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<table>
<thead>
<tr>
<th>TYPICAL OPERATION, ICAS</th>
<th>2 GL-811-A’s, Class B</th>
<th>2 GL-812-A’s, Class C Telegraphy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate voltage</td>
<td>1,250 v</td>
<td>1,500 v</td>
</tr>
<tr>
<td>Plate current</td>
<td>350 ma</td>
<td>346 ma</td>
</tr>
<tr>
<td>Grid bias</td>
<td>0 v</td>
<td>-120 v</td>
</tr>
<tr>
<td>Power output</td>
<td>310 w</td>
<td>380 w</td>
</tr>
</tbody>
</table>

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FEBRUARY 1951
VOLUME XXXV • NUMBER 2

PUBLISHED, MONTHLY, AS ITS OFFICIAL ORGAN, BY THE AMERICAN RADIO RELAY LEAGUE, INC., AT WEST HARTFORD, CONN., U. S. A.; OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION

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Subscription rates in the United States and possessions, $4.00 per year, postpaid; $4.25 in the Dominion of Canada, $5.00 in all other countries. Single copies, 50 cents. Foreign remittances should be by International Postal or express money order or Bank Draft, negotiable in the U.S., and for an equivalent amount in U.S. funds.
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by-pass, a coupling device, or as a filter is impaired.

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well-defined fault such as a "shorted", or "open" or "intermittent" capacitor. Instead, the only
outward sign of deterioration may be a gradual loss of sensitivity or stability in a communication
receiver or other circuit in which paper capacitors are employed.

As a matter of fact, there are probably plenty of communications receivers operated day after
day whose sensitivity and quality of performance has suffered severely as a result of undetected
leaky paper capacitors.

In such receivers, paper RF by-passes, AVC filters, and interstage audio coupling capacitors in
particular should be suspected. RF stage instability, IF regeneration, and loss of gain in these
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is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

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"It Seems to Us..."

C.D. PROGRESS

Almost keeping step with expanded military defense measures enacted by the Congress in December, civilian defense activities spurted forward with the Presidential creation of a temporary Civil Defense Administration and appointment of former Governor Caldwell of Florida as its head, while we write the House and Senate are substantially in agreement on the scope and extent of the program. Thus responsibility is removed from the aegis of the National Security Resources Board and placed in the new, specialized agency.

In our own specific field, things are humming, too. Right now the immediate problem is one of setting up frequencies for use by amateurs in civil defense communications, to the extent that they can be found. Primarily, this involves weighing the urgency of c.d. measures against known or contemplated military requirements, and determining what can be spared. The parties concerned — the military, FCC and the new CDA — are giving the problem intensive study. As we write at the turn of the year, there is still no information on what the decisions will be. Probably no official announcement will be forthcoming for several weeks; ARRL will of course distribute any news promptly to key field people such as SECs and ECs, and the dope will also be immediately on W1AW. In the meantime, the folks in Washington are keenly aware of the importance of telling us amateurs as soon as possible what we may expect in the way of frequencies, so that our planning may be realistic, and that is the end toward which they are working.

At this moment we have no reason to believe there has been any change in the analysis we conducted at length during our December issue discussion: 10, 6 and probably 2 meters are the most likely spots where frequencies can be made available. Certainly not the whole bands, of course. What we end up with may be spot frequencies here and there, or a chunk or chunks of a particular band — but as we see it at this writing, our planning can continue to look forward to the likelihood of frequencies in those portions of the spectrum.

Following the decision on frequencies will come the problem of regulations. They can't be simply the present amateur regs, of course; the nature of the service will be distinctly different. More than that, we believe there is no question but that there simply aren't sufficient amateurs in any city to handle all the c.d. communications tasks which will be assigned. For example, ARRL's SEC in one of our principal metropolitan areas is thinking in terms of 10,000 available operators for the civilian defense communications system; not even our largest cities can provide that many amateurs. It becomes a matter, therefore, of deciding what standards should be applied to non-amateur personnel volunteering in the communications field. There will certainly be other questions; for example, security clearance. Can amateur radio be given blanket authorization, or will there need to be separate applications and authorizations? These and other problems will require considerable study, in which ARRL will continue to be active in working with the c.d. people and FCC to come up with the answers.

Yes, things are humming. The task bids fair to be amateur radio's greatest challenge. The way to do your part is to register your interest and availability with your local ARRL Emergency Coordinator. Write HQ, if you do not know his name. Ownership of emergency-powered gear — or any gear, for that matter — is not necessary, nor is membership in the League. Your local c.d. plan will require many more operators than equipments, and your EC wants to know that you will be available to help amateur radio meet its responsibility.

ARE YOU LICENSED?

- When joining the League or renewing your membership, it is important that you show whether you have an amateur license, either station or operator. Please state your call and/or the class of operator license held, that we may verify your classification.
February 1926

... Acting on the recommendation of the recent Fourth National Radio Conference, the Department of Commerce has authorized amateur radiophone operation between 3500 and 3600 kc.

... Technical Editor Kruse reports on his tests of 32 commercial models of B battery substitutes. Points considered were economy, convenience, and performance.

... A 50-foot 2 X 4 mast that can be built and erected in 90 minutes is the handiwork of Don C. Wallace, 92T, and Boyd Phelps, ex-92T.

... Horizontal or vertical antenna polarization for shortwave reception? Technical Editor Kruse reviews the experiments of Dr. Greenleaf W. Pickard, whose conclusions favor the horizontal technique.

... F. J. Marcon, 92A, describes a regenerative shortwave receiver designed around the newly-announced "Aero" plug-in coils.

... President Maxim's pre-1912 station, SNY, is featured in the station descriptions section. A DeForest "crochet ball" audion, a Tucka loose coupler with E. I. Co. slider, and a Meeco 8-inch spark coil contributed to the efficiency of this early station.

... A method of calibrating a wavemeter with a quartz crystal oscillator and auxiliary generator is described by Assistant Technical Editor John M. Clayton.

... Stations participating in the first amateur communication between the United States and Norway are LYB, Dartmouth College, Hanover, N. H., and s1LAL, near Tromsø.

... Harold P. Westman, 2BGH, gives pointers on constructing and adjusting a.e. relays.

... A circuit for filtering synchronous rectifiers is presented by Clancy Hoover, 9AMU.

I.T.U. SECRETARIAT OPPORTUNITY

Announcement has been made by the Department of State of an opening with the International Telecommunications Union in Geneva, Switzerland, the seat of world radio regulatory matters. It is an opportunity attractive to anyone with a particular interest in the field of communications regulation and who would like the experience of working in an international organization abroad. The post is that of Technical Assistant in the Specialized Secretariat of the International Frequency Registration Board (amateurs will recall this as the permanent agency set up to engineer frequency assignments throughout the world as concerns primarily fixed and broadcast services).

Candidates must have a degree in physics or E.E., plus either five years' government or commercial experience in the radio communications field, or equivalent graduate study. A broad knowledge in the field of international regulation is required, as is knowledge of specialized terminology in at least one other language used by the Union. The salary range is $2020 to $3090, plus an epuration allowance of $280 and an additional $180 for each child of school age, with starting salary probably near the minimum and eligibility for promotion occurring each three years. Any appointment will be probationary for one year. Transportation expenses of family and household effects to Geneva will be refunded by the Union.

Any interested party may obtain further data from ARRL HQ, or from the Telecommunications Division, Department of State, Washington, D. C. Applications must reach Geneva not later than March 1st.

Seventeenth Annual ARRL DX Contest

C.W.: Feb. 9th-11th, Mar. 9th-11th; V.H.F.: Mar. 9th-11th

Amateurs everywhere are invited to take part in the 17th Annual ARRL DX Competition. There will be two week-end periods devoted to c.w. participation and two to 'phone. Special certificate awards will be given to the highest-scoring c.w. and 'phone stations for each country and each continental U. S. A. and Canadian ARRL section entered in the contest. Operators outside the U. S. and Canada will attempt to work as many W, K, VE and VO stations as possible. Exchange of serial numbers will be required. Complete rules and details on scoring appear on page 32 of January QST.

The contest periods will be divided for c.w. and 'phone as follows: first c.w. period will begin on Feb. 9th at 7:00 p.m. EST and end on Feb. 11th at 7:00 p.m. EST. The second c.w. period will be scheduled during the same hours from Mar. 9th to 11th. The first 'phone period will begin at 7:00 p.m. EST on Feb. 16th and end at 7:00 p.m. EST Feb. 18th. The second 'phone period will be scheduled during the same hours from March 16th to 18th.

Though not necessary for entry in the contest, ARRL will supply convenient report forms upon request. You may make up your own forms following the samples shown in last month's complete contest announcement. If you request report forms from Headquarters, please indicate whether you plan to enter the c.w. section, the 'phone section, or both.

If you are located in mainland U. S. or Canada, here is your chance to enjoy the thrill of long-distance contacts with the rest of the world and to compete for the special certificate awards. There will also be the opportunity to work new countries for the DXCC and other awards. If you are located outside the U. S. and Canada, you likewise have the opportunity to compete for an award and to pick up states for WAS or Canadian provinces for a WAVE award. It should be lots of fun!

OUR COVER

A close-up view of the 807 section of a new two-stage linear amplifier now undergoing performance tests in the ARRL lab. An early issue of QST will bring you complete constructional and adjustment data on this unit.
"Over the Hills and Far Away"

V.H.F. Propagation by Tropospheric Scattering

BY R. K. MOORE,* W2SNY

Beside being the title of five poems and at least one piece of music, "Over the Hills and Far Away" describes very well the way in which radio scattering in the troposphere can be important in v.h.f. work. Many of the v.h.f. contacts reported throughout the years, but not fully explained previously, may be explained by a new theory developed by Booker and Gordon.1 Regular maintenance of "over the mountain" schedules can be explained by scattering, and many contacts over long distances are probably the result of this phenomenon.

There have been many cases of v.h.f. propagation over the longer distances which could not be explained by tropospheric bending, ducts or sporadic-E. Several experiments were conducted in fact, the signal strength seemed to decrease as predicted out to a certain point, and from that point on the decrease was much smaller than expected. A typical example of this is shown in Fig. 1. The sharp break in the curve was apparently due to something not being considered at the time of the experiments but no explanation was given then. Recently this has been explained in terms of the scattering theory.

A signal propagated by scattering is always weak. When the receiver is close enough to the transmitter, the effect of the scattered signal is swamped by the effect of the direct (or diffracted) signal. This situation leads to the rapidly decreasing part of the curve in Fig. 1. Since the weak scattered signal does not decrease as rapidly with distance as the signal propagated beyond the horizon by diffraction, there is some distance at which the two are equal in intensity. Beyond this the scattered signal is more important than the diffracted one. This situation is a little different when a duct is present. Here the direct signal may be guided through the duct so well that it can be heard beyond the point at which the scattered signal would be lost in the noise; at such times scattering is not important. Hence we are led to the conclusion that v.h.f. signals heard beyond the usual range may be due either to a duct (or tropospheric bending) or to tropospheric scattering (provided the ionosphere can be disregarded).

If the conditions are not right for duct formation and there is no pronounced tropospheric bending, a signal heard beyond the normal range is probably due to scattering. The scattered signal fades much more rapidly than the direct- or duct-propagated signal; and even when the average signal is strong, "wobbling" may be due to the superposition of the scattered signal and the direct one.

Causes of Scattering

Scattering is caused by irregularities in the density and therefore the dielectric constant of the air. Probably the most familiar examples of this are the air pockets which plague fliers and the little whirlwinds everyone has seen near the earth's surface. Actually, similar and milder versions of these things are present nearly all the time throughout the lower atmosphere. We may consider that there are "blobs" of air, with dielectric constants differing slightly from the average, which are more or less packed together. These blobs may be of all sizes from a few inches across up to really big ones that can cause a large aircraft to drop.

Not much is known about the size of the blobs under different conditions nor by how much their

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* School of Electrical Engineering, Cornell University, Ithaca, N. Y.
dielectric constants differ from the average nor the way in which they are distributed above the ground. There is some basis for believing that the blobbiness decreases as one gets higher above the surface but even this is not really well established. Since no very good meteorological instruments have been designed for measuring such small-scale irregularities in the air, it seems likely that some of our best information about them may come from radio measurements.

Even though very little quantitative information about atmospheric turbulence (blobbiness) is available, it does seem likely that blobs will be present at all times. During the daytime, the blobs near the earth probably are smaller than those at night. Farther up, we don’t really know about their size. Certain types of clouds are indicative of a “blobby” atmosphere. Cumulus clouds, for example, are notorious for their internal turbulence. Whether this means that pointing a receiving antenna up at a large region of cumulus clouds will give stronger signals from a station in that direction is not known, but it might be interesting to try.

Most places in this country have less moisture in their winter air than in their summer air. The amount by which the dielectric constant of a blob differs from the average is likely to be less then, so scattered signals probably are weaker in winter.

**Antennas in the Sky**

These blobs act as little antennas which retransmit part of the signal reaching them from a transmitter on the ground. Since they are present fairly high in the air, the signals transmitted from the blobs may be able to reach a receiver far below the line of sight for the transmitting station. This is shown at A in Fig. 2. In this case, turbulent air over a mountain range is shown retransmitting a signal received from one side to a receiver on the other side. Of course, we don’t have to have a mountain range to take advantage of scattering from our blobs, for they can also be effective when the earth’s curvature causes the two stations to be out of sight of each other.

If the blobs are small compared with the wavelength, they act like dipole antennas oriented perpendicular to the line of sight from the transmitter. If the transmitting antenna is vertical, the scattering dipoles are directed as shown at B in Fig. 2. If the transmitting antenna is horizontal, the scattering dipoles are horizontal, too, as shown at C. It can be seen that it is quite easy to be end-on to the scattering dipoles set up by a vertical antenna, and this means that the range using horizontal polarization may well be greater than with vertical polarization when scattering is the mode of propagation.²

If the blobs are bigger, they have a tendency to scatter the signal pretty much in the direction of the transmitted signal. That is, they act like beam antennas pointed in the direction from the transmitter to the blob. For any large broadside array (or antenna with reflectors), the beam width is inversely proportional to the length of the antenna in wavelengths (the bigger the antenna, the sharper the beam). This is also true of the large blobs. In fact, when the blob exceeds a certain size, the beam is so narrow that it misses a receiving antenna on the ground. In this case, unless you happen to be flying your receiver in an airplane at the right height, the scattering is of no use. The two situations for large blobs are shown in Fig. 3.

It can be shown that there is a best angle above the horizon for pointing the receiving antenna to receive scattered signals, and this has been verified by some experiments in which scattered signals from i.m. broadcast stations were studied at the University of Texas. Usually, this angle is pretty small so that pointing the beam at the horizon is good enough. With really small blobs, though, the best angle for reception may be appreciably higher than 10 degrees. While it probably wouldn’t pay to put a vertical rotator on your antenna, it might turn out that someone

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²The superiority of horizontal polarization for v.h.f. work over paths where tropospheric scattering is an important factor is confirmed by evidence gathered experimentally in amateur work. See “Antenna Polarization on 144 Mc.” January, 1930, QST, p. 15.—Ed.
with a smaller antenna (wider beam) would do just as well with his beam pointed toward the horizon as the fellow with the really sharp one, because the smaller antenna would pick up more signal from this optimum direction. This is useful only as an indication of what might happen, because there is at present no way of knowing in
diagram}

![Diagram showing scattered beam and scattered beam]

Fig. 3 — Width of the scattered beam is inversely proportional to the blob size. At (A) a blob approaching the critical size returns only a small amount of energy. A too-large blob (B) has no beneficial effect.

advance what blob size to expect. It is important to realize that this holds for the scattered signal only. If a signal propagated some other way is stronger than the scattered one, pointing toward the horizon will give best results.

**Fading Rate**

The fading of the scattered signal should be fairly rapid. In fact, the so-called “wavery” c.w. signals which have been described from time to time on the more distant v.h.f. stations probably are due to scattering. The rate of fading is directly proportional to the speed of motion of the blobs and inversely proportional to either the blob size or the size of the antenna used for transmitting or receiving, depending on which is bigger. In fact, the period of fading is of the order of the time required to move across the antenna at a speed the same as that of the blobs. This holds for big arrays but does not hold true for simple dipoles or yagis. For high wind speeds and small antennas, the fading rate may turn out to be several cycles per second.

**How Scattering Affects the V.H.F. Man**

So much for the theory of scattering. Now let us see if we can draw some conclusions about the way this affects ham communication. In the first place, scattering makes possible ranges even over flat territory that would not be possible otherwise except by sporadic-E or by duct propagation. Since ducts are normally present only at night, this means that the effect of scattering on the range is likely to be greatest in the daytime. Since turbulence of the atmosphere is probably present all the time to some degree, scattering should also allow more consistent night work to ranges somewhat beyond the line of sight than the frequency of occurrence of tropospheric bending and ducts would indicate. It is important to realize, though, that any scattered signal is likely to be weak, and c.w. may be necessary to maintain the ranges made possible by scattering. Scattering undoubtedly explains the ability of some people to keep v.h.f. schedules over paths involving mountain ranges.

Secondly, it seems that horizontal polarization is definitely to be preferred to vertical polarization for contacts by scattering. This does not necessarily mean that the longest ranges will be achieved only by horizontal polarization, but it does mean that somewhat longer daytime ranges may be so achieved and that more consistent results at the intermediate ranges should be possible at night with horizontal polarization.

Thirdly, although there is an optimum angle above the horizon for receiving scattered signals, this does not mean that everyone should build himself a vertical rotator for his beam. For most applications, the beam pointed toward the horizon is plenty good. There may be times, though, when a less directive antenna pointed toward the horizon or a tiltable sharp beam will give better results.

So little is known about the size of blobs present in the atmosphere that it’s really hard to say what bands will be most affected by scattering. The experiments mentioned first were made at 3000 Mc. and the University of Texas ones at 100 Mc. It is probable that 28 Mc. and all the v.h.f. and u.h.f. bands are affected, but just how much is not known.

We see from the above that some of our previously unexplained “over the hills and far away” contacts may now be explained by the scattering theory. None of the conclusions above should make for any great changes in the v.h.f. man’s equipment or habits but they should help him to understand the reasons behind some of the contacts he makes.

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**IS YOURS ON FILE WITH YOUR QSL MGR?**

![Image of QSL card]

**Your Own Name, Is Your ST. Your Home Town. U.S.A.**

**SEE PAGE 90, JANUARY QST**

February 1951
Electronic Instrumentation

Cathode-Ray Tubes as Metering Devices

BY M. H. DUNBRACK,* WIBHD, AND R. A. BRADBURY,* WINUQ

Developments in electronics since the war have brought about a new kind of thinking in instrumentation. Although the familiar instruments — voltmeters, milliammeters, etc. — which have been sufficient for most uses in the past will not lose their utility in the future, even today they are inadequate for many types of measurements. To supplement them, the oscilloscope is turned to as the tool that will give the necessary information. The scope can be used to make any measurement a meter can, and puts a much lower load on the circuit in doing so. It can be used to measure frequency, phase angles, percentage modulation; it can be used to show wave shapes and proper operation of doubler and tripler stages in transmitters. It can be used through the entire range of frequencies up to 50 Mc, before its limitations begin to be reached.

The principal disadvantage of commercially-available 'scopes is their large size and cost. They are entirely unsuitable for installation in the way small panel instruments are used, although they are excellent as test equipment. An ideal unit would be small and suitable for panel mounting, just like a milliammeter. There should be as few controls and parts as possible, and the c.r. tube face should be as large as practicable. The old 913 would be ideal in every respect except screen diameter — a one-inch screen is too small. The next choice is the 2BP1; its two-inch screen gives a pattern of usable size, although it would be far

![Image of electronic meter circuit](image)

**Fig. 1 —** Basic circuit for the electronic meter. The same circuit is used for both the 2BP1 and 3MP1. C1, C2, C3, C4 — 0.01-mfd. 1000-volt or larger rating, according to high voltage used.

- C2 — 0.5 mfd., 200 volts.
- R1, R2 — 3-megohm volume control.
- R3, R4 — 82,000 ohms, ½ watt.
- R5, R6 — 2.2 megohms, ½ watt.
- R7 — 0.75 megohm, 1 watt.
- R8 — 0.25-megohm volume control.
- R9 — 0.1 megohm, 1 watt.
- R10, R11 — 0.25-megohm volume control.
- R12 — 0.27 megohm, 1 watt.

and power supply terminal strip are mounted on a bakelite panel at the rear of the 'scope. This terminal board is held firmly to the front panel by 8-inch brass rods. The tube is covered by a nicotai shield. Placing the input connectors at the rear makes the leads to these terminals and to the deflecting plates quite short, so that the input capacitance is held to the order of 8 mfd. The power supply needed is 500–1000 volts at 400–600 microamperes, and 6.3 volts at 0.6 ampere. Since the cathode of the tube is near ground potential, any 6.3-volt a.c. supply available can be used. The circuit diagram, shown in Fig. 1, is conventional in most respects. C1 and C2 are 1000-volt coupling condensers to keep B+ off the input connectors. Since the deflecting-plate sides of these condensers are already raised above ground by the B+ voltage, the maximum voltage that may be applied (d.e. plus peak a.c.) across these terminals is 1000 volts minus the "B" voltage applied to the 'scope.

Two versions of the "electronic meter. He uses the regular two-inch oscilloscope tube and the other a "stubby" three-inch tube (GL-3MP1). The mountings are small metal panels fitted with Millen bases.

more convenient in such an application if its length could be reduced. Nevertheless it is the smallest tube that is practical, of all those currently available.

A panel-mounting unit incorporating the 2BP1 is shown in the photographs. It contains


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The sensitivity of the 'scope is 65 volts per inch for the horizontal circuit and 40 volts per inch for the vertical, for a 500-volt "B" supply. The sensitivity is approximately one half (130 volts and 90 volts respectively) for a supply voltage of 1000 volts. Where very accurate voltage measurements are needed, the 'scope should be calibrated. This can be done externally or provisions can be made to plug the 'scope into a special calibrating socket where an accurately measured source of voltage can be impressed upon each set of plates.

Many measurements consist of comparing one voltage with another, for which sweep circuits are not required. For this reason, and because it would increase both size and cost, no internal sweep was built into the unit. However, if a sweep is desired for keying or modulation checks, it can be taken from the 60-cycle line voltage through a suitable voltage divider.

**Other Possibilities**

After thinking the matter over some and investigating the specifications on the 3MP1, it was decided that a three-inch 'scope could be built without increasing the size too greatly. The 3MP1 is 8 inches long overall compared with 7½ inches for the 2BP1. The over-all dimensions of the 3-inch unit shown in the photographs are 10 inches deep, 6 inches wide and 4½ inches high. The "B" voltage is 1000 to 2000 volts and the sensitivity is approximately 120 volts per inch per kv. of "B" voltage. Essentially the same design and construction is used in this 'scope as in the 2-inch unit, but it was decided to make this unit completely plug-in. Banana plugs were put on the power supply terminal strip and two special sockets were made to fit. One of these was mounted in the back of a small cabinet, while the other, of course, goes into the rig for modulation measurements. Other sockets could be made and installed in appropriate spots for tuning and neutralization measurements. Eventually it is hoped to have several 'scopes permanently installed.

The three-inch unit is completely plug-in. Mating socket assemblies can be placed wherever desirable in a transmitter or other equipment.

By comparing the size of the two units it can be seen that little more space is used for the 3-inch model than is used for the 2-inch unit. This is mainly due to the short bulb of the 3MP1. If corresponding improvements could be made in the design of 2-inch tubes, it may be possible in the future to get a 2-inch tube approximately 5 inches long. In that case a 'scope could be made with a maximum depth of about 6 inches.

The next logical step would be to eliminate the four controls on the front panel. This would reduce the size of the 2-inch unit to about 2½ inches square and the 3-inch panel would be reduced to about 3½ inches square — about the same panel areas as are used for mounting a meter. For a given "B" voltage on the 'scope, the controls are set once and left that way (provided the "B" voltage is constant) and there is no need to have them easily accessible. They could very well be midget potentiometers mounted on a panel at the rear of the tube, with provision made for screwdriver adjustment. It is also possible that they could be eliminated entirely in favor of a fixed resistance network. This would make the ultimate size of the indicator 2 inches square and about 6 inches deep. Of course, such a unit will have to wait for tube designers.

While there is some speculation in this article, it is hoped that the reader will realize that even now a compact 'scope can be built at very small cost. The uses to which such an "electronic meter" can be put, we believe, will be as many and varied as the uses which have been found for the grid-dipper.

**Silent Keys**

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

W2BYT, Elphge A. Luesler, Brooklyn, N. Y., N. Y.
W4BYX, George M. Williams, Columbus, Ga.
W4LTQ, George J. Parker, jr., Owensboro, Ky.
W7NHP, Harold J. Rhein, Great Falls, Mont.
W7OMD, ex-W6FEV, Milton J. Fetterhoff, Tobar, Nevada
W9FVJ, Clarence J. Mueller, Franklin Park, Ill.
W3JZL, Elmer W. Eversen, Evansville, Ind.
W3VGC, Henry F. Hekel, Denver, Colo.
JA2CT, L. Louis G. Selig, Signal Section, GHQ

February 1951
Loop-Type Antennas for 75-Meter Mobile

A Novel System with Good Performance

BY HAROLD L. MITCHELL,* W4IBZ

A mobile antenna for 75 meters always presents quite a problem. It must be an electrical quarter wave at least and, since a physical quarter wavelength is impractical, some form of loading invariably is used. The part of any antenna that contributes the most to the radiated energy is that carrying the most current. Unfortunately, in a quarter-wave vertical this is the lower part. The placing of the loading coil at the bottom end results in most of the high current flowing through this coil, the current diminishing to zero at the top of the antenna. Therefore, various methods of center and top loading to bring the maximum current pointe higher up in the antenna have been used with fairly good results. However, it seemed possible to turn the antenna upside down and have the high current at the top. To accomplish this, the top of the antenna is grounded and the bottom insulated. This was approximated by bending the top of the vertical antenna down and grounding it at the tip of the windshield post, as shown in the photograph. The other end was mounted on the insulator of an antenna mount formerly used on a Jeep. Where the antenna comes through the back of the car, a hole has been cut and a piece of polystyrene mounted for the rod to feed through. The antenna rod itself is composed of sections that screw together and it can be disassembled very easily.

The trunk view shows the mounting of the fed end of the antenna.

* 311 South Monterey St., Mobile, Ala.

The antenna system is tuned to resonance by a series tuning condenser connected between the antenna and the output terminal of the final amplifier, as shown in Fig. 1. An r.f. meter with a 3-amp. scale also is connected in this circuit at this point to read antenna current. The parallel fixed and variable condensers were used as an expedient to secure the proper capacitance but, of course, a variable of appropriate maximum capacitance will serve equally well.

The tuning of the transmitter is conventional in every way. A milliammeter is plugged into a grid jack and the final amplifier grid circuit tuned to resonance, as indicated by maximum grid current. The plate circuit is then adjusted to the characteristic dip and the antenna tuning condenser adjusted for maximum antenna current. In this particular installation the current runs about 3 amperes with 45 watts input to the final amplifier.

It is evident that the antenna and the body of the car in reality form a one-turn loop resonated by the condenser. The directional pattern theoretically should have a sharp null at right angles.

(Continued on page 60)

W4IBZ's 12-foot whip is bent to form a loop. The forward end is securely connected to the top of the windshield post.

The antenna is mounted close to the transmitter in the trunk. The antenna tuning condenser is fastened to the side of the transmitter box.
Furlough in Monaco

The Story of 3A2AB

BY SGT. GUY L. KANE,* DL4FS, W8SRB, 3A2AB

I got the bug to put a real DX station on the air back in early 1950. It was my habit at that time to take an odd assortment of gear up Koenigstuhl Mountain, near Heidelberg, and operate when the QRM from the transmitter station where I was stationed became too great to fire up DL4FS from my quarters. I speculated that if I could take equipment to this high point in my car, I could also transport it to some of the countries where ham activity was either low or nonexistent. With this idea in mind the Countries List was carefully checked, leaving me with the prefixes HE, PX, and (at that time) CZ. HE was crossed off the list because the HB gang were keeping the little country pretty well populated so far as ham activity went.

Several letters of inquiry were sent to the respective Directors of Communication for Andorra and the Principality of Monaco. No reply was received from Andorra but the Ministere d'Etat of Monaco sent a very cordial letter stating that any time I desired to operate from his country he would be pleased to issue the necessary authority. In March a trip was made there in the company of DL4ND but we met with great disappointment when we were informed that the Prince of Monaco had not yet affixed his signature to the document ratifying the Atlantic City conference regulations. We were told, though, that permission to operate would be granted as soon as possible. This arrived in July in the form of a letter stating that I had been issued "L'indicatif D'appel" of 3A1B. In August I received a second notice stating that my call had been changed to 3A2AB (just why, I was never able to find out).

Meanwhile, in July, after contacting my good friend Jean Wolff, LX1JW, the rig was taken to Luxembourg and put on the air as LX4FS for a few days' trial. The response from the W/VE gang was amazing and gave a preview of things to come when the time arrived to put 3A2AB on the air. The greatest lesson learned was the need to control the eager beavers who would go to any extreme to get a QSO. I'm sure W4NNN, W3BXE, W6SAI and others who have operated a rare DX station for a short period of time, trying to hand out as many QSOs as possible, agree that the W and VE ops are the best in the world and a great bunch of gentlemen. But let a new call be heard and you would swear you were sharing the band with a group of raving maniacs. It would be too much to expect that everyone can become proficient DX operator overnight but the article 1 in September QST on DX operating techniques should be read — and reread — by every ham who aspires to the DXCC or any other DX award.

In September the gear to be taken on the expedition was packed. The receiver was a Radiovision "Commander" and the transmitter a World Radio Labs 175-watt "Globe Champion." In anticipation of giving the phone gang a new one also, the modulator and mike were packed along with plenty of spares, tools, and an assortment of antennas.

On October 1st I was granted a 30-day furlough. A hasty check across all bands left me with a very gloomy feeling as there wasn't a thing of note to be heard. Therefore, rather than risk a trip down to Monaco and not be able to work out, the receiver was taken to Luxembourg where the band was monitored daily for any...

* B Co., 7774 Signal Bn., APO 403, % Postmaster, New York, N. Y.


Nestled between the mountains of southern France and the blue Mediterranean, the Principality of Monaco is internationally known as a tourist center and site of the Monte Carlo Casino.

February 1951
change in conditions. While enjoying the hospitality of the LX gang for a second time, I received a welcome telephone call from Don Ross, DL4UI (ex-SV9WB), who passed along the good word that he had been able to get a furlough starting on October 15th and wanted to make the trip to 3A-land with me. This news was certainly a change for the better because with Don as second op I could visualize 3A2AB being on the air 24 hours a day and really giving the gang a run for their money.

When the 15th rolled around Don and I were on our way. We had started with definite misgivings because radio conditions were still stinko. It is quite difficult for anyone who has never been in this part of the world to realize what it takes to go from one country to another, even without a car full of radio gear. With such equipment, traveling takes plenty of time and reams of paper work. Every border official is obsessed with the idea that the only reason any sane person would take such stuff into their country is for the purpose of selling it. Any argument to the contrary is considered a ruse to avoid paying customs!

After being held up for the best part of an hour at the French border while guards went through every piece of equipment and baggage we had, one particularly ingenious official, reaching the tiring point only very shortly before we had about decided our trip had ended in failure before it had even begun, reached into the transmitter and pulled out a VR-150. He then wrapped the rig with wire that looked as though it had been used to tow trucks, sealed same, and handed the rig back to us with the French equivalent of “Get going.” Believe me, we did!

Southern France is, for the most part, a scenic stretch of country. However, when you are looking forward to more than 800 miles of driving in steady rain over roads you thought were found only in the most rural areas of Arkansas, your taste for sightseeing is definitely dulled. On top of this, gasoline at 70 cents a gallon leaves you counting the cash on hand when there is so much to be seen and enjoyed.

We arrived in Monaco on the afternoon of the 17th and went directly to the office of the Ministere d’Etat. He greeted us warmly, wished us success, and assured us the full cooperation of his office.

After looking over the list of hotels, we chose the Royal because of its superior radio location and its reputation for an excellent bill of fare. Luckily the genial manager, Mons. Crettaz, spoke perfect English. After a brief explanation of the purpose of our trip and a rather wild description of ham radio, he gave us all the assistance necessary in setting up the rig and stringing the antennas.

The power situation had been checked during the March trip and found to be 125 volts (more or less). But, as we were warned by Mons. Fromagemat of Radio Monte Carlo, in some parts of the Principality this was 25 cycles and in others it was 42 cycles. Fortunately, our hotel was supplied with the 42-cycle variety. We crossed our fingers when the equipment was first plugged in and were relieved when the line voltage remained in the vicinity of 100 volts under full load. The only trouble outside of one blown fuse—which brought all the occupants of the third floor out into the hall giving us looks that would kill—was that when the elevator was running the voltage dropped below 80. The heating of the transformers from the low-frequency current was quite bad but we solved this by packing them in wet rags, which left us wiping the steam off the meters and dial facing every few minutes!

Once we had ironed out our antenna problems we found that our transmitter loaded perfectly. So, with the rig cranked up to about 125 watts, a very short and timid CQ was transmitted on 14,000 kc. at 1710 GCT. You could have heard a pin drop in our room as we sent the closing K and flicked the receiver back on. With both of us trying to squeeze into a single pair of headphones, we thrilled to “3A2AB DE W6IBD AR.” Shakily, he was given a 569 report. Instantly, the band erupted into a madhouse of kilowatts calling everything from SV9AB to 2A2TS! Listening certainly is a trait of the real DX operator because for an hour previous to our first call not a single W had been heard and the best we expected was a local.

For a few minutes after signing with W6IBD we felt like someone who had accidentally set off a charge of dynamite, blowing up everything around him and leaving him with nothing but a foolish look. After things quieted down to a mere bedlam we called CQ again, signing with U10. This was completely ignored, however, and we were unable to make another QSO for four or five minutes. But, after another try, the gang started moving up and we made consecutive contacts until the band went dead around 2000 local time (a nightly occurrence during our stay).

The next morning we were up bright and early,
calling CQ for an hour before we raised anyone. Although the Europeans and North Africans were heard with very strong signals, QSOs were few and far between in spite of good signal reports being received from all stations worked. At first we discounted this as being attributable to the funny call sign and the disbelief of the many amateurs who had been taken in previously by phony calls signing Monaco calls. However, this condition existed right up to our last day of operation and is due either to disinterest or to lack of operating ability on the part of many amateurs in this part of the world.

Our biggest letdown came when we found that on 20 we could work the W/VE gang only via the long way around, the mountains to our rear evidently cutting off signals from the other direction. Besides this, the band opened for Ws for only very short periods each day. As many contacts as possible were passed out in this direction but it was very exasperating going because even though directional CQ W and KN were used, they were ignored completely by the ops over here who continued to call us on our frequency and during QSOs. In this respect the Gs and DLs were the biggest offenders with their 5-w.p.m. 10X10 calls zero beat on our frequency. I guess this is the accepted method of raising DX but it certainly becomes maddening in a very short time. The Ws stood out like the proverbial injured digit with their short snappy calls on whatever portion of the band we indicated we were tuning. And because of this the Ws netted more QSOs in an hour than the Europeans did all day!

One of the biggest faults of the Europeans was their habit of giving us all the dope on the TX, RX, WX, and everything else that came into their minds, slowing us down to a crawl when we were interested only in giving as many bands as possible a new country. Even though U10, D5, ML, etc. were used regularly, we were never left with our frequency clear of guys calling us. One particularly ignorant DL7 (he holds DXCC, incidentally) called us for four consecutive days for hours at a time, exactly zero beat, and perhaps wonders to this day why we didn't work him. Another of the inconsiderate habits prevalent over here is to call a DX station on his frequency and if he doesn't answer turn around and call CQ DX! One very loud G tuned his transmitter for approximately ten minutes exactly on our frequency and then without a break for listening called CQ DX for another five minutes. Then, after signing and hearing the hundreds of others calling us, he had the guts to turn around and call us also! For several days running one EA who couldn't raise us on our frequency after calling us several times would switch to A3 and play phonograph records for several hours, running what seemed to be 300 per cent modulation!

Of course, there were a few top-notch ops over here who landed QSOs immediately by short calls off our frequency, but this type was definitely in the minority.

Don made the phone contacts and ran up against the same trouble that I did on c.w., only in spades. One particular QSO which left Don rolling on the floor was when a G3 said, "I don't believe I've worked a Monaco station before. Please QRX a minute while I check through my log." And another that really left him biting his nails was the operator who, after being given an R5 S9 report, came back with "The QTH here is London—I spell L-London, etc." The ops who took special honors for stupidity were those who came back with "OK on your QTH Monaco, OK on your name Don, OK on your rig 125 watts, OK . . . OK . . . OK."

We tried to work 'phone with the W gang but this was almost impossible because of the I and EA stations running heavy modulation and continuously blanketing the band with their incessant whistling and playing of phonograph records. Despite this, Ws GRI, TT, TS, AM, ENV, MPT, VFR, W1FJN, and others were worked on voice.

On several nights, after 20 had gone dead, we tuned up on 40. Among the first stations raised was W2QHF. A sked was arranged for 80 and Howy made it a three-bander with his low power. Although excellent signal reports were received on 3.5 Mc., business was very slow and we felt the band wasn't worth losing sleep over. Oddly enough, on this band the mountains didn't seem to affect reception from Stateside. We decided to QRT on October 24th because by this time conditions had reached a low level. We were reluctant to leave, knowing there were thousands still wanting to contact us. However, our budget was running pretty low at this time so we really didn't have much choice.

What proved to be the biggest thrill of the entire trip came during our last QSO when we were telling G6QB (of the British Short-Wave Magazine) of our intentions of leaving. Who should walk into the room (or the shack as we were calling it by this time, much to the discomfort of the manager!) but none other than the world-famous Leon Deloy of ISAB. We switched over to 'phone and handed the mike to Mons. Deloy expressed amazement, making his first 'phone QSO, at the improvement in amateur radio since the days of spark gaps. Listening to Deloy and Tommy chew about 25-cycle sparks, Don and I rather self-consciously felt behind our ears to see if that wet feeling we had was real. We got quite a kick out of hearing his tale of the first trans-Atlantic QSO with Reinartz and Warner.

During our stay we made 581 QSOs. Half were with the W gang and half of these with Ws. This wasn't because of discrimination against other call areas but because the Sixes were the only stations heard for the greatest part of the time. East Coast QSOs didn't pick up until the fellows started aiming their beams southwest.

Returning to DL4-land, a policy of QSL for QSL was decided upon. If you were one of those worked and want a Monaco card, drop us yours (Continued on page 90)

February 1951
COMMERCIALS IN AMATEUR BANDS

One of the things we amateurs must keep watch
on is possible misuse of our bands by commercial
stations. Hq. takes action as necessary on reports
from you fellows in the field concerning non-
amateur stations in our bands. Some of this op-
eration is legal, some is not. How is one to know
which is which? Let's see if we can separate the
sheep from the goats in general terms as concerns
our major bands:

10 meters: Exclusively amateur throughout the
world. Please let Hq. know about any non-
amateur operation.

11 meters: Shared here with scientific, indus-
trial and medical services, and in some parts of
the world assigned entirely to other than amateur
use. So you might run across most anything, and
it's probably okay.

20 meters: Exclusively amateur throughout the
world. But some folks — and you know who —
don't pay much attention to their international
agreements, so as a result we find a few Russian
(and Communist China) stations operating in
the 20-meter band, heard mostly on our west
coast (actually, U.S.S.R. at Atlantic City said
it was going to use 14,250-14,350 for its fixed ser-
vice). Because it involves dealing with the Soviet,
there's little chance of any success in filing formal
complaints, but you might send dope to Hq., for
information, concerning what stations you hear
and on what frequencies. We'd also like to know,
for action, about any other non-amateur opera-
tion in this band.

40 meters: Exclusively amateur in the Americas
but rather thoroughly chopped up for broadcast-
ing in other areas. Outside this hemisphere 7200-
7300 kc. is available for short-wave broadcasting
and there is nothing we can do about it. When the
Atlantic City frequency table goes into effect
in a year or so, 7150-7300 kc. will be broadcasting
outside the Americas, with 7100-7150 additionally
available to that service on a shared basis
with amateurs! Thus because of the greed of for-
ign administrations for propaganda frequencies,
the situation will become worse instead of better.
Any broadcasting below 7200 now (or 7100 later)
is illegal.

However, don't confuse foreign amateur
phones with broadcasting. There are many Latin
amateur 'phones in countries to the south. Each
government has the right to specify how the ama-
teur bands shall be whacked up as between modes
of emission, and in most of Latin America the
predominant (almost 100%) amateur interest in
voice operation is reflected in most or all of each
band being available for A3. This makes it a
little tough on us, but is one of those things. (In-
cidentally, over the years attempts have been
made to come to a compromise with the Latins,
both informally and by means of international
agreement, on what frequencies they would use
for voice; these attempts have failed miserably,
for any compromise with adequate U. S. exclusive
c.w. space is unacceptable to the Latins, while any
arrangement with A3 space adequate to the
Latins is intolerable to us.)

Any commercial operation (other than broad-
casting above 7200) anywhere in 40 meters is a
violation of the regulations, so please post Hq.
on whatever such you may hear.

80 meters: Exclusively amateur in the Americas.

<table>
<thead>
<tr>
<th>Region</th>
<th>3500</th>
<th>3600</th>
<th>3700</th>
<th>3800</th>
<th>3900</th>
<th>3950</th>
<th>4000</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (Europe—Africa)</td>
<td>AMATEUR—Fixed—Mobile</td>
<td>(AMATEUR—Fixed—Mobile)</td>
<td>(Fixed—Mobile)</td>
<td>(Aero)</td>
<td>(Europe—Fixed—Broadcasting)</td>
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<tr>
<td>II (Americas)</td>
<td>AMATEUR—Fixed—Mobile</td>
<td>(AMATEUR—Fixed—Mobile)</td>
<td>(Aero—Fixed—Broadcasting)</td>
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</tr>
<tr>
<td>III (Rest of World)</td>
<td>AMATEUR—Fixed—Mobile</td>
<td>(AMATEUR—Broadcasting)</td>
<td>(Broadcasting)</td>
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Although not an exact chart of the complicated allo-
ations tables, this illustrates accurately what foreign sta-
tions other than amateur are legally permitted in "our"
bands. The entries in parentheses show Atlantic City
provisions, not yet in effect.
However, there is quite a bit of commercial telegraph operation in this band by countries of Central and South America, taking advantage of the international provisions that a government may assign any frequency in derogation of the treaty so long as no interference is caused. Because of the mountainous terrain and considerable expense of maintaining landline communications there, radio is used extensively for internal short-distance circuits. Such operations have been going on in our 80-meter band for many years; mostly it is low power, but when propagation conditions are good we hear the stuff, particularly along our southern borders. Does this operation violate international agreement? Technically, yes. If the interference is not intolerable, however, we suggest that we try to get along with it. Why? Because this entire question of the 80-meter band in the Americas is a very delicate one, and the existence of many complaints of interference to amateurs will indicate to the other countries that the present "arrangement" is unworkable and that at the next Region II conference the allocation ought to be changed to get some exclusive frequencies for their fixed services in 3500-4000 kc., something that almost happened at the Washington conference in 1949. Make no mistake, however; we said, "if the interference is not intolerable." If there is actual and continued disruption of amateur communication on any frequency in this band from such Latin American operation, Hq. wants to know about it so proper steps can be taken for relief.

In the low end of 80 there are several South American broadcast stations operating in violation, and handling of this matter is already under way. At the top end, some aeronautical mobile stations may be heard from other regions, entirely legal (see chart); they are international air flights operating between the U. S. and Europe and, quite properly, using this channel after they cross into the European region some thousand miles or so east of New York.

In handling these matters, in order to have a good "case" Hq. needs more data than a single intercept. Occasionally a foreign transmitter will, in the process of being retuned for a new frequency circuit, temporarily develop a parasitic in our bands. We don't want to start international diplomatic machinery rolling for simply that. Should it be a consistent operation of any type, of course it merits complaint. So when you run across a station you think is in violation, note its frequency and the type of emission, as well as the call; then listen for him the next day and several days during the following week or so. If he's heard consistently, send your log dope to Hq. If you don't hear him again, forget it.

A word of caution: on the higher-frequency bands, if you run across an S9 "interloper," make sure it's not a receiver image. More than once we've been called upon to chase an invader out of our 20-meter band, only to find it was an image of a station operating around 15 Mc.

(Continued on page 68)

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1 QST, p. 30, September 1949.

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FEDERAL COMMUNICATIONS COMMISSION
Washington 25, D. C.

PUBLIC NOTICE
December 21, 1950

RADIOCOMMUNICATION BETWEEN AMATEUR STATIONS OF DIFFERENT COUNTRIES

Communications between amateur radio stations licensed by the Federal Communications Commission and foreign amateur stations are permissible subject to the limitations of Section 1 of Article 42 of the Radio Regulations appended to the International Telecommunications Convention (Atlantic City, 1947). Section 1 of this article provides as follows:

Radio communications between amateur stations of different countries shall be forbidden if the administration of one of the countries concerned has notified that it objects to such radio communications.

According to information obtained by the Commission from the Department of State, to and including October 13, 1950, certain foreign countries object to the exchange, internationally, of amateur radio communications and others impose specific limitations upon such communications. The names of the countries permitting foreign exchange, internationally, of amateur communications and countries imposing restrictions on such exchange, together with the terms of the restrictions, are hereinafter set forth.

ADMINISTRATIONS WHICH FORBID RADIO COMMUNICATIONS BETWEEN THEIR AMATEUR STATIONS AND AMATEUR STATIONS IN OTHER COUNTRIES:

Indonesia, Japan (excluding amateur stations of Allied Occupation Forces as authorized by the Supreme Commander, Allied Powers).

ADMINISTRATIONS WHICH FORBID ALL AMATEUR RADIO OPERATION:

Indo-China, Iran, Lebanon, Netherlands Antilles, Thailand.

THE FOLLOWING ADMINISTRATIONS HAVE PLACED THE SPECIAL RESTRICTIONS NOTED ON AMATEUR RADIOCOMMUNICATIONS:

Australia (Commonwealth of): Amateur stations in Australia are authorized to conduct radio communications for purely experimental purposes with amateur stations in other countries and the administrations of which permit such radio communications.

Austria: The reception of foreign amateur station transmissions is permitted, but transmissions by Austrian amateur stations are strictly forbidden by the Allied control authorities in Austria.

Accordingly, United States amateur licenses are warned that international communications are limited by treaty as indicated above. The foregoing does not in any way modify and should not be confused with the provisions of Section 2 of Article 42 of the International Radio Regulations (Atlantic City, 1947) which prohibit the use of amateur stations for transmitting international communications on behalf of third parties except when permitted by special arrangements between the countries concerned.

This Notice supersedes and cancels Public Notice of October 12, 1949 (Mimeo. No. 41636) and November 4, 1949 (Mimeo. No. 42042).
Don’t Pamper Your Harmonics!

Avoiding Damaging Harmonic Resonances in Amplifier Circuits

BY PHILIP S. RAND,* WIDBM

It is a well-known fact that no two amateur transmitters have the same harmonic content in the v.h.f. region, even though they were built from the same circuit diagram. As a matter of fact, the tube line-up and all the parts can be identical, but with a slightly different mechanical layout the harmonic generation will be quite different. In an effort to learn more about this phenomenon the experimental breadboard oscillator-amplifier shown in the photograph was set up.

It was reasoned that the only possible difference between two r.f. amplifiers using the same circuit, tubes and voltages would be that one might have a secondary resonance in the v.h.f. region because of a combination of stray inductance and capacity resonating, by chance, at or near a harmonic frequency. If this were the case it would be equivalent to having two tank circuits, Fig. 1, the first resonant at the fundamental and the second resonant at some harmonic frequency. With the proper conditions it might be possible to have nearly as much output at the second harmonic as at the fundamental.

Fig. 2 shows a typical 28-Mc. amplifier circuit that was set up to investigate spurious circuit resonances and their effect in increasing harmonic output. It also shows how a grid-dip oscillator was coupled to detect these unwanted resonances. The amplifier had tuned plate and grid circuits, link coupled, and was neutralized by a combination of inductance and capacity. It was driven by a push-pull 28-Mc. oscillator whose harmonic content had been carefully reduced to a minimum.

As shown in the photograph, all the usual TVI remedies had been applied except plate traps and shielding. Both oscillator and amplifier were mounted on a wooden breadboard so that they would be readily accessible for measurements and changes. A careful check with the grid-dip oscillator showed only one resonance point — 28 Mc. — in the complete range of the grid-dipper. With grid drive and plate voltage applied, no harmonics could be detected with the usual crystal diode wavemeter. A Hallicrafters S-27 used as a field-strength meter read only S3 on the second harmonic, while the meter was pinned at 20 db. over S9 on the fundamental.

In the next test a 56-Mc. resonance was artificially introduced in the circuit at the various points in Fig. 3 indicated by Xs. Each time the grid dipper was able to pick up and spot this resonance. At the harmonic frequency and each time the power was applied to the amplifier the crystal diode wavemeter read off scale when tuned to the second harmonic and placed anywhere near the amplifier or any of its power supply leads. The field-strength meter indicated an increase of from 35 to 56 db. in harmonic output. This represents an increase of from 3160 to 398,000 times in power output at harmonic frequency depending on just where the unwanted resonance occurs in the circuit.

The highest harmonic output occurred when the 56-Mc. resonance was in the cathode circuit.

*% Laboratory of Advanced Research, Remington Rand Inc., South Norwalk, Conn.
1 "TVI Tips," QST, October, 1949, p. 55.
Fig. 3 — Resonant circuits simulating possible spurious resonances were inserted as shown and also tried at the points marked with an X.

To produce this resonance artificially, the cathode was connected to ground through a 13/8-inch length of No. 14 wire. This was paralleled by a 150-μfd. mica condenser. Fig. 4 shows the frequencies of the resonant circuits made by simply shorting the pigtails on various sizes of mica condensers.

Obviously, we would not intentionally put resonant circuits at harmonic frequencies in a transmitter we were building, but often they exist in the form of stray inductance and capacity. If they exist, they must either be eliminated completely or at least detuned to some frequency far removed from a harmonic frequency. If two spurious resonances occur at about the same frequency simultaneously, one in the grid or cathode and the other in the plate or screen, the r.f. stage will take off as an oscillator, and we will have what is known as a beautiful case of parasitics. This is usually cured by inserting a parasitic choke in either the grid or plate to detune one of the resonant circuits and thus stop the parasitic oscillation. This procedure may or may not make the harmonic situation worse, depending on the frequency of the two resonant circuits that caused the parasitics.

The best bet is to investigate with a grid-dip meter and either eliminate any spurious resonances that might accidentally be there or detune them to some harmless frequencies.

Frequently the use of parasitic chokes may cause a resonance near a harmonic frequency and make the generation of harmonics much worse. It is better to change the layout so that shorter, heavier leads can be used, and to also use more effective by-pass condensers for the v.h.f. region.

Sometimes a resonance at harmonic frequency is composed of stray inductance and capacity within the final tank condenser and its resonant frequency can be varied by turning the condenser. If this is the case, be sure that the fundamental and harmonic tune at different dial settings. If they do not, adjust the number of turns in the tank coil so that the fundamental resonance falls as far away as possible from the harmonic resonance, or try a tank condenser of different physical shape or size, as this may have a different amount of stray inductance and capacity, and hence may resonate at a different frequency. The best tank condenser to use is the variable vacuum type — if you can afford it.

Troubles may be caused by a faulty by-pass condenser in the plate, cathode, screen, or grid circuit. By faulty, I mean one that has too much internal inductance in the v.h.f. region. It may be a fine condenser for audio or r.f. work, but at v.h.f. it looks more like a coil and condenser in series (Fig. 5). Try substituting a condenser of smaller physical size or try a Sprague Hypass.

If you use plate traps, be sure they are tuned for maximum attenuation of the harmonic in question, and not to resonate the circuit as a whole at the harmonic frequency. If the traps are tuned to the harmonic frequency with a grid-dipper after they have been wired in the circuit, they will produce greatly increased harmonics. The only safe way is to tune them for minimum harmonic output while watching a f.s. meter.

Fig. 5 — At v.h.f., "by-pass" condensers with their leads turn into an equivalent inductance. This occurs at all frequencies above which the combination of condenser and leads is series-resonant.

Oftentimes in the case of two and six meters, TVI, BCI, and even r.f. feed-back in speech amplifiers can be traced with a grid-dip oscillator to a resonant circuit tuned to the transmitter's fundamental frequency. This resonant circuit is made up of various stray inductances and capacities associated with the grid of the first audio stage in the offending receiver or a.f. amplifier and usually can be measured with a grid-dipper.

W1PEA in Norwalk had a bad case of r.f. feed-back when operating on two meters. Grid-dip oscillator showed that the first audio grid circuit was resonant at 150 Mc. By re-arranging parts, this resonance was raised to over 200 Mc. and the r.f. feed-back disappeared.

See p. 34, QST. April, 1949.
The "Clemens Match"

Balanced Feed with Coaxial Line

BY JOHN F. CLEMENS,* W9ERN

About a year ago a new 3-element 10-meter rotary beam was under construction at W9ERN. A previous model, fed with 300-ohm Twin-Lead and a T-match, had just been taken down due to the unsatisfactory performance of the feed system, which exhibited a high s.w.r. and considerable unbalance of the feed-line currents. An experimental project was undertaken to devise a method of feeding the beam with coaxial cable to take advantage of the general availability and good weather characteristics of RG-8/U. The experimental work on the antenna was done on a scaled version at 300 Mc., fed with the smaller-sized RG-58/U.

A feed system finally evolved from these investigations which appeared promising. The system was then applied to the full-sized 10-meter beam and the entire antenna was installed and evaluated over an 8-month period. The results of operation over this length of time on ten meters confirmed the results with the 300-Mc. antenna. A description of the antenna feed system with the design data appeared in *Electronics* in October, 1950.1

A number of inquiries followed publication of this article, mostly from amateurs who wished to apply the system to amateur antennas. The original thought in the first article was the probability that the antenna feed system might be attractive for use on television receiving beams. QST requested information on the system since it apparently had greatest interest for amateurs and many amateurs would be reached only through QST.

Unlike several previous antenna feed systems, this one bears no resemblance to an alphabetical letter, either English or Greek; and therefore, for want of a descriptive name the system is called the "Clemens Match."

Fig. 1 is a drawing showing the method of assembling the feed system. All dimensions in Fig. 1 refer to the 29-Mc. 3-element "plumber's delight" beam and are inversely proportional to frequency. Thus, to use the system on half the frequency, all dimensions would be doubled. Theoretically, of course, to be exactly similar to the original even the diameter of the elements should be scaled to the new frequency; practically, only the lengths of the elements and longitudinal dimensions need be scaled. The effect of a different element diameter should be negligible.

An advantage of this method of feed is the simplicity of installation. The entire feed system can be prepared on the ground, rolled up, carried onto the roof, and fastened to the antenna. This is because the matching system itself is made of RG-8/U, without any additional tubing or clamps being required.

The simplicity of the system is evident from the drawing. The odd feature of the "Clemens Match" is that the center conductor of the coaxial cable is not connected directly to the antenna. Also, a decided advantage is the fact that it is not necessary to split the driven element and plumber's delight construction is therefore practical.

**Principles and Construction**

The general theory and development of the system may be explained thus: The impedance between two symmetrically located points on an antenna rises from zero, when the points are adjacent, to a very high value, when the points are at the ends of the antenna. By suitably locating two such points, we may have an impedance whose resistive component is equal to the characteristic impedance of the transmission line. The equivalent impedance between the two points may be represented as a resistance and reactance in series or in parallel. Suppose that these two points have been chosen so that the resistance component of the equivalent series impedance is the characteristic impedance of RG-8/U, or 50 ohms. These two points were obtained by experiment and are 20 inches each side of center in the antenna shown.

A coax cable may now be fed to the antenna and the necessary elements and shield will resonate. The effect of the elements and shield will resonate. The effect of the elements and shield will resonate. The effect of the elements and shield will resonate. The effect of the elements and shield will resonate.

When the cable reaches one of the driving points, the shield must be well bonded to the antenna element. Current from one conductor of the transmission line, the coax shield, reaches one of the driving points by this connection.

The center conductor of the coax is extended, without shielding, and makes a "U" turn, passing back past the center of the antenna and so on to the other driving point. The center conductor enters a shield at this second driving point and the resultant coax cable continues along the antenna toward the boom and mast. The shield of this section of coax is bonded to the second

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* © Electronics Research, Inc., Evansville, Ind.
driving point. This second section of cable is eventually short-circuited to form an equivalent capacitive reactance. In the antenna of Fig. 1 a 72-inch length of coax provides the proper value of capacitive reactance. The shield of the shorted coax section may also be bonded electrically to the antenna, mast, and boom, if desired, but it is essential that the shield be well connected to the antenna at the second driving point.

The entire assembly is almost perfectly symmetrical and as a result may be expected to be free of electrical unbalance effects.

The purpose of the shorted coax section is to provide a capacitance to resonate with the inductance of the exposed center conductor of the cable, which is the cross lead (42 inches long in Fig. 1) plus the small additional equivalent series inductance of the antenna element itself between the two driving points. All of these various capacitive and inductive components can be calculated once the two driving points have been experimentally determined. However, the determination of these quantities is only of academic interest since the experimental data were necessary to fix the 50-ohm feed points.

During the experimental work on the antenna, one model was tested with bare braid coax with the braid contacting the mast and antenna. The performance of this antenna was exactly the same when the braid was insulated everywhere except at the connections to the two driving points. Since the weatherproof feature of coax was a prime aim, the final installation was made with RG-8/U with the vinyl jacket intact, except for an inch or so at each connecting point where a heavy soldering lug was soldered to the braid and fastened to the antenna element with a self-tapping screw. The entire region of the connection was then taped with Scotch electrical tape to prevent the entry of water under the vinyl jacket. The cross lead was formed of 42 inches of coax center conductor from which the vinyl jacket and shield braid had been removed. The heavy polyethylene insulation was left on the center conductor for weatherproofing. After 8 months, which included a winter, the feed system was still in perfect condition. The 42-inch length of center conductor sags about 3 inches below the antenna element and from a distance the feed system looks like a T-match.

Both the feed line and the shorted capacitive section were wound in a slow spiral turn or two around the antenna element for mechanical support and likewise spiraled around the mast and then taped in position.

**Transmission-Line Pick-Up**

Standing-wave measurements on the transmission line showed a perfect 1/1 match at 29 Mc., rising to approximately 1.5/1 at 29.5 and 30.0 Mc. Experiment then continued to determine the balance of the feed-line currents. Balance of the feed-line currents is essential to achieve maximum signal-to-noise ratio, since the beam and not the feed line does the receiving.

One test for balance is the alignment between the direction of maximum radiation and the elements of the antenna, maximum radiation occurring perpendicular to the antenna element in a balanced antenna. This desirable condition was found to exist by test with a field-strength meter and local receiver S-meters. The voltages at the two tips of the antenna were compared and found to be the same by hanging flashlight bulbs at each tip. The center conductor of the coax was then broken at the antenna where it emerged from the shield and the receiver in the shack went completely dead, demonstrating the lack of signal pick-up on the shield.

Several remarkable instances of the benefits of a balanced coax feed have been observed. For instance, when an electric appliance such as a sewing machine was operated in the house below the operating room, it was found that an 89 signal of perfect readability which was only slightly affected by the noise disappeared far below the noise when the shield was broken at the receiver even though the center conductor remained connected. The noise signal from the sewing machine also rose from S4 or so to S9+ when the shield connection was broken at the receiver.

The directional characteristic of the beam was just as pronounced on reception as on transmission, a further indication of balanced feed.

The same matching system should be applicable to other types of antennas, such as a 4-element beam or simple half-wave single element. It is possible that 50-ohm cable can be matched even to a half-wave dipole having a center impedance of 73 ohms, because the antenna is not broken but allowed to shunt the resistance component which can produce a 50-ohm equivalent series resistance by suitable selection of the
driving points. Lack of time has prevented work on applying the system to other antennas. There is reason to believe, however, that the same dimensions could be used on a 4-element close-spaced or even a wide-spaced beam with a negligible mismatch, say, less than 1.5/1. The reasoning behind this belief is that although the center impedance of the driven element varies appreciably as the number or spacing of parasitic elements is changed, the impedance between the tips of the antenna varies in the opposite direction. Therefore, there must be a region on the antenna where the impedance varies only slightly or actually remains constant and the two feed points, 40 inches apart, may be in this region.

Adjustment

Should anyone wish to determine exactly the correct feed points for any type of beam, a description of the test procedure will be helpful. A Micromatch is used to determine the s.w.r. on the transmission line. Instead of the shorted length of coax cable a small variable condenser may be temporarily used in series with the cross lead. Two feed points are arbitrarily selected and the coax shield is clamped to one, and one terminal of the variable condenser is clamped to the other. The center conductor is then connected to the other terminal of the variable condenser, power is applied, and the condenser is tuned for a minimum s.w.r. If this minimum value is not 1/1, the feed points should be relocated and the test repeated. In this way the proper points of feed may be rapidly located. The capacity setting of the condenser should then be determined and a length of shorted coax should be cut to provide the same value of capacitive reactance and this shorted stub is then used to replace the condenser.

The necessary length of cable for a closed stub is determined, once one knows the necessary capacitive reactance, by

\[ X_c = Z_k \tan \theta = -\frac{\lambda}{Z_o} \]

solving for \( \theta \). The electrical angle \( \theta \) will always be between 90 and 180 degrees and may then be converted to inches of coax by the formula

\[ D = \frac{32.8 V_p}{f} \theta \]

where \( D \) is the length in inches, \( \theta \) is expressed in degrees, \( f \) in megacycles, and \( V_p \), the propagation velocity, as a fraction. (\( V_p \) for RG-8/U is 0.66.)

The series-resonant circuit formed by the shorted coax capacitor, the antenna and cross-lead inductance and the antenna radiation resistance is a low-Q circuit and therefore has a negligible effect on the over-all bandwidth. In other words, since a parasitic beam is a relatively high-Q narrow-band device, the matching circuit will not affect the bandwidth of the system to an appreciable degree.

A standing wave will always exist in the shorted capacitive stub but the values of voltage reached are well within the ratings of RG-8/U for even a kilowatt of r.f. The currents in the shorted section will exceed the rating of RG-8/U with transmitter powers of over 100 watts or so. The obvious remedy is to use an open-circuited coax capacitor section, which will suffice for over a kilowatt of r.f. This change will require subtracting a quarter-wave-long section from the capacitive section and then leaving the coax open-circuited. The number of inches of coax equivalent to 90 degrees at the operating frequency may be computed and subtracted from the length originally determined. In Fig. 1 the shorted coax section may be shortened by 67 inches, leaving an open stub 5 inches long (\( f = 29 \text{ Mc.} \)). The open end should be well taped for weatherproofing.

The benefits of coaxial cable will be greatly appreciated by anyone who has attempted to use Twin-Lead under adverse weather conditions. The loading of the coax-fed antenna is unaffected by rain or ice and the feed line may be wrapped around the mast without harm.

---

Packaged Audio Phase-Shift Network

The audio phase-shift network has often been a stumbling block in the path of an amateur building phase-shift type single-sideband transmitting and receiving equipment. Many have built and adjusted their own networks, of course, but there has been a need and demand for an inexpensive preadjusted unit. That demand can now be met by the No. 75012 Phasing Network recently announced by the James Millen Manufacturing Company, Malden, Mass.

**Designed by Donald Norgaard, W2KUJ, and described in the November-December issue of *QST* for amateur a.s.b. receiving or transmitting service. — H. G.**
Top Electronics Units Commended

The following Naval Reserve Electronics Companies have been named the outstanding Reserve electronics units in their districts for the year 1950.

<table>
<thead>
<tr>
<th>Company &amp; Location</th>
<th>Amateur Call</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>KINRA</td>
<td>1-2</td>
<td>Maiden, Mass.</td>
</tr>
<tr>
<td>K2NRW</td>
<td>3-20</td>
<td>Ramsey, N. J.</td>
</tr>
<tr>
<td>K3NAC</td>
<td>4-6</td>
<td>Stroudsburg, Pa.</td>
</tr>
<tr>
<td>K4NRK</td>
<td>6-22</td>
<td>Sarasota, Fla.</td>
</tr>
<tr>
<td>K5NAN</td>
<td>8-45</td>
<td>Harlingen, Texas</td>
</tr>
<tr>
<td>K9NAG</td>
<td>9-106</td>
<td>Downers Grove, Ill.</td>
</tr>
<tr>
<td>K6NBG</td>
<td>11-8</td>
<td>Pomona, Calif.</td>
</tr>
<tr>
<td>K6NRM</td>
<td>12-6</td>
<td>Modesto, Calif.</td>
</tr>
<tr>
<td>K7NAQ</td>
<td>13-23</td>
<td>Great Falls, Mont.</td>
</tr>
<tr>
<td>K10HR</td>
<td>14-1</td>
<td>Pearl Harbor, T. H.</td>
</tr>
<tr>
<td>W3USN</td>
<td>5</td>
<td>Washington, D.C.</td>
</tr>
</tbody>
</table>

The achievements of these units from the standpoint of training, personnel, and administration have been recognized by letters of commendation forwarded to each district winner by the Chief of Naval Personnel.

Training by Television

On October 10, 1950, the Special Devices Center of the Office of Naval Research, Sands Point, New York, in association with the Director of Training, Third Naval District, inaugurated the first of forty-two weekly television programs for training Naval Reservists in nineteen training centers in the New York area. These programs are one-half hour each and are carried as a public service by WOR-TV. During the forty-two weeks, various types of format will be used. Some programs will originate in the Special Devices Center studio, and others from a destroyer anchored off Gravesend Bay, Brooklyn. All programs are designed strictly for training purposes and make no appeal to the usual home audience.

Amateur Clubs Share Reserve Facilities

The following listed amateur radio clubs have accepted an invitation to hold their meetings at local Naval Reserve activities. These are in addition to the clubs mentioned on the Naval Reserve page, December 1950 QST. NRTC indicates Naval Reserve Training Center; NREF indicates Naval Reserve Electronics Facility.

- Amateur Club of Gary (Ind.) (NRTC, K9NRV)
- Anderson (Ind.) Radio Club (NRTC, K9NRZ)
- Arrowhead Radio Amilet Club (NRTC, Duluth, Minn., K9NRN)
- Dubuque (Iowa) Amateur Radio Club (NRTC, K9II)
- DuPage Radio Club (NREF, Downers Grove, Ill., K9NAG)
- Genesee County Radio Club (NRTC, Flint, Mich.)
- Hannibal (Mo.) Amateur Radio Club (NRTC, K9NBK)
- North Iowa Radio Transmitting Assn. (NREF, Mason City, Iowa, K9NBQ)
- Oakland County Amateur Radio Club (NRTC, Pontiac, Mich., K9NAX)
- Oakkosh (Wis.) Amateur Radio Club (NRTC, K9NRO)
- Quad City Amateur Club, Inc. (NRTC, Moline, Ill., K9NRD)
- Western Illinois Radio Club (NRTC, Quincy, Ill., K9II)

Emergency Operations

During November floods at Reno, Nevada, the Naval Reserve Training Center (K7NRU) at that city provided walkie-talkie communications, water pumps and amphibious vehicles, and assisted generally with evacuation of goods and personnel from downtown and suburban areas.

Naval and Marine Corps Reserve Training Center (K8NRR), Bakersfield, California, established emergency operations for the duration of the Kern River high-water threat, November 20th-21st. Assistance was provided to the California State Highway Patrol, Kern County Supervisors, Fire Department, Disaster Council, and Pacific Gas and Electric Companies.

During the severe storms which hit New England in late 1950, both electric power and telephone service were disrupted at the Naval Reserve Training Center (K1NRQ), Lawrence, Massachusetts. Emergency radio equipment provided the only direct means of communication.

The District Engineer, Louisville District, Corps of Engineers, USA, has requested the assistance of radio amateurs (Continued on page 98)

February 1951 29
How's DX?

CONDUCTED BY ROD NEWKIRK, W9BRD

How:

Now and then we are confronted by some soul-searching individual who poses the apparently simple question, "Say, chum, just how does one go about getting the most kicks out of DXing, anyway?" Now we can refer him to W1DX's apt summation of this "thing" in our September, '50, back number which covers the subject well; also in lieu thereof we might list a few prime considerations on the negative side, the observance of which should certainly assist one to derive the least enjoyment from amateur radio's DX angle.

Such as, to wit:

- Keep as few statistics on your operation as possible. Card indexes, complete QSL files, and an accurate log are strictly for the novices.
- Develop a strong prejudice against some phase of DXing such as phone, c.w., QRO, QRP, newcomers and so forth. Your scorn may soon burn you to stamps or crocheting.
- Be content with nothing but high power so that when suddenly stuck with a TVT/BCT-hidden QTH you'll QRT rather than QRP.
- Build your station strictly around one ham band so you won't be tempted to work others when your favorite goes out on a TVI or snapshot binge.
- Buy and repair as little of your gear as you can. It's safer to call up the factory than risk soldering-iron burns.
- Keep your code speed as low as the law allows since that stuff can't possibly be fun.
- Specialize in hamradio operation at your station. The "look how sloppy I can transmit and still work DX" attitude always impresses one's listening public.
- Make a strong attempt to stay far out-of-date in keeping up with the state of the art. C.w. break-in and single-sideband phone advantages belong solely to commercial.
- Ignore neighbors with interference problems as TVI and BCI are too often the fault of manufacturers. Neighbors are usually cranks with public nuisance complexes, anyway.

Well, don't be too piqued if you can't bat a perfect zero on this talent test. Jeesee & Co. are already having trouble with their own 1951 resolutions along these lines.

What:

A somewhat bulkier tome might be condensed from the walls of anguish emitted by DXers bearing on the prevalent mediocre conditions. One local built a b.c.-sct converter for twenty and it took him a week to ascertain that it was working. But things really aren't that bad. In fact, DX may be on the menu. 24JN (14,018) was the 100th country worked by W2JBL's 45 watts and vertical whip, for instance. George's others: 3VBA (14,050), TP3SF (14,020), LK1AS (14,040), CRVBB (14,005). VQs 2JN (14,070), 4MS (14,055) 4KRL (14,000), MZ2ABE in Trieste (14,010), CR5AC (14,010), Z3Q (14,055), and ZE3J (14,092). Somebody once told us that a vertical will outperform a horizontal under poor ionospheric conditions — very well could be, 4F2AC (14,038 t/0), FM7YK (14,009), F77YB (14,008), 4EAGM (14,028), TA3AA (14,006), PEITM (14,038), YS1O (14,016), ZC4XP (14,041), ZE7JD (14,098), UOSKAA (14,022 t/6), and U3KRA (14,002) are reasons why DL6FS prefers his rhombic. VASKAB QST'd quickly, by the way. Guy was told by YUICAG that YU1WZE is a private. DL4FS was hoping to pull 3A2AB on the air once more sometime in early '51 which could be right now. W5FXN has been pretty busy but caught up with QSQ9Q (14,015) while still chasing VK1RF (14,080), VK1RB (14,080), VK3AT (14,060), WSOEU/K6W (14,063), U6AF (14,082), and CR7BC (14,100). Jim is curious about some C1A1V. W6GAL captured U6QNYX, VF2A1, VF4NJD, WF4GK, and G2ZCQ while W8QUL ran into the mysterious LA42Z (14,100). While we don't think time-of-QSO has as much possible universal value as frequency, we're willing to list any submitted. The hour of the day that a West Coast station works an Asian usually means needs more to the East Coast, and vice versa. Anyway, W6FID bagged the following (EST): SP1JF (0546), HP1BR (1822), K84AC (1852), and CN8B (1744). W8CG wrapped up EA8EC (14,076), F8YK (14,051), EA5AB (14,056), CR7C (14,092), CR6AW (14,056), and a CRS while W4CYY contacted EA9AP, CR6AD, 9S4AX, and Y02BF. "J " recently won a battle with some kidney-stone QRN. G2ZCQ (14,070), V82CP (14,110), YU2MD (14,058 t/0), UG2EAB (14,029), and CR7AG (14,097) were hauled in at W3JY while W6WFS adds YQ2GW, FY8AC, an FT8 and a Y81. Ray would like some pitch on CR6SS. KP4HD and KP4HU increased power to 36 watts on their joint enterprise, KP4KB, and reached 88 countries with folks such as Z04AA, E79X, PK6V, and F4QAC. -- VQ6PD (14,030) is a nice one noted by W4CYY and Z8ZMI (14,006) is back at it from Mareland according to W8FXN. HS1VR (14,001 t/QRH) and YJ8AA (14,060) were being stalked by KV4AA. The So. Calif. DX Club has been making okay as indicated in their Bulletin. Y1s CZY, Y1s CZY2, B8 and 3A1R (14,012) ECU (14,114) DIN (14,049) MBC (14,030), Z8SMK (14,117), FBZSS (14,030), ISICNQ (14,077), FDS3G (14,040), PK7EK (14,129), EQSB (14,073-000), ZG2SF (14,051), and LIKXY (14,050) are great DX logs out of the 14th Edition. Editor's logs records that the band is frequently wide open in the morning out thataway. Gads, those guys must have a pipeline to Iraq. The DXer of the Nor. Calif. DX Club adds others: E81X (14,035), Z8KM (14,090), FP8AL (14,040), and YK1AB (14,090). More morning work. Greely may have had DXing in mind

30 QST for

OKAY JEEVES, LESH GET BUSY ON THAT NEW BEER CAN VERTICAL
when he was harassing young men to go West. - EL4F (14,060) with 75 watts to a long wire. ZS7C (14,052), and F3R0Q (14,080) have been attracting large followings.

In the ‘phone division, DL4FS nailed down the elusive FNSAD (14,286) and W4CXY has been hearing a good signal from EQFM (14,085-120) - Z59F (14,175), Z5PF (14,315), VP2QG of the Woodwards (14,175), Z5ZSB (14,330), and TV4QF (14,336) answered W5MPG's new 3-element array. W4ENA/JAS on Iwo was worked by W8EBC and AR8BC puts a good signal into Kansas according to Mr. A. Rappe. The Lorenz item can often be found around 14,170. - The aforementioned DXzer and Bulletin apparently have not been concentrating on the dot-and-dash method but the latter maker notes of Z58S, V31E, and VK1F (14,168).

Without expecting in its reporting role, forty has nevertheless provided some diversion. VP8BHI (7018 74) has nifty taken over representation of the Claymores we are notified by W5CEL, and F8WAA of all is reported by the Bulletins to be scheduling F8SAC on this band. The boys are trying to interest him in the joys of DXing. - DL4FS chatted with VP8B (7025), VSTNG (7020), UQ2AL (7003), ZD4AB (7016), and SP1JF (7018). W3JAK managed OA4BG, CN5CM, F8ADD, SP1CM, and UQ2AX while youngster W5QKN broke into the DX angle with HK4DP and YN3CP.

Somebody's electric blanket terminated the efforts of W3A8J to raise F5SSCC (7050 76) and W8BQD puts the finger on W1FAX/KW6 (7010) who comes through around breakfast time. - W9EQN has a nice gathering in YV5DO, CN5BE, HZ3C, FM7WF, HC2HI, ZE3BN, HZ2HZ, ZE3K, YF7NQ, HS5HN, TI2PI, KG86U and others. W9PID works Africa and the Caribbean around midnight EST and W9KQB has pushed his EC-50 to fifty-six 7-ME countries. - The So. Calif. DX Club's special forty-meter DX test brought to light the activity of W34PJ A K4A A1B, W32AA, PK4DA, FK8AA, the shabby MX1AF, UA0V, UA5KBB, VS6CH, F4ABG, and ZK1AZ.

W3ZVB's beam broke down in a gale to decimate our report for ten on this tower. But not before Dickie had rolled off confab with MD2GC, M1RXX, CR6AV, K9JAJ, ZE2K 3K1 3J7T, VQ2VR, and ZS8A. - Another New Jersey sharpshooter, W2AEB, gloomed onto ZS7C, ZE5A 1JE 2JL, ZP5B1, E8AAX, F54AA, VQ2GR, and ZS3O. If the price of coax ever decreases sufficiently it would appear advantageous for the truly deluxe DX station to feed a W2 skycare for 28-ME. work and a W6 antenna for satisfactory 14-ME. results. - A 98.54% QSL average is still held by W4MKB with 185 verified from 137 worked. CR5UP and ZK2AA cards are still on route. - On c.w. W8EBC encountered W41HC/KW6 - D3XBD and HC2KB console each other around 28,050 kc.

There's lots to chortle about this week and if you have a dearth of neon signs and power leaks in your surroundings you might make hay. W9AND made it forty-three 5-ME. countries with SM5AQP (3003) and also raised Gs 3CKL 3D5 Y6V 6GM 3JR and ZL9 1HM 3SNE. - CR4F-JD is about to face up on 3534.715 (1 kc. with a Vee. Monroe reg permission permit hamming in the 3500-3625 kc. range only, making it tough to flag down 75-meter W phones. Except for forty meters where the 7200-7300 kc. range is unavailable, the C N S recognizes run close to our own. - W9UHZ knocked off ZL4 ICI 3OP 4IE and KH5PL while W2PEO collected SP1JF (3510). - W4RHR contributes a juicy list of stuff worked and in the works: F7VMA, F8A5C (3515), YN1AAA (3525), KS4AC (3512), VP6CDI (3515), L7UAZ (3513), VPSFR (3510), ZS1K (3515), EK1AA (3508), VP1AA (3501), ZL2 DZ, 2AF 3BC and 4GJ near 3515, and European HAA5A, G3AZY, GZ2DW, G8KT and DL7AH between 3510-3520. Gene learns, via VK6YP and KP4HU, of ZK2AB (3538) and FO5GH (VFO near bottom edge). - W2QHH landed 954AX. is skidding ZB31 on 3007, and has shipped a 3347 rock to EA6AA.

W1BB reports one-sixty QSOs with EK1AO, G6GM, and G3PU. - sufficient indication that DX on this band is more than somebody's pet chimera is the fact that W4NNN was reported heard in New Zealand during last season's occasional activity. Bob is now situated in Iowa and is shopping about for a good DX QTH. - If you've room for an antenna for the low band, you might refer to page 82 of January QST for particulars on the 100-meter DX tests.

Where:

If you think you've having a deuce of a time raising DX, pray take a peep at our accumulation difficulties in the QTH department. They can almost be counted on the digits of one hand. One cause why. Because of his leaving Tripolitania, H. T. "Butch" Orrell, MT2E, advises that he has surrendered MD2/MT2Q S2L bureau duties to MT2DZ who answers to the address: Peter Keller, P. O. Box 200, Tripoli, Tripolitania. North Africa. - We have it from the NNRL that LA4ZZ/MM's operation is unauthorized so somebody might use the QTH given below to infer him of the fact. - If you work an FT1 you'll probably find him in the FI listings in the Call Book as only the prefix was changed on Sicilian calls.

<table>
<thead>
<tr>
<th>Call Sign</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA2BE</td>
<td>Lee, Palmas, Canary Islands</td>
</tr>
<tr>
<td>F6QFM</td>
<td>New York City, N. Y.</td>
</tr>
<tr>
<td>FF5AC</td>
<td>Yvon Regina, Box 19, Port Elliot, Mauritania, F. A.</td>
</tr>
<tr>
<td>HR2JM</td>
<td>John B. Morrison, American Consulate, San Pedro Sula, Honduras</td>
</tr>
<tr>
<td>I5A</td>
<td>(Ex-M54A) (QSL via N5Q)</td>
</tr>
<tr>
<td>LA4QC</td>
<td>(QSL via NRRL)</td>
</tr>
<tr>
<td>LA4ZZ</td>
<td>(QSL via WRYN)</td>
</tr>
<tr>
<td>L12Z</td>
<td>Box 3009, Oslo, Norway</td>
</tr>
<tr>
<td>MB4Z</td>
<td>Box 2009, Oslo, Norway</td>
</tr>
<tr>
<td>MB9BL</td>
<td>G.S. Beanshe, H. Q. Kaggenfurt Garrison, British Troops in Austria, Austria</td>
</tr>
<tr>
<td>M5FEAE</td>
<td>(QSL via RSGB)</td>
</tr>
<tr>
<td>MIS2R</td>
<td>Box 7544, PM, New York City, N. Y.</td>
</tr>
<tr>
<td>Ex-MT2E</td>
<td>H. T. Orrell, Eastern Telegraph Mess, Aden, Aden</td>
</tr>
<tr>
<td>OB31L</td>
<td>QSL Bureau, APO 777-A, U. S. Forces in Arabia, Saudi Arabia, Saudi Arabia</td>
</tr>
<tr>
<td>PK1RI</td>
<td>A. Te Riet, P. O. Box 127, Djakarta, Republic of Indonesia</td>
</tr>
<tr>
<td>SW9WZ</td>
<td>Wm. J. Koster, % American Consulate, Saloumika, Greece</td>
</tr>
<tr>
<td>VK1RF</td>
<td>(QSL via WIA)</td>
</tr>
<tr>
<td>V8FPA</td>
<td>(QSL to GM3EYP or via RSGB)</td>
</tr>
<tr>
<td>YU2DGE</td>
<td>Box 48, Belgrade, Yugoslavia</td>
</tr>
<tr>
<td>ZC4AA</td>
<td>(QSL via RSGB)</td>
</tr>
<tr>
<td>E22DYM</td>
<td>Leaire, Nigeria, Signal Squadron, Lagos, Nigeria</td>
</tr>
<tr>
<td>ZE53T</td>
<td>P. O. Box 2100, Salisbury, Southern Rhodesia</td>
</tr>
</tbody>
</table>

Still copying solid through the QSB are W2s AEB JBL ZLB, WSA FXN NWB, WSA ALC AM, WSCVU, WSA CHT HUZ, WBYRN, DL4NS, KF4KD, and Mr. Phil Bates.

Tidbits:

Conditions permitting, W4RXP and W1PVF will ride the airwaves out of St. Pierre (FP8) come this June or July... MS4A finished a three-month sojourn in Italy and returned to Somaliland where he will resume activity as IA5A. IS being the new label for Italian Somaliland. This from W2AEB who also brings good tidings in word that Z5BF is again active. - KP4KD hopped

February 1951
Still trying to promote some HV-prefixed operation for the DX gang. Johnny Martelli tells us the W/VE anvil chorns at the controls of his widely-worked 11FL of Bologna.

over to KV4 and had a pleasant visit with KV4AA. The two hadn't hooked up personally for some 27 years. By discovered things in sad shape at KV4AO but the boys got everything perking again in time to hit the 3.5-Mc nets. KP4RD and KV4AA were shipmates a long time back when operating the Navy's NAU and made the XYLs strictly second fiddle in the chin-wagging department. Much too late to do any good but Z11KP told W6FXN he was trying to work some portable in Z8 in December and January. If you snapped him, bully for you! ZD4AF will head for ZS-land in April or May. Learns W4MKB, Grey will do his darndest to use up the 1900 QSls furnished by Joe which is surely okay by us. The ZD4AFs have a first harmonic now at just a few months old. We regret to hear via W3ADB from ZL2KY that Bill Hall, ZL2BF, recently entered the list of silent keys. Bill was quite well-known throughout the world of FX. CNS8EJ received his "greetings" from the Vatican on behalf of HVIA but that wasn't the end of the story. Jim was telling MD2AC about the deal when who shows on in the QSO but an HVIA! He didn't linger long, however, upon learning that the jig was up. According to CNS8EJ, CNS8EO EO BS ET and EW will soon be QRT, leaving CNS8E and EF EQ EH EJ EM and EX to handle the U. S. division of French Morocco activity. CNS8EJ is looking forward to contacts with S. Dak., Mont., Idaho, Utah, Wyo., and Nev. for the purpose of securing his WAS certificate. --- "Conditions are quite poor. The WS are hanging in good on 40 meters so maybe I have to have that band and KV4AA don't have an extremely lucky in this QTH and several times have made WAC in the day on 20 form. The DX Hogs over here fight for EQ5FM's 20 watts!" With these lines SV8WX seems to cover the Grocean DX situation quite adequately. Bill puts 35 watts into an 807 which feeds a doublet and he receives with an SX-28.

You diploma chasers may be interested in the Belgian W-10-BAS award (Worked Ten Bruges Amateur Stations). It will be given to any amateur who submits proof of contact with ten Bruges amateurs since January, 1951. Qualified as Bruges stations are all licensed amateur stations situated within the limits of the Bruges district and some of these are CNS6 AJ DJ DZ IA IB IC IG HH HF EE LF LO LV OD OQ PU UM and YL. No QSls are required; merely submit a list mentioning the calls of the stations worked along with date, time and frequency band to The Grocean Gang, U. B. A., P. O. Box 38, Bruges, Belgium, enclosing five IRCs for return postage.

DL4FPS of LX4 and 3A2 remain on the air trying to swing a deal for some Andorra operation. So far the PX authorities evince little enthusiasm in correspondence with Guy, we are told by W6AAM. --- Sixty-one countries have so far been contacted by CNS9AA's mobile. We'd like to hear other claims in this respect. Sooner or later we expect news of a mobile DXCC accomplishment.

WEB8E takes time out to advise that, contrary to a previous "Where" item, he does not handle GIFL, QSLs.

["I'd like to handle one with our call on it, Boss — Jeran."]

Pressure of work has curtailed Bud's DX activities. DL7AH is in need of but one more state for his WAS, that being Utah. This one seems to be in great demand these days. We may be able to provide a useful service to WAS-hunters of DX men in the following states will notify us of their activity and most-used frequencies: Wyoming, Montana, South Dakota, Arkansas, Vermont, Delaware, Nevada, and the aforementioned Utah. These, judging by the overseas mailbag, appear to be the toughies. W4VE, ex-WDYN, hears that one of the KX5AA operators is returning to the States. This probably won't affect the on-the-air status of the station. C08AJ expects to be off for a air for some months and desires to pass along his best regards to DX buddies through this medium. All due MTZ2E QSls are en route destinations now and Butch is QRX in Aden awaiting assignment of a new call. This may be VS0B. Incidentally, he writes that MD2WY was never licensed and cards for the fellow must remain undelivered.

LA4QC on Queen Maud Land in Antarctica has been keeping in touch with home through LA87Y and 2G. The NRRL states that the station consistently employs both 'phone and c.w. Plaza handy with the Norwegian lingo will have the jump on this one.

H2FJM is wondering where all his overdue QSLs have gone. John recently fired up in San Pedro Sula and does well on 'phone with 25 watts to an 807W with a doublet radiator. H2FJM expects to remain active for approximately six months before acquiring a new QTH and possibly a new prefix — 100% QSL is guaranteed.

Tan Koon San of PK4KS gasses past his final at the cameraman in the backyard. PK4KS was one of the first postwar Pks and succeeded in keeping the 10-meter boys in a state of high excitement for a lengthy period. (Photo courtesy WB8YC)

LJ2Z has held the calls W2API, WQFZQ, and W7JHS and informs us that LJ1 is a new country unless one needs Norway. Charlie is another sure bet for a QSL.

OE1JLL sends us a card from Salzburg's vicinity bearing the classic "least seen in the world" upon it. This would refer to the call letters we presume and he must be right, by gosh. Still a long way to go to pass up old BAR06, though.

Written upon one of his famous Dornier I cards, CX2AJ sends us word of a week's visit to Argentina where he and LA2CM had a merry go-around. CX 'phones are fairly plentiful nowadays but where are all those old-time CX c.w. ops hiding?

We see W5PH's team fished W5HEB's outfit in the No. Calif. DX Club's recent DX Test by a score of $8,992.175 to 29,875,290 — sounds like a Yankee-Red Sox baseball game. W60JX was high man with 400 QSOs in 91 countries. This was a two-month battle and 21 members (Continued on page 38).

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QST for
In Search of the Ideal Electronic Key

A Further Advance in Bug Design

BY ROY E. BRANN,* W6DPU

Amateur radio seems to be approaching the goal in its search for the ideal electronic key.
The multivibrator type is being abandoned because of its susceptibility to transient effects.
Small voltage pulses that find their way into the circuit sometimes shorten the mark or the space.
The search is narrowing down to some form of the key first described by Bartlett, 1 W6OWP.

Later 2 there was a modification of this circuit that at first seems to be the answer. It is simple and smooth in operation, and what more could one ask? Well, to begin with, Turrin says in his article, "Because $C_1$ does not charge instantaneously through $R_4$, $R_1$ cannot be a fast-acting or high-speed relay." Obviously, to use a fast-acting relay requires a reduction in capacitance at $C_1$.

On the other hand, we hear complaints that relay spring tension has a great influence on the mark-space ratio and on the repetition rate or speed in words per minute. This is true because (in the above-mentioned designs) the $RC$ network brings $C_1$ to nearly complete discharge before $R_{11}$ operates.

Figure it out. Twenty-five w.p.m. is 5 dashes per second; i.e., the dash pulse interval is 0.2 second. If the discharge resistance is 2 megohms, and the capacitance is 0.02 mfd., then $RC = 0.04$ second and the dash pulse interval is 5 $RC$. In 5 $RC$ seconds the charge remaining on the capacitor is less than one per cent of the initial value. Good timer design calls for the use of not more than 2 $RC$, so that the tube grid passes through cut-off rapidly enough that the time interval is determined largely by the circuit constants and as little as possible by the tube and relay conditions. The conclusion is that while $C_1$ should be made smaller, the circuit time constant should be increased, but without increasing $R$.

Cathode-Follower Charging

The only solution is to find an electronic means for amplifying the time constant of an $RC$ network. This is easily accomplished by using a cathode-follower arrangement to supply the charging voltage for the $RC$ network. The resistor is returned to the cathode of the cathode-follower stage instead of to a point of fixed voltage. Using a 6J5 or half of a 6S5 tube, we obtain an increase in time delay of approximately 20 more than that obtained with the resistor returned to $+250$ volts. This makes possible the construction of a key in which the pulse interval for dashes is roughly 1 $RC$, thus permitting operation on the most nearly straight portion of the capacitor charge curve.

It should be pointed out that simple $RC$ timing networks can be used in electronic timers in either of two ways: The free end of the capacitor, where the control tube grid is connected, can be driven in a positive direction and allowed to return to zero exponentially, as is done in the references cited above. Or the free end of the capacitor can be driven in a negative direction and allowed to rise exponentially. This second arrangement is preferred for precision timing work because the input impedance of the control tube does not become a part of the $RC$ network. During the

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The circuit is the important thing in the W6DPU electronic key, and normally one can make use of parts on hand to obtain the desired results.

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timed interval the grid is driven into grid current cut-off — instead of positively into grid conduction. The second arrangement is the only one that can be used with the new cathode-follower timing circuit here described, as the exponential rise is always in a positive direction.

![Diagram of a cathode-follower charging circuit for amplifying the effect of an RC network. The output voltage will reach a given value much later than the capacitor, C, were charged through R directly from the 250-volt source.](image)

Fig. 1 — A cathode-follower charging circuit for amplifying the effect of an RC network. The output voltage will reach a given value much later than if the capacitor, C, were charged through R directly from the 250-volt source.

The electronic key is not a simple electronic timer. It has two timed intervals. The primary interval is the pulse interval, which determines the repetition rate or speed of transmission (words per minute). The subinterval is the mark duration or interval during which the transmitter is keyed. The subinterval is shorter than the primary (pulse) interval by an amount equal to the inalterable space.

It was pointed out that it is desirable not to allow the input impedance of any control tube to become a part of the RC network. This means that the control tube for the subinterval must be isolated from the RC network — which presents no problem at all where the cathode follower is used — simply choose the cathode-follower cathode as the driving point for the subinterval control-tube grid.

Circuit Operation

Fig. 2 shows how this new timer circuit is used in an electronic key. To make a dash, C1 is brought to complete discharge through the key lever. At this time six things happen simultaneously: (1) C1 discharges; (2) grid of cathode follower is lowered to ground potential; (3) cathode of cathode follower is lowered to about plus 15 volts; (4) pulse tube is cut off; (5) the d.c. amplifier is cut off; (6) keyer tube is cut on. The keying relay pulls in and the pulsing relay drops out. The transmitter is keyed and C1 starts to charge.

The charging voltage is supplied from the cathode of the cathode follower, which is always more positive than its grid. As soon as the cathode approaches + 135 volts, the d.c. amplifier comes into operation and cuts off the keyer tube. This is the end of the mark, but the cathode voltage continues to rise; and when it approaches + 180 volts, the pulsing tube starts to conduct and the pulsing relay pulls in. When the pulsing-relay contacts close, this will be the start of another dash if the key lever is still held closed to ground. Or if it is closed to + 90 volts, a dot will be next, since the cycle will be started at a point on the C1 charge curve where the dash pulse interval is half completed.

Fig. 3 is the complete circuit of the key. The d.c. amplifier could be eliminated from the circuit, but then it would be necessary to provide a relay with normally closed contacts and to key through these back contacts. This is undesirable, since the back contacts can never receive as much pressure as the front contacts; also, the back contacts are closed while the tubes are warming up, and the time-delay protection normally provided by any tube keyer is lost. In operation the d.c. amplifier causes the grid of the keyer tube to pass rapidly through cut-off, so that the spring tension on R30 has little effect on the mark-space ratio. The voltage-regulator tubes are important to the circuit, since a constant supply voltage insures that the space following the dots will be equal to the space following the dashes — and that the first mark of a series will be the same as the rest. The series dropping resistor, R10, should be adjusted so that the VR tube current is never less than 5 ma.

Controls

There are three controls in the circuit:

1) The SPEED control, R1, varies the pulse interval of dots or dashes. The pulse interval is divided into mark (dot or dash) plus space. Since speed or repetition rate is the reciprocal of pulse interval, a large pulse interval makes a slow sending speed.

2) The SPACE control, R10, controls the intraletter spaces. If this control is varied while the others remain fixed, the variable space will be subtracted from the fixed pulse interval. Hence, increasing the space decreases the mark duration. Since the dot pulse interval should be
one-half the dash pulse interval, a change in space length would produce a change in dot duration proportionally twice the change in dash duration.

3) The DOT-DASH RATIO control, $R_{11}$, determines the ratio of pulse interval (dot) to pulse interval (dash). This ratio should be set at $\frac{1}{2}$ and the control locked in place. Thereafter, adjustments of the space control and of the speed control can be made without affecting the dot-dash ratio — provided that the electronic key uses relays fast enough so that the relay operating time is negligible compared with the pulse interval.

The function of $R_s$ is very interesting. Without it in the circuit, the capacitance of the cable leading to the key lever will initiate another short dot at the end of a character. $R_s$ keeps the cable capacitance charged when the key lever is open and prevents the spurious dot. Incidentally, if your key lever contains a key-click filler, remove the capacitors or they will aggravate the condition mentioned above. They are not needed, since the key lever contacts break no current. Although there is no break, there is a make; and an r.f. choke in series with $R_s$ will make the initial current rise less steep. Even if your key lever is built into the unit, and there is no long cord, $R_s$ is of value in eliminating the effects of a.c. hum pick-up and of any minute leakage to ground in the wiring or relay contact springs.  

When the key lever is pressed, it is intended that $R_s$ should limit the current through its contacts. Without $C_2$ this would not be so on dots, since $R_{11}$ and its adjacent components would be in the discharge circuit; and the use of fast-acting relays would be impractical. In other words, $C_2$ serves as an accumulator of current for the quick discharge of $C_1$ to the proper voltage for dots.

Touching the key lever drives the current in $R_{11}$ instantly to zero, and at the end of a mark the current in $R_{9}$ drops rapidly to zero. The result would be large inductive kicks within the relay coils except for $R_{14}$ and $R_{15}$, which retard the collapse in magnetic field. If you want fast relay operation, guard against making $R_{14}$ too small, for obviously the armature can’t drop out until the field collapses. A small value of shunting resistance makes for a sluggish drop out of the relay.

**Adjustment**

An ohmmeter connected to the keyed output terminals will give a deflection proportional to the duty cycle of the transmitter, which is the

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To install $R_s$ in the key described by Turrin, connect it from the key-lever armature to $B-$.
ratio of mark to pulse interval (mark plus space). To produce code that sounds like an automatic tape transmission, after adjusting the dot-dash ratio to \( \frac{1}{2} \), set the space control to yield a dot duty cycle of 0.5 (50 per cent). The dash duty cycle will consequently be 0.75 (75 per cent).

There are those who aver that they like the sound of the code better with the dots and dashes slightly heavy — for instance with a duty cycle of 0.6 for dots and 0.8 for dashes. And as a matter of fact, using these settings, one’s own fist may seem to be more pleasing. But, after all, where radio communication is concerned, it is the man on the receiving end who must be satisfied. The receiving operator usually hears interference of various kinds along with the signal; and his chief interest in the signal is its readability. Considered in this light, the intraletter spaces are equal in importance to the dots; hence the optimum adjustment is to make them equal in time duration — a dot duty cycle of 0.5.

But the most important adjustment to be made is the dot-dash ratio, which must be set exactly \( \frac{1}{2} \). This deserves some discussion. If the attempt is made to set it by ear, you may get it close enough and again you may not. Unless this ratio control is properly adjusted, the basic rhythm in the code will be false. The more you use the electronic key, the more conscious you will be of what constitutes perfect rhythm — and you will be dissatisfied without it.

If an electromechanical impulse counter is available, it can be connected to the keyed output terminals. Key dashes for five seconds and note the count — then key dots for five seconds and note the count again. Adjust the ratio control until the counter registers twice as many dots in the counting interval as dashes.

But the quickest way of all is to connect an ohmmeter to the keyed output terminals. Set the speed control to 20 w.p.m. or more. Swing the key lever to make dashes — adjust the space control to give an average reading of \( \frac{1}{2} \) full scale on the meter. Next, swing the key lever to make dots — then adjust the dot-dash ratio control to give \( \frac{1}{2} \) full scale reading. This is not a precision method because of the difficulty of reading the meter as the pointer vibrates and because of a slight difference which may exist between the space following the dash and the space following the dot. But it is rapid and will satisfy most amateurs.

If you used small high-speed relays, these settings will remain correct for a wide range of speeds; sluggish relays will cause the mark-space ratio to drop noticeably as the code-speed setting is advanced. Best operation is obtained by using the fastest relays obtainable or by employing circuit modifications to accelerate relay operation, such as by substituting a pair of pentodes for the twin triode actuating the relays. Choosing relays for this circuit then becomes a matter of compromise, for wiping contacts are most desirable in relays — yet the lightest and fastest relays usually have solid contacts.

The limitation on usefulness of high-speed relays is determined by the fact that \( C_1 \) must be fully discharged before \( R_{10} \) drops out, if erratic operation is to be avoided. In 10 RC seconds a capacitor will be 99.99 per cent completely charged or discharged. The circuit of Fig. 3 shows \( C_1 = 0.01 \mu F \), and \( R_4 = 560 \) ohms; hence 10 RC = 0.056 milliseconds. It is unlikely that you will ever find relays fast enough to give pulses this short. Conclusion: Don’t hesitate to use high-speed relays.

An interesting check on the speed of \( R_{10} \) is to connect the ohmmeter to the keyed terminals and a 50,000-ohm variable resistor across the dot key lever terminals. With the key set to produce \( \frac{1}{2} \) full-scale ohmmeter deflection when the resistor is at zero ohms, gradually increase the resistor value until a downward shift of average pointer position is noticed. With a good fast-acting relay this will be obtained with as little as 5000 ohms. If \( R_{10} \) is sluggish, increasing the value up to 50,000 ohms may not produce any effect on the ohmmeter indication.

Calibration

Some may wonder how we ascertain the words-per-minute figure for calibrating the speed control. This is not difficult. After adjusting the ratios as explained above, swing the paddle to dashes and count for five seconds by the clock. The five-second dash count is the number of words per minute. The foregoing method is based on the relation: speed in bauds equals 0.8 times speed in words per minute. This conversion factor is the one contained in the International Telecommunications Treaty and is used by W1AW for the calibrated tape transmissions.

"Words per minute" is only an approximation, however, and those who wish to can calibrate their speed control in bauds. The signaling speed in bauds is equal to the number of code elements per second. Since a speed of one baud is one code element per second, one dot per second will be 2 bauds, and one dash per second will be 4 bauds. By counting dashes for four seconds you have the transmission speed directly in bauds.

Using the Key

In using this or any other self-completing electronic key at slow speeds, an annoying situation may appear which is very disturbing to the operator. He will go through the motions of sending a letter such as "G," where a terminal dot is preceded by one or more dashes, but sometimes the "G" comes out "M." — the dot doesn’t form. This may be the result of pushing the key lever faster than the speed for which the key is set; or it may be the result of a bad habit into which the operator has fallen. He fails to hold the paddle in the dash position for the full time of the dash.

(Continued on page 84)
New Life for the Q5-er

BY DOUGLAS R. JORDAN *

SOME time ago, QST introduced to its readers the idea of using a BC-453 as a selective amplifier on the tail end of the communications receiver.1 Since then "Surplus Sam's" has been hounded by an increasing number of fellows who want to know just who or what hides under the fifth layer on 20 or 75. In almost every case complete satisfaction, often accompanied by considerable amazement, was the immediate reaction of the proud owner of a Q5-er; that is, after the initial simple conversions were completed and the junior op's train transformer "borrowed" for the filament supply.

It does not take many weeks of operation, however, for the glitter and gleam to disappear, as the deficiencies of the 453 become more apparent. One of the most obvious faults is the uselessness of the set on the 10-meter band if auto ignition QRM is at a high level. Weak signals often are masked by the hum and background noise, or a microphonic 12A6 may ping at the drop of a pin. Strong locals pound through to overload the receiver unless the r.f.-i.f. gain is backed down. And, of course, the audio quality leaves a lot to be desired.

After removing unpleasing small machine screws and carefully studying the maze of wiring "below deck," it was decided that a conversion could be successfully made that would bring the 453 onto a level with communications receivers, and at the same time neither involve too many additional parts nor difficult work. In brief, the major changes are these:

1) Replacement of the 12-volt tubes in the r.f., mixer, and i.f. stages by 8-volt equivalents, with heaters all wired in parallel.

2) Removal of the 12A6 to make room for a 6SQ7 second detector, a.v.c., and first audio.

3) Replacement of the 12SR7 second detector-b.f.o. by a 6J5 b.f.o.

4) The addition of a 6F6 audio stage and an output transformer to drive an 8-inch speaker.

5) The use of a 1N34 crystal diode as a shunt-type noise limiter.

After modification, the revised 453 has individual noise limiter, b.f.o., and a.v.c. on-off switches, separate r.f. and audio gain controls, and a b.f.o. pitch control. A coax connector is installed in place of the original antenna terminal for neater station appearance and to prevent spurious pick-up. The 6F6, output transformer, and 'phone jack are mounted on the rear portion formerly mounting the dynamotor, and the 'speaker and power terminals are on the back. The particular model used was a BC-453-B, but the conversions seem applicable to any of the series.

Preliminary Work

Conversion begins with the removal of the audio output transformer (2ES-591027), the B+ filter choke (5634), the three-section filter condenser (5413), and the heater filter choke (5546). This will uncover two mica condensers on the chassis floor: a 0.006 ufd. (4091) and a 0.001 ufd. (4114); these no longer will be necessary, nor will either of the power connectors, which can be taken off quite readily by ripping out several of the prongs. All associated wiring to plugs and components should be removed during this part of the operation, with but two exceptions. One is

The revised Q5-er (BC-453) has front-panel h.f.o. control, a noise limiter, separate r.f. and a.f. gain controls, and optional a.v.c. The original antenna bonding post has been replaced by a coaxial fitting. These changes do not require too many new components, and they greatly increase the usefulness of the unit.

a red B+ lead going to the 7000-ohm bleeder resistors (parts 5805) from the B+ filter; this lead will be long enough to connect directly to the B+ pin of the new power input plug. The other is a yellow screen-voltage lead running into the main part of the set from the 0.22-ufd. filter condenser; move this lead over and attach it to the top junction of the bleeder resistors. The bottom connection of the bleeder circuit, the black B− lead, should be fastened to the chassis with a machine screw after the filament filter is removed.

Throughout this conversion it is best not to have too many loose wires around — they tend to get lost. Therefore, enlarge the rear hole with a chassis punch and install a four-prong socket for the new power-input plug. By running the red B+ lead to one prong, and connecting another prong for B− to a soldering lug mounted to one of the socket bolts, all of the high-voltage wiring changes from supply to receiver will be completed. Unless the power supply used involves a grounded center tap on the heater transformer, the third prong of the power terminal may also be connected to ground, the fourth prong being used as the “hot” side of the heater line.

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Fig. 1 — Revised second-detector and audio circuit, showing how the noise limiter is added.

C1 — 200-µfd. mica or ceramic.
C2, C3 — 100-µfd. mica or ceramic.
C4 — 0.01 µfd. (see text).
C5 — 0.05 µfd., 200 volts.
C6 — 15 µfd. (in original set).
C7 — 0.1-µfd. paper.
C8 — 10-µfd. 25-volt electrolytic.
R1 — 2 megohms.
R2, R3 — 0.15 megohm (one in original set).
R4, R5 — 1 megohm.
R6, R7 — 47,000 ohms.
R8 — 2700 ohms.
R9 — 0.5-megohm potentiometer, compartment.
R10 — 22 megohm.
R11 — 470 ohms, 1 watt.
All resistors 1/2 watt unless specified otherwise.
J1 — Closed-circuit jack.
S1, S2 — S.p.s.t. toggle switch.

Other parts which may be completely eliminated are the 3-µfd. condenser (7858) located on the front panel, and the 5-µfd. condenser (8380) fastened to the side above the second i.f. socket. The latter condenser is a plate-circuit by-pass; its removal did not affect operation and permitted sliding over the three-section condenser above the i.f. output transformer to make room for new terminal strips. A slight relocation of these strips, however, would permit this by-pass to remain. Finally, the box in the front panel may be worked loose, and all wires leading to it removed, to make space for the front-panel controls.

The B.F.O.

Work can now start on the 12A6 socket, which will take the 6SQ7, and also on the 12SR7 socket, for the 6J5 b.f.o. To work on the 12A6 stage, unfasten the three-section condenser directly above it and carefully push the unit out of the way. All wires to this socket are removed, except for a white heater lead running from Pin 7 to Pin 7 of the 12SR7; this is kept for the new heater line. By running a lead from the heater prong on the new power plug to Pin 7 of the 12A6 socket, and grounding Pin 8, the heater circuit for the 6SQ7 will be completed.

Move now to the 12SR7 socket. Pins 8 and 1 were grounded originally and are left as is. A grid condenser from the center terminal of the b.f.o. transformer will be found connected to Pin 2. Remove this lead and ground the pin, thereby completing the 6J5 heater circuit. The other end of the 0.1-megohm grid-leak resistor (tied to Pin 3) should also be disconnected, and all wires to Pins 3, 4 and 5 removed. Leaving connections as is on Pin 6, run a wire between that pin and Pin 3, which will connect the plate of the 6J5 to the B+ circuit. (Pin 6 is not used on a 6J5, and thus serves as a convenient tie point.) The grid condenser from the b.f.o. transformer can now be swung over to Pin 5, and the 0.1-megohm grid leak connected from Pin 5 to ground.

The b.f.o. pitch control uses the antenna input trimmer located on the front panel. This is wired in by first disconnecting the wire from the r.f. coil and removing the small moon glow lamp attached to the side; then the stator plates are connected to Pin 6 of the 6J5 with a lead running along the chassis side. To complete the stage, the b.f.o. switch is installed by running a line from one pole of a s.p.d.t. switch on the panel to the junction of the 20,000-ohm resistor from the top terminal of the b.f.o. transformer, the 0.05-µfd. condenser, and the red B+ lead; the other switch terminal is grounded.

Second Detector, A.V.C., A.N.L., and First Audio Circuits

Fig. 1 shows the revised second detector circuit. That terminal of the i.f. output transformer previously connected to the diode plate (Pin 4) of the 12SR7 is now connected to Pin 5 of the

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6SQ7 diode. Space is saved by locating the coupling condenser, C₂, under the b.f.o. transformer. The a.v.c. diode lead, R₁₁, is the original 2-megohm grid resistor for the 12AO. It can be found on the resistor strip between the 12AO and 12SR7 sockets. On the opposite end of the same strip is a 1500-ohm 12AO cathode resistor; using a pair of long-nose pliers and a pointed soldering iron, this can be removed and the new 2700-ohm cathode resistor, R₆, substituted. It should be noted that both R₁₁ and R₆ will have their resistor-strip pins away from the 6SQ7 grounded, without changing the original circuit wiring. C₉, the cathode bypass, is a 15-μfd. "can" condenser above the first i.f. tube socket, and formerly used in the 12AO stage. Returning to the a.v.c. circuit, R₄ is connected to a 0.1-megohm resistor found in the resistor group mounted between the 12K8 and first i.f. sockets. The original ground connection to this 0.1-megohm resistor is broken and R₄ connected in its place, as shown in Fig. 1. A line runs from this junction to switch S₁ on the front panel.

Two more resistors no longer needed should also be pulled out, as well as any associated leads or ground connections still tied to their pins: these are 0.1-megohm and 0.51-megohm resistors found on the strip between the output i.f. transformer and 12SR7 sockets. This will remove the last of the original second detector circuit components. They are replaced by two 0.47-megohm resistors, R₅ and R₆; by putting R₅ nearest the 12SR7 socket and the junction of R₅ and R₆ on the side toward the center i.f., a neat wiring job will result. The ground lead at C₃ is connected to Pin 1 of the first i.f. tube. R₇ can then be installed, and by lifting C₁ over the 12SR7 socket, a sufficiently rugged “floating” connection between R₇ and C₁ can be made. The 1N34 limiter, C₁₀ and R₉, and the audio coupling condenser, C₅, are all tied to terminal strips above the i.f. output transformer; leads are then run to S₉ and R₁₀ on the panel. C₄ is the 0.01-μfd. section of the three-section condenser previously located over the second i.f. output and now above the second i.f. socket; this section is unused originally.⁴ It was found necessary to shield the lead from R₁₀ to the 6SQ7 grid to prevent coupling near the oscillator section of the receiver. Finally, the 0.1-μfd. audio coupling condenser, C₇, can be placed directly behind the bleeder resistors and connected to the ‘phone jack.

Audio Output Stage

By giving a hack saw an invigorating workout, the shock mounting can be removed from the rear corner, and room made for the 6P6 stage. The 'speaker tips are located on the back next to the power plug while the cathode by-pass, C₈, is placed next to C₇. If the output transformer is to be placed on the chassis rather than in the 'speaker baffle, it may be mounted directly above the hole left by the dynamotor plug. In selecting this transformer, one with a 7000-ohm primary and suitable secondary should be used. If feedback occurs between the audio stages, shielding the grid lead from the ‘phone jack will probably straighten things out.

Completing the Conversion

The remainder of the heater circuit is easily finished. Only a few changes are needed to alter the original wiring of the first four stages, shown in Fig. 2A, to that required for 6-volt operation, Fig. 2B.

After a bit of experimentation, the cathode circuit of the r.f. and first i.f. stages, shown in Fig. 3A (with gain control added), was changed to that of Fig. 3B. R₁₄ and R₁₇ are located in the resistor group between the 12K8 and second i.f., while C₁₀ is the condenser removed from the front panel. The lead from R₁₇ to R₁₅ found on the strip between the 12K8 and first i.f., is removed

(Continued on page 34)

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⁴In some units. In others it is a 0.05-μfd. unit. — Ed.

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Fig. 3 — Original (A) and revised (B) r.f./i.f. gain control circuit.

- C₅ — 0.05 μfd.
- C₁₀ — 3 μfd.
- R₁₄, R₁₅ — 620 ohms.
- R₁₆ — 30,000-ohm potentiometer, compact.
- R₁₇ — 0.36 megohm.
- R₁₈ — 1500 ohms.

All but R₁₆ are components in the original set.

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Design Limits for “High-Output” Grid Modulation

The Lippert idea of utilizing the duty cycle of speech in controlled-carrier modulation as a means for increasing power output without exceeding plate-dissipation limits is an intriguing one, especially in connection with grid modulation. In grid modulation of the ordinary type the plate loss limits the output long before the plate-voltage and plate-current limits are approached, simply because the plate efficiency is so low. It is therefore of some interest to determine just how much of a power increase is possible.

It is not altogether easy to find a satisfactory answer, because speech is a highly variable thing. For the same peak amplitude its energy content will vary with different individuals. Also, no two people speak at exactly the same rate, and when we are dealing with a system in which the ratio of “off” time to “on” time is a critical factor in design, just how the talking is done becomes highly important. In such a case the only approach appears to be to search for an average by experimental measurement.

The possible output is primarily limited by tube ratings: maximum permissible plate dissipation, plate voltage, and plate current. The plate dissipation rating is based on the amount of heating the tube can stand, and the way in which the heat is generated enters into the rating. For example, in plate modulation the instantaneous power loss in the plate varies over the modulation cycle; at the peak of 100 per cent modulation it is four times the loss at the carrier level, and at the modulation trough it is zero. When the loss is varying at an audio-frequency rate the thermal inertia of the plate is great enough to filter out the instantaneous variations and leave only the average heating to consider, just as a power-supply filter takes off ripple and leaves only d.c. But, if the rate at which the plate loss varies becomes quite slow, the plate temperature will tend to follow the changes in much the same way that a d.c. milliammeter will follow changes in current that occur no more rapidly than a few times a second. In such a case the average heating over a moderate period of time may not exceed the rating, but nevertheless there may be many times during such an interval when the plate temperature is too high for safety.

Turning now to plate-current and plate-voltage ratings, we suggest that, as limits for design purposes, they be based on the peak values that occur during plate modulation, since it would appear to be inherent in these ratings that the peak conditions represent safe operating values. This assumes, of course, that in using one or the other, or both, of these peak values the rated plate dissipation is not exceeded. The peak values are twice the carrier values as given in the tube manufacturer’s operating conditions for plate modulation.

An Experimental Check

In an effort to determine operating limits, experimental data were taken on an 807. This tube was chosen for several reasons: It is widely used in amateur transmitters; the voltages and currents are in a convenient range for experimental work; it was anticipated that a tetrode might be less likely to maintain linearity with increased voltage and current than a triode; and finally, it seemed more probable that an 807 would break down, at higher-than-normal voltage and peak current, than some other types of tubes that might have been selected. The published plate-modulation operating conditions for the 807 call for a plate voltage of 600 volts and a plate current of 100 ma. Doubling both gives 1200 volts and 200 ma. as the limiting values for grid modulation. In grid modulation the d.c. plate voltage does not vary, but the 200-ma. figure represents a peak current that is reached only at the peak of the modulation cycle; in terms of the plate milliammeter reading with an amplifier that is operating linearly the current would be 100 ma. when the 200-ma. peak is being reached.

In talking design limits of this order, the question immediately arises as to whether the tube would be capable of linear operation to a peak current of 200 ma. Testing under normal conditions of modulation would be impracticable, since the plate efficiency with grid modulation is known to be about 33 per cent at the carrier level, while the plate input at 1200 volts and 100 ma. would be 120 watts. However, a method was devised for testing the operation without running the plate dissipation beyond a safe level, and it was found that with screen modulation the 807 will operate linearly up to a peak current of 200 ma. With proper adjustment, equally linear operation can be secured with plate voltages ranging between 800 and 1200 volts.

A controlled-carrier system was then set up and a check made on the plate dissipation with average speech. Measurement under static conditions showed that the 807 plate does not show color in a dim light at the normal rating of 30 watts, but that careful inspection will show just a trace of reddening around the plate supports at 40 watts. Although this is $\frac{1}{2}$ more than the rated dissipation, it was used in the checks because it was ob-

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1 Lippert, "A Constant-Modulation ‘Phone System,” QST, April, 1930.
2 By “grid” modulation is meant any system in which the modulating signal is applied to a grid electrode — control grid, screen, suppressor, etc. The power output in all such systems is determined by the peak power that can be obtained with satisfactory linearity, whether the system is conventional or one of the many “high-efficiency” or “high-output” types.
servable. With no modulation, the "resting" input was set to make the plate dissipation roughly half the rated value, so the tube had a reasonable chance to cool off between intervals of full modulation. When the system was adjusted so that during periods of continuous talking the plate dissipation just reached 40 watts, it was found that the ratio of peak power input to plate dissipation was, in round figures, 5 to 1.

We believe this ratio to be a reasonable basis for design in such systems. In the case of the 807, it means that plate dissipation rather than plate voltage or plate current is the determining factor, and the d.c. input at the modulation peak should not exceed $5 \times 30 = 150$ watts. This figure applies, incidentally, only when the peak efficiency is at least 66 per cent, which was the highest efficiency we were able to obtain with careful adjustment of plate loading, excitation, and modulating voltage. Lower peak efficiency will call for a corresponding reduction in plate power input.

There is no very definite correlation between the plate milliammeter reading and peak plate current, in the case of speech. However, it was observed that when the controlled-carrier system was adjusted so that the modulation was 100 per cent at the same time that the peak input reached its maximum permissible value, the plate current as read by the meter usually ran between 30 and 40 per cent of the peak current. Thus if the plate voltage is 1000 and the permissible peak input is 150 watts, the peak plate current will be 150 ma. and the plate milliammeter reading on a voice peak will lie between 45 and 60 ma.

**Power Output**

With maximum modulation on a controlled-carrier 807 operated as described above, the equivalent carrier output is one-fourth the peak output, or 25 watts. This is a 66 per cent increase in power over straight screen modulation, where the power input is limited to 40 watts, 30 of which are dissipated in the plate, the other 15 being carrier output. The increase is worth while although it does not come up to the plate-modulation ratings. Operating at the maximum voltage and current ratings of 1200 volts and 200 ma. peak gives a carrier power output of 40 watts, which is very close to what plate modulation will give. However, with average talking the plate shows color if the modulation level is high for several seconds — the duration of a sentence, for example.

Similar limits, especially with respect to plate voltage and plate current, apply to "supermodulation" as analyzed by O. G. Villard, jr. In this system the output is determined by the peak output of the "peak tube," since the carrier tube contributes nothing at the peak. (This point has been confirmed in an experimental trial of the system.) However, the average dissipation in the peak tube is lower than it is in controlled carrier, so with an 807 as the peak tube it would appear safe to use the 1200-volt 200-ma. peak limits.

With sine-wave modulation the average plate current of the peak tube will be under 60 ma. in this system when the 200-ma. peak is being reached, and will be less with voice modulation. The equivalent carrier output, with 1200 volts on the peak tube, is 40 watts. While lower plate voltage can be used, power output is sacrificed in the same proportion, since the peak current cannot be increased without exceeding the tube ratings.

A somewhat smaller tube can, of course, be used as the carrier tube, since it can be adjusted to supply a 40-watt carrier with about 66 per cent efficiency (for linear modulation downward) and thus the plate dissipation at carrier level is only 20 watts. But, if a pair of 807s is assumed for both "supermodulation" and controlled carrier, the comparison is a carrier equivalent of 40 watts for the former against 60 watts for controlled carrier. Whether the varying carrier of the controlled-carrier system is equally as effective in actual communication as the steady carrier of supermodulation is a question that can only be decided by on-the-air experience. — G. G.

**HAMFEST CALENDAR**

**MICHIGAN** — Saturday, February 24th, at the Rowe Hotel, Grand Rapids — Annual Midwinter Hamfest sponsored by the Grand Rapids Amateur Radio Association. Formal program starts at 8:00 p.m. but doors open at 3:30 p.m. for swapping gear and gab. Eating facilities for out-of-towners. Special program for YLs and XYLs. Admission by ticket, 50¢ in advance, 75¢ at the door. Write Grand Rapids C.R.A.A., P.O. Box 333, Grand Rapids, Mich., for tickets or further information.

**ONTARIO** — The annual banquet of the Frontier Radio Assn. of Windsor will be held at the Norton-Palmer Hotel, Windsor, on Friday evening, February 16th, at 7:30 o'clock. Guest speaker will be Great Lakes Division Director John H. Brabb, W59PF. A special program of entertainment has been arranged. Registration and dinner, $2.50. For further information write Walter Guillot, Y53BVR, 5% Frontier Radio Assn., 86 London St., West Windsor, Ontario.

**WWV-WWVH SCHEDULES**

From the benefits of amateurs and other interested groups, the National Bureau of Standards maintains a service of technical radio broadcast over WWV, Belleville, Md., and WWVH, Maui, Territory of Hawaii.

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 600 cycles, (5) radio-propagation disturbance warnings by International Morse code consisting of the letters W, U or N, indicating warning, unstable conditions, or normal.

The audio frequencies are interrupted at precisely one minute before the hour and at precisely on the hour and each five minutes thereafter. Code announcements are in GCT using the 24-hour system beginning with 0000 at midnight; voice announcements are in EST. The audio frequencies are transmitted alternately: The 600-cycle tone starts precisely on the hour and every 10 minutes thereafter, continuing for 4 minutes; the 440-cycle tone starts precisely five minutes after the hour and every 10 minutes thereafter, continuing for 4 minutes. Each carrier 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.
M.A.R.S.

W:Whether it’s advice on how to fly a plane, install and operate aerial-mobile equipment, or plan and run a fixed-station system, members of MARS-Air Force need have no hesitation about calling on their new Chief.

Capt. Charles C. Mack, who has been named head of the Air Force portion of the Military Amateur Radio System, brings the enthusiasm of an airborne amateur radio plus experience as Continental Air Command MARS Director to his new Washington job. He replaces Maj. Raleigh H. Ralls who, having completed his tour as MARS director, has been assigned to a classified Air Force project.

Capt. Mack’s calls are AF2BRJ/W2BRJ, which soon will be modified to fit his new geographic location. Readers of QST will recognize W2BRJ as an ardent exponent of v.h.f. work and a high scorer in 1950 Field Day activities. “I could have made a much higher score,” Capt. Mack says, “but I didn’t handle any messages, and I shut down operation after only five hours’ work.” All contacts were made aerial-mobile from a C-47, using an ARC-3 transmitter and a battery-powered two-meter converter to a BC-348 receiver.

Capt. Charles C. Mack, AF2BRJ/W2BRJ.

As might be expected from such an active v.h.f. enthusiast, one of the first MARS-Air Force projects Capt. Mack plans is the proposed direct-relay radioteletypewriter circuit linking Continental Air Command (CONAC) at Mitchel Field, New York, Headquarters USAF at Washington, D. C., and Eastern Defense Air Command at Newburgh, New York. The project was started several months ago but press of other activities disrupted completion of the channel. “This circuit will provide an absolutely reliable QRM-free channel and excellent back-up for our established military circuits,” the new MARS chief said.

Air Force-MARS has requested that a frequency be assigned in the vicinity of the two-meter band. Eighteen SCR-522s are available and will be spotted on the CONAC-Washington-EDAF triangle. Should the MARS frequency not be immediately available, Capt. Mack plans to initiate the circuit as an amateur facility.

A native of Maine, Capt. Mack was associated with the Raytheon Manufacturing Company before enlisting as a cadet in the Air Force in 1941. He was commissioned a second lieutenant in August, 1942, and served as a fighter pilot during the war, including two years in Iceland.

U.S.A. 11

WANTED — RADIO COMMUNICATIONS MEN

The United States Government has openings for radio operator-technicians who are interested in careers in radio communications and general electronics involving extensive overseas assignments.

Applicants should have the following qualifications: (A) Two years’ active radio experience in the design, construction, and maintenance of transmitting and receiving equipment and the ability to copy code at fifteen words per minute, preferably on a typewriter. (B) Knowledge of radio wave propagation and practical design and construction of antennas. (C) Over age 21 and able to pass a thorough physical examination. (D) Willingness to serve overseas extensively and in any location required.

Current salaries for nonservicemen radio operator-technicians range from $3,100 to $3,824 per annum. Leave, promotions, employee benefits, transportation and baggage allowance, cost-of-living differential allowances, etc., in addition to basic salary, are in accordance with current government regulations. Interested personnel are requested to write a brief application letter to Box 73, C/o Administrative Headquarters, the American Radio Relay League, West Hartford, Connecticut. Considerable duplication of effort will be avoided by the applicant if the following outline is adhered to:

1. Experience and training.
   a. Number of months radio training and type (college, service schools, technical or trade school).
   b. Number of years radio experience and type (military, merchant marine, commercial, government).
   c. Amount of this experience in telegraphy and amount in construction or maintenance.
   d. Present radiotelegraph code speed.

2. Age and marital status.

If your initial application appears promising, you will be sent full application forms upon which detailed information can be entered.

PHOTO INTELLIGENCE SPECIALISTS

There now exists a limited number of vacancies in United States Air Force Headquarters at the Pentagon for electrical and electronics engineers with education and/or experience in radar or airborne communications and search equipment who also possess photo-interpretation experience or potential, in the following jobs with grades and salaries listed:

Photo Intelligence Specialists GS-9 ($4600–$5400 starting salary).

Civil Service grades assigned will depend largely on education and/or equivalent experience in the field of electrical or electronics engineering. Photo-interpretation experience is desirable but not absolutely required. Every effort will be made to place qualified applicants in positions commensurate with their education and experience. Inquiries regarding these positions and requests for the required Civil Service application forms should be made to: Photo Intelligence Section, Reconnaissance Branch, Directorate of Intelligence, Headquarters, United States Air Force, Washington 25, D. C.

V.O.A. TECHNICIANS

The Voice of America has a continuing need for experienced radio men, including studio, recording, field (remote pick-up), maintenance and transmitter technicians, for New York City and also for overseas points. Applicants must

(Continued on page 96)
The international situation being what it is, our thoughts turn even more to civilian defense and war emergency communication. All over the country emergency communication planning is being stepped up, and every day the Headquarters mailbag is full of questions dealing with this phase of amateur endeavor.

"What bands should we plan for?" is frequently asked. The editorial in December QST gives as complete an answer as could be formulated today, on the basis of what is known in Washington, though we may have more definite word soon. Numerous amateur groups, taking into account all the factors in their own situations, have come up with more specific answers.

Many, considering the practical angle of a number of mobile units already in operating condition there, have gone ahead with planning based on utilization of the 10-meter band.

Others, having already experienced difficulties with DX interference during their initial workouts on 28 Mc., have started looking for something better. Several of these have come up with the decision to use the 50-Mc. band as the best compromise between availability of equipment and effectiveness of their group in covering a desired service area.

This approach, for our money, has much to recommend it. It's a simple matter to set up for 6-meter mobile, for instance. There are commercial converters available for that band, and if one wishes to build his own, any of several relatively simple single-conversion designs may be used effectively in conjunction with a mobile broadcast receiver. A 2-tube r.f. section will do the trick for a transmitter, and most 10-meter gear could be modified fairly easily to work on 6. Coverage is good, and skip-distance interference is relatively rare, compared to 28 Mc.

Of the two major v.h.f. bands, 144 Mc. is thus far getting much the bigger play. On the basis of equipment already in being, it has a numerical superiority over 50 Mc., but if gear is to be built especially for the job at hand more gear per dollar can be made for the lower band. Especially as regards mobile receivers, 50 Mc. has a considerable advantage. On the basis of security, however, 144 Mc. is probably the best bet of all.

Where the 144-Mc. band is given a place in initial planning, the question may arise of what to do about the modulated oscillator and super-regenerative receiver. Hundreds of compact economical-to-operate transmitter-receiver combinations, many of them veterans of WERS days of World War II, are still around. Should they be pressed into service in our 1951 plans?

In anything but an emergency of the gravity of the present one, we'd say no. As the result of its all-too-clearly-demonstrated inadequacies, that type of gear has been banished from the 2-meter picture almost everywhere. With the tremendous improvement in operating effectiveness that accompanied the change to stabilized transmitters and selective receivers, few of us mourn that passing of the wobbling transmitter and the

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2-Meter Standings

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

February 1951
rushbox receiver. We can hardly be expected to welcome them back with open arms.

But, on the other hand, we have a job to do. If the simple gear will help to get it done quicker or more completely, then perhaps we should put it to work. There are a number of short-distance jobs where it may serve very well, but in areas where there is extensive 2-meter activity, the potentialities of the simple gear for causing severe interference should be reckoned with. It would take only a few such stations to mess up an area plan pretty thoroughly, if they were operated carelessly.

Perhaps the answer is to restrict their use to that portion of the band above 146 Mc., at least while we continue normal operation. Most of our routine operating is being done in the first megacycle, and with narrow-band techniques 144 to 146 should be enough for almost any locality. If the QRM machines are kept at the middle or higher they should cause no serious trouble. Crystal control and selective nondisturbing receivers should be used wherever possible; they are worth extra trouble their construction involves, but we feel that the urgency of the case justifies the use of any sort of equipment that can serve a useful purpose.

December Doings

As is usually the case, December was a period of generally low v.f.h. activity, the downward trend having been accelerated during the month of November. By widespread antenna damage suffered in the severe storms of late November. The 50-Mc. band was open for sporadic-E skip communication on several occasions, but too many of the 6-meter gang seem to be of the opinion that skip openings are exclusively a springtime phenomenon, and the December sessions found only a handful of stations taking advantage of the opportunities that came along. It has been mentioned many times in these pages that sporadic-E skip develops either side of the shortest day in the year as well as the longest. The December openings are not as frequent or as widespread as those of June, but it is certain that if there were as many stations on hand in the winter period as in the summer, the number of DX contacts made on 50 Mc. in December would be far greater than is now the case.

During the evening of Dec. 14th, W4MS, Pensacola, Fla., and W4NUW, Chattanooga, Tenn., were putting fine signals into W1 for more than an hour, the latter managing it with 10 watts input. There was E6 over much of the country on the 18th and 17th, as evidenced by hundreds of very short-distance skip contacts made during ARRL’s 10-meter WAS Party, but few contacts were reported on 6. W1GJO, Westminster, Mass., who worked W4JVP, Greenville, N. C., on the afternoon of the 17th, reports that the W4 was in for an hour after calling CQ after CQ without results. W4MS worked VE8AET at 5 p.m. EST on the 18th, and W6AJG and W5MJD between 6:45 and 7 p.m. on the 21st. The band was open to other areas as well, and W9s INI, JOL and UQM were heard between 5:50 and 7:30 p.m.

From Barranquilla, Colombia, HK1DX reports that 50 Mc. was open to Argentina on the 6th between 8 and 8:30 EST, and briefly around 8:10 p.m. on the 15th. There was evidence of E6 in this country around that time, indicating that sporadic-E contacts with South American stations still may not be beyond the realm of possibility.

Things were extraordinarily quiet on the 144-Mc. front during December, if the lack of mail from the 2-meter gang is any indication. One of the few reports of unusual conditions we have on hand is from W9FVJ, Toledo, Ill., who says that the evenings of Dec. 16th and 17th brought good signals from up to 150 miles to the east. W9ASM, Indianapolis, Ind., W9JVB, Victoria, Ill., and W9ITU, Avon, Ill., were worked. The loss of the 16-element array at W9ZHL, Terre Haute, Ind., has had a bad effect on the activity in the...
One of the best solutions to the oscillator problem lies in the butterfly type of tank circuit, combining inductance and capacitance in a single unit that is mechanically rigid. Fred Smith, W1KCO, Waltham, Mass., uses a simple two-plate butterfly that can be duplicated readily from scrap material. Dimensions of the metal plates are given in Fig. 1. The stator (left) is mounted on pillars at three points, those same spots serving as connecting points for the tube plates and plate voltage. The 6J6 oscillator socket should be as close as possible to the split end of the stator plate. The rotor plate is fitted onto a 1/8-inch polystyrene rod, which is, in turn, driven by a 1/4-inch shaft of the same material. The shaft turns in a panel bushing of standard design.

![Diagram](image_url)

**Fig. 1 — Details of the butterfly tank circuit used by W1KCO, and suggested schematic diagram for use in a push-pull oscillator.**

- C1, L1 — Butterfly tank.
- R1 — 10,000 ohms.
- RFC — 6 turns No. 20 enameled wire, 1/8-inch diameter, 3/8-inch long.

The oscillator assembly is supported with the plates vertical on a sheet of insulating material. Shielding is preferred, to reduce band capacity effects and make it possible to control the oscillator injection. W1CLS, also of Waltham, has built a 420-Mc. converter using a coaxial-line crystal mixer and a butterfly oscillator of this design. He mounts the oscillator assembly in a small utility box. Coupling to the oscillator, if needed, may be done with a loop of stiff wire about one inch long near one inductance arm of the butterfly. For best stability the coupling should be the minimum.

(Continued on page 98)
PART II*

It is possible to make contacts on 50 Mc. and higher without having the slightest knowledge of wave propagation, but the fellow who goes about it in this way misses at least half the fun. Knowing something of the means by which his signals may reach distant points can be an important tool for the v.h.f. man. The information to follow will not qualify the reader as an ionospheric physicist but it represents about the minimum he should know in order to make good use of the many propagation vagaries he will encounter in the world above 50 Mc.

Tropospheric Bending

Most of the variations in conditions observed on lower frequencies are the result of varying ionization of the upper reaches of the ionosphere.

The area of maximum bending of v.h.f. waves usually follows the trailing edge of a large slow-moving high-pressure area. This map appeared in the morning papers of October 3, 1950. VE1QY, Yarmouth, Nova Scotia, worked W4CVO, Fayetteville, North Carolina, on 144 Mc. at noon on this date.

At 50 Mc. and up the lower atmosphere (the region where our weather variations show up first) gets into the act. As a result, propagation on the v.h.f. bands is tied up closely with observable weather effects to a much greater extent than is true of our lower bands.

The normal state of affairs in the troposphere is a gradual reduction in temperature with height, amounting to about three degrees for each 1000 feet of elevation. When this "lapse rate" is less, or, as may often occur, an actual temperature inversion is set up, we have a condition whereby v.h.f. waves are prevented from taking off into space at the normal radiation angle. Instead they tend to travel along the earth's surface, bending over considerable obstructions and making signals audible far beyond the visible horizon.

This happy condition may be the result of an influx of warm air from the south, overrunning cold air that may have had its origin in polar regions. The two types of air may retain their individual characteristics for many days as they move across the country. V.h.f. DX may be worked along the air-mass boundary until the masses become thoroughly mixed. The area of maximum bending is usually closely associated with the trailing edge of a large and slow-moving high-pressure area, and consequently such DX is often predictable from a study of daily weather maps showing pressure distribution.

The convection that takes place along our coast lines and near other large bodies of water in warm weather is another great aid to v.h.f. propagation. The quick cooling of the earth's surface after sundown, with the air aloft retaining its heat longer, is the cause of the variable pick-up in signal level that takes place at dusk. Heating of the upper air, before the sun warms the earth appreciably, is the factor behind our familiar early-morning v.h.f. DX.

Atmospheric phenomena such as these make possible communication on 50 Mc. over distances up to 300 miles or more, but it is on higher bands that the effects become most interesting. Above about 100 Mc. a sort of duct effect begins to show, whereby v.h.f. waves may be propagated as if in a gigantic waveguide, losing almost nothing in signal strength over tremendous distances. Just how far this condition may be maintained is not precisely known, but examples of tropospheric communication on 144 Mc. over distances well in excess of 1000 miles give some clue as to the possibilities. This phenomena is not in evidence on 50 Mc. but is relatively frequent on 144 Mc., indicating the likelihood that DX far beyond our present limits is possible on 220, 420 and higher amateur assignments.

Fortunately, tropospheric phenomena are easily observed and quite readily predicted, once we become familiar with common weather signs. The ambitious v.h.f. man soon learns to correlate such evidence as changing trends in temperature and barometric pressure, cloud formations, wind direction and visibility. By forming the natural habit of watching the weather, and by studying the daily weather maps now appearing in many

* Part I appeared in January QST.

QST
newspapers, he is soon able to tell with reasonable accuracy what is in store on the v.h.f. bands. Tropospheric DX varies with the seasons. It is most common in spring and fall, when the days are warm and the nights cool. September and October, known variously as the “hurricane season” and Indian summer, combine the attributes of good v.h.f. weather to the greatest degree of any of our seasons. Warm weather is generally better than cold, but even in midwinter a change from clear cold weather to milder temperatures and increased cloudiness will be accompanied by improved v.h.f. propagation.

**Aurora Effect**

To the occupant of 3.5, 7 or 14 Mc, the appearance of an aurora is the signal to knock off for the night. The ionosphere storm with which the aurora is associated may wipe out communication on these bands almost entirely and even a mild disturbance will turn normally strong signals into wavering will-o’-the-wisps. But to the v.h.f. fraternity an aurora is an opportunity for some of the most interesting fare on the menu. The experienced operator on 6 or 2 is constantly on the alert for signs of an ionosphere storm. When he hears wavering signals on 75, or a dribbling sound on the carriers of 10-meter 'phones, he turns his beam into the north, plugs in his key, and prepares to have himself a time on c.w.

A visible aurora is a sure tip-off, if the disturbance develops at night and the visibility is good, but many aurora openings come in daylight, or during conditions of low nighttime visibility, so careful listening is the safest bet. The diffused nature of the reflections from the auroral regions causes pronounced distortion of the received signal. Modulation of any sort is turned to unintelligible mush, making straight c.w. the only satisfactory means of communication. Voice or tone modulation may be partially readable on 50-Mc. signals at times, but it is often difficult to tell whether a 144-Mc. signal is being modulated at all, and c.w. becomes an absolute necessity.

The optimum antenna heading is approximately north, though this may vary for stations in different true directions. Working one far to the east may require a northeasterly heading; one to the west may come in better with the array shifted to the northwest. The location of the aurora governs this also, though the most common bearing will be toward the north magnetic pole. Occasionally aurora effect may be spread well over the sky, extending up to or beyond the zenith. In such instances there may be only a slight improvement in signal strength when the beam is turned north. This condition is most common around the peak of the solar cycle, when sunspot activity is spread well over the sun's surface, instead of being concentrated near the solar equator.

Ionospheric disturbances are predictable with a fair degree of accuracy on a short-term basis. The Central Radio Propagation Laboratory of the National Bureau of Standards issues a weekly forecast of the probable dates of ionospheric disturbances for the ensuing three-week period. This information is transmitted nightly by the ARRL Headquarters station, W1AW, during the regular information bulletin periods.

Aurora propagation is particularly intriguing to the v.h.f. man in that it provides opportunities for work into areas that may be difficult to reach by other forms of propagation. The distances between 200 and 600 miles, seldom worked on 50 Mc. by either tropospheric bending of sporadic-E skip, are right in the best range for aurora work. Stations out to nearly 1000 miles may be worked on both 50 and 144 Mc. on rare occasions, but hops under 600 miles are most common. Whether or not aurora reflection is possible on 220 or 420 Mc. is a question that is waiting for some enterprising v.h.f. men to answer.

Aurora effect is observed most frequently in northeastern U.S.A. and bordering Canadian provinces, less often west of the Mississippi, and rarely in the South, though experience has shown that it may occur anywhere in the country. Like other solar-caused propagation phenomena, aurora recurs on a 27-day cycle coinciding with the turning of the sun on its axis. The most frequent and pronounced disturbances usually occur in the months of February, March, September and October. It is most common in the early evening hours, and after midnight, though it has been observed at all hours and during every month of the year.

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1 The daily weather map may be obtained on a subscription basis from the Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C. The price is 20 cents a month or $3.60 per year.
Unlike some other forms of v.h.f. work, aurora DX work does not require a good location. The chances are that if you can see the aurora you can bounce signals off from it. The most important requisites are a high-gain antenna (preferably one with a good front-to-back ratio), a fair amount of power, a clean-keying c.w. system, and a sensitive and stable receiver.

**Sporadic-E Skip**

This is the phenomenon that makes life interesting for the fellow on 50 Mc. who is so situated that he has little or no chance of making regular contacts under normal conditions. Patchy concentrations of ionization in the E-layer region are often responsible for the reflection of 28- and 50-Mc. signals — the popular “short skip” that provides such fine contacts over distances of 400 to 1300 miles on these bands during the early summer months. It is most common during May, June and July, with a lesser period in December and January, but it has been observed in all months, and at all hours of the day and night.

Multiple-hop effects may appear, when ionization develops simultaneously over large areas, making possible work over distances of 2500 miles or more. Observation of conditions on 28 Mc. provides a good check on the possibility of 50-Mc. openings. If 10-meter skip signals are heard coming in from a distance of 400 miles or less it is practically certain that 6 is open in the same direction, but probably at a distance of 600 miles or more. The shortest skip yet observed on 50 Mc. is in the neighborhood of 300 miles. Contacts in the 700- to 1200-mile range are most frequently and easily made.

Sporadic-E openings may develop very rapidly, the signals breaking through on 50 Mc. within a few minutes after the first sign of the phenomenon appears on 28 Mc. The presence of sporadic-E ionization is difficult to detect by observation on frequencies lower than 28 Mc., though unusually short skip on any band is a good sign. On marginal openings, 50-Mc. signals may appear and fade out again in a matter of a minute or less, while at the peak of the season there may be strong steady signals for hours at a time. Since it is largely unpredictable, at our present state of knowledge, sporadic-E skip is of high “surprise value” and it is in this capricious nature that much of the appeal of communication by this medium lies. The experienced v.h.f. enthusiast never tires of trying to outguess the ionosphere, and make the most of every opportunity that comes along.

The upper limit of sporadic-E reflection is not known exactly. Until recently it was thought to be in the vicinity of 100 Mc., but several instances of long-distance work on 144 Mc. show evidence of having come about by this medium.

**$F_2$-Layer Reflection**

Much of the communication on 28 Mc. and lower frequencies is carried on by means of reflection from the $F_2$ layer. This highest of the reflecting regions of the ionosphere is also capable of producing 50-Mc. DX around the peak of the 11-year sunspot cycle. At the low point of the solar cycle, such as the period we were entering in 1941, the maximum usable frequency (m.u.f.) may go as high as 28 Mc, only during short periods in the spring and fall, whereas it may reach 60 Mc. or higher at the peak of the cycle.

Though there were isolated reports of long-distance reception on 56 Mc. in the ’30s that may have resulted from $F_2$-layer reflection, the first authentic instances of $F_2$-layer two-way work on amateur frequencies above 30 Mc. occurred in the fall of 1946. DX of world-wide proportions was worked on 50 Mc. in 1947 and 1948, as we passed over the peak of the cycle, and it has continued through the present, in the more favorable areas of the world, though we are more than two years past the peak.

In the higher latitudes there are m.u.f. peaks each spring and fall, with a low period during the summer and a slight falling off during the mid-winter months. At or near the Equator conditions are less variable, and the average m.u.f. is higher. North-south paths generally show higher m.u.f. than east-west ones, except near solar activity peaks.

Fortunately, $F_2$-layer m.u.f. is often readily determined by observation, and means are available whereby it may be estimated quite accurately for any path at any time. It is predictable for months in advance,\(^2\) enabling the v.h.f. worker to arrange schedules with distant stations at propitious times. With numerous signals to be heard between 28 and 50 Mc., it is possible to get a fair idea of the m.u.f. by listening carefully in this range. The length of the skip on 28 Mc. also provides a good m.u.f. indication. When strong steady signals are heard from 1000 miles or less one may be certain that the m.u.f. is getting close to 50 Mc. in the same direction. Daily observation will show whether the m.u.f. is rising or falling, and once the peak for a given month is determined, it can be assumed that the next high point will follow approximately 27 days later.

The working range via $F_2$ skip on 50 Mc. will be roughly comparable to that on 28 Mc., though the maximum distance is somewhat greater on the higher band. Two-way work has been done on 50 Mc. over distances ranging from 2200 to 10,500 miles. The maximum frequency for $F_2$-layer reflection is believed to be in the vicinity of 70 Mc.

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\(^2\) *Basic Radio Propagation Predictions, National Bureau of Standards, available from Suppt. of Documents, Washington 25, D. C., $1.00 per year.*
nounced when the m.u.f. is just above the operating frequency, so it is relatively rare in v.h.f. work. It may be observed on 50 Mc. as the m.u.f. rises above that figure, a condition likely to occur only for short periods around the sunspot cycle peak. Similar rebound effects are seen occasionally in sporadic-E work.

**North-South 50-Mc. Work**

In recent years it has been observed that when there is a pronounced ionospheric disturbance in the evening hours the 50-Mc. band may be open for long distances in a north-south direction the following day. Examples are contacts made by 50-Mc. stations in northern U.S.A. and bordering Canadian provinces with various South American countries, notably Ecuador and Argentina. Experience indicates that such openings occur most frequently around 10 a.m. local time. Contacts have been made by this means when the predicted m.u.f. was as low as 36 Mc. They have been most frequent in October, November, February and March. This effect was also noted in work between Europe and South Africa.

**Reflections from Meteor Trails**

Probably the least-known means of v.h.f. propagation is that resulting from the passage of meteors through the signal path. Reflections from ionized meteor trails may show up as sudden bursts on very weak signals, or they may bring in other signals not ordinarily heard. The short duration of a single meteor trail burst renders the phenomena useless for long-distance communication ordinarily, but meteor showers of considerable magnitude and duration may provide fluttery 50-Mc. signals from distances of 1000 miles or more.

**Developing V.H.F. Activity**

The foregoing discussion shows that the v.h.f. man has no lack of variety to add spice to the routine operation of his station, but such DX opportunities should be kept in their proper perspective. We have seen that DX, whether it be measured in thousands or hundreds of miles, can be as much of a challenge to the v.h.f. man as to any other, and its successful conquest can bring an equal degree of satisfaction. In this continual extending of our operating range lies a basic appeal of v.h.f. endeavor. To build a better beam or a more efficient receiver; to make changes in the rig to get a little more stuff into the antenna; to extend the minimum working range, regardless of conditions — these are the constant aims of the more ardent v.h.f. enthusiast. But his efforts may come to naught if there is no consistent activity on the bands in which he is interested.

To be the most fun, and to be productive of the best all-around results, v.h.f. activity must have continuity. In the ideal situation there would always be someone on the band of our choice; someone waiting to talk with us whenever the spirit moves us to throw the switches. Obviously, this is not often possible, particularly in areas where the population is sparse and amateurs are separated from one another by many miles, but by proper coordination of effort, even a relatively small group spread over a large area can keep things going at an interesting level.

If there is not sufficient amateur population in a given area to sustain spontaneous activity throughout the year, there are numerous ways of promoting a reasonably good substitute. At your local radio club, or in the course of contacts on other bands, talk up your v.h.f. interest. The chances are that you will find others that will be glad to work with you. Arrange a schedule (one night a week will do for a starter) when everyone interested will make an effort to be on the air at an appointed time.

Then keep the schedule, and see that others do likewise. Don’t just turn on the receiver and listen across the band to see if anyone is on, only to abandon the idea if nobody is heard. Get on the air and make some noise, and if you hear someone else on give him a call, even though he may be just across town. Hams are gregarious creatures; there is nothing like hearing a fellow on to cheering the rag to encourage others to do likewise. The opposite is even more true; nothing discourages a budding v.h.f. enthusiast like listening to several megacycles filled with nothing but receiver noise.

Make schedules with stations near the edge of your working range. Such schedules, kept religiously by both parties, will net contacts far more often than would be guessed from random observation. Send information on any scheduled operation to ARRL for use in “The World Above 50 Mc.” and include any news, tidbits or helpful hints that might be useful to other v.h.f. men.

There are many other ways to develop and maintain interest and activity, but they all revolve around a sense of responsibility and consideration for the other fellow. We should be ready and eager to make the most of DX opportunities when they arise, but let’s not allow DX chasing to become the sole end in view. We need regular use of our bands to make them really worth while. It is the job of every dyed-in-the-wool v.h.f. man to see that no step is left untaught that will contribute to that end.

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**Strays**

The following is reprinted — without comment! — from the question and answer section of Dr. Paul Popeneoe’s syndicated newspaper column, “Modern Marriage.”

Q. Any suggestions as to how a serious-minded girl can meet marriageable men? A. Try becoming a radio “ham.” There are several hundred thousand of them in North America. They are likely to be a serious and intelligent lot of fellows. Many are unmarried. Get someone to set you up with an outfit. You can get in touch with all the hams within 30 or 40 miles. Invite them to drop in and criticize your hook-up and give you further suggestions.

February 1951
C.W.
Touro and Spring Sts., Newport, R. I.
Editor, QST:
After working on ham bands since 1935, first on c.w. and then later on 5-, 25-, 2-, and 10-meter phone, have just lately returned for a second go at c.w. on 40 meters and do you know I am enjoying it. I am in the radio and TV business and get tired of talking all day to customers. To come home and talk on phone is too much. I find that c.w. just fits the bill. It relaxes me. Maybe it will help other talked-out business men. Hi!
— F. E. Emms, WJ1FF

DX CONTEST QSLs
Aparatado 299, Guatemala, C. A.
Editor, QST:
I answered a pretty large pile of QSLs from the 1950 ARRL DX contest. The job would have been easier if the Ws and YEs remembered there are several pages of log for each contest day, and put not only the date but also the time of QSO on their QSL. Most of them did remember, but many didn’t. How about it this year?
While signing QSLs, would you do any good to remind certain operators that when a foreign station calls a directional QSL or a particular station, he wants that locality or station and not anybody else in case you don’t get him?
— Roberto W. Engel, TG2AD

PEACE PIPE
1406 Venice Blvd., Los Angeles 6, Calif.
Editor, QST:
Re the cover of December QST—I am wondering who is trying to help sell that pipe tobacco. I don’t think that anything like that should be put on the cover. I believe ARRL is now too darn commercial so let’s not go into selling tobacco.
— Norman Lefton, WE7RT

A SUGGESTION
14220 Gramatan Ave., Cleveland 11, Ohio
Editor, QST:
The editorial “The Service Headquarters” in the October 50 issue was excellent. So was the editorial “League Control” in the April 50 issue; Perhaps these will have some effect on our dissident elements in ham radio. . . .
In my experience, these hams who complain loudest about bias on the part of the League are those who don’t take the trouble to read the editorials or the Board Minutes. True, they’re not easy reading.
I have a suggestion along this line, however. That is, to carry out the newspaper method of writing even more than is being done at present. It would take more space. But even frequent subject headings interpolated in the detailed Board Minutes would make for easier reading.
— James B. Bamberg, WS8OPX

Hi!
2929 Longwood Ave., Los Angeles, Calif.
Editor, QST:
Being back in Los Angeles, I have the call of W6JAO, and the television station on Channel 2 was at one time W6XAO. The other day a neighbor came over to complain about a NS TV picture. He said that he saw my call letters spelled out on his screen and wanted to know how much power I was running on TV. After my explaining to him about the difference in calls he complained that he no longer could get the channel. Looking into the matter I found that his 300-ohm line was torn in two. However, we are all straightened out now, and he no longer sees my call on TV. The FCC has granted the station a new call, KTVL.
— Michael Purzyckie, W6JAO

QSL CARDS
53 East 7th St., Holland, Mich.
Editor, QST:
Anyone who has any trouble with the ink running on his QSL cards when being filled out should immediately experiment with a different type of fountain pen. I myself have found a cheap ball-point type pen to do a perfect job on any kind of card stock.
— Russ Salkers, WS6ED

CODE PRACTICE
420 West 66th St., Chicago 21, Ill.
Editor, QST:
I received my ticket in May, 1950. I sincerely believe your code practice each nite deserves all the credit since I had no other means of learning code. Thanks loads!
— Don Allen, W9KJJ

THAT BOOK!
River Ridge, Hanover, N. J.
Editor, QST:
Re W1LVQ’s article “General Operating” in the November QST, he states in the opening paragraph “. . . the XYL has picked up a good book and settled down for the evening.”
Kindly rush the name of that good book; I wish to get several copies for the XYL here!
— Richard C. Dunham, W1EWF
[Editor’s Note: “How to Live Alone and Like It.”]

VISIT SWAPPING
Box 308, Culpeper, Va.
Editor, QST:
Could you find me two hams from the United Kingdom or a ham and his XYL who would like to spend a brief visit in the U. S. as house guests of a W7?
The gimmick is this: I want to visit Europe someday, but probably won’t have enough money to do so on a tourist basis—hotel accommodations are too expensive. There must be UK hams in the same boat.
Our house is small, and we would not be able to accommodate more than an absolute maximum of two visitors. I am twenty-five. They (or he) should be in the same age group. The only other conditions are that they pay at least part of their board and that they help with their part of the extra housework. We won’t be able to put on a “show,” so they will have to be resigned to living as one of the family.
I’d be especially tickled if they had never been to the U. S. before.
— George L. Thurston, W4MLE

SWITCH TO SAFETY!

QST for
CATWALK FOR BEAM ADJUSTMENT

ANYONE who has plans for a new rotary beam antenna will be interested in the rugged mounting arrangement shown in Fig. 1. It is the final realization of a dream that many hams have had, namely a rotary beam that is both safe and easy to adjust while it is in its operating position.

The photograph shows the details of the mounting at the top of a 50-foot pole. A catwalk is built between two 10-foot crossarms, with two more crossarms providing a guard rail and additional support for the entire structure. The thrust bearing that supports the antenna is mounted at one end of the structure, so that by merely rotating the antenna, almost any part of it can be reached from either one end of the catwalk or the other.

An 18-foot ladder is used as the boom, and the elements are mounted on 12-foot lengths of kiln-dried fir 2 by 8. — George Tamer, Jr., W4BAD

IMPROVED PERFORMANCE IN SURPLUS RECEIVERS

THE performance of some surplus receivers, notably the BC-34S and BC-342, can be improved by the following simple operations: First, replace all of the 0.01-mfd. by-pass condensers with new mica or ceramic units. The condensers in the original equipment look like mica condensers because they are enclosed in a black bakelite case, but actually they are paper, and as they grow older they develop leakage sufficient to reduce the over-all performance of the receiver. Next, apply a liberal coating of "Lubriplate," which is available in most hardware stores, to the bearings of the main tuning condenser, and — in the case of the BC-34S — to the gear train in the bandswitch. This will eliminate the tendency to instability that sometimes develops in these receivers because of corrosion of the moving parts in the h.f. oscillator tuning mechanism. — Paul E. Griffith, W2SOY

QSL CARD DISPLAY SIMPLIFIED

ANY methods of displaying QSL cards without damage to either the cards or to the surface on which they are mounted have been proposed, but almost all of the tricks have fallen short in one respect or another. About the best solution to the problem is to use Carter's rubber cement on the back corners of the cards. It will bond them to almost any surface, and when it becomes necessary to remove or relocate them, they will come off easily if a thin-bladed knife is slipped behind them. The adhering cement can be rubbed off with the fingers, leaving both the QSL card and the mounting surface unmarred. — Merritt F. Malvern, W2ORG

NOVEL SWITCHING SYSTEM

THE circuit shown in Fig. 2 eliminates the possibility of applying plate voltage to a transmitter before the filaments are lighted, a common hazard in most transmitter control systems.

With the connections shown the filament transformer is energized, no matter which switch is thrown first. Whichever switch is thrown second will apply plate voltage. In the reverse operation, the first switch thrown OFF will turn off plate voltage, the second will turn off filament voltage. — R. L. Baldwin, W1IKE

Fig. 1 — A solution to the old problem of how to adjust the beam while it is 50 feet above ground. The secure-looking individual on the catwalk is W4BAD.

Fig. 2 — A novel switching system for the low-power rig. No matter which switch is thrown first, the filaments come on, and the second switch will then turn on the plate supply. S1 and S2 are double-pole single-throw toggle switches.
Best DX . . . in ARRL's 17th International DX Competition. During February and March ARRL has traditionally scheduled its annual DX Contest, and this year is no exception. In this hemisphere conditions are those of the winter season when many have time for some intensive operating. We can hope that radio propagation will be favorable . . . and we suggest that the possibilities of the lower-frequency amateur bands not be overlooked. On this part of the propagation cycle “eighty DX” may well approach what it was some twenty or more years ago. Impressive scores didn’t start to come (with growing contest popularity) much before 1930, but the DX flourished, as always brought to the fore by announcement of a special activity. Purpose of the test has always been to focus the attention of all the fraternity on DX possibilities, and add to the operating enjoyment the possibility of finding a new country or station not worked before. So note the dates, and here’s luck and DX!

The log form that was optional two years ago has become standard and we have distributed as many as possible on request, to make participation as easy as possible and to help systematize the work for the contest checking crew. See page 32, January 1951 QST, for full details on rules and participation.

Copies of Operating Aid No. 5, the ARRL DX Operating Code, are available on request. Its points were arrived at after consulting a cross-section of DX operating amateurs in this country, and the societies abroad. Aimed at discouraging the poorer practices that have driven some hams from DX work, there has been intensive distribution overseas — and foreign societies are cordially invited to ask for copies of this aid where additional distribution without translation can be utilized. The seven points for overseas amateurs conclude with the thought that DX amateurs avoid working W-VE amateurs who are constant violators of the principles expressed in the code. In the contest work coming up, may we ask participants:

1) To make calls short.
2) To keep in their government’s frequency band limits, on penalty of disqualification.
3) To keep your signal clean of clicks, feedback, splatter, etc.
4) To include honest reports as the first part of serial numbers, and honest power figures in the latter section of these exchanges.
5) To observe carefully any tuning instructions of DX stations . . . such as 15U or 25D indicating the ko. up or down from the given frequency to call.

6) To call DX stations only after they call CQ, send QHRZ, or sign SK.

A word concerning sportsmanship should here be said. How one operates is much more important to the participant than what the score is. We continually have questions about rules and working that make us confident that whatever a small number of DX-greedy individuals may do to label themselves for their tactics with the general body of those participating, the larger number are decent and good amateur citizens who will be able to take the operating test in stride. Each contestant in taking part in an ARRL activity must automatically subscribe to all contest rulings and decisions as final as well as certify on his log that he has played the game squarely. We call upon all who take part to live up to the spirit as well as the letter of the contest rules and FCC regulations, and must invite attention to the fact that the customary self-policing and FCC measures and award committee disqualifications will be invoked to keep contest work in bounds.

On Getting Replies to CQs. Through the years we have many times mentioned the practice of excessive CQing as inefficient, stupid operating. A recent letter gives us one more example with the suggestion that new and old hams use short CQs or short directed calls with break-in. There’s virtue in the old “three times three” call and the acceptable modern practice mentioned in Operating an Amateur Radio Station which recommends that CQ be “sent not more than 5 times without interspersing one’s station identification with the length and number of repeated calls carefully limited.” A W4 sent us the new example (how to waste one’s operating time) from observations made in the 7-Mc band and taking place right in the enlightened year 1950!

8:45 p.m.: CQ sent 42 times (identification), CQ 41 times (identification), CQ 5 times (identification). K 115 CQs in one transmission! No answer. 8:50 p.m.: CQ 37 times (identification), CQ 15 times (identification), K 69 CQs in one transmission! No answer.

A word to the wise . . .

Club TVI-BCI Committees. The radio club is a top agency for assisting amateurs in any community to meet common local problems. High among the other services for members is the club maintenance of an interference committee which centralizes the availability of test equipment, assists in public contacts and promotional pub-
licity to assure best public understanding and relations, arranges technical committee demonstrations of essential TV+BCI reduction measures, etc.

In January, 1950, QST (page 62) suggestions for forming such a committee were given. This is just a reminder that the ARRL CD will supply on request the ARRL mimeographs covering the following: (1) Typical Solutions to BCI; (2) BC Interference... ice-breaker for a ham's neighbors; (3) Television Reception and Interference, FCC 48-1803; (4) About Television Reception... facts for the TV receiver owner; (5) TV Interference Remedies; (6) Bibliography of QST References to TVI Reduction. Ask, by number, for the type your committee can use. — F. E. H.

MEET THE SCMs

Ellen White, W6YTM, took office as SCM of San Diego October 16, 1950, filling the post left vacant by the resignation of W6BWO. While not the first member of her sex to hold such a post, she is presently the only woman SCM in the League's field organization.

Obtaining her first license in July, 1946, she has held the calls W2RBU, K1H6QI, and W6YTM, and now possesses first-class 'phone and second-class telegraph tickets.

A versatile ham, Ellen takes part in Field Day and YLRL Contests, maintains membership in the Soledad Amateur Radio Club, the San Diego Amateur Radio Club, and the YLRL, and holds, or has held, several offices in these organizations. She is active as ORS and Official Observer, and has earned her RRO certificate.

HIGH CLAIMED SCORES — 1950 SWEEPSTAKES

The pace set during the first week end of the Seventeenth ARRL Sweepstakes indicated a good possibility that new score records might be set by both cw and 'phone participants. A combination of unfortunate circumstances, however, combined to thwart the efforts of many contestants during the second week end. Violent wind and snowstorms raged in many areas. Loss of power forced stations off the air in some instances; in other cases, contestants dropped out of the Sweepstakes in order to take part in the more important business of handling emergency traffic. Those hams who were in a position to continue their activity found themselves plagued by an ionosphere storm that caused contacts per hour averages to suffer. Despite these hard breaks, numerous 8Ssers doggedly continued making contacts and came up with some excellent scores.

All figures are claimed by the contestants and are subject to further checking. Final results will appear in an early issue of QST.

C.W.

W4KFO ............ 171,600-595-72
W6FJW ............ 197,040-333-72
W8RGM ............ 150,930-800-72
W8BED ............ 150,820-830-71
W8ODU ............ 149,932-843-71
W8DMG ............ 135,810-584-69
W7KGR ............ 112,000-503-69
W8JTD ............ 109,840-794-69
W8FQ ............ 104,785-629-68
W8QF ............ 104,785-629-68
W8FQ ............ 104,785-629-68

'PHONE

W6GQJU ............ 122,532-854-72
W4CYC ............ 50,850-450-70
W5FAG ............ 50,837-320-70
W6YX ............ 50,507-414-69
W8MSM ............ 52,140-516-68
W8DIM ............ 50,823-357-67
W1ATF ............ 46,881-326-62
W4CHY ............ 45,589-280-65
W8JFJ ............ 32,150-261-67
W4AGB ............ 32,004-233-63
W7M8J ............ 51,260-257-62
W6YBS ............ 50,473-239-63
W8PTO ............ 50,253-198-63
W8PTP ............ 52,050-231-63

WSNU operator. 1 Multicaller-operator entry.

The station at W6YTM, located in the dining room, consists of 6-L-807 rig for 7 Mc., 6-LF VFO-6-LF6-6AC2-807 for other bands, and a homebrewed superhet receiver. Bands in actual use are 3.5-, 7-, and 14-Mc. cw. and 3.85-Mc. 'phone. Antenna is a 25-foot center-fed doublet.

Ellen, the XYL of W6YTM, has the distinction of being the third member of her family to hold the position of SCM; her father-in-law, W6AFG, and her brother-in-law, W6CHY, are former SCMs.

In the past she has held positions as radio announcer, engineer-announcer, and transmitter engineer at broadcast stations in San Diego and Honolulu. At the present time Ellen is attending San Diego State College, where she is majoring in physics.

A.R.R.L. ACTIVITIES CALENDAR

Feb. 3rd: CP Qualifying Run — W6OP
Feb. 7th: Frequency Measuring Test
Feb. 9th-11th: DX Competition (c.w.)
Feb. 14th: CP Qualifying Run — W1AW, W7TD
Feb. 16th-18th: DX Competition (phone)
Mar. 2nd: CP Qualifying Run — W6OP
Mar. 9th-11th: DX Competition (c.w.)
Mar. 13th: CP Qualifying Run — W1AW, W7TD
Mar. 15th-18th: DX Competition (phone)
April 1st: CP Qualifying Run — W6OP
April 14th-15th: CD QSO Party (c.w.)
April 19th: CP Qualifying Run — W1AW, W7TD
April 21st-22nd: CD QSO Party (phone)
May 5th: CP Qualifying Run — W6OP
May 16th: CP Qualifying Run — W6OP
June 8th: CP Qualifying Run — W6OP
June 9th-10th: H.F. Contest
June 19th: CP, Qualifying Run — W1AW, W7TD
June 23rd-24th: ARRL Field Day
With the AREC

Cross chapter in Bakersfield to assist in an emergency arising from a cloud burst and flash flood which threatened Bakersfield with flood conditions. W6GQ, in communication with W6GS, W6LRQ took over as NCS on 3885 kc. Amateurs throughout the San Joaquin Valley stood by on 3885, as well as amateurs throughout the central and southern part of the state, W6DDE, W6CN, and W6CC in the Los Angeles area were standing by in case it was necessary to tie in with established c.w. nets. The flood situation was critical in the Bakersfield area until 2000 Sunday night. W6QAD was critical on 2000 W6QAD broke and the St. Johns River started out the flat lands. Red Cross traffic was maintained to Kernville all day Sunday and throughout the night until 1930 when one hundred telephone lines were made available. The Kern river basin was invaded by floodwaters from the south, and W6DUF went into the disaster area of Kernville with an ambulance, radio jeep, his personal car with a boat on top and another car and boat. W6TA, W6WBY and W6AQG stood by at their own stations. W6QQR handled the ten-meter mobile circuit consisting of W6GQ PXY HBV and GHA, and this net was linked with the 75-meter net via W6SD. The 75 kc phone net was secured at 2217 as all locked under control in the valley; however, at 0300 Monday W6SD was called by the Kern County Sheriff's office to contact Kernville regarding weather and what was needed. Due to skip conditions, this contact had to be established through W6QYXG in New Jersey to KBHI. W6QYX in Kernville, even though not real Bakersfield to KBHI acted as relay and traffic regarding immigration material was handled to guard against an outbreak of typhoid. The traffic circuit on 75 was maintained until 2220 Monday night. During the day Monday W6ZCO handled the net continuously and did an excellent job of maintaining contact to Kernville with his mobile rig on Monday and maintained contact with W6QQR.

Much traffic was handled. On Sunday W6LRQ handled 138 transmissions including the Monday 43 transmission almost an hour and a half. Those stations participating not mentioned above include mobile W6 KPA and WG, and fixed W6s ASV ARE BZF RGF RTE CAN CHI DBX DXM DDC KVU HZU EAN FED W6QQR F6CMF. The net included stations like HIE HYG IEM IJG JJE JDN JPV JPS LDD MYS MJU NFC FSW PNG QON RJE RJF TO UIN VJQ VTV WLY WGO WUD WMU WYM TCS YYR ZXR ZEK.

Flood conditions continued to pester California throughout November and into early December, necessitating action by AREC units all over the state. On November 23rd and December 3rd-4th, the American and Yuba Rivers carried the waters from the high Sierras in creating devastating floods. Amateur radio furnished the communications in directing rescue work. W6DGO set up a station at Red Bluff headquarters on November 23rd and W6QQR in Sacramento set up a station on November 24th. W6DDE, W6LBD and W6QQR worked stations in the mountains, in the foothills, and in the valleys. W6QQR worked stations in the foothills, and in the valleys. W6QQR worked stations in the foothills, and in the valleys.

On November 19th, W6LRQ was alerted by the Red

NATIONAL CALLING AND EMERGENCY FREQUENCIES

C.W.

PHONE 7100 kc. (day) 3875 kc.
3550 kc. (night) 14,225 kc.
14,050 kc. 29,640 kc.
28,100 kc.

During periods of communications emergency these channels will be monitored by stations of the National Emergency Net for personal-traffic use. At other times these frequencies can be used as general calling frequencies to expedite general traffic movement between amateur stations. Emergency traffic has precedence. After contact has been made the frequency should be vacated immediately to accommodate other callers.

The following are the National Calling and Emergency Frequencies for Canada; c.w. — 3885, 7090, 14,060 kc.; phone — 3815, 14,150 kc.
That morning a special meeting of the city council resulted in the ABECS being asked to install a station at City Hall and another at Fire Headquarters. Dynamite had been totally ineffective in breaking up the ice jam, and more trouble was expected. During that afternoon VE6AY set up at City Hall and VE6XX with the assistance of VE6AC set up in the Fire Hall. Early that evening the city engineer went with VE6WT/mobile on a tour of the river, maintaining continuous contact with City Hall. It was determined that a flood of major proportions would hit Calgary at about 2200. Meanwhile, VE6KA, EC at Edmonton, had been contacted and advised of the trouble and had agreed to come down to help (a mere 200 miles) along with another mobile VE6BQ. These two mobiles maintained constant contact with VE6OD during the trip down. The flood struck at about the predicted time, but no great trouble was experienced. However, the following day (Monday) a breakthrough occurred, at 2200 at a very critical point. Only prompt action in reporting it by VE6WT enabled a bulldozer and sandbag crews to effect repairs before too serious a flooding had taken place.

And so it went, all through the week, with constant vigil being kept by the ARC units all day and often far into the night. Not until Thursday of that week did the Bow River cut a new channel for itself elsewhere on its course so that the pressure on critical city areas was relieved and the ABECS gang could relax. A grateful city paid tribute to its ABECS organization with publicity in the local papers, and the City Commissioner told EC VE6TK, "I have just told Mayor MacKay that the headlines should have read: "Thank you, Calgary from the Flood.""

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On December 2nd a tornado ripped through Greenville, Ill., fifty miles northeast of St. Louis. All communications out of the city were severed by the storm. As soon as it could be determined that assistance was needed, W9ZE and W9UZU of the Granite City ABECS drove their mobiles to Greenville to assist. In short order, with the assistance of W9RV, they set up a control station at the City Hall to handle all police and rescue communication. W9TCP, working as a relay point for out-of-town traffic, was also in the area with their mobiles. W9UQT and W9CQG arrived in town the next day and set up W9CMZ at a fixed station on the Illinois Emergency Net frequency of 5040 kc. W9UQT also used his mobile for the same purpose when needed. The Civil Air Patrol of Southern Illinois provided emergency generators and worked with the amateurs in handling this emergency. W9RVP, W9BAP and W9NNT also assisted.

The GREAT LAND HURRICANE of 1950

The dawn that came on Saturday morning, November 25, was a gray, windy and wet one throughout the northeastern United States and the southeastern states. Much of the wetness was in the form of swirling snow, in others driving rain. Everywhere there was wind of near-hurricane force, topping trees across power and communications lines, blowing roofs off houses, blocking transportation. Winds reached a velocity of 100 mph in one area.

Old Mother Nature was really on the warpath, and facilities of the Amateur Radio Emergency Corps were alerted and taxed to the utmost to maintain uncertain and sporadic communication due to power, telegraph and telephone failures.

Each ABECS unit which was alerted had its own story to tell about its part in the emergency operations which took place throughout Saturday, Sunday and in some cases on into the following week. In the east, once the wind had stopped blowing, and power and communication were restored, the need for our services quickly terminated; but in western Pennsylvania, Ohio and other near-midwestern states a blanket of snow up to 30 inches with drifts of six to eight feet in some places slowed down recovery of normal communications necessitating continued emergency operation into the early part of the following week.

The complete story cannot be told, nor is it available. We shall attempt to summarize on this page the operations conducted by various ABECS units on the basis of reports received (which were many), realizing that many incidents must go unreported and that many of the thousands of amateurs who took part in one way or another—by standing by, by helping to clear emergency channels, by handling traffic—will go uncredited.

New England

The New England Emergency Net on 3975 kc. was alerted by WIAHX at 3 P.M. on Saturday afternoon. At 5 P.M. net control was turned over to WISSW who carried on until about 10 P.M. when he handed over control to an emergency generator unit. W1GQJ took over until 3 A.M., then WISSW got his power back. W1AVP in Vermont on emergency power rendered valuable assistance in relaying traffic. Traffic continued to flood in Sunday, but the area received a little sleep. Emergency communications were handled for the state police, the Board of Health, railroads, Western Union, power companies, the Red Cross and the telephone company, in addition to the usual assortment of personal messages. Stations rendering outstanding service in the New England Emergency Net were W6 AVP, A1H, DFS, GNB, ITU, TVC, JNC, JNS, LUS, MOC, NLO, OQT, PZX, QG, QQQ, QAQ, RXN, RZK, SFE, SKN, TS, TNC, TV, W2A0U, W2A1A, W2D7T.

In Vermont, ABECS organizations in Chittenden, Rutland, Addison, Windsor, Windham and Orleans counties were active both locally and through liaison stations in the Vermont "phone" and c.w. nets and the New England Emergency Net.

While no emergency was apparent in some of the counties represented, all stations were able to assist by providing liaison contact between the various local (ten meter) nets and statewide "phone" and c.w. nets, as well as with regional traffic and emergency facilities. Operators reported being on the job by the end of September. W1RWA were W6 ASH, AT2, AVP, AXN, A07, B1P, BRS, BRO, CEF, CTB, ETO, FAP, IF, JT, JMO, JNC, LUS, NLO, OKH, PRE, PZX, QCT, QNM, QKK, QYS, QXX, RXN, RZK, RP, RAP, RKL, RTL, RXD, SDL, SIO, SBT, SFP, TBB, TSW, TFB, TJS and W2NNT.

The Connecticut State Police Amateur Auxiliary of the ABECS was active on 3960 and 29,080, both emergency-powered and mobile, and succeeded in handling a lot of official traffic. In addition, ABECS units in Norwalk and Stamford were set up as liaison points on the job. In Norwalk the EC was out of town, but operations proceeded smoothly without him, a simple matter of applying long practices to reality. The efficient way in which the ABECS in Norwalk was put on the air, coming out of Cannon, was so impressive both to the Norwalk Red Cross and the public. By 9:15 A.M. Saturday morning operators were arriving at the Red Cross station, W1SG5, carrying cans of gasoline for the emergency generator and spare batteries for the mobile units. By 9:30, W1DBM/M was on his way to the waterfront area to report on conditions from his mobile-equipped station wagon, closely followed by additional mobiles under control of
New Jersey

The New Jersey 'Phone Net' was in operation throughout most of the emergency, handling whatever traffic was re-
quired and effecting liaison with isolated points. Several of the sta-
tions in the net were operating with emergency power.

In Ellistol, the Union County AEC Net was put into ac-
tion on Saturday morning under EC R3BG, W3GZ, the club-
ship station of the Union County Amateur Radio Asso-
ciation, was placed in operation at the Elizabethtown Red
Cross Chapter, and mobile units were put on patrol. Other
units were in the refugee centers with police and Red
Cross headquarters. The AREC gang also set up emer-
gency generators for power, since the Red Cross headquar-
ters was without electricity as a result of the gale. Amateurs
called on the EC as having participated included W3AO,
CQD, EUI, HYK, IHR, KQJ, LOP, PIC, SYO, ZVO and
WSQY.

In South Jersey, the Burlington County Emergency Net
was called upon for use by the Red Cross, and within an hour
was in operation with seven stations participating. Portable
emergency-powered equipment was rushed to and set up at Red
Cross headquarters by EC W2PWP and W2PKM, and constant
communication maintained with that headquarters.

W2ORS maintained constant communication with K4AUS
in Washington until the emergency was declared over at 0930 Sunday. R3BG and W2ZEB assisted at
W2ORS. Other stations reporting in and assisting included
W2A ALA, BDL, HV, 2\(\)1, SXT, W2s DVC and ELL.

Pennsylvania

In the Lehigh Valley area EC W3FPY and EC W2ZVY
got their combined AEC organization up and rolling as a
full-fledged telephone net. With control station at
Red Cross headquarters in Bethlehem mobile units were set
up at scenes of disaster and at shelters during winds when
telephone lines gave Red Cross constant communication
with critical points. W2HA in Lehigh gave hourly re-
ports on river conditions to W2ZVY who relayed on 10
meters to Red Cross headquarters. Other cooperating ama-
teurs were W2ZFP and W3A NF, PQX, PZG, FZL, QBF
and QCI.

The Susquehanna Emergency Net under the guidance of
EC W3U4A functioned for 36 hours. It served as the only
source of communication in repairing and returning to
service the interconnecting high tension system of northern
Pennsylvania. Mobile units were assigned to substations
where needed. Many hours of outage were saved by use
of SEN members. The Corps of Engineers and the Pennsyl-
vania Railroad were also served during the course of opera-
tion. Constant radio communication was maintained with
Red Cross headquarters in Washington, but no traffic was
required to be handled. SEN members who took part were
W2s AYD, PWN, LKH, TI, WY, W3s AFR, CER, DBC,
IBM, IPE, JDM, B, LHR, LRA, LOA, RRO, MIB, MBR,
PZU, QPU, TIZ, LOD, UPP, W3s OLL, PHL. Other assist-
ing stations were W2QAA, W3s AQF, BFF, BHK, BRC,
BSR, DIS, DKT, HFZ, KLG, KVO, KFP, EJS, KXP,
OGN, PHP, FUO and RKK.

In the Pittsburgh area a network sprang up on Saturday
morning to meet the need for emergency communication as a
result of a thirty-inch snowfall which crippled transporta-
tion and raised havoc with communications facilities.
W3AQK and W3CFM started operations on 29,300 kc.,
the frequency of the Allegheny Valley-Kiski Radio Club. Before
it was all over, 120 hours had elapsed and over 50 amateurs
had played a direct part in a major disaster. W3AQK
was net control, assisted by W2PPF. A tremendous amount
of traffic was handled (111 by W3OMA alone). Most of the
traffic handled was of a personal nature, but the Red Cross
and other relief and utility agencies were also involved. The
Emergency Coordination of Allegheny, Westmoreland and
Armstrong counties were actively engaged in this operation,
as was the SEC himself. Those reported as being active:
W3A AXA, AQQ, BSO, CITN, CUM, CVT, PHX, GBL,
XIO, X3J, XBF, KZ, KQ, KSP, LAF, LBP, LMM,
LOE, LPG, LRO, W3BZC, W3WTO, W3BTM and
W1PTM. WINOA/1 was the call used at Red Cross
headquarters which was operated by W3EC, WISEM,
WINF, W1NFO, W1SFO and W3NER. The local U. S.
Naval Reserve Training Center loaned a generator for the
occasion.

Ohio

In Ohio, where snow and high winds were general through-
out, the state emergency systems worked well. The nets
were in operation on all bands, 160 through 2 meters.
The list of stations participating in the Ohio emergency
looks like a complete list of Ohio amateurs, to say nothing of
the many amateurs outside the state who participated.

The Ohio Emergency Net on 2880 kc. went into operation
on Saturday, November 23 and stayed in operation until
Thursday afternoon, November 30. W8UWT did the bulk of
net controlling, although W8SQQ, W8MWF, W8CTO and
others assisted at different times. During this period 501
stations were logged as reporting in to render assistance in
one way or another.

The North Ohio Emergency Net on 160 meters was also
active. This net was called together at 0800 Saturday
morning by net manager W8SETS and carried on for three
days as W8ETS, W8ZMIF and W8SQH alternated as net
control. 35 stations participated. Out-of-state traffic was
handled on 75 meters 'phone and 40 meters 'phone.
W8NIE, W8SWI and W8DFD. W8DGK and WA9VG
performed liaison with the 10-meter net. Some 74 messages
were originated and handled by members of the net.

The Akron gang was alerted at 0725 Saturday by a re-
quest from EC W8PBI in Cleveland to W8FFV in Akron.
By 1000 a net was set up on 29,130 kc. controlled by
W8ZXN and contact made with the Cleveland organization,
W8DMJ and W8V9B net. A news disaster, W8HZ, worked
liaison to Youngstown, where relay contact was available
to a great many other Ohio communities as well as to com-
muties in western Pennsylvania. Later in its operation, the
net established additional liaison with additional
control stations.

TheAkron net was handled "personal worry" messages, but some of
them concerned food and other relief supplies, rescue operations
and contact with towns or parts of towns isolated by loss of
communication. The net was active for 66 hours and han-
dled 283 messages. In spite of the good job done, W8ZXN
sasa: "We learned ... enough to know we all need some
training in procedure and net operation."

In the Cleveland area EC W8FPZ was alerted at 0710
Saturday morning by W8TMA, and by 0745 the Cuyahoga
County Net was active on 29,160 kc. A short time later
another net was set up by W8AJJ on 29,900 kc. to check
in the stations with which W8AZQ had lost touch. The
control stations had lists of jeeps, ambulances, cars with chairs,
doctors, available milk supplies and other useful data.
Eleven mobiles were on the job and proved worth your
performing tasks that could not be done by fixed or even
portable stations, some of them by running transportation,
with communication. One mobile unit burned up 64 gallons
of gas in an all-day job, traveling 300 miles and in the course
of the day digging 65 cars out of snow banks. Local nets
were active on 2, 10, 20, 40, 75, 80 and 160 meters. The EC was
net control on 10 meters but the other bands were ad-
8

QST for

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iquate taken care of by assistant EC's who selected net
controls so that the operations might proceed smoothly.

There is insufficient room on this page to give specific
mention to each of the more than 830 amateurs who participated in the Ohio emergency. All who were reported to have done so will receive recognition in the form of ARRL Public Service Certificates. A good job, gang.

Canada

In Burlington, Ontario, SCM VE51A sparked-plugged a group of amateurs into a kind of action which took city officials completely by surprise. Toronto EC VE51L and Ontario REC VE51M were on hand at once, and within an hour of offering their services a network of amateur stations was in operation, including mobiles and emergency power. VE51A set up at police headquarters while mobiles VE51L and VE51MK were dispatched to strategic communications points. Operation was conducted until 0400 Sunday. Amateurs from the vicinity who took part were VE51S ABF, BIK, BNQ, BPE, BTK, DGZ, DJ1Z, and DBG in addition to those already mentioned.

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed in a number of Sections, as provided in our Constitution and By-Laws, electing the following officials, the term of office starting on the date given:

Hawaii
John R. Sanders, K5FBR
Jan. 14, 1951

Minnesota
Charles M. How, W8MXC
Feb. 17, 1951

Michigan
Norman C. MacPhail, W8DLZ
Feb. 17, 1951

Western Pennsylvania
Frederick H. Hinkley, W3KEL
Mar. 17, 1951

In the Western Massachusetts Section of the New England Division, Mr. Victor W. Psencik, W1EOB, and Mr. Henry Baier, W1TYN, were nominated. Mr. Psencik received 77 votes and Mr. Baier received 85 votes. Mr. Psencik's term of office began Nov. 10, 1950.

ELECTION NOTICE

(To all ARRL members residing in the Sections listed below.)

You are hereby notified that an election for Section Communications Manager is about to be held in your respective Sections. This notice superseding previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been a licensed amateur for at least two years and similarly a full member of the League for at least one contiguous year immediately prior to his nomination.

Petitions must be in West Hartford, Conn., on or before noon on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, and station call of the candidate should be included with the petition. It is advisable that eight or ten full member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reason of expiring memberships, individuals signing uncertified or ignorant of their membership status, etc.

The following nomination form is suggested: (Signers will please add city and street address to facilitate checking membership.)

Communications Manager, ARRL [place and date]
38 LaSalle Road, West Hartford, Conn.

We, the undersigned full members of the [ARRL Section of the... Division, hereby nominate... as candidate for Section Communications Manager for this Section for the next two-year term of office.

—F. E. Hendy, Communications Manager

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names of all eligible candidates.

You are urged to take this initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

—F. E. Hendy, Communications Manager

Section Closing Date SCM Present Term Ends
Maine Feb. 1, 1951 Manley W. Haskell, Jr. Reigned Apr. 15, 1951
Los Angeles Mar. 1, 1951 Virge A. Gentry, Jr. Reigned Apr. 15, 1951
Wyoming Mar. 1, 1951 Marian R. Neary Reigned Apr. 15, 1951
Missouri Mar. 1, 1951 Ben H. Wendi Reigned Mar. 17, 1949
Yukon * Mar. 1, 1951 W. E. Williams Sept. 15, 1949
Alaska Mar. 1, 1951 Charles M. Gray May 12, 1941
Wisconsin Mar. 1, 1951 René W. Gotsch May 12, 1941
Iowa Apr. 2, 1951 William O. Davis June 16, 1951

* In Canadian Sections nominating petitions for Section Managers must be addressed to Canadian General Manager Alex Reid, 160 Logan Ave., St. Lambert, Quebec. To be valid such petitions must be filed with him on or before the closing dates named.

BRIEF

Our apologies to W6MYQ, whose call and countries total of 190 should have appeared in the DXCC list on page 46 of December QST. We have been very careful to include Dick's call and new total in this month's DXCC box.

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TRAFFIC TOPICS

We write in the middle of the Christmas traffic rush, which this year appears to be greater than ever as a result of the additional load of traffic for GIs overseas and at training camps throughout the states. On top of the rush of traffic, we have been plagued with the most unfavorable kind of propagation conditions. The reactions on the amateur traffic-handling fraternity have been interesting to observe, with many dropping out their handling. Some handle whatever they can in the time they have and refuse to worry about the rest. The old "war horses" keep plugging, plugging, and eventually clear their hooks, bet it midwinter, before they get to bed. Individuals harassed by the increased flow have proposed a system of priorities and even boycotts on certain types of traffic.

In spite of all this, a good job is being done. Many of the NTS nets have expanded their operation to a seven-night-a-week basis until the load dies down to normal again. New stations not heard in traffic circles for many years have reappeared to help. "Phone notes" are taking a great share of the load, too. We'll get by, fellows, as we always have. The overseas Q traffic is of the greatest importance and gives us the greatest satisfaction in handling, especially when it is done with efficiency and dispatch — but other traffic must be handled, too. Everything that is originated must be handled somewhere. If some of it is delayed, our consolation is in knowing that we have done the best we could. Most of it is reaching its destination in good time, thanks to the extra efforts of those many amateurs who are seeing to it that the traffic gets handled.

We have received a registration for the "Broken Tree" net which we feel deserves more than a simple listing in the Net Directory. Excerpts from the registration information follow: "This is one of those abysmal, anathema, indignant and vitriolic denunciations you are expecting. We find that our net is not listed in 'What the Well Dressed Station Wears,' 'Done and Broadstruck' or even the 'Net Directory.' This is to advise you that our net is organized as follows:

- **Executive:** All of us.
- **Manager:** All of us.
- **Frequency:** Quite often.
- **Time:** Not particular.

"We guarantee that any message filed with us will be delivered — eventually." The net consists of MacLean (W4ZOJC), MacLean (W4PAMN), MacLean (W4PIPE), MacLean (W2HZUZ), and Kerr (W2ZBL). We thank OM F. MacLean, W2HZUZ, for this novel registration. If the truth be known, we suspect that many nets are similarly organized but won't admit it.

National Traffic System News. The big news on NTS right now is that numerous new certificates are available for regular participants at the regional and area level. They are issued by the net manager, but not upon request. Far from it. If you see an NTS certificate on someone's wall, you will know that he worked for it, that he served for a period of at least three consecutive months as NCS, representative or liaison station at least once per week, and that he carried out such duties successfully to the satisfaction of the net manager. The regional net certificates are similar to Trunk Line certificates, with green border and sunburst in the center. Area net certificates are the same design but have a lavender border. Sound gandy? They look swell.

Section net certificates? Yes, we realize that section nets are an important part of the NTS and many section net certificates are available from your SCM if he wants to issue them — have for years. If you are interested in them, get your net manager to get after the SCM to make some available. He can get them from Headquarters. The usual method of issuance is by the KM or FAM through the SCM and bearing the latter's signature.

The Winter Emergency and Traffic Bulletin, which should have reached everyone capable of receiving it months ago, contains a summary of NTS activities up to about the end of November — a summary much too long to reproduce here. We have extra copies of this bulletin for anyone who is interested but has not received one — as long as our supply holds out. Also, micromorphed certificates indexed net directories are available upon request.

In general, the National Traffic System is going along in good shape this year as last year. The three area nets are functioning pretty much according to system with occasional personnel troubles. At regional level, there is the usual assortment of difficulties occasioned by lack of representation from sections for which there is a great deal of traffic and inability to locate suitable "thru" stations on a regular basis. It is all very fine to volunteer on the spot, and this is a great help, but it is a strain on our services can be depended upon, or only if you will take the responsibility of seeing that the service promised is rendered, either by yourself or someone acting in your place. Otherwise, the handling of a net without an NCS or without a representative from or to another net.

Many traffic handlers do not understand NTS. We have a special micromorph available just for them. Even if you are not part of the system, it will benefit you in your traffic handling if you thoroughly understand NTS. It is not complicated, but it is big in framework to accommodate as many amateurs as we want to participate. If you do not know how NTS works or how to report into NTS nets at the various levels, you should get a copy of this micromorph and study it. NTS nets can become valuable traffic outlets to you if you use them right. Otherwise, you slow them down and make them less effective. You are welcome to QNI NTS nets if you have trouble and if you do it right. You are even more welcome to become a part of NTS.

**BRASS POUNDERS LEAGUE**

Winners of BPL Certificates for November traffic:

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

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A message total of 500 or more or 100 or more origination-

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**BRIEF**

Billie Adela, W6HBO, merits two unusual distinctions. Not only is she the only woman radio operator in the United States Merchant Marine, but also she is the only American woman to regularly operate a Navy radio station aboard ship. For six years "Sparky," as her fellow sailors call her, has been operating radio stations aboard American and foreign ships. Billie thoroughly enjoys her work and her efficiency and determination have won her the respect and admiration of all the men with whom she has worked.

58 QST for
ATLANTIC DIVISION

PENN-sylvania - SCM, Jerry Mathis, W3BES - The Abington Twp. AAA is trying for 100 feet, tower. L9A 3G, QO, TSO, and K3LST are known a radio-controlled boat at the Philadelphia Area Council of Radio Clubs' Hamlet. The Lancaster RT's set up a station. The good news is that members on the air. AXA lost his antenna and chimney in the big blow. Europe reports his skywave were wounded, PDI lost all his gear but managed to continue. AXA is 5000 and S900 with emergency power during the storm. Our two "gales" make the BPL, AG1R, Q4, as he is back on active duty with the Navy. The Northeast Radio Club raised $40 by an auction of spare parts for the Brattle Technical School. BTEB1 set received his Class A ticket. RAE has a new Lycom TV-les trans with the last piece of Jeep gear in 12 acres in the East Hill. CAU (GO) found three lack with 9K notes and one in oil foul territory. General comments are that the ham afternoon activity had a normal day. The main attraction was W3KMH-TY, with a tremendous pile of gear on display. HW2 showed his TV-les transmitters along with the only TV in the area. W3KMH-TY's TV-les rig operated by the Frankford Radio Club 50 feet away. The West Philadelphia Club had emergency gear on display and others had demonstrations. APOs to those mentioned, as I am writing this from memory. The text contains a lot of material to the affair. The order was supplied by Messrs. Budlong and will be sent to the Civilian Defense. The PACRC supplied communication for a Philadelphia vs. Santa Monica, Calif., chess match. Many hams antennas hit the dust during the Nov. 26th storm, most spectacular of which was Q5F's 100 ft. tower. L9A 3G, QO, TSO, and K3LST were known to have lost beams. DJH, ORU, SIB, and AIZ lost long-wire support. Power was off in many sections for several hours. H1S, K9B, VEA, W2ZAF, W2TTY, WP2B, W4ZAF, W5BB, W5BBW, W6LBW, W6WBB, W6ZLD, W6ZLS, W6ZLD are all operating. Trafic: W2MLU 205, NHI 555, AXA 94, PDI 78, OML 5, WTS 18, QZV 12, HIF 4, CAU 4.

DECATUR-DALE COUNTY - SCRs, Eppa W. Darne, W3BBW - Members of the Washington Radio Club, at the Nov. 11th meeting, elected a new slate of officers. K9F, QC, the local sound limbs labs on the East Coast. QPL conducted the members through the different sections of the studio and plans, explaining all the methods of manufacturing and processing of sound films and cartoons. The second November meeting the Club featured a "Radio Scavenger Hunt" and games. Subject of the Nov. 7th meeting of the Chesapeake Amateur Radio Club was "The Theory and Applications of the Radio" and demonstrations with some time was the talk. At the second November meeting, LK4A gave a talk and demonstration on "High Frequency F.V. amateurs." The Rock Creek Amateur Club held a "Shofar Session" as its Nov. 24th meeting. MFJ is doing some nice DX on 7 Mc. Friends of COF are grieving at the news of his passing away. COF has been in the hospital but now is recovered and will be back on the air. LPI is on 28-Mc., phone and 16-Mc. r.f. is using new whip tubing modulation. OBO recently made a trip to Europe, CBE has been hanging around, K9K rig for 3.5-, 7-, and 14-Mc. c.w. is rebuilding. Q5F is on 7 Mc. and 3.5 Mc. CY4 has a DX score of 210 confirmed, and is using an 813 with 250 watts and a TV. Trafic: W3BIF 205, W9KLS 158, ONA 250, K4E 104, ECP 78, OVB 47, J4Y 102, MCG 38, AK4 18, LIZ 7.

SOUTHERN NEW JERSEY - SCM, Dr. Luther M. Mather, W3THQ. Many reports were received this month. This sincere sympathy is extended to K2AZ, who lost his tower, beam, rig and Q6A was restored from the extended tour of Cuba, visiting many Cuban radio stations and clubs. ZYX would like to have some active South Jersey stations for the S.J.N. Net which meets on 3050 kc. 7:30 p.m. Mondays, Wednesdays, and Fridays. BAY is building a new QTH and expects to move in soon. Anyone interested in joining the amateur radio club can contact the S.J.N. Net by contacting W3B6WB or W3C44.

February 1951
CENTRAL DIVISION

ILLINOIS — SCM, Lloyd E. Hopkins, W9EJV — GSB, unable to work from apartment building, has gone mobile. He is moving his QTH to the town. He feels better.

OREGON — SCM, Alex L. Kinnear, WA7XKJ — QTH is in the town. He is now mobile. He will be in contact with all stations in the area.

WASHINGTON — SCM, Elgin D. Roberts, W7CGB — QTH is in the town. He is now mobile. He will be in contact with all stations in the area.

CENTRAL DIVISION

DAKOTA

Dakota

NORTH DAKOTA — SCM, Dr. Lawrence W. Strode, KJ0A — QTH is in the town. He is now mobile. He will be in contact with all stations in the area.

SOUTH DAKOTA — SCM, Dave Voigt, W9ACU — QTH is in the town. He is now mobile. He will be in contact with all stations in the area.

MINNESOTA — SCM, John B. Morgan, W9RA — QTH is in the town. He is now mobile. He will be in contact with all stations in the area.

WISCONSIN — SCM, Renzo W. Geisler, W9QCM — QTH is in the town. He is now mobile. He will be in contact with all stations in the area.

WISCONSIN — SCM, Alex L. Kinnear, WA7XKJ — QTH is in the town. He is now mobile. He will be in contact with all stations in the area.

WISCONSIN — SCM, Alex L. Kinnear, WA7XKJ — QTH is in the town. He is now mobile. He will be in contact with all stations in the area.
GREEN and Frankfurt. BXU always is QNI on KYN. MWX and CDA are doing good jobs as RMs. WWT is consistently high in traffic handling. FRM has some 221-2-1 and 221-2-2 but is working well. CRB key is 221-2-1 but is 202-2-1 in the key and 221-2-2-3 sounds good. MGT also has 221-2-2 and an electronic key, NWY is a good one on 1200. GAC has a 1200, but works regularly. BKXU always is QNI. BKXU is a new member of the Arkansas emergency phone net. MDR wishes to express his appreciation to FAV, NBE, ENE, ENE, RAS, TEA, and others for a phone and a time. Mr. M. W. Dollar of Daviess passed away Nov. 19th, and the family did not have the address of a son who was moving from out of state. Throughout the efforts of these amateurs he was located and contacted his family. I would appreciate reports from club secretaries on new members and QTH's. Under the new regulations all amateurs in the State in the new rulings. RK7's XYL insists that he go on phone. ZS operated mobile during a hunting trip through the South. Recent reports as on 2600 were on Shreveport. QPC turns in a good report as SO. Thanks to RIQ for an excellent Berkeley Field emergency report. Rains new affixed to the lower end of Shreveport. REUQ was in good shape as a drive for the new club-house in West Monroe. ED has taken over the control room from work and allowed him quite a bit of SSB and voice operating time. BJJ sold his mobile equipment. QII, KJ7, 28 again in C. C. and a new ham in C. G. KU7. BBK has a QTH in the North. KU7 has a new receiver. MM7 has a rig for the high-frequency phone bands. The Monroe Traders held a meeting this week. A new rig in Shreveport, KX7, has 2B-8 phone in Rodeo. H12 is operating in C. G. Mobile, AR. KX7 is keeping the line open in West Monroe area. BMM and his brother, C6G, carried mobile equipment with them on Gulf fishing trips on the East coast. MM7 was at the atlantic coast for 8 days. RV7 is a rig for a police victim. Traffic: W5NQ 129, GHF 42, QCQ 3.

LOUISIANA — SCM, Robert E. Barr, W1CFH — PLQ is the latest to become 3855-9. K1R is in West Monroe area. BBK is active in the higher end of Shreveport. QPC turns in a good report as SO. Thanks to RIQ for an excellent Berkeley Field emergency report. Rains new affixed to the lower end of Shreveport. REUQ was in good shape as a drive for the new club-house in West Monroe. ED has taken over the control room from work and allowed him quite a bit of SSB and voice operating time. BJJ sold his mobile equipment. QII, KJ7, 28 again in C. C. and a new ham in C. G. KU7. BBK has a QTH in the North. KU7 has a new receiver. MM7 has a rig for the high-frequency phone bands. The Monroe Traders held a meeting this week. A new rig in Shreveport, KX7, has 2B-8 phone in Rodeo. H12 is operating in C. G. Mobile, AR. KX7 is keeping the line open in West Monroe area. BMM and his brother, C6G, carried mobile equipment with them on Gulf fishing trips on the East coast. MM7 was at the atlantic coast for 8 days. RV7 is a rig for a police victim. Traffic: W5NQ 129, GHF 42, QCQ 3.

MISSISSIPPI — SCM, J. G. Walls, W8DLA — HIP recently was appointed disaster communications chairman of the Red Cross Chapter at Natchez, and will be assisted by SCM, C. M. Cross, W8LW. The text-to-text company will add to the set-up. HIP is building new 4-125A amplifier driven with a Lycom Transmitter. HIP's permission to use Air Radio Club's room and KG7 are setting up b.h. station at Centerville, RKO is active in the TXN Net. RGM is tuning up the rig for 3855-9. phone. J88S is a student. Oliger, on 2.81 MHz recently was 2600 on KX7 and RV7. RI and FL are the proud parents of a new daughter. Congrats to Walt. By the time you read this we will be on a training trip to the Acadiana area and the beautiful and picturesque Near Warau. Traffic: W8JHS 140, WZ 60, MG 6, RKO 3. TNSNNSISBE — SCM, D. G. Rice, W8JHS — Kington was at Direction Office Club house was visited by Director Canfield, SBSR. On his trip brief stop was made at Chatt- mois and Oak Ridge. Q6DG was a regular stop on the way. F. C. is located in the New Jersey DFR was snow-bound in E. Tenn., without mobile gear. Route Manager hit the road again after a short lay-off in getting set up. Brebeuf. The Davidson County Ten-Meter Emerg- ency Net is experiencing good attendance and activity with regularly-conducted emergency drills. SEQ, J88S requests mobile and portable gear. Q6G made a nice score in the recent SS, OOA is new on OPS and is active in the SS as well as chasing 725-2. Vine St. 125a is maintaining regular schedules with DLAP, DFV. PL was vacationing in Florida. NDE has been appointed EC for Oak Ridge to fill position left by Mr. J88S. Those interested in DXing from California, BAP operated into traffic nets with portable gear from Alabama. He reports regular AREC drill sessions are location and regular drill sessions. AREC is on a recent vacation trip. Our SEC, DFD, has a tremendous job and it behoves each and everyone of us to get behind him and help out in any way possible. Those of you who do not belong should sign up. AREC at this time is of utmost importance and it is imperative that BDF be informed of the situation and that we, as a group, put our heads together and help out in any way we can. The members include, W8P4, 1175, APC 505, BAQ 69, AEE 52, LUB 30, AF1 25, CY3 28, OGG 19, H6Q 14, RKD 7, D6R 5, NDC 4, DFP 3, OOA 3, PMR 2.

GREAT LAKES DIVISION

KENTUCKY — Acting SCM, L. W. Lyle, jr., W4KEG — KYN, KYB, and KYC are rolling along in fine style. KYN needs stations to QNI Your humming, Bowling Green, and Frankfort. BXU always is QNI on KYN. MWX and CDA are doing good jobs as RMs. WWT is consistently high in traffic handling. FRM has some 221-2-1 and 221-2-2 but is working well. CRB key is 221-2-1 but is 202-2-1 in the key and 221-2-2-3 sounds good. MGT also has 221-2-2 and an electronic key, NWY is a good one on 1200. GAC has a 1200, but works regularly. BKXU always is QNI. BKXU is a new member of the Arkansas emergency phone net. MDR wishes to express his appreciation to FAV, NBE, ENE, ENE, RAS, TEA, and others for a phone and a time. Mr. M. W. Dollar of Daviess passed away Nov. 19th, and the family did not have the address of a son who was moving from out of state. Throughout the efforts of these amateurs he was located and contacted his family. I would appreciate reports from club secretaries on new members and QTH's. Under the new regulations all amateurs in the State in the new rulings. RK7's XYL insists that he go on phone. ZS operated mobile during a hunting trip through the South. Recent reports as on 2600 were on Shreveport. QPC turns in a good report as SO. Thanks to RIQ for an excellent Berkeley Field emergency report. Rains new affixed to the lower end of Shreveport. REUQ was in good shape as a drive for the new club-house in West Monroe. ED has taken over the control room from work and allowed him quite a bit of SSB and voice operating time. BJJ sold his mobile equipment. QII, KJ7, 28 again in C. C. and a new ham in C. G. KU7. BBK has a QTH in the North. KU7 has a new receiver. MM7 has a rig for the high-frequency phone bands. The Monroe Traders held a meeting this week. A new rig in Shreveport, KX7, has 2B-8 phone in Rodeo. H12 is operating in C. G. Mobile, AR. KX7 is keeping the line open in West Monroe area. BMM and his brother, C6G, carried mobile equipment with them on Gulf fishing trips on the East coast. MM7 was at the atlantic coast for 8 days. RV7 is a rig for a police victim. Traffic: W5NQ 129, GHF 42, QCQ 3.
teur Clubs meeting was held in Columbus on January 13th, AQ worked 77WS, KHDR, and 7PKBF on 3.5 Mc. The Champaign County Groundwave Contest produced the following contests: 7PK, URI, KFRU, and MX. The Out-of-county — DMM, LVK, CRL, and HKF. The Case Tech. Radio Club was very active in the SS Contest. DGG made 110 QSOs and 1,356 Mc while KFRU made 225 QSOs and 1,356 Mc. Appointments are available for OHS, OSS, OPS, ORS, and OR. If interested, drop your SCM a postal. FJX has a new rig or W2JF. KFRU finds 0.3 Mc and W2KG finds present u/h conditions poor. Cleveland c.m. stations gave the amateurs considerable publicity during the recent raffle for the Wardian case. DXCC W2B, WWJG, EZE 9, E9, E2A 5, PMT 1, DAZ 2, LKH 6, ATRK 4, E8T 3, 2F3 2, UFR 2, 2QD 1.

HUDSON DIVISION

EASTERN NEW YORK — SCM, George W. Sleeper, W2CGL — Sec; NJF. Your new SCM wishes to thank you for your cooperation, and hopes to be able to fill the shoes of EQD, who did so much to build up the section. The AEC and NYS did another outstanding job in providing election-return service for WNYC and again beat the press by two hours and more. Welcome to 8C-SY, recently transferred from Michigan. The Albany Amateur Radio Club exhibited all the recent and recent-only recent Albany hobby show. Congratulation goes to ILI and the NYS-Division for the fine service performed for the ECM in this project. (See WAZ, December, page 27.) Ap- pointees should watch for endorsements dates for the approval of their club traffic lists. W2CGL, GRC 52, 230, DAE 235, AJW 141. (Local Scoop) The Western New York VHF Net and the Western New York NCBV, both on 220 Mc, are operating as of 1974. EZE 8, PMT 6, DOZ 5, LKH 5, ATR 4, E8T 3, 2F3 2, UFR 2, 2QD 1.

NORTHERN NEW JERSEY — SCM, Thomas J. Ryan jr, W2KRL. This is a report following the sale of our project. Many more news on progress to date will be coming your way via your local NEC. (See NEC, December, page 10.) The NEC held its annual meeting on Dec. 18. A major result of the meeting was the publication of an Emergency Manual for Operation for the New Jersey NEC. The NEC is now in a position to contact, should contact the SEC, LOP now is equipped with PE-75 for emergency power. EGM is doing great organizational work, making it easy for the ECM to keep in touch. SAC of GQ 145. He has just been appointed Elect. comm. for 14 Mc. He operates on all bands. Pictures no artist could paint: ECM with a bun leg climbing tree to replace antenna blown down during storm. Awarded Gold State Area AEA: BTG, pres.; FZK, vice-pres.; LMB, secy.; ILI, treas.; GUM, chief engineer. CUL continues to knock off high school records. LHK has just been appointed Secy. The NEC just had a very successful 2-meter net every Sun. at 1930 a.m. on 146.5 Mc. Another field day of the Brookfield Radio Club was held recently. LOP now is the largest operator. They conduct North Hudson 2-meter net every Sun. at 1930 a.m. on 146.5 Mc. (See NEC, page 21.) The NEC members are popular with the citizens of this area. W2KRL, ECJ 146, 207. A new scoops for the following: W2KRL, ECJ 146, 207.

CINCINNATI DIVISION

The Radio Club of Cincinnati (RCC) has a new call of W2CI. W2CI is a new call of the Radio Club of Cincinnati. The RCC is the oldest radio club in the United States. RCC is the oldest radio club in the United States. RCC is the oldest radio club in the United States.

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Many of us have occasion to wish for a feed method for a rotary antenna which would eliminate the need for brushes or the nuisance of twisted feed lines. Inductive coupling does very nicely to accomplish these aims besides allowing for a quick and easy method of eliminating standing waves. The question of how to go about using this method has bothered many of our brethren so here is a brief outline of procedure.

First of all, the size of loops to use for the inductances is governed by three factors: One, the loops should be large enough so that they will provide the necessary coupling without being physically too close together. This is important to prevent shorting them due to wobble in the rotating loop and also because small changes in spacing have a greater effect on the terminating impedance of the transmission line when the loops are close together than when they are far apart. Two, the inductances should not be too large because the q of the system is directly proportional to L and too high a q restricts the frequency range. Q's of 2 to 5 are good. Three, the spacing between loops of given size is governed by the impedance transformation desired. That is, if you wish to step-down from 50 ohm (RG-8U transmission line to 8 ohm), the loops will be close together whereas if an impedance step-up is required, the loops will be far apart. Therefore, for a big impedance step-down the loops may have to be bigger in diameter in order to keep them from getting too close together. Under these conditions, the q may be too high for the bandwidth desired. If a big impedance transformation is desired rings whose inductances are proportional to the impedances involved may help by allowing them to be operated in the same plane. It is also desirable to avoid big transformations in the loop system by employing another kind of impedance matching device before or after the rings, such as T match or a quarter wave matching section.

Now it is important to know what impedance your antenna looks like at its input terminals. Bear in mind that if the system is properly tuned this will be resistive. Now if you use the formula 

\[ C = \frac{1}{2\pi FRQ} \]

where R is the antenna impedance and Q is some desirable Q, say 4, a value of C can be found which will resonate the secondary loop at the operating frequency. As an example, if F is 29 mc. and R is 50 ohms, C is found to be 27.5 uuf. Now a loop is constructed at the operating frequency, "Terman's Radio Engineering" has a chart which lets you make the ring from knowledge of the inductance but the cut and try method may be used. A grid-dipper is handy to find out if your loop inductance is correct by putting C across the loop terminals and checking the resonance. In our case, the loop is found to be 13'' in diameter of \( \frac{5}{8}'' \) copper tubing. C is now made up of two condensers each 2C connected in series with each antenna terminal. 600 volt micas with short leads may be used for antenna powers up to 200 watts.

If the impedance transformation desired is not greater than about 3 to 1 the primary loop may be made the same size and resonated with the same capacity. All that remains is to connect your transmission line in series with the loop and condenser and adjust the coupling until the SWR on your line is a minimum. Who knows? You may be able to make it zero. In our practical case, we can match RG8U with about 1 3/4'' between the loops.

As a further refinement the primary loop may be made a coaxial affair to provide electrostatic shielding between the loops. The C in the primary may be slightly different to resonate the loop but the action should otherwise be the same.

And incidentally our GS insulators are ideal for supporting your rings.

M. H. Oxman, W1NYU
THE NEW ENGLAND DIVISION

CONNECTICUT — SCM, Walter L. Glover, W1VB — The small (?) hurricane in November furnished a good opportunity for an actual test of our emergency operations. According to reports received, the gang responded nobly. The State OES has tabulated the area's emergency service, and fixed stations in Norwalk, Stratford, Saratoga, Danbury, and other locations. Nice work, fellows. AOS was all set in the storm and did a fine job of Civil Defense service. It is a pity they don’t know the commercial lines were down. HHX has his job at W1ZL and is working in Ridgefield. W1RA is still running DX. W1QA has 12 contacts in the last 24 hours. EC offers to help the Western Airman, and EC GC1 is out of town during the storm, but says the gang didn’t all go right without him, N1M is building a ‘Corkey’. The Greenwich Amateur Radio Club held a general meeting for the establishment of a radio net for use of the local Civil Defense services. The new net was reported to be operating in the town. Pollution was installed in the local Town Hall. This seems to be the first installation of the kind in the section, and might be a forerunner of things to come. There was a meeting of the local Civil Defense plans, if and when it is decided that amateur radio will be the service to function in bombing attacks if the telephone lines fail. Unable to get a net for the bands to show their value. Traffic: (Nov.) W1N3N 375, L1221, B11 156, BVB 15, A7 76, BY 50, FOB 37, C119 53, 500-500. (Dec.) W1PB 19, NVY 115, AZS 11, OJR 11, JIT 4, NYF 1. (Oct.) W1NYF 82. (Sept.) W1AW 101 (Aug.) W1AW 231 (July) W1AW 207. (June) W1MAINE — SCM, Manley W. Haskell, W1VY — The Pine Tree Net frequency was changed to 3599 ke. effective Nov. 20th. All operations are on the 2-meter band. AOG attended a meeting of the Mathematics Club in Bangor, QEQ acted as toastmaster and had all the amateurs introduce themselves. Col. Averill, of the Maine National Guard, and the OES were present. The Maine amateurs were on the job during the emergency of Nov. 25-26, Much traffic was handled and sent from Vermont, which was hit hard and without facilities. W1KS is working on a bill to be presented to the State Legislature, which is designed to secure automobile license plates for amateurs with no plate in the state. The now famous number 3, VRF, the SEC, reports activity throughout the section in August with the report of a ELC to Fay, Junction, Portland, Central City, Wiscasset, Fort Fairfield, and St. Louis. There are a total of 105 AEC members in these areas. Fourteen Assistant EEs are being used and the Rangers are in mobile service when a break in a gas main caused an acute emergency in the Clay County Area. Thanks to VRF and TNA, AOG has received his Old Timers Club certificate from ARRL. K1K reports 39 contacts in the recent CD Contest. QMF is looking for better reports and more contacts now that the old 12-24 hour rule has been eliminated. K1B you on NCS for MION in the St. Louis Area, in addition to being active in the regional net, DE5C made new friends and maintained the roar of the regional net in the same manner. Also starting C174 on c.w., GCL still is staying with the 355-Mc. phone. Traffic has dropped down during the past month for QSO’s, but when we open the old 12-24 hour rule we may see an increase in activity. Arrangements and renewals in the section are as follows: VRF as SSW, N1XK as W1VY, N1J as W1VY, W1E as W1VY, and V1X as W1VY. OES, RSE is head of Radio Communications for Civil Defense in Maine, AYN has been an active member in Foxboro. Station 144 Mc.: HVC, PCO, J10, KWD, and LPH. On 3.5-Mc. c.w.: ATX, ACA, and KRT, JDX has been on 3.850 Mc. c.w., 600 watts, and AM on 3.5 Mc. c.w. TAV and DBS is on 3.350 Mc. phone, JDX moved to Lexington, RQA writes from Franklin, Pa., where he is stationed. MAI writes from Chicago, c.w. 3.5 Mc. for 21 years as he has been suffering from cerebral palsy. S1Q has rig in his car on 28 Mc. and works out on 3.350 Mc. 200 watts, and 3.350 Mc. on 28 Mc. MOJ has mobile rig on 3.350 Mc. SWL in Weymouth, is on 7.3, 3.8, and 3.350 Mc. The South Shore Radio Club had an auction with AYR doing his stuff, also ARP. When our Director, BVR, presented ARP with his Alternate Director’s pin, NF has been doing some radio experimenting and checking out one amateur station in each state, and has made contact with W1O and has NC-57, SMO has Class A license. PF reports that the Deep Sea Dragnet handled traffic from YV in Rutland, VT, during the past month. W1A, EC1, YV4, K1T, and Q1Y have been operative. W1K is active in Deep Sea, France, and Fish Nets, FGT is working in IRN and is on 144 Mc. some, JFF has receiver for 1.8 Mc. W1DSB reports from NQ1 in the Unknown territory. K1XN put up three-element beam, TY has new beam. The Eastern Mass. Radio Assn. had a ham exhibit at the Hobby Show in Boston. DX operating the call for the American EARS. W1MAINE is new 8-element beam. W1MAINE is new 8-element beam.
It is generally agreed that of all amateur activities the DX Contest puts the greatest strain on men and equipment. Hour after hour of peak performance is demanded from each.

It isn't just coincidence that year after year in these grueling battles Eimac tubes fill key sockets in the leaders' transmitters. Men like Ransome, Knowlton, Lindenhayn, and Clark depend on Eimac tubes for reliable, efficient performance.

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New York 18, N. Y.

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Los Angeles 25, Calif.

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Norfolk 10, Va.

Radio Parts Co., Inc.
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Milwaukee 3, Wis.

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Los Angeles 15, Calif.

Radio Products Sales Co.
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The Eldico SSB Jr. is patterned after the amazingly effective unit developed by Don Norgaard, W2KUJ, and described in the November-December 1959 G-E Ham News. It is available in either kit form or completely wired and tested.

Everyone can now enjoy all the benefits of single sideband transmission. Tremendous effectiveness of low power: QRM minimized or eliminated entirely; QSB has less effect...complete phone contacts with "c.w. reliability."

Eldico’s SSB Jr. is a complete 7-tube 5-watt single sideband transmitter. Tube complement consists of 12AU7 combination speech amplifier-oscillator; 12AT7 twin-channel amplifier; 6AC7 final; 12AT7 twin-speech preamplifier; 6H6 bias; 5Y3G rectifier.

Each kit comes complete with all parts, punched chassis, cabinet, tubes, power supply components and full instructions for assembly and operation. Audio phase-shift network comes fully assembled-preadjusted, eliminating necessity for elaborate test equipment. Less difficult to construct and adjust than any conventional transmitter...practical SSB at amazingly low cost is now a reality. The Eldico SSB Jr. may be used as a transmitter, as a driver for high-power linear amplifier, or in conjunction with a v.f.o. The transmitter provides 40-db. sideband suppression by using a simplified phasing method which because of Eldico’s laboratory assembled phase-shift network, requires only standard components and no special technical skills. A pre-amplifier is included as an integral part of the Eldico SSB Jr. Kit to enable the use of any low-level microphone such as crystal or dynamic.

SSB Jr. complete kit with instructions $69.95
SSB Jr. Wired and tested $99.95
NORTHEASTERN DIVISION

ALASKA — SOM, Charles M. Gray, K7LIG — EC RU

A report things are beginning to take shape in Ketokkinan. They have four members and are affiliated with the Q.A.L. They are going to be a QOM, and have an IRT and Super Pro, AAD, and AEL and have the Rat Island Net going on 7-Me. The Kenai Radio Club has a new logo, AEM, vice-pres., and RE, secy.; and expects 100 active members.

The new Radio Inspector arrived in Juneau on July 20 and has been working plenty of DX with 500 watts and IQ-129 receiver. Ti is doing fine on 9-M, and is not on 9-M...

IDAHO — SOM, Alan K. Ross, W7IWI — Twin Falls: Very sorry to lose TWIN to other clubs and put them in a hole. Good luck in your new job at KJDF in Miles City. New EC for Twin Falls is OQT, St. Anthony: He has turned his back to 9-M and 9-M and this is... He sold his Globetrotter to a Rexton ham. Hayden Lake: FIS has been busy winterizing cars and cars, and is on the Gen Net now. QSL work allows.

The new Radio Club officers are YTG, pres.; MZG, secy.-treas. 160 meters is very active with quite a few house and Gama hams on, including KRO, OGR, OGR, 9-M, 9-M, OGR, and MFC. The Farm Net is active on 3955 kc. at 7 p.m. — make good use of it; get to know the gang.

Move your trailer somewhere on 9-M and 9-M, and has been meeting with both nets. Why would like more personal letters from more of the Idaho gang.

NEW HAMPSHIRE — SOM, Norman A. Chapman, WJNJC — SEC, KYG, RM, CBW, and WYIK meet every Thursday Night. The WHC meets 9:00-10 p.m., Friday; and on 10:00 kc., 1:00 p.m., Sunday. Let's have more ham on the air for past 10, and I'm sure it will be put to good use. Traffic: (Nov.) WJFBO 195, BVR 105, AW9 G, G9A J, RCG 3, BDD 5, JAH, 2, 10, 1, 1.

NEW MEXICO — SOM, Fred C. Robertson, W6NM — SEC, KYG, RM, CBW, and WYIK meet every Thursday Night. The WHC meets 9:00-10 p.m., Friday; and on 10:00 kc., 1:00 p.m., Sunday. Let's have more ham on the air for past 10, and I'm sure it will be put to good use. Traffic: (Nov.) WJFBO 195, BVR 105, AW9 G, G9A J, RCG 3, BDD 5, JAH, 2, 10, 1, 1.

NEW YORK — SEC, William H. Simpson, W5YI — SEC, KYG, RM, CBW, and WYIK meet every Thursday Night. The WHC meets 9:00-10 p.m., Friday; and on 10:00 kc., 1:00 p.m., Sunday. Let's have more ham on the air for past 10, and I'm sure it will be put to good use. Traffic: (Nov.) WJFBO 195, BVR 105, AW9 G, G9A J, RCG 3, BDD 5, JAH, 2, 10, 1, 1.

MONTANA — SOM, Edward G. Brown, WYKGO — Our favorite huckster, LCM, shut-in Mayor of Butte, the little country town in the East, and his QSLs are... A New Club has been formed in Bozeman, consisting of local citizens. Skip conditions in this area have curtailed the local nets severely and a few stations are dropping out. Some of the above conditions surely will improve soon. The Glacier Club has disbanded temporarily because of loss of members but expects to begin meetings again in about three months. CT has his new 9-M rig nearly completed. All stations landing traffic are requested to send monthly report to the WYKGO, even if other stations that accounts toward our usefulness to the public. FMY is home again after being away all summer. KGF and LK9 now on 10-meter bands.

OREGON — SEC, J. R. Roden, W1ZQG — QIO is new PAM, HDN, real, and D1 says that TVQV activity is at a high peak. TVEQ mobiles did a nice job on Halloween in assisting the Washington County. Office. OZL is teaching in high school in Burns. PAA is new call for Burns High School. NQA is new EC for Burns Area. BSY is busy keeping the gang around ORC interested in AE activities. NQA is new ORC. JRM is complaining about the bad skip in his area. AHZ is new QEN phone net outlet in Junction City. After getting his Class F he has been attending BAA Official's interest in LO-Nite. AIRS is back on the air with an IRT-9. AARX now has 201 countries and 416000 skips. ETV is now at the heart of the Northwest and is keeping in touch with gang via mobile. EOLQ looked through LTV's mobile log book and has found that LTV is doing a remarkable job assisting E8J in keeping OR is active on the map. KDU now has a new alumnus on 40-foot pole for his new antenna, working on 14 and 20 M. JPH has left to work for CAA in Alaska. MTB has received his Class A license. EBD has been called by TIAA and KIA A. P2A has worked from his home. KEN had a hard time keeping his tower up through the big storm. ORX is now new OC. Class III, BG has moved to Portland. Traffic: (Nov.) WJFBO 195, BVR 105, AW9 G, G9A J, RCG 3, BDD 5, JAH, 2, 10, 1, 1.

WASHINGTON — SEC, KAA, RM, JJK, CQW, mobile to a new location and has his shack in the basement. GND made a fine score in the SS. DMR is now a DX peddler for AAM, working on 23 M. He is building a carrier-control modulator, DRA (Continued on page 70)
PLATE TRANSFORMERS—Primary 115/230 Volts, 50/60 Cycles

Here they are—top-performing plate transformers and matching filter reactors. They're conservatively designed, with ample insulation throughout. They operate with a temperature rise of 40º to 50ºC at full load, 60 cycles, under CCS duty. Under ICAS conditions, duty cycle is 15 min. on and 15 off, 40º-50º temperature rise.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Max. Pri. VA</th>
<th>Secondary A-C Load Volts</th>
<th>D-C Volts after filter</th>
<th>D-C Mo. CCS</th>
<th>ICAS</th>
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</thead>
<tbody>
<tr>
<td>P-45</td>
<td>185</td>
<td>675-0-675</td>
<td>400</td>
<td>250</td>
<td>325</td>
</tr>
<tr>
<td>P-67</td>
<td>250</td>
<td>900-0-900</td>
<td>750</td>
<td>250</td>
<td>325</td>
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<tr>
<td>P-107</td>
<td>310</td>
<td>1150-0-1150</td>
<td>1000</td>
<td>250</td>
<td>350</td>
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<tr>
<td>P-1240</td>
<td>350</td>
<td>1425-0-1425*</td>
<td>1250</td>
<td>200</td>
<td>260</td>
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<tr>
<td>P-1512</td>
<td>550</td>
<td>1710-0-1710</td>
<td>1500</td>
<td>300</td>
<td>425</td>
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<td>P-2520</td>
<td>915</td>
<td>2260-0-2260</td>
<td>2500</td>
<td>300</td>
<td>425</td>
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<tr>
<td>P-3025</td>
<td>1850</td>
<td>3450-0-3450</td>
<td>3000</td>
<td>500</td>
<td>700</td>
</tr>
</tbody>
</table>

*Both secondaries may be rectified simultaneously

FILTER REACTORS

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Inductance in Henries</th>
<th>Max. D-C Ma.</th>
<th>D-C Resistance, Ohms</th>
<th>Insulation Volts RMS</th>
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</thead>
<tbody>
<tr>
<td>R-67</td>
<td>6</td>
<td>700</td>
<td>35</td>
<td>10,000</td>
</tr>
<tr>
<td>R-105</td>
<td>10</td>
<td>500</td>
<td>40</td>
<td>9,000</td>
</tr>
<tr>
<td>R-65</td>
<td>6</td>
<td>500</td>
<td>35</td>
<td>9,000</td>
</tr>
<tr>
<td>R-103</td>
<td>10</td>
<td>300</td>
<td>40</td>
<td>7,500</td>
</tr>
<tr>
<td>R-63</td>
<td>6</td>
<td>300</td>
<td>35</td>
<td>7,500</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>D-C Ma.</th>
<th>Insulation Volts</th>
<th>Inductance in H's</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR-300</td>
<td>300</td>
<td>7,500</td>
<td>.02 to 1.5 H's</td>
</tr>
<tr>
<td>SR-500</td>
<td>500</td>
<td>10,000</td>
<td>.02 to 1.5 H's</td>
</tr>
</tbody>
</table>

Low Pass Filter No. LPF-1

Designed to provide optimum attenuation of audio frequencies above 3,000 cycles. Economically and effectively confines a speech signal within narrow frequency limits. The filter operates out of a source impedance of 15,000 ohms (as presented by plate of single 6C5, 6J5, or triode-connected 637) into a 100,000 ohm grid. Step-up ratio of 1:2.63 is obtained when primary is connected to 100,000 ohm secondary. A plate blocking condenser is required to prevent D-C from saturating the coils in the filter proper. Filter operates satisfactorily at signal levels of +10 volts RMS across the 100,000 ohm secondary, or of +0.7 volts RMS at 500 ohms.

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is rebuilding his rig. ACF has been under the weather again, as has the SEC KAA. KTL is working on a mobile net for the Nevada area. NWP built a new rig after the old one fell apart. LAG is at Veterans Hospital, American Lake, Washington, and would appreciate hearing from the gang. IOQ handles trans-Pacific traffic. BEE has 28-Mc mobile, mobile checks into nets and has his operator to control the phone nets. KCU is planning to be a female Van Winkle if traffic does not pick up. ZU is building a Tesla coil. BX checks into the nets. PRR checks into the nets. VFW has his band in the town game with a few schedules. EWK keeps a receiver on the Tacoma emergency net frequency of 29.3 Mc. "The cold weather is keeping JZB away. KSJ, B2, and CZY have their jr. operators. The Cascade Radio Club has its station on wheels and on the air, complete with auxiliary power. The Walls Walla Walla Valley Club has its club-house nearly complete. Traffic: W7CZ 699, IOQ 542, FLX 75, KUS 70, ZFR 58, FRU 30, BX 10, EWY 11, LV 15, APS 6, EOK 5, ETA 2, GWX 1.

PACIFIC DIVISION

NEVADA - SEC, Carroll W. Short, jr., WTBYZ 1, SEG, HJ, KCY, HJ, XTB, MBO, KV, TTY, and KAO. RM: PST, OFS: JEO. NWU has low-powered rig on 7 Mc. JUO worked 141 stations and 59 seconds on a new phone. KEV worked 800-ppm answering a report for a score of 139,000. FST reports NBN operating Mon. through Fri., at 7:15 P.M. on 3600 kc. UB is building "Dream Rig." MBQ works 10- and 16-meter phone. TFF is on 28-Mc. mobile. FFZP, KLR, and CK were in the SS, 6 Ny now is 7OXX. JU is working on a 3.5 Mc. mobile rig. JLV is on 28 Mc. ACCX has low power on 3.5 Mc. KLX is 3.5- and 28-Mc. mobile. ZT has 4004's with 900 watts on 3.5 Mc. Also 480 watts to d/s-receiving equipment. 813a, NCR, IVY, MWH, and G1H are on 28 Mc. Mobile in Las Vegas 3KBS/7 is new in N. Las Vegas. KUP, in the Air Force, operates MARS station in Washington State. LFJ has controlled-carrier modulated 3.5 Mc. Mobile in Los Angeles has new all-band antenna. KT8, LVJ, and MAV have 45K-134 on the air. TQZ has handy-talky on 28 Mc. JE has new housing for mobile gear — new Buick! Traffic: W7ZT 69, OXZ 8, JU 7, KLE 6, BYZ 2.

SANTA CLARA VALLEY — SEC, Roy I. Conin, W6LZC, ETA. VEN, IN, DTV, ECG, QIF, LXJ, XTO, and TPG. A prepared and unified emergency set-up is becoming a reality under the able guidance of UTW. All EC's in the section are actively engaged in construction of 2-meter portable and mobile equipment. Most of the gear has been bought by city and county funds set aside for Civilian Defense and will be made available to the public free of charge under the supervision of the EC. CER and LXJ are new appointees. CIS received an endorsement for ORS, ZDB, with the able assistance of his OM and QN. ZDB moved a 45-foot 600-pound telephone pole to his new QTH. BPTS active on 2K6. RMN and Early Bird Transcon Nets. NW is active on RN6. PAN, and TEN. HC is a representative to PAN and TEN and is active on RN6 and RN9. QLE on 2-meter portable equipment in a parade. Boy Scouts picked up messages and QSL'd them during the course of the parade; he also gave the local TVF demonstration of amateur emergency operations connected with JKC doing the operating. On 144 Mc., mobile in South San Francisco are ZXS, JIV, MMG, FYK, QIE, YVE, OXN, and CER. CER and JTJ of Special Ops, at Willow Creek, were guest speakers at PAARA's December meeting. IUV is looking for a slow-speed net and is very active on 7 Mc. The SCGAR elected the following officers for 1951: W5YI, pres.; UTW, vice-pres.; QBO, secy.; FON, treas. CFC, HC, and BPT were elected to the Board of Directors. Traffic: W5KFZ, HC 123, N7C3.

EAST BAY — SEC, Horace R. Green, W6PTI — Asst. SEC, Charles F. Henry, BEJ, SEC: OBY, ECA, AKS, BHS, NNS, JR, IP, IVY, QIE, LAMZ, JQW. The City of Berkeley has appointed ZC as communication coordinator for the Radiological Survey Corp., a part of Civil Defense. This group now has special attention and one phase-of-work. Those interested for Berkeley may get in touch with Mel Chromium, 301 Orinay Peak, Berkeley, telephone LA 4-8380. Between 8 and 10 P.M., you may call 244. Protests at the November meeting of the California Radio Council met at the home of the Oakland Radio Club in the American Red Cross Building, 9th and Fallon, on the 19th. Those at this meeting were CFR, UTW, WOW, CTH, ZL7, HC, and QHZ, representing their respective clubs. The officers of the NBARA are as follows: ZZT, pres.; WUX, secy.; and QPS, treas.; HUY, secy.; AFC, editor; HUY, associate editor; ZL7, printing. The SNO Transmitter Hunt was held on Nov. 19th. SECO was a great success. CBG, N5F, and QWX were the only amateurs that did not bring their QSL cards. The hunt was won by the team of K6AY and K6JO, who scored for 23.5 Mc. Here is the new Plymouth. SE reports the Civil Defense program is moving along smoothly. The Mission Trail Net, Inc., is an organization of amateur radio clubs desiring to hasten the sending of messages free of charge for the general public, especially in times of emergency or disaster. Interested amateurs are invited to join and check in with us regularly on 3854 kc. e.g., at 7 P.M. PST and/or 3854 kc. "phone at 7 P.M. PST. DTV makes BPL again this month. He reports he worked..." (Continued on page 78)
"You can't beat Sylvania Tubes for long life and great performance,"

says Philip J. Crist, W3NNX

Mr. Crist, one of Baltimore's most active Hams, is also widely known for his regular morning program on Station WFBR during which he salutes the Hams. Naturally you'd expect this expert to be a booster of Sylvania Radio Tubes . . . and he is. Says he:

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This report from Mr. Crist may also be regarded as good news by scores of Hams everywhere. The Sylvania line now consists of highest quality tubes for every rig . . . for every circuit, tuner, receiver, and transmitter. You'll find all these tubes listed, rated and fully described in the catalogs: "Sylvania Radio Tube Characteristics" and "Sylvania Transmitting Tubes."

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his 100th country and his station is complete with auxiliary power. YQI has made BPL twice in a row, FJQ twice in a row, DXV twice in a row, and his share of QSOs on each band. W3C was one of the first few QSOs on each band. W3F is calling DX and will be going to be going to the new final for each band to help the DXV. W3B bought himself a TV set to keep the W3F happy. DUB is moving back to Osaka, Japan says, "I am very happy to be here." RA is working days now and is getting a chance to work some SW PDX for a change. ELW claims his rig now is free of T32, and we should all have two jobs on our hands. Civil Defense communications and peaktime emergency communications. The first comes under OX and the second under OJZ. Let's plan today to sign up. Let's do our part today. Traffic: W5D7W 1005, JZ 730, XQN 84, RRH 89, YD1 6T1.

SAN FRANCISCO — SCM, R. F. Czeczowski, W6ATO — Phone: 7-5651, SEC: NL. Phone: 7-6437. We regret to say that for the first time in eight months NOH has been awarded a single club in this section, nor any responsible individual in those clubs, sent in news for this column as they usually do. It is impossible to edit this column without this information. This criticism includes the Central California Chapter of the National League, whose November minutes included no club news in these sections. May we point out that since the original meeting of the CCG of RC, NO news of its activities has been received. The organization was reported briefly in this July 1952 QST.

Five individuals, however, reported. They are the reliable members of the WTP, and the overall knowledgeable KQ6s DI and FAA. SWP reports that his traffic is going to the base because of swing-shifting work and the recent wave reverses. HAD has been moving and is eagerly awaiting his Class A ticket. JRG reports in on the Mission Trail and RN radio nets with a BC-458 on 7 Mc. and a BC-600 on 2.5 and 3.5 Mc. His occasionally reported in on NSN, OSN, and American Legion nets. Being in an apartment house, his antenna is disguised as a clothesline. Congratulations to Clark Cox, KODDI, who, in addition to his regular duties, is taking all the traffic he handles, somehow manages to work a good bit of DX. Clark recently sent in to ARRL this country's congratulations. KQ6AA is fast becoming a driver. Pete as chief operator, while Bank and AI are the assistant operators. Clesa is the director. This station is active on MARS frequencies as AI9F, Conditions, although poor during the month, permitted 73 phone patches. PGY now is able to be up and about for short periods after his long and serious illness. He operated in the SS Contest while in bed and ran up an excellent score. San Francisco: EC is BY7, phone BA 4L157. Marin County: EC is KNN, 24955 Woodside Drive, Mill Valley, Eureka Area: EC is SLX, 22625 8th St., Eureka. BYS has been rapidly increasing the total membership of the SF ARC, and is closely collaborating with the District Council. This is an important work and merits your participation. The San Francisco Radio Club held its fourth Friday at 641 Taraval St. The High Frequency and Amateur Mobile Society met the second Friday at the local Red Cross building, 161 Van Ness Ave. All are welcome. The Marin Radio Amateurs' Club met the second Friday in the Engineering Lecture Room, Marin College, Kentfield. The Humboldt Radio Amateur Club met the third Friday in the YMCA rooms, rear of Municipal Auditorium, entrance on "C" Street, Eureka. The Sonoma County Radio Amateurs' Club met the first Wednesday in the Banquet Room of the Grace Bros. Brewery on Second St., west of the Freeway in Petaluma. Rosea. Traffic nets: XA9 703, KG6DI 720, W6CG 30, SWP 14, HQN 8, ATO.

SACRAMENTO VALLEY — SCM, Ronald G. Martin, WQ2E — Area: Sacramento and vicinity. SEC: North Central Area, OCKV; Southern Area, 65555. SEC: KME, EC: Met. Sacramento, AUO: Walnut Grove, AY2; Dunsmuir, JDN; Mount Shasta City, EWO; Paradise (Chico Area); HBM; Roseville, GHP, RPM; PVI, OBS; AF, BTY, PAM: ZYV, OBS; FIV, GHE, OOf; ZYV, YNM, BTY, GDO. YV, OOS; JDN: NTS; EID Emergency (old), AUO NCM, NCM: Valley Emergency Net, BTY NCS, EID ANCS, BNC Valley Section (traffic); ZYV NCS: Mother Lode, UNT NCS, NorCal Area: The NorCal Area Section requested EW7C be appointed EC for Mount Shasta City. JDN aided wife of S.F.P.R.H., station agent in Chowchilla, California. Probationary by contrast, GRC held Nov. meeting at CKV's residence; HBM was guest speaker and discussed emergency work. GERC's usual Christmas Outing was held at WYR's. BNL News has Class A, TSR completed his Meinerig Sig, Shifter is building 5000-watt PA, GYA and HNL handle traffic nightly on 20-15 Mc. GYF has new 150) and summer. GSA moved to Redding, DFO at Oroville and AYU in Sierra Buttes are on 160. Sutters Area: MAR is holding meetings bimonthly this year. In spite of illness, NTS' paper news is out now. WQ6: WQ6 worked 36400th country — MNB and IAP's new QTH is 3571 Bogota Ct., Sacramento. PIV is preparing for cataract surgery at Good Samaritan Hospital. L. A. QST finally blossomed with ART-12, mobile ASI has 75 mobile ready for his monthly trip. It is reported (Continued on page 74)
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SAN JOAQUIN VALLEY — SCM: E. Howard Hale, WOFFM — QG: FYM, ECZ; GST: HZB, IZB, AEB, IZB, MOU, EBS: EXH, GRO, KBT: OBS: HU, GJS, GRO, OBS: GRO, IEM, OBE, KVB, UWT, OOW, FKL; GRO, AEBH, KFB; KFB. Communications for Tulare County and has done a fine organizational job there with GOS appointed GC and a hang-up of the gang throughout the W6 region. QKF is in the AEC program as Assistant EC. GRO's dad is recovering from a very serious operation. GRO is still traffic handling in the 600 kc. EJX1 puts out AEC. No emergency traffic Thursday at 1900 and 1945 on 1440 Mc. and at 1930 on 7155 kc. FKL expects to have 1-kw. rig for 7-Mc. e.w. finished by Friday, and he has just received new QSL card from NOG. As this goes into the mail we have an incomplete report of stations active in the Modesto Area during the last month. CQ/FM, EUR/M, GRO/M, and GRO/FM were active last month. KQX has new 32V-2. KCA is now a call in Visalia. IF/MT, CTU, and ONK have joined the Santa Maria Navy. JPS is proud of a new 5 kw rig on the air and doing OK. The MHSN X is in Fresno. K6DP is on 144 Mc. How come activity in the Taft Area is booming, according to NQF, INO, GRO, and HHB. The Taft Amateur Radio Club was formed Nov. 29th with about 20 members. SAR and FFM report from Hanford and Armona that activity is increasing in that area also. Traffic (Nov.): W6UJ 211, GRO 135, GUF 2, FTM 2. (Oct.) W6GRO 101, (Sept.) W6GRO 60.

ROANOKE DIVISION

NORTHERN CAROLINA — SCM: Herman P. Jolets, W4DCQ — PMI: DLX. SE: ZG. MFA is now 2FEH in New Jersey. LQB and LQG have moved to New Orleans but are going to school at Maris Hill and operating portable. EDA took time out to work in the last CQ Contest while getting his big rig on the air. As AEDB, Bob was station of the month in the 3rd Armory Area. LMB and EDA have schedule Mon., through Fri. at 9:00 p.m. on 3695 kc. The Kinston 150 Club station, UQX, has officially folded. Some of the 35-Mc. mobiles on the air are DLX, HUU, CUQ, HCC, NSQ, DSX, and CYY. GRO has missed quite a few meetings of the NCAC Net because of the children (and Walt, Hope long) on his new "Peek-A-Boo Box" (this name copyrighted by ANU). N28 is working the CAF frequencies in Culpeper, goods going there. Quite a few others were active. No traffic in Northern Carolina.

SOUTH CAROLINA — SCM: Wade H. Holland, W4AZT — The Charleston Radio Club has moved from the Naval Base to the Civil Defense Building downtown. CSH has left Charleston. AUL is in Sumter. DLX has 20 kw. mobile, and more. GRO is also on 28-Mc. mobile, along with NQF and GFT. MPR is now on 28 Mc. GCW and EAO are on 160 meters. HEY is on duty at Camp Gordon near Augusta. GA, FM, has new 28-Mc. beam and battery-operated rig. FCM is a new ham in Winnsboro, M4X is new to 35-Mc. phone. N2PB is a new ham in Greenville and on 7 Mc. For installing high-level negative peak limiters, HZS and AZT can work within 10 kw of each other on 35-Mc. phone with both running full CW, and only three kw on the 12 mc. port. EDB is a new Carolina "Phone Net Manager. HXZ, former manager, has moved to Hot Springs, Ark. Traffic: W4ANK 30, FMI 6, 30, 2BD 11.

VIRGINIA — SCM: H. Edgar Lindauer, W4FF — SIU — simultaneously with the SS the FVRC conducted an intra-club contest between W3 and W4 members. The W3 team won the W2 teams, NNN now is BBBY. The snowstorm in the Midwest and New England found the Virginia phone net and the emergency ERG and W6FV. The Two Withers emergency traffic Nov. 28, 64. FY, NAD, NV, and ONW took turns at the SOS post with the following stations QNI: W4WA, W4PQ, W4QW, W4JO, W4DJ, W4QX, W4TX, W4YO, W4SD, W4VQ, W4JH, W4M, W4UD, W4QX, and W4BYV. Those from other states were CQ/FM, CQ/E, EUR, and EUR/FM. Traffic from the Richmond Amateur Radio Club is YC, prn.; M, KJ, TD, LWA, NAD, AN, and CQ/FM. New hams in Richmond are RBB and SCM. RBB has just moved to a new site. Recovered from a broken leg. HXZ has been issued a new "PEZ" and QST. QST is singing the call 2F1J while attending Cornell U. F4 and CYW have in

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Staked teletype systems on 144 Mc. Good reports from NAD, our SBC, indicate favorable progress with local community and county officials who are including ham emergency organizations in Civil Defense plans. The mayor of Falmouth, Va., was host to the Mayor of Falmouth, Cornwalt, England, His Honor Albert Victor Baker, with VFII holding a round-table welcome at ONW where messages from 15 mayors and town supervisors were conveyed to His Honor. GVO is sporting two new portable rigs in his airplane. AAM assigned as EC of Fairfax County. QDX was activated as 7MOU on WSN and WART, and resumes his activity as QDS and ODS on VN, VPW, 4th, 5th, 6th, and CAN. LAF moved to Annapolis with a new 237-3, 287-23, 287-25, 287-30, 297-5, ex- 10IRN, is new to Alexandria, MWE is new RM. Congratulations to Headliners for their fine selection in KTV, operator at WIAQ. Traffic: WFLP 47B, JFY 13B, MWH 99N, NAD 71, MUP 84, NUO 60, LK 62, PWX 46, CFV 42, NSW 42, KOC 8A, JXQ 29, KRE 24, BCI 17, CVO 15, KYB 14, IYI 8, GR 5, KMS 4, PAS 3.

WEST VIRGINIA — SCM, Donald B. Morris, W8JCM — SCM reports two new amateurs in area: YQG and YCZ. DWA is operating portable from there, WSL had an enjoyable visit from 49U and his XYL. ELZ keeps swabbling. 4U9 in Martinsville, Ga., QSO from Ft. Monroe, where he is employed. ALR visited Charles-town amateurs, O3F and BWH and worked with operators with operation of their rigs, VCA has new 2916 and checks the Frequency Measuring Tests interesting and devotes time to improving his equipment. FMU has excellent equipment, was approved in Lineville, Fort, and OJW was active in Gallia County. Traffic: WSAU 481, QJG 46, MGR 27, DFO 24, BWE 9, J3L 3, DYP 5, SKD 4, YMN 3.

ROCKY MOUNTAIN DIVISION
COLORADO — SCM, M. W. Mitchell, W1BQG — SEC: KHQ, RMs: LZY and ZIO. It is with deep regret that we report the death of VUG, SCM of Colorado during World War II days and affectionately known as "Hick" to his many friends. Hick was an ardent 28-Mc. hams and was known far and wide for his sense of humor. ZIO still makes BPL every month. JO reports the MARS (AF) net in Colorado meets Thursdays at 2100 on 3497.5 kHz. A total of 180 members was reported. VCA is operating from The Simmons General Hospital through the Sky-High Net and IC, 8KG, PNK, and OTR on Thanksgiving. HJX is trying mobile and has VPO on 3850, 14, 27, and 28 Mc. GQV has closed space beam stacked 10 over 20, three-element, and is ready to go 14 and 28 Mc. a bad time, OQC is working on a clamp-on transformer and is trying great equity in it. It doesn’t work. YL operator WQG reports the Coffee Club members are very helpful to a beginner and sends a card to prove it. Those members are O3F, DDM, KAD, and AML. The Colorado Emergency Net is speeding up its operations and is becoming quite an efficient net. A new 28-Mc. net has been organized under the name of the Sky-High Net, WAL is Net Control. Our director appears to lead a talk at the Denver Radio Club based on the editorial in December QST. Please send in your certificates for renewal or endorsement if the date is near or near to expiration. Traffic: W1BQG 1188, IC 119, HXZ 35, KHQ 30, LZY 15, GQY 11, OGC 11, OWP 6.

WYOMING — Acting SCM, A. D. Gaddis, W7HNI — HDS is at Mayo Clinic. GOU is moving and re-building antenna. FLO is keeping the boys in line on the Pony Express Net. GSO is moving transmitter to shop. JDE is with the Navy in Guam. QIZ is keeping Laramie on the map, NOU is mixing coal and burning up final tubes, HLA rebuilds 2B7, stage and antennas, MWS is keeping Cheyenne warm, GZ is putting some traffic, AIC is on both Washington nets with c.w. ATJ has new 160-meter rig. NVX is on 3.5-Mc. c.w. with a good signal, AMU, IXZ, and AXG are on the WYO Net, c.w. nets. OWZ and OWP 6 on the line. Traffic: (Nov.) WTGZ 12, OWZ 8, GZG 2, HILA 2, HNT 2, (Oct.) W7WZ 28, HDS 22.

SOUTHEASTERN DIVISION
ALABAMA — Acting SCM, Perry Sexton, W4HFL — A INU, who is leaving for military service, was guest of honor at an arm service given by the Mobile Club. HLA has 140 counties confirmed on 14-Mc., and the Athens-AL FAB-1 is ready for emergency. Those of us who have been in doubt as to what to do about re-building, going mobile, building an emergency rig, what kind of rig, etc., should, read "It seems to us" in Dec. QST. 2MV had 35-w.p.m. QP certificate. PIS now is Class A. GJW has new 28V12 and is making a long-term study of 3.5 Mc. during ionospheric storms. GYD and LEN took part in recent ES Content. AIL is new member of AEC. OKJ is Blount County EC. LEN is (Continued on page 72)

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(Continued on page 72)
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These units are complete with TUBES and crystals, some in black cradle finish, others in plain aluminum. Some may have slight dents, but ALL ARE UNUSED and in excellent, like-new condition. NOTE: the xmrts make topnotch VFO’s, CW and Phone xmrts. Quantities LIMITED.

Order No. Fig. Type Description Price
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R-653 B BC-451A Control Box .49
R-556 C BC-453 190-550 kc-Q’er 12.95
R-577 D BC-455 Modula or w/o dyn’r 1.95
R-585 E BC-457 Xmr, 4.5-5.3 mc 7.95
R-565 E BC-458 Xmr, 5.3-7 mc 7.95
R-558 E BC-459* Xmr, 7.9-11 mc (40M) 12.50
R-657 E BC-696A Xmr, 3-4 mc (80M) 12.50
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Delco Dual Blower $14.85

Delco Dual Blower is a must, makes the SCR-522 most useful piece of gear in the fast-disappearing surplus market. Covers 100-156 mc range thus ideally suited for navigation, airport control, railroads, police, rural phone, taxi communications. Also makes a top-rated, r.f.-controlled 2-meter LENT condition, and our price VHF rig, 10 watt output. EXCEL in the lowest in the U.S.A.

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SCR-522 DYNAMOTOR (PE-94)
Order No. R-0196A Only $2.50

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GIANT 1951 CATALOG

Just issued! 172 pages BIG, one of the few all-new mail order catalogs to be released this year! A gold mine of product information and listings for hams, labs, industry. 3 index pages! Lowest prices! Write TODAY for your free copy!
and JP are able to transmit on 144-Mc. DJ is building 144-Mc, crystal-controlled, converter. AK is OBR, OG, and AEC member. KD received Ramey certificates, VX, PK, and KD got new AEC membership. WO and NC have new tower for 28-Mc. colms. Coelho San Jose students have requested KF4AA as the call for their club station. KO is building 50-Mc phone, and H3X4 is building a bandswitching, mobile, CM22L is a new ham in Havana. Trans.: KF4DJ, JT 5, AK 4, KD 1.

**CANAL OUTLOOK** — SEC, Kiemel and Kimmel, K2ZAW — AG, CG, FC, WG, and WJ met with the newly-appointed Director of Civilian Defense for the Canal Zone, in a preliminary discussion of amateur radio communications, includingIGIN Mobile operation. Operations on all authorized bands are now permitted for K2ZAW — SEC, but AM is now receiving permission for KG0Z. KG0Z is a new amateur, BC, and adds a 12-Mc. ham to the AMU's farm to squint c.w. in the right places. WA has his Class A ticket. WJ had added his friend to the radio, WJ plans to return to the air later in the evening, probably p.p. 958z. WJ also has WJSH, first civilian MARS station here. A number of K2ZAW received Public Service certificates for Florida hurricane participation. KG0Z moved to a higher spot on Ancora Hill, Captain "Greg" of K2ZAW, Army MARS officer, will brief the CZAALR gang on that subject soon. Sound movie radio transmissions from KM2Z at a big attendance at CZAALR meetings. Trans.: KZSLR 4.

**SOUTHWESTERN DIVISION**

**LOS ANGELES** — SEC, Virgil A. Gentry, jr., WSVM — SEC, SCN, PAM: MVK, RM, CE, CMN, DDE, FYW, JQB, and LDR. William F. Muirhill, SCN, was appointed KG0X on Nov. 30th. WYF is W2ATL. W2MC, 14500 Ridgeway Dr., Van Nuys, Calif., sells RSR, who resigned Nov. 10th. KE1K was appointed W2BE for the City of Los Angeles on Jan. 1st. KE1K's jurisdiction includes all the AM bands in the W2AM sets of CW, DQO, MVE, ZV7, TFC, and WQO. Your SCN regrets to announce his resignation, to be effective not later than Jan. 14th, 1956. I am sure you have heard of the new business transfer to the Northwestern Texas section. I have enjoyed serving the Los Angeles section for any success that I have in the capacity of SCN. It is my last Station Activity report. 73, and I hope to contact all of you from the 75th Land. FYW has a new three-element beam on 16 Mc. CU2 and QGE have had a successful summer, and were presented by the Long Beach Club. JFO joined the Long Beach and mobile net on 20 Mc. GMK built a new three-element beam with the VFO control. SE and NSX have gone mobile, sorry to hear that KO has been in the hospital. VMA found that a lot of TVI can be caused by the first filter on the frequency. BES made 185,000 points in the fall CD Party. RQ moved two doors west of VYD, KG6ET, ex-W6EHT, has returned to this section from Guam. He has recovered from the shock of seeing the deluge of TV antennas, DL and PFO are employing controlled-carrier screen-grid modulation with a W2QG controlling 4575a and 402AA, CUF, BJU, UQO, and UYK worked EA2A. It's a grim situation when QGR watches TV more than he operates. The fact that QGR can call on any as a YL has resulted in doing TVI on the air and (it's) interest in mobile work. HY8 finally decided to use a prop- nish motor to rotate his beam, IDM has had transmitter trouble. JMAC has a new 200-Watt rig with a mobile rig and BXP has a new oscilloscope. ANM moved to Chatworth. AFR continues to be one of the most effective OIBs in this section. FYW says that the WZV traffic, MSG went into the Navy and left his rig with WZV. CMN is back with the SCN, TFO was appointed SEC for the San Fernando Valley. It replaces W6FF, who is SEC. All radio amateurs are urged to join the AEC now regardless of your amateur or ARRL status. This must be done to provide the power required to retain our bands in view of the growing international situation and shortage of radio frequency spectrum. Our amateur bands are being watched with envious eyes by other radio amateurs and we are needed for you to provide the activity required for amateur radio to remain a service in the "interest, convenience, or necessity" of the public. The following are the present Emergency Coordinators so that you may be free to use the amateur bands in any manner that you wish consistent with the regulations: COZ, W2CO, WZT, DDE2, DDE3, DDE4, EUR, HKD, KE1, KSS, MXV, QN8, RIT, RNN, TF8, TSC, W2AM, W2ATL, Y2D, YV7, ZV7, K2ZAW, Trailer (Nov. 15), W6CE 1375, GYH 448, DLA 1360, JQB 1365, KSS, DDE 132, HRG 9, HZ7 7, FYW 37, MU 28, BES 14, AM 8, AF 7, AN 7, HY5C, COZ 2. (Oct.) WQ4Q 822, GW5 E7.

**ARIZONA** — SEC, Jim Kennedy, WTMID — As many of the gang are having trouble getting land use or on both ends of the 80-meter band, the o.w. net frequency is being changed from 3515 to 3890 kc. Because of the small attendance, the net won't be held until further notice at 7:15 p.m. Tuesdays and Thursdays, right after the 3805-ke, emergency 'phone net call. This will enable the 'phone boys to take breaks, but their calls aren't strictly a traffic net but is a spot where the o.w. gang can meet and get acquainted, so drop in some night. All

(Continued on page 68)
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73,
Bob Henry
WØARA

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Utility power supply, 350 volts dc @ 50 Ma, 6.3 volts @ 2 Amp, black crackle chassis 6¾" x 5" x 2 ½". Has choke and 2-section filter, AC switch and line cord, a wonderful buy, less No. 80 rectifier, only……. $2.25

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73, Julie Burnett, W8WHE

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speeds are welcome. NDIJ, in Wickenburg, checks into the San Diego Ham Reunia and handles the use of Arizona traffic on 3.6 Mc. PUM and OLB were heard going to town in the WAS Contest. LK7W now is married. Congratulations, Bruce. The Arizona Ham Reunia had a nice get-together and invited a "unique "koolkawat" rig was exhibited by AMP.

New calls on 3.85-Mc. phone recently are MAA, NAP, and RBN, the latter two with new QSOs. Both QRP is also back on after rebuilding his final. Traffic: W7OFI Q

SAN DIEGO — SCM, Mrs. Ellen White, W6YUM — Asst. SCM, John B. Whitaker, VKQ — Chas. W. Martin, SVQ — Orange County, Shelley Trotter, 6HAM, ECG — San Diego County, V8Q — Orange County, DBY, RM: ELQ. The AEC Headquarters, is in the House of Chasing Bats and has been open for club meetings since December. DBY reports plans are being made to install emergency equipment on 3.56, 7, and 28 Mc. at Santa Ana Red Cross Headquarters.

The SD YLRL members are promoting new club badges of original design, and the San Diego Club plans to have its new buttons, an appeal to the Civil Aeronautics, almost issued. In the Big AEC District, a new amateur radio club was formed in Fullerton, the Fullerton Radio Club. Newly-active on 80 is QYY, ECP, and FMZ. What some people didn’t do for a QSL card: ELQ reports sending 065BW a pair of lightning arrestors for Christmas! The San Diego gang welcomes the familiar and friendly voices of Elmer Sando, from behind the corner of a local ham supply house, IZQ is now CBS appointed. FCT, active on 80, also finds time to howl in the Industrial League. Y radio caught eight new figures of 80, NI8, and 63 contacts with all of 20 watts on 7 Mc. The XDIA of RVF and DIII are studying for their tickets. ER8 is now a QKX with 3500 watts in Bradford, in a schedule for the summer. Help the old OM, EUW. V7G should be settled shortly in new QTH with soundproofed "bammkazam." Traffic: W6EIQ 294, BAM 107, IZQ 39, FCT 19, FMZ 5.

WEST GULF DIVISION

NORTHERN TEXAS — SCM, William A. Green W6KLE, CSC, Jocq, SEC, AAO, RM; GZU, PAM, EG.C, NTEN, with JGQ the AEC Secretary. NCS, still leads in Trophy competition. NIC is the Alternating current power supply for the station. The AEC Headquarters, is in the House of Chasing Bats and has been open for club meetings since December. DBY reports plans are being made to install emergency equipment on 3.56, 7, and 28 Mc. at Santa Ana Red Cross Headquarters.

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OKLAHOMA — SCM, Frank E. Fisher, W5AIHT/AST — SEC: AGM, RM; FOQ, PAM; ATJ. News is scarce this month. A lot is going on but everyone is too busy to report. I imagine, HXU has his old call back and expect we will hear from him before long. IGO and OM Claude expected to take HXU out for Thanksgiving dinner but found Harold had prepared a turkey and "filled" it. A feature of the Thanksgiving celebration should place Harold on the eligible list of some "gal." The ESE continues to care for Camp Folk traffic on OLE, GQV and KQN on OLZ, while KVQ and KQN on OLZ does a tremendous traffic representing. MQI broke the bottleneck on traffic at Oklahoma City, by joining OLI and is doing a nice job, as is LCN at El Reno, who works both nets and helps with Oklahoma City traffic. Attendance on OPEN has been excellent throughout the month. It is nice to see how smoothly the net operates. Now that of NCS, Fred TA is heard from now vía's 6061 and expects to have the big rig ready shortly. We sure missed you, Doug. Two-meter activity is increasing but we have no reports on how or how. EQH has been off the air for receiver overhaul. K7ZVYQ is a new instructor at the CAA Air Operations School and Traffic: W5MRJ 122, ATJ 104, FOQ 69, HOM 64, MEZ 29, MQI 22, NQX 17, ADB 4.

NEW MEXICO — SCM, Lawrence R. Walsh, WSSMA — Acting SCM and PAM, Dick Matthews, 5BW, SEC, PLK, RM; NKG, PAM, NKG, PAM, NKG. The SCM expects to be away for a few months but has a new equipment for the SCM, PLK has a receiver on 3886 kc. at all times. NKG

(Continued on page 64)
### DRIVER TRANSFORMERS

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Driver</th>
<th>Output</th>
<th>Turn Ratio, Pri. to ½ Sec.</th>
<th>Class</th>
<th>Pri. M.A.</th>
<th>Dimensions</th>
<th>Price</th>
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<td>6C5, 114A, 30, 49</td>
<td>Single 146, 19, Push-Pull 30, 49</td>
<td>2:1</td>
<td>B</td>
<td>10</td>
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<td>A-2291</td>
<td>6F6, 2A6, 6L6</td>
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<td>AB</td>
<td>5</td>
<td>3° 1° 3°</td>
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<tr>
<td>A-2922</td>
<td>6A6, 6C6, 6N7, 46</td>
<td>Single 6A6, 6N7 Push-Pull 46</td>
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<td>AB</td>
<td>30</td>
<td>3° 3° 3°</td>
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<tr>
<td>A-3120</td>
<td>500 ohm line</td>
<td>Class B Grids</td>
<td>15 Watt Capacity</td>
<td>B</td>
<td>25</td>
<td>3° 3° 3°</td>
<td>6.76</td>
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<tr>
<td>A-3121</td>
<td>500 ohm line</td>
<td>Class B Grids</td>
<td>30 Watt Capacity</td>
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<td>30</td>
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<tr>
<td>A-3122</td>
<td>PF66A6, 59.</td>
<td>PF66C5, 6N7 6J5</td>
<td>5:1*</td>
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<td>15</td>
<td>3° 3° 3°</td>
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<tr>
<td>A-3124</td>
<td>6F6, 46, 59.</td>
<td>2A5, 42</td>
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<td>A-3126</td>
<td>PF22A3, 6L6, 45.</td>
<td>50V, 6F6</td>
<td>2:1</td>
<td>B</td>
<td>30</td>
<td>3° 3° 3°</td>
<td>3.67</td>
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### MODULATION TRANSFORMERS

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<tr>
<th>Type No.</th>
<th>Output Tubes</th>
<th>Ohms Impedance</th>
<th>Max. M.A. Watts</th>
<th>Dimensions</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-3008</td>
<td>PF6A95, 6V6, 6F6, Single 6A6, 6N7, 53</td>
<td>10000 c.t.</td>
<td>10</td>
<td>21° 24° 21°</td>
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<td>A-3109</td>
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<td>5000-8000 c.t.</td>
<td>20</td>
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<td>A-3110</td>
<td>PF66L6, 807, RK41, HY56, HY61, HK24</td>
<td>4000-5000 c.t.</td>
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<td>A-3113</td>
<td>PF-580, 500, T2-40, T-55, HK-54, HK-31, HY-40, 811, 807, 812</td>
<td>4000-6000 c.t.</td>
<td>250</td>
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### UNIVERSAL MODULATION TRANSFORMERS

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<th>Pri. M.A. Per Side</th>
<th>Sec. Impedance</th>
<th>Max. Sec. M.A.†</th>
<th>Watts</th>
<th>Dimensions</th>
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<td>2000-20000</td>
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<td>2000-2000</td>
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<td>2000-2000</td>
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<td>3° 3° 3°</td>
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<td>A-4007</td>
<td>250-20000</td>
<td>250</td>
<td>250-20000</td>
<td>250</td>
<td>17° 13° 5°</td>
<td>33.52</td>
<td></td>
</tr>
</tbody>
</table>

### ALUMINUM CHASSIS

Johnson Aluminum Chassis uses reinforced gussets and multiple spot welds in corners. This close fitting butt joints ensures a chassis suitable for any application. All chassis are made of high quality 14 to 12 gauge aluminum with straight sharp bends.

### STEP-DOWN AUTOTRANSFORMERS

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Output</th>
<th>Dimensions</th>
<th>Price</th>
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<tbody>
<tr>
<td>P-3161</td>
<td>80</td>
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<td>P-3162</td>
<td>150</td>
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<td>4° 4°</td>
<td>4°</td>
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<tr>
<td>P-3164</td>
<td>500</td>
<td>4° 4°</td>
<td>4°</td>
</tr>
<tr>
<td>P-4065</td>
<td>1000</td>
<td>7° 4°</td>
<td>5°</td>
</tr>
</tbody>
</table>
is taking over NJR's job as RM until Larry recuperates from his recent illness. Your SCM visited PLK, FAG, and BIV on Dec. 1st. The Sandia Radio Club elected officers as follows: IL, pres.; WBS, vice-pres.; FBP, secy.; QPH, treas., MSG, monitor. FAG made 243 contacts in 78 minutes for a score of 56,840 in the 'phone section of the Sweepstakes. AX1H, his new XYL, visited your SCM on route to Utah. PFF visited Jauras, Racine, recently, MSQ is taking a course in microwave electronics at UI, of N.M. KQJ is rebuilding his rig. The Menominee Valley Radio Club heard a talk by SAB on "The Noise Figure in a Cascade Amplifier" at its November meeting. BIV is trying to hold schedules on 14-Mc. "home with 2UVF, whose son is a physics professor at State College. NXP took part in the ODI Party and SS with low power. KBSWE, from White Sands, is on 35-Mc. "phone. KADJ is holding a schedule with EXN every evening at 7 P.M. SE is working with Indian Service. MIMX is operating with an NC-24D0 and Lyneco on all bands. QYS is putting up a new 10-20 array. QVY is active on 7 Mc. with a pair of 807s. At the Sandia Radio Club meeting of Nov. 27th, Director-elect A. David Middleton spoke on AFAR activities in the 1920s. FVO was appointed head of the v.h.f. activity. The 73-meter "phone net mete at 1800 Tuesday and Thursday evenings, in addition to Sunday mornings. Traffic: (Nov.) WZSU 30, NFX 20, NEXG 19, PLK 16, SMA 7. (Oct.) WZGU 48, ASZU 36, W9JQK 9.

CANADA

MARITIME DIVISION

MARIITIME—SCM. A. M. Crowell, VE1DQ—KOC. MFQ. Acting RM: EY. The Maritime Traffic Net (M.T.N.) met Monday, Wed., and Fri. at 1900 EST on 7375 kc. EY is Net Control. BC has been doing a bit of 3.8-Mc. mobile work with IT and JK. The HRC ended a very successful season with a social evening. E3O and LK are back on 28 Mc. ET again won the DX Contest in the Maritime "phone section. LW is on 3.5 Mc. An excellent report arrived from VO via BW. Ron Peddle, Jr. The following calls are all prefixed by VO: 1A, our first call. 1A6C, having lost his fine 14-Mc. beam, still does well with doubler. E2-JL now QSTs. W1DI is quite active. 14- and 3.8-Mc. mobile, and won the trophy for Field Day work. BQ, NARA secretary, is on 28, 14, and 3.5 Mc. IP has 500 watts, both "phone and CW. 18 is on regularly with nine quality "phone. IT won the trophy for VO-Land in the BERU Contest and is active in AFARS Net. 1U is on 7 and 3.5 Mc. LX on 3.5 Mc. is TAP. New 3.5-Mc. rig is active on AFARS Net. IAP has a nice 14-Mc. beam. IAQ is on 28-, 14-, and 3.5-Mc. phone. IAR is on 3.5 Mc. IAK is DX man on 14- and 3.5-Mc. LX is cut for CW. New VFO. LAN has new TBS-50 and HRO. HHD is active on 3.5 Mc. Traffic: VE1FQ 36, MK 24, EY 16, DB 4.

ONTARIO DIVISION

ONTARIO—SCM. G. Eric Farquhar, VE3A—With sincere regret the passing of LY on Nov. 16th is recorded. Bert began hamming in '30 and made many loyal friends. A shot-in for two years be kept in touch with the gang. Member of the Ontario 'Phone Club, body soxers and shot-in, he will be greatly missed. AZ1I still keeps nightly schedules with his brother in W6M. BAH is Marathon, 180 miles east of Ft. Williams, BLT spent Christmas holidays from college clearing traffic. PH is a regular in the Northern Net on 3442 kc. HUR sends a nice report and heads the traffic list for November. BFR is Assistant BC in Camp Borden, WY enjoyed a vacation in Florida and now is back in harness. W3K每次 conditions on 7 Mc. are the worst ever in 28 years of hamming. GH has new frequency standard. DBJ sports new rig. BER operates new shack. November, the month of club elections, gives the following: Ottawa Amateur Radio Club: KH, pres.; BCL, vice-pres.; AP, secy.; IAM, treas. Northam Amateur Radio Club: Toronto: AEJ, pres.; AAW, vice-pres.; BBL, secy.; SVS, treas. Hamilton Amateur Radio Club: BPE, pres.; BVR, vice-pres.; BHP, secy.; V6, treasurer. W8GOA held an excellent banquet and dance. Ham radio was called into emergency at Vanwagener Beach when winds of 150 mph threatened Lake Ontario for 18 hours. They saved theunderlying houses. The Mayor of Burlington holds high praise for the ARRL Emergency Corps and comments on the efficient and quiet manner in which they stepped in to provide facilities. ARB, AKL, BHK, BNQ, BPE, BTE, D0H, DGH, IA, IB, and K6 took part. Thanks to all from Chief of Police Smith and Mayor Craig. Burlington, W9EAD, Alex Reid, CCM. Traffic: VE3BHR 163, NJ 104, ATR 89, E288, IA 78; HR 53; GI 38; EYW 32, WY 31, ASZ 28, KM 28, KK 24, E2 24; PH 7.

QUEBEC DIVISION

QUEBEC—SCM. Gordon A. Lynn, VE2GL—QV is back on 28 Mc. with 100 watts to 823H final in new rig. CK also has new rig with a pair of AR-88 receiver with semi-vertical folded dipole. MG has taken down the 28-Mc. beam for the winter and is using

CONTINUED ON PAGE 89
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folded dipole. KG put up new four-element 144-Ma. beam at the old QTH. DI now has more time for DX and rag-chewing. BI is back on the air from St. Lambert using VFX-80 on 20. Wrong QTH on R1155 receipt and counter together with folded dipole. AKJ maintains schedules and beam with a fair amount of traffic. QN reports ten new members registered on the occasion of the ARRL Emergency Test, Oct. 14-15. LO reports that AGG, in Drummondville, is ironing out bugs from his new phone rig. EC reports that AHRK is working on his developing transformer for 38.5-Mc. TR addressed the St. Maurice Valley Club at its last dinner. APE is a newcomer in the St. Maurice Valley area. BI recently visited many of the stations in the area. Phyliss, at CA, continues to schedule YESSF, and other YESSF call in with traffic. OK, ex-VE1JK, has 10 watts on 28.5-Mc. in Longueil. HV continues in his battle at 145 countries. AOH now has tower up 70 feet. KX worked BFVX on 14-Mc. o.w. and was appalled when he looked at his key and found a scope. XX lost his 1600-u. long wire antenna to thieves, and now is scratching his head over what new skyline on 31.5 Mc. Traffic: VESCA 47, LO 29, AKJ 17, QN 17, GL 14, EG 7.

VANALTA DIVISION

ALBERTA — SCM, Sydney T. Jones, VEMBJ — Heartiest congratulations to FV and VJ on the arrival of a Jr. operator. LQ said band conditions are poor for frequency-measuring. The Calgary ARC has taken over the frequency-measuring job. DI did a commendable job during the recent flood when the Bow River went on the rampage. OD recently acted as Net Control for Saskatchewan Net because of poor conditions. EO reports a nice score in the SS Contest. SY, QS, and XY are to be congratulated for nice work on CW. In connection with the search for a lost child in the Jasper area, KZ is a new call in Vegreville and seems to be getting out well with 70 watts. LW, also of Vegreville, has bought a 3800-u. oscillator to work CW. KQ is attending the University in B.C. and claims he will be back on 28 Mc. as soon as he has finished his exams. HS has issued his Class A Exam and is building a VFO. HI recently visited Edmonton and obtained all the dope for his EC appointment. Traffic: VEH 10, MJ 13, EQ 9, MB 3.

BRITISH COLUMBIA — SCM, Ernest Savage, VE7FB — Officers for 1961 of the British Columbia Amateur Radio Asso. are K3A, VAW; DQ, vice-pres.; and M, Treas. PA is retiring president, AC, who gave us our 9th ARRL Convention and many picnics, and to his staff all we wish to extend our thanks. The University of B.C. Amateur Radio Association has its rig working right down to 28 Mc. with a mean thousand yards on an 807 buffer. The Nanaimo ARC has started an Island Net and is looking for new members on the Island. The frequency is 3025 kc. and the time is 1800 PST, Mondays, Tuesdays, and Saturdays. AAA and FY are confined to the hospital. AEC is leaving us for W6L, UT has joined the ARRL ranks and is active on Trunk Line. "J" US, who did such a good job in organizing the South West B.C. EC, has taken over the SW B.C. Net and is looking for new members on the Island. The frequency is 3815 kc. and the time is 1800 PST, FA is a new call in the SS Contest. 50 P now is 7ST. Welcome to Vancouver, Jimmie Traffic: VE7UT 106, YC 101, AQ 24, 29, TA 10, XA 8, AGK 5, BQ 2.

YUKON — SCM, W. R. Williamson, VESAK — CF was heard on 38.5 Mc. with 6 watts. CA is calling around with VFO on c.w. KJ is a new call around Whitehorse. CU is on at Watson Lake. HV is QRT but will be on as soon as VE4. Sorry you're leaving, Harry, DM, at Bear Creek, is on c.w. AO should be on more as OM Winter tops up his car. CI is set up in new quarters near Mayo. FN surely is working those 813s. BT is heard on 7 Mc. Let's have some more. Frank. The joint amateur club in Whitehorse, with servicemen and civilians, is coming along fine. Traffic: VESVY 8, BN 2.

PRAIRIE DIVISION

MANITOBA — SCM, A. W. Morley, VE4AM — PAM: FA, GQ gave ham radio a nice boost when interviewed on CKY's Talk Time. A new program, FN, is a new call here. LG is new at Flin Flon and has applied for AMC membership. He sends along a nice report of doings around Flin Flon. EQ, working 144 Mc. on 7 Mc., is new at Flin Flon and has applied for AMC membership. He sends along a nice report of doings around Flin Flon. EQ is rebuffing for 144 Mc. On 7 Mc., EQ has a new and 10-meter beam. JP is on 3 Mc., occasionally with 3 Mc.; 7T, BK, and FS are on new 7 Mc. Thanks, Larry. HG worked on 7 Mc. on 7 Mc. and 10 Mc. 807s going on 7 Mc. RO worked ZV1X and CQ5DV on 3.8-Mc. on phone, and before midnight too! FU has new AR-S8 receiver plans to send package to VOS on 7 Mc. on phone. NF is on 3.8 Mc., phone and 3.5 Mc. o.w. with a 30-Mc. and 3.5-Mc. o.w. with an 813 and 10-meter beam. XP has new VFO. FA is working plate transformer for 813s. We need more receivers for 813s. We need more receivers for 813s. We need more receivers for 813s.
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(Continued from page 18)
to the direction of travel of the car. In practice, however, this has been found to be so sharp and the remainder of the pattern so broad that not too much directional effect is noticed. An interesting sidelight is that the windshield post itself carries so much r.f. that an r.f. indicator consisting of a microammeter in series with a 1N34 crystal has been mounted on the dashboard and connected across about 10 inches of this post to give an indication at the driver’s seat. This indicator is mounted below the dash just to the left of the steering post.

After the installation had been completed, a test run was made from Mobile to Tuscaloosa, Alabama, a distance of slightly over 200 miles. From departure at 9 A.M., until arrival about 2 P.M., continuous communication was maintained with the home station. Many other amateurs joined in the test and excellent reception was reported by all of them, some as far away as Arkansas and Georgia. The results have exceeded our expectations and we believe other amateurs may get some ideas from the design to help carry on their own experimenting. It is reasonable to suppose, however, that a metal-top car might have some influence on the operation of the system.

Furlough in Monaco
(Continued from page 81)
via the DL4 QSL Bureau, APO 757, New York City, and we’ll see that you receive one direct in return.

When is 3A2AB going to be heard again? Early in 1951, we hope. In the meantime, if anyone knows anybody in the Andorra government who can get us permission to operate from there, we’re all for it!

We would like to express publicly our heartfelt thanks to Mons. Passeron of the Ministere d’Etat, Mons. Fromaget of Radio Monte Carlo, and Mons. Crettaz, our host, for making our expedition a successful one.

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- We can now pay the highest possible prices for good clean microwave test gear. We can also use certain plumbing, thermistors and bolometer elements, as well as specialized cavities and VHF gear.

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After the big blow of Nov. 26th had subsided and the rain had slackened, W3FQZ got out his ladder and went up on the roof to survey the damage. He was just getting things cleared up a bit when the wind picked up and the rain started again. George decided it was time to quit — but the wind had blown the ladder down. It took quite a bit of stomping and shouting to attract the attention of Mrs. W3FQZ, who went next door for help. George had a few more bad moments when he realized that the rescuing neighbor was one with whom there had been a bit of unpleasantness in the matter of TVI!
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AC VOLS: 0-15, 150, 750, 3000 (1000 ohms per volt)
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Leatherette Case: $5.00

RANGES: Model 230

AC VOLS: 0-10, 250, 1000 (400 ohms per volt)
DC VOLS: 0-10, 50, 250, 1000 (1000 ohms per volt)
DC MILLIAMPERES: 0-10, 50, 250
OHMS: 0-1000, 0-100,000
ACCURACY: DC 3%—AC 5%
SIZE: 3½" x 5½" x 2½"
WEIGHT: 1½ lbs.
SHIPPING WEIGHT: 3 lbs.
AMATEUR'S NET PRICE: $23.40
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3-30 famous Gom-set converter complete to connect to the P-69-13 or 18-ARS receiver... $39.95

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HAPPENINGS

(Continued from page 83)

Summing up, what Hq. wants to know about is:
80: Consistent cases of harmful interference from non-amateur stations.
40: Any non-amateur operation except broadcasting outside the Americas above 7200 kc., and other than U.S.S.R. stations.
20: Any non-amateur operation other than from U.S.S.R.
10: Any non-amateur operation.

At the same time, remember two things: These matters move slowly, often involving diplomatic red tape, so don’t hope for immediate action. Also, because of the world situation, it may not be possible to get relief at all in some instances (e.g., U.S.S.R.). But let’s keep a watchful eye on our bands and insofar as possible ensure that no interlopers make illegal use of them.

U.S.N.R.

(Continued from page 89)

and Naval Reserve activities in establishing an emergency reporting system for weather and flood data. Types of messages to be handled fall into two groups:
1) reports of river stages, weather and rainfall;
2) reports of flood protection works.

Coverage of forty-one emergency communication points throughout Indiana, Illinois, Kentucky and Ohio is involved. An initial test was held on November 16, 1950. The purpose of this test was to collect weather and river data from amateur radio stations at outlying points and to forward them to the District Engineer’s Office in Louisville.

The following were designated as collection points for traffic:
Naval Reserve Training Centers at Louisville (KANRY), Terre Haute (KINRY), Evansville (WUBN), and Indianapolis (KINR), and ARRL Emergency Coordinators W3BAZ at Louisville (3505 kc.) and W6UBP at Cincinnati (3725 kc.). Naval Reserve stations guarded 3010 and 7120 kc., as well as Naval Reserve frequencies.

HOW’S DX?

(Continued from page 85)

took part. Which reminds us of a pretty potentiation suggestion we heard concerning the problem of boosting on-the-air club activity. A point system is worked out on an annual basis for all ARRL activities including DXing, traffic, v.h.f., home construction of gear, and contests.

The member with the highest aggregate point total is recognized for his year’s light hills from the club treasury. The So. Calif. DX Club is in there pitching, too, and their Bulletin speculates the possibility of a V77A4 showing up from Naun Island. This is a British mandate just west of the Gilberts. These W6s also speak of working or hearing one AGC328 in an aircraft over Japan. This would dispute OB5IL’s claim both literally and figuratively!

Here’s an idea that might make for a little easier operating. It has been suggested that there should be a terminal signal after a QSO to mean “Don’t reply exactly on my frequency — I won’t answer!” and that the signal be “K7” to mean “Keep off,” “Knock off,” or some other obvious slogan. It would only be used instead of “K7” at the end of a QSO, or at the end of a QSO when you’re going to stand by for other calls. During a QSO, “K7” would carry the usual burden. What do you think?

Jove would like to know how one goes about assembling the “complete QSL file” recommended in our lead this month. Very simple. You study hard, get your license, get on the air and work one station. Then you QRT and wait for his QSL. If he comes through you sell your gear and quit while you’re even.

92
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with Thermostat Sealed In Helium

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The new design results in greater frequency stability—longer life—greater reliability than is possible with mercury thermostats! The JK07E is available with either a 6.3 volt 10 watt heater, or a 115 volt 12 watt heater. It's broadcast, FM & TV, F.C.C. approved!

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JK Stabilized H-18 Specifications

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- Octal base.

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(Continued from page 50)

This doesn’t seem necessary—and isn’t—except as an aid to developing the proper wrist motions. A single dot is struck purely by reflex action. So when the dash position is cut too short, there is a likelihood of hitting the subsequent single dot too soon—with the result that the dot is never made. The remedy is always to go through the motions of holding the dash position until the dashes are completed. Your electronic key will maintain perfect timing in case you fall now and then, but try not to let it happen too often.

Q5-er

(Continued from page 50)

and the connection between R14 and R4 broken; then the appropriate leads are run to the gain control on the panel. L.f. gain is held down by replacing R15 with the 1600-ohm cathode resistor taken out from the 12A6 stage.

A 3- to 30-μd. mica compression trimmer is mounted behind the original antenna trimmer (now the b.f.o. control) and used as a new antenna trimmer. It is supported on a single 3/8-inch spacer bolted to the side wall and is adjusted through a 3/8-inch hole in the side wall. The "stator" side of the condenser is connected to the lead from the r.f. coil previously soldered to the stator of the original antenna trimmer.

If 15/16-inch diameter gain controls are used, there should be no difficulty in making all the parts fit on the front. The noise limiter switch and r.f. gain control are mounted in holes enlarged from those left by the original knob and shafts on the small panel. To fit in the other two switches, however, new holes are drilled. The a.v.c. switch is mounted vertically in a hole with a center line 3/8 of an inch from the bottom of the panel, while directly above it, mounted horizontally, is the b.f.o. on-off with its center 1 9/16 inches from the bottom. It is necessary to remove some metal around the edges of the opening if back-of-panel nuts are used to regulate shank-extension distance, but this is readily done with a small file.

To remove the antenna post for the coax connector, the ceramic antenna condenser is disconnected and the tuning unit carefully tilted back. The hole then is enlarged with a reamer to provide ample clearance for the pin terminal, and by mounting both units of the connector on the panel front, nothing need be "broken off" the tuning condenser to make things fit. The small machine screws which held the mica condensers removed from the back have the same thread size as those used to secure the tuning unit. It is possible, therefore, to use one of these smaller screws and make the upper left-hand condenser mounting hole serve both for refastening the condenser and securing the coax fitting.

By purchasing a special spline coupling now available from several dealers, the problem of the
Compactness, symmetry and ability to withstand high d.c. voltages, make these new B&W Variable Capacitors outstanding favorites among the amateurs, experimenters and engineers.

Having only one fourth the frontal area of their larger companions—CX types, these smaller units have been designed to do a big job in tight places. Heavy rounded edge plates permit ratings of 2000 volts d.c. unmodulated and 1250 volts d.c. in modulated final amplifier circuits. Voltage rating measured at 30 megacycles.

Used with any B&W “B” or “BX” type air-inductors, the combination results in a versatile, variable capacitor-inductor assembly, hard to beat at any price and tops for efficiency. See your dealer or write today to Dept. Q-21.

Amateur Net Prices: JCX25E $6.60 • JCX50E $8.10 • JCX100E $10.80

B & W TYPE JCX VARIABLE
Butterfly type CAPACITORS

Thousands of America’s Hams
MUST BE ON THE BEAM!

NEW EICO instruments and KITS
give you Laboratory Precision AT LOWEST COST!

It’s smart ham sense to cut your test equipment costs—without sacrificing quality. That’s why more hams than ever before are building their own precision instruments with EICO KITS.

For top-notch laboratory-precision equipment, EICO gives you the newest efficient designs and circuitry and the finest quality brand-name electronic and mechanical components. Each EICO Kit is complete with pre-punched chassis, cabinet and etched panel. For rock-bottom cost, you do the simple assembly in one easy evening with the EICO simplified instructions.

EICO Kits and Instruments are acclaimed and used by the top-flight universities, schools and original equipment manufacturers from coast to coast. See the complete EICO line of superbly engineered, handsone VTVW’s, scopes, tube testers, signal and sweep generators, etc.—at your favorite jobber TODAY. Ask him about the EICO Make-Good Guarantee—the strongest guarantee in the industry! Write NOW for your free latest Catalog 2-Q.

Prices 5% higher on West Coast. Due to unsettled conditions, prices and specifications are subject to change without notice.

ELECTRONIC INSTRUMENT CO., Inc.
276 NEWPORT STREET, BROOKLYN 12, N.Y.
main tuning control is easily solved. A look through the junk box, however, might reveal an old-type knob with a long 1/2- or 5/4-inch diameter shank, with the screw replaced close to the end. By removing the cable fitting and enlarging the hole to a suitable size, such a knob can be easily attached to the spline shaft. Actually, a tuning knob is more of a refinement than a necessity when the receiver is used as a Q5-er, so don't lose any sleep over it.

It will be noticed that tuning through a 'phone signal produces a rough hiss within a few kilocycles either side of the carrier frequency, caused by the narrow bandwidth of the i.f. The 0.005-uf. mica condenser removed from the set will help by-pass much of this disturbance when connected between C2 and ground.

As for new power requirements, a supply capable of delivering 250 volts at up to 90 ma, and 6.3 volts at 2.2 amp. is necessary. Removal of the 6F6 will cut the maximum B+ drain to about half that value.

Converted in this manner, the BC-453 combines the high-selectivity advantages with many of the features of the communications receiver, thereby increasing its utility as a Q5-er. It should be noted, too, that the set forms a complete but inexpensive basic i.f. strip for a homebuilt system. Just to illustrate this point, a small tuning unit covering from say, 3 to 8 Mc., could be built in a utility box placed on top of the 453. Then, a plug-in coil or bandswitching converter covering 20, 11, 10 and 6 meters, either tunable or crystal-controlled, could be added, resulting in a compact receiving set-up incorporating the image rejection, coverage, and selectivity found only in the higher-priced receivers now available. Go to it, fellows, the possibilities are tremendous.

U.S.A. Calling
(Continued from page 48)

have 2 or 3 years of commercial technical radio experience, or equivalent, at least one year of which must have been in a studio or recording operation. Salaries range from $4,200 to $5,400, depending upon qualifications. Applications must be made on Standard Form 87, available from the Civil Service Commission in New York City or any first- or second-class postoffice outside N.Y.C.; mail to Department of State, Personnel Branch, 260 West 57th St., New York, N. Y. (Please do not telephone, as the office is not equipped to discuss personnel information in response to such calls.)

Quick action by two Atlanta hams recently saved an automobile from complete destruction by fire. Spotting the burning car near his home, and with no telephone nearby, Galen Clements, W4NWH, raced to his own car and transmitted a “mayday” distress call on his mobile rig. Across town he was heard by Lee Connell, W4NQO, who in a few seconds made the necessary 'phone call and had the fire department on the way. The blaze was extinguished with only minor damage.
Astatic’s Synabar Model DR-10
Unidirectional Cardioid
Crystal Microphone

ASTATIC's Synabar Microphone uses a special sintered metal
to cancel out 15 db front to back, making it, 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
cable connector and 20 feet of single conductor shielded cable, and
is available in models with or without off-on switch.

<table>
<thead>
<tr>
<th>Model</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>DR-10</td>
<td>$37.25</td>
</tr>
<tr>
<td>DR-10-S*</td>
<td>39.95</td>
</tr>
</tbody>
</table>

*With off-on switch

Now Available
For Immediate
Delivery

The Astatic
Corporation
Conneaut, Ohio

In Canada, Canadian Astatic Ltd., Toronto, Canada

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insuline
Metal Goods for every use!

"FLEXI-MOUNT" ALUMINUM CASES
UTILITY CABINETS with built-in chassis
MIDGET SPEAKER CASES
CHANNEL-LOCK ALUMINUM BOXES
SLIP COVER ALUMINUM BOXES
MINIATURE OPEN END ALUMINUM CHASSIS
ALUMINUM UTILITY CABINETS

Just a few of the hundreds of different styles, sizes and types available. Write Dept. Q for complete catalog

Insuline Corporation of America
Insuline Building • 36-02 35th Avenue • Long Island City, N. Y.
West Coast Branch and Warehouse: 1335 South Flower Street, Los Angeles, Calif.
Exclusive Canadian Sales Agents: Canadian Marconi Company, Montreal
that will give satisfactory mixer performance.

The bandspread can be varied by adjusting the spacing between the stator and rotor plates. The closest practical spacing will allow a coverage of about 405 to 470 Mc, with the plate dimensions shown. The circuit shown can be adapted to use as a superregenerative detector, by feeding the output of a separate quenched oscillator into the grid circuit at the junction of the grid choke and $R_2$. A 680-$\mu$fd, by-pass is connected on the cold side of the plate r.f. choke and the audio taken off at that point.

The World Above 420 Mc.

Before the December issue of QST, containing a description of the 420-Mc. TV set-up of WIBHD, had been out many days Mel received several letters from amateur TV experimenters. One was from W1MUX in near-by Wayland, who has a flying-spot system nearly ready to go and is working on receiving equipment. WIBHD has copied his TV pattern on 35-mm. film. By means of a 35-mm. projection head he projects the pattern into the camera, doing away with the necessity for bright illumination of the TV pattern.

WIBHD is in the process of compiling a list of all active amateur TV stations, with the details of the equipment actually in use or under construction. If you are transmitting amateur TV, or preparing to do so, Mel would like to hear from you. His address: 148 Glendale St., Everett 49, Mass.

Members of the Hattiesburg Amateur Club proudly display the new call letter license plates now being issued to Mississippi amateurs as a result of the club's work in getting the special tags approved by the state legislature. L. to r.: Past President Lou Wicht, W5FGE; ARRL Section Emergency Coordinator Floyd C. Poston, W5MUE; President M. W. Kriegsmann, W5KYC; Secretary Ken Bloom, W5PDM; and W. C. Parker, Jr., W5HVA.
INTERMODULATION METER

Model 31

GENERATOR
LOW FREQUENCY: 60 cycles.*
HIGH FREQUENCY: 3000 cycles.*
LF/HH VOLTAGE RATIO: Fixed 4/1.
OUTPUT VOLTAGE: 10v. max. into high impedance or +5 DBM matched to 600 ohms.
OUTPUT IMPEDANCE: 2000 ohms.
RESIDUAL IM: 0.2% max.

(*Other frequencies on special order)

ANALYZER
INPUT VOLTAGE: Full scale ranges of 3, 10 and 30 volts RMS. Less than one volt of mixed signal is sufficient for operation.
INPUT IMPEDANCE: Greater than 400 K ohms.
INTERMODULATION: Full scale ranges of 3, 10 and 30%.
ACCURACY: < 10% of full scale.
OSCILLOSCOPE connection at meter.

WANTED: Hammarlund
Super pro
Receivers SP-400X & SP-400SX in good condition.
State: Best price, pre-or postwar Model, condition.
BOX 175 QST

RADIO COURSES
- RADIO OPERATING
- CODE
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- FM TELEVISION
- Preparation for Civilian, Maritime, Army and Navy license requirements.
- Personal Counseling Services for Veterans
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Anyone Can Be a Good Sender with a VIBROPLEX
SUPER DELUXE Semi-Automatic KEY
Jewel Movement
Touch Control
Super-Speed Control

PRESENTATION
Speed Range From Dead Slow to Lightning Fast
24-K Gold-Plated Base Top $39.95
Thousands have become good senders with the Vibroplex. Many who thought they never could make the grade have found it easy with this Super DeLuxe Vibroplex key. No matter what sending faults you may have Vibroplex will have you sending like the best in almost no time. Brings out natural ability you didn't know you had. So don't give up the idea of being a good sender - it's easy with a Vibroplex. Other models $12.95 up. 3-key hand models, one dollar more. Order yours today! At dealers or direct. FREE catalog.

Headquarters for new portable, all models and styles of types. Also rebuilds Standard and portable typewriters with ALL CAPITAL letters and other styles of types. QUICK SERVICE. Order direct from us.

THE VIBROPLEX CO., INC.
833 Broadway
New York 3, N. Y.
WANTED: Teletype 1/60TH HP synchronous motor. WGM, Orv, Calif.

WANTED: AN/PRR-4 receivers and tuning units; APR-1, APR-5, HC-1, HC-2, VC-7, VA-9 (and others like them and "A" equipment"); ARR-S, ARR-R, REL-3; BC-348, ART-13, and other surplus: General Radio, Boston, Perkin, others. Other top-quality equipment wanted, especially for 600 to 1,200 Mc; region also 107-8, other special-purpose tubes, magics, bykrons, inductances, manuals, power supplies, test equipment, Field, Paralle, Box 26, Dayton 9, Ohio.

WANTED: High-quality amateur radio equipment bought and sold. WSBC, Ralph Hicks, 206 E. Fairlawn, Tulsa, Okla.


FOR SALE: Collection ancient wireless and radio items dating back to 1899. See inside front cover. Also offer new and old parts. Thousand of old items must be cleared out fast. Stamp, please, for list. WML, Wrightwood, Calif.

WANTED: SWSUs for stamp. Harrison, 800 Piney Branch Road, Silver Spring, Maryln.

FOR SALE: HF/10-20, used 6 months. Like new. $50.00, WJQG, 24 Pour, Philadelphia, Pa. (Chilton ad). HF/10-20, surplus equip. A used by individual, not a commercial outfit, has taken over AD-300D equipment--needs changing. Contact in quantity for profit, even if by an individual, is commercial and all advertising by him takes the 50¢ rate. Provide date of death in ad in apparatus in quantity for profit, even if by an individual, is commercial and all advertising by him takes the 50¢ rate. Provide date of death in ad apparatus in quantity for profit, even if by an individual, is commercial and all advertising by him takes the 50¢ rate or apply to all advertising in this column regardless of which rate may apply.

(5) Because error is more easily avoided, it is requested that all authors take care to check dates carefully. If necessary, requests for information should be submitted promptly.

(6) No advertiser may use more than 100 words in any one issue or more than one ad in one issue.

Note: Please note the rate on ham-ads is the ARRL rate. The local rate is higher. 

QUARTZ — Direct importers from Brazil of best quality quartz suitable for making piezo-electric crystals. Diamond Drill Carbon Co., 2143 World Bldg., New York City

QSL's: $1.50 per 100, prepaid. Gifts, WFRS, 102 Pine Delta Ave., Baltimore 29, Md.

SUBSCRIPTIONS — Radio publications a specialty. Earl Meld, Hey, 6863 E., 5th Ave., Miami, Fla.

QSL's: High quality, fair prices. Samples? W7GPP, R. D. Dawson, 1331 Central Ave., Kansas City, Mo.

CRYSTALS: Basset Type 100A precision low-drift units made to your exact specified frequency within the 80 or 20 amateur band, plus others. Must have both caps and be in good condition. Write Alt., W6BC, 531 West 12th St., Kansas City, Mo.

QSL's: Write for samples today. Your best bet! Larry's QSL's, 9020 S. Denver Ave., Kansas City, Mo.


WANTED: Marconi coilholder magnetic detector. Multiple-tuner. DeForest responder and other gear prior to 1920. Franklin Kingbird, Rock Hill, S.C.

QSL's: $1.50 per 100, prepaid. Gifts, WFRS, 102 Pine Delta Ave., Baltimore 29, Md.

QSL's: Windows, wall mounted, 1507 Central Avenue, Kansas City, Kansas.

QSL's: $1.50 per 100, prepaid. Gifts, WFRS, 102 Pine Delta Ave., Baltimore 29, Md.

QSL's: $1.50 per 100, prepaid. Gifts, WFRS, 102 Pine Delta Ave., Baltimore 29, Md.


QSL's modern, Sample booklet. 12x, Stamper olay. Westerners we samples at leading Ham stores. WGGF, Van Groos, 1416 Serrano, Hollywood 37, California.

QSL's: 40 designs, photos, cartoons and conventional QSL cards. Showing of type tabs to aids in designing your own card. (refunded with order brings) youres. W. John Chimers, Drawer 38, Cambridge, Ontario.


PHONE: patch schematics, practical discussion. $1.00. Nichols, W5VR

FRAMS and antenna elements. Send a card for full information. Riverside Tool Co., Box 87, Riverside, Illinois.

QSL's: Uncle Fred QSL's. Three colors and up. Rainbox map QSL's. Special design of your own in QSL's; samples rushed. 10¢, Uncle Fred, Box 36, Lynn, Penna.

QSL's: SWLS? Modernistic? Cartoon? Photography? Delicate? QSL's are more than letters. Letters are not QSL's. Amateur Radio QSL service, QST ad Q ad renewals. Subscriptions acquired. Special QSL's. Shipping charge, 25¢. W6TEA, $0.98, Rus Sakiers, WBSDR, $0.97 (2nd copies), 10¢ each.

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QSL's modern, Sample booklet. 12x, Stamper olay. Westerners we samples at leading Ham stores. WGGF, Van Groos, 1416 Serrano, Hollywood 37, California.

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The No. 37300 Series
Steatite Terminal Strips
Another exclusive Millen "Designed for Application" product is the series of steatite terminal strips. Terminal and lug are one piece. Lugs are Navy turret type and are free floating so as not to strain steatite during wide temperature variations. Easy to mount with series of round holes for integral chassis bushings. Ideal answer to the "tropicalization" problem.

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MFG. CO., INC.
MAIN OFFICE AND FACTORY
MALDEN
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TECHNICAL CERAMICS

FOR ELECTRONIC
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Chattanooga 5, Tennessee
LITTLE DEVIL COMPOSITION RESISTORS

Resistance and wattage are clearly marked on every one of these tiny, rugged insulated composition resistors. Three sizes: 1/2, 1 and 2-watt in all RMA resistances. Tolerance ±5% and ±10%.

CLOSE CONTROL RHEOSTATS

Insure permanently smooth, close control. Widely used in industry. All ceramic, vitreous enameled; 25, 50, 75, 100, 150, 225, 300, 500, 750, and 1000-watt sizes.

DUMMY ANTENNA RESISTORS

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

TYPE AB POTENTIOMETER

It’s quiet! This Type AB Potentiometer has a resistance unit that’s solid molded. As a result, the noise level often becomes less with use. Has a 2-watt rating, good safety factor.

BROWN DEVIL WIREWOUND RESISTORS

Dependable vitreous enameled units, in a size small enough to fit most installations. Easily mounted by 1/2" tinned wire leads. Three sizes; 5, 10, and 20 watts. Tolerance ±10%.

DIVIDOHM ADJUSTABLE RESISTORS

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

RADIO FREQUENCY CHOKE

Single-layer wound on low power-factor statite or bakelite cores, with moistureproof coating. Seven stock sizes for all frequencies, 3 to 520 mc. Two units rated 600 ma, others rated 1000 ma.

OHM’S LAW CALCULATOR

25¢

Favorite of engineers everywhere! Solves Ohm’s Law problems with one setting of the slide. Also has parallel resistance and slide rule scales.

To countless thousands of technical men all over the world — engineers, designers, and servicemen — the name OHMITE has become synonymous with dependability. There is good reason for this overwhelming opinion. Every OHMITE product is carefully designed and constructed to give extra performance and long life under severe service conditions. When you need dependable resistance components, play safe and specify OHMITE.

OHMITE MANUFACTURING CO., 4864 Flournoy St., Chicago 44, Ill.

Be Right with OHMITE® TAP SWITCHES

Printed in U.S.A.
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Concord, N.H.
Another National first! A complete superhet covering all major broadcast and shortwave bands that measures only 11" x 7" x 7"! Built with the same rugged quality that distinguishes National's more expensive receivers, the SW-54 sets a new low in price — a new high in value!

**Coverage:** 540 kc. to 30 mc. Voice, music or code.

**Features:** New miniature tubes in advanced superhet design. Coverage dial with police, foreign, amateur and ship bands changeable in one rotation. Plastic bandspread knob usable over entire range.

**Controls:** Main tuning, Bandspread, On-Off and Volume, Reception Bandswitch, AM-CW, Speaker-Phones.

**Tube Complement:** 12BE6, converter; 12BA6, CW osc. — IF ampl. — CB filter 1st. — A. V. C.; 50C5, audio output; 35Z5, rectifier.

$49.95

slightly higher west of the Rockies
A full 520 watts input CW...350 watts input phone
...with easy-to-drive RCA-812A triodes

For solid power and performance—on cw or phone—here's a dependable tube line-up you can follow with confidence.

Designed around the popular RCA-812A high-pervance power triode, this well-balanced line-up offers high power at low cost.

The push-pull RCA-812A's easily handle an input of over 500 watts cw up to 50 Mc, and require only 13 watts driving power to their grids. For phone, the push-pull RCA-811A's... operated at zero bias... can deliver an audio output of up to 310 watts...more than enough audio output to 100% modulate the 812-A's.

To get all the tube power, performance, and life you pay for... buy genuine RCA tubes from your local RCA TUBE DISTRIBUTOR.

ARE YOU getting the new RCA HAM TIPS? There's a copy waiting for you at your RCA Tube Distributor.
CIVIL DEFENSE FREQUENCIES

Announced

IN mid-January the Federal Communications Commission issued a public notice specifying frequency bands which are now earmarked for use by amateurs in civil defense communications in the event of war. They are:

1800–2000 kc. (under the existing restrictions as concerns Loran)
3500–3510 and 3990–4000 kc. (Two 10 kc. bands)
50.35–50.75 and 53.35–53.75 Mc. (Two 400 kc. bands)
145.17–145.71 and 146.79–147.33 Mc. (Two 540 kc. bands)
220–225 Mc.

(The Commission also stated that the band 1750–1800 kc. will continue to be available for use by qualified amateurs authorized to participate in the Disaster Communications Service.)

Actual regulations covering amateur participation in civil defense communication remain to be worked out (the task is already in process). Meanwhile we amateurs have not only the positive assurance that frequencies will be available but we know in advance what these frequencies will be. Planning can now proceed apace. It is obvious that 10, 6, 2, and 1¼ meters are the basic spots for local planning. The low-frequency assignments (1.8 and 3.5 Mc.) will probably be available only for certain medium-distance circuits in special cases.

NOTHING IN THIS ANNOUNCEMENT IN ANY MANNER ALTERS PRESENT AMATEUR RULES OR REGULATIONS. It is simply a notice of intent to make these frequencies available for civil defense communication by amateurs in the event of war and a resultant shutdown of normal amateur activity.

This action by our Government indicates the extent to which our operations and potentialities are held in regard at Washington. It is now up to us to show we merit that confidence. The first step you should take is to notify your ARRL Emergency Coördinator of your willingness to pitch in and help shoulder amateur radio’s responsibility.