Caryl Ave., Younger, N. Y.

BC-489-Q converted. Purchased new, Original overseas packing; with specifications, order, and next to new all original trans- mitter supply; aligned, $85.00 or best offer. R. G. hardness, Pleasant Valley Avenue, Massena, N. Y.

SELL: BC-221B (12 volt BC-489) Like new, Complete with shock mount, DynaMowr, No wiring changes, $42.50. Want: R9er, beam rotator. Consider a trade. W5MUM, 630 Clover Ridge, Houston 17, Texas.

BC-221 frequency meters for sale. Metal cabinets, complete with crystals, tubes, original calibration books, some have spare tubes, all have good coloration books. $50.00, W54CH, 415 Francis Avenue, Jackson, Miss.

SAVE on this fine communications receiver, National NC-81-X, bargained with reliable dealer, 100% metal finish for only $35.00. H. Dene Loveland, 407 Pratt Ave., Belle Vernon, Pennsylvania.

ART-13, excellent, unamped condition, tube and instructions. $115.00; 28 V, 15 amp. D.C. supply for above, $45.00; 120 V, and 400 watts supply for above, $15.00. All P.E., Plattfield, N. J. Complete 150 watts. 5000 to 18000 Kc gyro-9 bandswitching transmitter. Clarion VHF, 150 watts, $110.00. VHF+ watts 110 vac power supplies, antenna network, meters, control panel, all self-contained. 803 straight final amplifier, Instruction manuals. Over 100 countries on the air with. $52.00, 80 meter. K2CTC 600 watts 80 meter output and input, also filament transformer and meter. Wired for 10 mc input, output. W2HA, 5 W. 116th St., New York, 21, N. B.

FOR Sale: Hudson-250, BC-455-A with power supply and BC-453. QST, about all you'll ever need, write W5CJH, 316 Dix Road, Jefferson City, Missouri.

FOR Sale: BC-489R, 1000 volt 110 vac output, 6000 volt 110 vac output, 1500 watts VHF. W3IZ, 225 Maple Ave., North Plaitfield, N. J.

FOR Sale: QH-129-X, BC-455-A with power supply and BC-453. QST, about all you'll ever need, write W5CJH, 316 Dix Road, Jefferson City, Missouri.


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GOLD PLATED CRYSTALS

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ALL FCNTDAL FREQUENCIES IN KILOCYCLES

ALL FREQUENCIES

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ELECTRONICRAFT, Inc.

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Tuckerton, N. J.
The No. 74001 Tunable Coil Form

Another new Millen "Designed for Application" product is the No. 74001 permeability tuned, shielded plug-in coil form. Standard octal base of low loss micro-filled Bakelite, polystyrene ½" diameter coil form, heavy aluminum shield, iron tuning slug of high frequency type, suitable for use up to 35 mc. Adjusting screw protrudes through center hole of standard octal socket. Special extension terminals facilitate connection to base plate.

JAMES MILLEN MFG. CO., INC.
MAIN OFFICE AND FACTORY
MALDEN
MASSACHUSETTS
Here's a transmitter that will kindle the pride of ownership in any amateur! It's more than a kit in the popular sense of the word. The VIKING 1 is a completely designed and engineered transmitter furnished unassembled but complete in every detail including wiring harness of AC and DC leads. Chassis is drilled and punched.

A full 100 watts output is available on amateur bands 160, 80, 40, 20, 15 and 11-10 meters.

The pi-section output stage will efficiently load many antennas without external couplers. The final tank coil is a variable inductor with excellent insulation and high Q throughout its range. Band switching eliminates plug in coils completely.

All parts are furnished except tubes, mike, crystals and key. Tubes required — RF tubes: 6AU6, 6AQ5, 4D32 — AF tubes: 6AU6, 6AU6, PP807S. Rectifiers: 6AL5, 5Z4, parallel 5R4's.

Instructions are carefully detailed, profusely illustrated. Novice or oldtimer alike can assemble and get brilliant performance from the VIKING 1.

Why not own a "commercial in appearance", "commercial in performance" transmitter? You'll be one of the proudest ticket holders on the air.

VIKING 1 Transmitter Kit (less tubes, crystals, mike & key), Amateur Net.........Only $209.50

E. F. JOHNSON CO., WASECA, MINNESOTA
NEWS ITEM:

Improved manufacturing methods and new raw materials have made Mallory Vitreous Enamed Wire-wound Resistors even better and more reliable than ever for amateur and commercial equipment use.

As a result of a recent program of thorough laboratory investigation into the physical and electrical properties of wire-wound power resistors, and at the recommendation of expert Mallory resistor engineers, two important changes have been made in the manufacture of Mallory Vitreous Resistors to further improve their already proved characteristics.

Mallory Vitreous Enamed Resistors are now being supplied with a new, non-alkaline, non-hygrosopic enamel which seals the resistor cartridge completely behind a tough, glass-like, moisture-impervious barrier.

The moisture resistant, non-alkaline characteristic of this new enamel has reduced destructive corrosion of the wire element of the resistor to an irreducible minimum by actually eliminating the main causes of corrosion—alkalinity plus moisture in this instance.

In addition, Mallory Vitreous Resistors now include improved metal terminal straps, made of a special alloy whose coefficient of expansion with temperature change is practically identical with the temperature coefficient of the new enamel covering. This means that the opposing forces, normally resulting from unlike temperature coefficients of metal strap and enamel, are practically equalized, thus effectively reducing the possibility of lead breakage at the junction point of the terminal strap and the resistance element.

Accelerated laboratory life tests of representative Mallory resistors, made with these new materials, prove conclusively that far less lead breakage occurs due to sudden temperature changes, and that practically all cases of "high resistance" or "opens" caused by corrosion are eliminated.

If you are bent upon getting the most value for your money (and who isn’t!), you’ll be particularly interested in these resistors, because in spite of the special materials and techniques used in their fabrication, their price still remains no higher than ordinary resistors.

Your Mallory Distributor’s store is the place to see and buy these extra quality resistors. Incidentally, while you’re there, don’t forget those other Mallory parts, including—3 and 4 gang Inductuners*, ham band switches, controls—rheostats—potentiometers—pads, tubular capacitors, transmitting capacitors, dry electrolytics, dry disc rectifiers, vibrators and vibrator power supplies.

*Registered trademark of P. R. Mallory & Co., Inc., for inductance tuning devices covered by Mallory-Ware patents.
INVEST IN VERSATILITY

THE NEW HRO-50

all the features
you want in
one receiver...

All the time-tested HRO features PLUS these 14 new features you asked for:

No wonder the HRO-50 is the versatile, more-for-your-money buy of the year!

$335

(less speaker and including coils AA, B, C and D)
slightly higher west of the Rockies

SPECIFICATIONS

FREQ. RANGE: 50-430 kc., 480 kc.—35 mc.
TUBE COMPLEMENT: 6BA6, 1st r. f.; 6BA6, 2nd r. f.; 6BE6, mixer, 6C4, h. f. oscillator; 6K7, 1st i. f.; 6K7, 2nd i. f.; 6H6 det. & a.v.c.; 6H6, a.n.l.; 6SJ7, 1st audio; 6SN7, phase splitter and S-meter amp.; 6V6 (2) p.p. audio; 5V4G, rect.; 6J7, b. f. o.c.; OBZ, volt. reg. Accessories: Crystal Calibrator, 6AQ5; NFM Adaptor, 6SK7, i. f. amp., 6H6, ratto det.; Select-a-ject, 12AT7 (2).

POWER INPUT: 115/230 V. 50/60 cycles A.C.
POWER OUTPUT: 8 watts undistorted, push-pull amplifier fidelity ± 1db 50-15,000 cycles.

SENSITIVITY: 1 microvolt or better at 6 db sig./noise.

SELECTIVITY: Variable from 15 kc. overall to about 400 cycles at 40 db.

DRIFT: Negligible after warm-up.

CALIBRATION: Direct frequency reading.

ACCESSORIES

100/100 kc. calibrator, $19.95; NFM-50 adaptor, $16.95; SOJ-3, $24.95.

COIL SETS

(Specify rack or table model, when ordering.)

<table>
<thead>
<tr>
<th>Model</th>
<th>Frequency Range</th>
<th>Price</th>
</tr>
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<tbody>
<tr>
<td>HRO-50E</td>
<td>750-1200 kc.</td>
<td>Net $16.25</td>
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<tr>
<td>HRO-50G</td>
<td>150-430 kc.</td>
<td>Net $21.95</td>
</tr>
<tr>
<td>HRO-50H</td>
<td>100-200 kc.</td>
<td>Net $24.05</td>
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<tr>
<td>HRO-50J</td>
<td>50-100 kc.</td>
<td>Net $28.90</td>
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<td>HRO-50A</td>
<td>14-30 Mc.</td>
<td>Net $16.35</td>
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<tr>
<td>HRO-50AB</td>
<td>27.0-300 Mc.</td>
<td>Net $16.35</td>
</tr>
<tr>
<td>HRO-50AC</td>
<td>30.0-35.0 Mc.</td>
<td>Net $24.50</td>
</tr>
<tr>
<td>HRO-50AD</td>
<td>210-215 Mc.</td>
<td>Net $16.35</td>
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Team Mates...

811-A

812-A

TYPICAL PUSH-PULL OPERATING CONDITIONS (ICAS)

<table>
<thead>
<tr>
<th>Two RCA 811-A's as Class B Modulator</th>
<th>Two RCA 812-A's as Class C Amplifiers</th>
</tr>
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<tbody>
<tr>
<td>DC Plate Voltage</td>
<td>DC Plate Voltage</td>
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<td>Peak AF Grid-to-Grid Voltage</td>
<td>DC Grid Voltage</td>
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<td>-120</td>
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<td>Zero-Signal Plate Current</td>
<td>DC Plate Current</td>
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<td>Max-Signal Plate Current</td>
<td>DC Grid Current</td>
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<td>Driving Power</td>
<td>Peak RF Grid-to-Grid Voltage</td>
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<tr>
<td></td>
<td>260</td>
</tr>
</tbody>
</table>

THE FOUNTAINHEAD OF MODERN TUBE DEVELOPMENT IS RCA

NOW—more power on phone and CW with these improved transmitting triodes

- Here’s more than your money’s worth of power and performance—huskier construction...greater high-voltage insulation...a plate structure with radiating fins...are just a few of the features that make the new RCA 811-A’s and 812-A’s the sweetest power triodes your money can buy.

You can operate a pair of 811-A’s at zero bias in class B modulator service and get an output as high as 310 watts with surprisingly low driving power...more than enough output to 100% modulate a pair of the new 812-A’s...or any rf amplifier with an input up to 620 watts.

A single 812-A easily handles an input up to 260 watts (ICAS rating) in class C telegraphy up to 30 Mc. A pair can be operated with an input of 520 watts with only 13 watts driving power.

The RCA 811-A and 812-A supersede the 811 and 812, and can be used respectively in their sockets without circuit changes.

To get all the tube power, performance and life you pay for...buy genuine RCA tubes in the familiar black and red cartons. For complete data on the new RCA 811-A and 812-A tubes, see your RCA tube supplier, or write RCA, Commercial Engineering, Section 148M, Harrison, New Jersey.