IDEAS for modern STATION DESIGN

One of a series

Electro-Voice

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Export: 13 E. 40th St., New York 16, U.S.A. Cables: Arleb

MICROPHONES • HI-FI-SPEAKERS • PHONO PICKUPS • TV BOOSTERS • TV DISTRIBUTION SYSTEMS
MAKE SURE, in your new speech circuit, that your words get a break! Type 6BX7-GT, as Class A Amplifier, will help you reach the other fellow with crisp, clear talk that's readily understood.

TWO OF THESE G-E TUBES, arranged in push-pull parallel, will put out 10 watts with only 2½% harmonic distortion. Here's real aid toward superior phone transmission! In addition, the new 6BX7-GT offers you high-perveance design and transconductance of 7,600 micromhos. See your G-E tube distributor for the low price.

AND BY THE WAY ... that record-player the XYL dotes on: next time you have it apart to improve the tone-quality, try a 6BX7-GT for the revamped circuit! You'll find the music benefits greatly.

SPECIAL FREE CHART! To help you apply the 6BX7-GT, write for an instructive chart of the tube's power output and distortion, plotted against load resistance. Address Tube Department, Section 11, General Electric Company, Schenectady 5, New York.

G-E MILESTONE:
Tubes for Radio Voice Transmission

As early as 1915, General Electric scientists were doing pioneer research on tubes to modulate h-f for radio voice transmission. That same year, G.E. designed and built a successful radio-telephone transmitter which operated from a-c. It contained all the fundamentals of a modern broadcast transmitter. Two were installed on U. S. battleships, and used in the 1916 spring Navy maneuvers. . . . Basic experience like this is a priceless element of G.E.'s electronic design knowledge and manufacturing skill. These pay off for you in superior tube quality!
LINEAR CALIBRATION DIAL:
All divisions are same width. On the 160, 80, 40, 20 and 15 meter bands, each division equals 1 kc. The dial is accurate within 1 kc to 21.8 mc, and 2 kc between 26 and 30 mc after calibration. This all adds up to exceptional band spread and accurate dial setting.

NOISE LIMITERS:
The phone limiter is a series diode type that automatically adjusts the threshold of limiting to signal level for optimum performance. Can be turned on or off by front panel controls. The cw limiter is a shunt diode type following the first audio amplifier. Provides front panel control of limiting level. Limits both negative and positive peaks.

CRYSTAL FILTER:
Factory adjusted. Selectivity is variable in five steps from 4 kc at 6 db down to about 12 kc at 60 db down with selectivity knob at zero — crystal filter out. With selectivity knob at 4, bandwidth is approximately 200 cps at 6 db down and 6.5 kc at 60 db down.

WITH the Collins 75A-2 you'll pick out signals you've never been able to hear before. Two noise limiters, one for cw and one for phone, hold interference to below signal level. Nerve-wearing noise is reduced, and by clipping interference the limiters help you identify and copy otherwise unreadable signals.

For cw reception, highly stable BFO injection and an effective crystal filter give pinpoint selectivity with only slight loss in gain. Linear dial calibration, exclusive in the 75A-2, provides easy "resetability." These satisfying features have been designed with the respected Collins skill, and form part of the receiver that has friends throughout the world.

FOR THE BEST IN AMATEUR RADIO, IT'S . . .

COLLINS RADIO COMPANY, Cedar Rapids, Iowa
11 W. 42nd St., NEW YORK 18 1937 Irving Blvd., DALLAS 2 2700 W. Olive Ave., BURBANK
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THE SX-73 COMMUNICATIONS RECEIVER

"A Gibraltar of Stability"

It is the ultimate in all-wave receivers . . . this jewel of precision craftsmanship! Refined in even the smallest detail, the SX-73 meets the tough military communications specifications.

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and Dependability

Frequency Range:

540 kc to 54 Mc in six turret-selected bands.

20 tubes, including rectifier, voltage regulation and ballast tubes.

Dual conversion, 455 kc and 6 Mc crystal controlled.

Receiver type: Single superheterodyne in tuning ranges of 540 kc to 7.0 Mc and dual conversion on tuning ranges from 7.0 to 54.0 Mc.

Types of signals: AM, CW, MCW, ICW, and Carrier Shift Tele-typewriter.

Frequency calibration: 2 tenths of one per cent or less at all frequencies.

Image rejection: Not less than 80 db at any frequency.

Front panel controls: R.F. gain, AC on/off; b.f.o., pitch; audio gain; crystal phasing; selectivity; V.F.O./Crystal; crystal vernier; band selector; frequency; receiver/send; CW/modulation; A.G.C./manual; A.N.L./off; antenna adjust.
### Section Communications Managers of the ARRL Communications Department

Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio Club reports are also desired by SCMs for inclusion in ONT. All ARRL Field organization appointments are not automatically available to League members, OES, QRP, 00 and Climbers, where the various SCM's desire applications for SEC, EC, RM, and PAM. In addition to station and leadership appointments for Members, all amateurs in the United States and Canada are invited to join the Amateur Radio Emergency Corps (ask for Form 7).

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*Officials appointed to act temporarily in the absence of a regular official.*
Oh me! Oh me! What will my frequency be? Do you have spots before your eyes and kilocycles on the brain? The best cure for instability—sometimes known as "where-am-I-hope-it’s-in-the-band"—is positive CRYSTAL CONTROL WITH PRs! Yes, PR Precision CRYSTALS give you peace of mind, because when you have a PR in your rig you KNOW WHERE YOU ARE ... and your friends do, too! You can get PRs at your jobber’s for the exact frequency you want (integral kilocycle) within amateur bands at no extra cost! Tens of thousands of amateurs all over the world use and boost PR Precision CRYSTALS for accuracy, stability, low cost, dependability and activity. They’re unconditionally guaranteed.

20 METERS, Type Z-3, $3.75 • 40, 80 AND 160 METERS, Type Z-2, $2.75

PR Crystals

USE PR AND KNOW WHERE YOU ARE

PETERSEN RADIO COMPANY, INC.
2800 W. BROADWAY • COUNCIL BLUFFS, IOWA
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.

All general correspondence should be addressed to the administrative headquarters at West Hartford, Connecticut.

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"It Seems to Us..."

21 MC.—A CHEER AND A CAUTION

Yippee!  
Hot Dawg!!  
Geronimo!!!

These exclamations and a couple of others echoed down the corridor at 38 La Salle Road when FCC via telephone informed Hq. of the proposed opening of the new 21-Mc. band May 1st — the culmination of many months’ conference attendance, and government and industry meetings. It is five years to the month since the start of the Atlantic City conference which earmarked 21,000-21,450 kc. for amateur use, and we think those joyful exclamations are not out of order as a climax to five years of playing the role of expectant father pacing the floor in the anteroom.

It’s going to be a good band. Despite the unfavorable conditions presently characterizing the higher frequencies, 21 Mc. should provide quite a few openings this summer during a good portion of the day. And, as the sunspot cycle curve starts upward again, the band should improve rapidly and become a worldwide DX channel combining the characteristics of 14 and 28 Mc. and perhaps therefore a more desirable spot than either. Yes, it’s going to be a good band.

It’s also going to be a bad ’un, in one respect. We mean from the TVI standpoint, in case you hadn’t guessed. It’s a short, sad story. Several years ago — before TV broadcasting got started but after the U. S. announcement of plans for a 21-Mc. amateur band — television receiver manufacturers were casting about for a standardized intermediate frequency. Despite dire warnings from the American Radio Relay League, the industry chose 21.25-21.9 as the sound-channel if. — right smack in the proposed 21-Mc. band. Our protests were to no avail; there was no television broadcasting, only experimental TV receivers — “TVI” was a term yet to be coined, and its prospect then struck no particular fear into the hearts of the manufacturers.

There was no 21-Mc. band, and therefore no way to prove our point. So some millions of sets were produced with the 21-Mc. if.

Anticipating trouble, in 1948 ARRL worked out with Phil Rand, W1DBM, a series of tests of potential interference from 21-Mc. transmissions; FCC, at our request, provided an experimental license, K2XBH. Exhaustive tests showed conclusively that television receivers using an i.f. of 21.25 Mc. were simply drowned under, even several miles away; those using 21.7 or 21.9 Mc. had very little or no difficulty, even at short distances. The remedy for the millions of existing TV receivers with 21.25-Mc. (or thereabouts) i.f. is, obviously, realigning to 21.9 Mc. (or at least above 21.45 Mc.), and possibly a high-pass filter. Cooperation of RCA and others during the tests showed that this works. Any competent serviceman can do the alignment job.

The bright spots in the picture — and that’s no pun — are twofold: One is that in the last couple of years manufacturers, plagued with interference problems from many sources, have pretty well shifted their standard i.f. to the 40-Mc. region, so that current sets shouldn’t have any appreciable difficulty. The second, concerning older sets with the 21-Mc. channel, is that for once the position of the amateur station and the TV receiver is reversed — for once the first place to start looking for the gremlin is not the transmitter, but the receiver.

It’s our job — yours and mine — to see that this indeed becomes the case. Not in an attitude of “we told you so”— the industry now knows the problem as well as the rest of us; it is, generally, also aware of its responsibility in this particular phase of TVI. We’ll be in touch with the companies involved. But it’s a long route from the chief engineer or service manager to the individual dealerserviceman, and although that gap is being gradually closed by a number of steps in process within the industry concerning TVI matters, it all adds up to another task for you in local cooperation. This time your tools are not by-pass condensers and shielding, but public relations and cooperation with local service organizations while they make equipment adjustments. And this again underscores the desirability of getting a community interference committee into action as quickly as possible.

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1 Grammer, "TVI from 21 Mc.," QST, December, 1948, p. 20.
COMING A.R.R.L. CONVENTIONS
June 14th-15th — Rocky Mountain Division, Estes Park, Colo.
June 28th-29th — West Gulf Division, Corpus Christi, Texas.
July 4th-6th — Pacific Division, San Francisco, Calif.

Strays

A current catalog describes a TV antenna that "provides high gain on all channels." W9LQE wonders if he could get one that would discriminate against the prevailing low grade of "corn."

DX on 10 'phone can be tricky stuff. W1NOF found a good location for it on a sandy beach. It took W1NEK's radio assistance and an AAA tow truck to pull him back into the band.

For two days preceding the Memorial Day 500-Mile Auto Race, Indianapolis hams will be on the air to direct incoming mobile hams to any point in the city they may wish to reach. If possible, instructions will also be furnished for reaching hotels or other quarters.

Indianapolis Radio Club

Our April "Happenings of the Month" column, reporting on the reestablishment of RTMA's Amateur Radio Activities Section, erroneously listed the call of Vice-Chairman W. J. Halligan, sr., president of Hallcrafters, as ex-W0WZE. The "ex" was a mistake — Bill has his W9WZE call in active standing.

HAMFEST CALENDAR

CALIFORNIA — Sunday, May 25th, at Verdugo Park, Glendale — the third annual picnic of the Los Angeles Council of Radio Clubs, sponsored this year by the San Fernando Valley Radio Club. Special awards, including one for the gals. Also games and prizes for the children. Transmitter hunts on 75, 10 and 2 meters. Bring your own lunch (we furnish the coffee) and come early.

OHIO — Saturday, May 3rd, at Leon's Restaurant, E. Tallmadge Ave. and Brittain Rd., Akron — the 25th anniversary banquet of the Buckeye Short Wave Radio Association. Chicken or steak dinner at $2.00 per plate or $3.00 family style. Make reservations with Bud Ports, W8LBB; 827 Kickapoo Ave., Akron.

TEXAS — Friday through Sunday, May 9th-11th, at the Blue Bonnet Hotel in Kerrville — the seventh annual convention of the South Texas Emergency Net. The suppression of TVI will be one of the main topics of discussion, and there will be transmitter hunts and other contests. There will be a banquet on Sunday evening. The registration fee is $2.50. Pre-register with Cedric Toler, Blue Bonnet Hotel, Kerrville. Hotel or Court reservations may also be arranged.

Quist Quiz

A recently acquired r.f. ammeter and installed it in the feed line to his antenna. To his chagrin, he finds that maximum output, as indicated by the r.f. ammeter, does not coincide with the plate-tuning dip indicated by the milliammeter in the plate circuit of his 807 output stage. His friend B tells him not to worry, that the ammeter is the best indication of proper tuning for maximum output, but A feels that something is wrong with his rig, since he always tuned it up on the plate-current dip. Who is right?

(Please turn to page 51 for the answer.)
The Truth About the Vertical Antenna

Measured and Calculated Performance Compared with an Ideal Horizontal Antenna

BY B. W. GRIFFITH,* W5CSU

Many words have been written and spoken on the subject of antennas, yet the utility of the vertical antenna for the lower amateur frequencies still remains a ripe subject for argument. It is not the intent of this article to attempt to settle the controversy, but rather to provide some ammunition. There are presented herein data, both calculated and measured, which have been accumulated during several years of actual operation of a vertical antenna in the amateur bands; it is hoped that the information will be of value to those who are interested in determining the real value of this type of antenna.

The factors which must be considered in studying an amateur antenna system are generally these:

1) Will it produce a usable signal over a large area in competition with QRM?
2) Is its appearance acceptable at your location?
3) Is the cost reasonable?
4) Is it suitable for multiband operation?
5) Is it a good receiving antenna?
6) Will it be disabled mechanically or electrically by wind or ice?
7) What is its effect regarding BCI-TVI?
8) Does it present a personal hazard?
9) Does it present a lightning hazard?
10) Is excessive space required?
11) Is it difficult to construct?
12) Are serious difficulties involved in obtaining correct adjustment?

The application of these questions to the vertical antenna is the purpose of this article. In order that the investigation of the antenna be in sufficient detail to be informative, the present discussion is limited to its performance in the 75-meter band. Some information concerning impedance matching and comments on the performance in other bands are included, but the presentation of actual data on operation in other bands is beyond the scope of this article.

Specific Type of Antenna Studied

The antenna considered here is a vertical conductor whose base is at the surface of the earth. The radiator is insulated from the ground at the base, and is series excited. In the particular antenna used at W5CSU, the radiating element consists of 40 feet of 4-inch galvanized iron downspouting, soldered at the joints and guyed at the center and near the top. Guy wires of No. 12 copperweld, insulated at 12-foot intervals and spaced 120°, have successfully held the antenna through five years of violent Texas windstorms and winter ice.

The base of this must rests on a Pyrex transmission-line insulator, which in turn rests on a sturdy built copper-covered wooden pedestal about 2 inches above the ground and about 6 inches square.

*6502 Wofford Drive, Dallas 17, Texas.

- No one antenna will do all sorts of jobs equally well, and to ask if one system is "better" than another frequently is nothing more than posing a meaningless question. This article compares vertical and horizontal antennas for 75-meter operation and gives facts based on calculations, measurements and observation. Whether the vertical or horizontal best suits your particular objectives is something you will be able to decide after reading it.

May 1952

The vertical antenna at W5CSU, constructed of 4-inch down-spouting, is 40 feet high and is usable on 20, 40 and 80 meters.
The current flowing in the ground near such a vertical antenna will cause considerable power dissipation in the form of heat, unless ground wires are provided to reduce the resistance. These wires must follow the lines of current flow and so must proceed radially from the tower base. A system of wires of this type is known as a "radial ground system." Broadcast-station antennas are commonly installed with 90 to 120 or more such radials extending 1/4 to 1/2 wavelength from the tower. For amateur purposes, however, it is not necessary to go to such lengths to obtain reasonably efficient operation. The antenna at W6CSU is operated with a ground system of 16 radials varying between 25 and 40 feet in length as limited by the dimensions of the lot. It has been operated with only 8 radials with good success. The radials are No. 14 wires buried about two inches below the surface (an axe was found to be the best tool for making the trenches). Either enameled or bare wire may be used. The wires may even be laid on the surface, as their capacitance to ground allows satisfactory operation, but this is not suitable as a permanent installation for obvious reasons. The radial ground wires are soldered to the edge of the copper sheet which covers the antenna pedestal.

Questions now arise: Is a pipe driven into the earth a good ground for a vertical antenna? No, because the earth losses in the absence of the radial wires would be equivalent to a loss resistance in the order of some 50 ohms, and who wants to put a 50-ohm resistor in series with his antenna?

Another question: Does a water pipe make a good ground? Only if it runs radially out from the tower base. Then it will be equivalent to one radial wire.

How good is the system of 16 radials described above? The calculated radiation resistance of this tower at 4 megacycles is 12.0 ohms. Its measured resistance is 19.6 ohms. This is taken to indicate that the ground-system resistance is in the vicinity of 7.6 ohms, so that the radiation efficiency of the antenna at 4 megacycles is about 61 per cent. This means that the radiated signal will be 2 decibels lower than its value with a perfect ground system. It is probable that with the addition of more radial wires the ground resistance could be brought to less than 3 ohms.

The choice of 40 feet for the antenna height was based mainly on the consideration of its being useful in several bands. The height chosen is approximately 0.16 wavelength in the 80-meter band, which is the shortest with which reasonable efficiency can be realized, and 0.58 wavelength in the 20-meter band, which is the longest that can be used without wasting radiation at high vertical angles. This height therefore allows efficient operation in the 80-, 40-, and 20-meter bands. The radiation efficiencies on 40 and 20 are higher than on 80.

**Comparison with Horizontal Antenna**

The standard to which the vertical is compared is a half-wave horizontal antenna 1/2 wavelength above ground. Since a half-wave dipole (some 125 feet long) is a difficult thing to fit into an average city lot, and particularly hard to raise 1/4 wavelength (62 feet or so) above ground, the average amateur antenna will not give as good results as the standard selected. The actual antenna is usually a compromise of questionable efficiency. Thus the comparison to follow is more favorable to the horizontal antenna than would be expected in practice.

The field intensity in any given direction from an antenna is proportional to the square root of the applied power. The calculated antenna patterns and coverage discussed are based on the assumption of 1000 watts input to a Class C final amplifier, with appropriate allowance for transmission losses.

Under these conditions, the theoretical vertical-plane patterns of the vertical and horizontal antennas over earth of perfect conductivity are shown in Fig. 1. The values plotted are the field intensity in millivolts per meter at a distance of 1 mile. These values assume 100 per cent efficiency (no losses) in both antennas.

Fig. 1 is not directly usable because the actual antennas are not 100 per cent efficient as radiators and the earth is far from a perfect conductor. However, the theoretical values form a starting point for calculating the actual behavior.

Fig. 1 shows that most of the radiation from the horizontal antenna goes out at very high angles. Only a small portion of the power is dissipated in the earth. With the vertical antenna the preponderance of radiation is at quite low angles. This low-angle radiation, within the first few miles from the antenna, is intimately tied in with and is a part of the surface wave or "ground" wave. As this wave travels over the imperfectly-conducting earth, energy is drained away and dissipated as heat in the earth. Although this
attenuates the surface wave and the radiation at very low angles, the earth cannot remove much energy from that part of the signal which is already at a great height above ground. The vertical pattern at considerable distances from the antenna thus takes on a shape similar to that shown in Fig. 2. Here it may be seen that the maximum effective radiation from the vertical antenna occurs at an angle considerably above the horizon.

The rate at which the surface wave and low-angle radiation diminishes is determined by the characteristics of the soil over which the signal is traveling. The computations involved in the determination of Fig. 2 are not presented here but the method of calculating these factors will be found in an article by K. A. Norton. The values shown were computed for soil conditions existing in the vicinity of Dallas, Texas, and the surface-wave intensity was checked by the field-intensity measurements presented in Fig. 4 and discussed later.

Soil conductivity varies greatly in different parts of the country. A map in the F.CC Standards of Good Engineering Practice for Broadcast Stations shows the soil conductivity over the United States, and similar maps have also been prepared for Canada and Mexico. Only the soil within about 15 miles of the transmitter affects appreciably the vertical-pattern characteristics of the vertical antenna.

Wet soil is not necessarily indicative of high conductivity. The presence of water, with its high dielectric constant, materially reduces the depth to which currents penetrate in the earth, thereby reducing the cross-sectional area through which current flows. Many dry soils exhibit higher r.f. conductivity than moist soils. Salt water marshes, however, show extremely high conductivity.

Fig. 2 assumes 1000 watts input to the final amplifier, with 61 per cent efficiency for the vertical antenna and 95 per cent efficiency for the horizontal antenna. The contours of equal signal show how the signal shapes up as it departs from the antenna, and we can guess from this its probable final form at great distances.

Take first the horizontal antenna. Its maximum signal is radiated directly overhead, diminishing at lower angles. In the daytime, the signal fired directly up is returned, let us say, by the F2 layer, arriving back at the local area of the transmitter with a field intensity of about 500 microvolts per meter after having made a 300-mile trip and having passed through the D, E and F1 layers. Owing to the vertical incidence on these layers, the absorption is small and the intensity therefore almost follows the inverse-distance law. This accounts for the practically constant field intensity observed for a number of miles around the transmitter. Beyond about 30 miles, the signal decreases rapidly because of the increasing distance traveled to the ionosphere and back and because the received radiation is coming from progressively lower angles in the antenna's vertical pattern. A particularly rapid reduction of signal strength with distance is apparent in the daytime because of the rapid increase in signal absorption by the lower ionospheric layers as the angle of incidence deviates from the vertical. At night this absorption disappears, allowing the signal to be transmitted to greater distances. Occasionally at night, especially during sunspot minima, the ionosphere will not reflect 4-Mc. signals at near vertical incidence, thus making it impossible to produce a readable signal at a distance nearer than perhaps 150 miles. This is the "skip-distance" effect which is so disastrous to emergency communications during the night hours.

The expected nighttime signal of the horizontal antenna is shown in Fig. 3, determined by computing the root-sum-square values of signals arriving by one-hop, two-hop, three-hop, etc., transmission, assuming a loss of 3 db. due to absorption and scattering at each ground reflection. This approximates rather well the actual condition of nighttime transmission with the F2 layer reflecting the signals from a height of about 220 miles.

The propagation from the vertical antenna behaves in a rather different manner. Since there is practically no radiation at angles near the vertical, the coverage within about 30 miles of the station is purely by means of the surface wave. This produces a signal of constant intensity day and night. At about 30 miles the reflected signal from the ionosphere, when applicable, is approximately equal to the ground wave, and exceeds it at greater distances. This is because the attenuation of the ground wave is much greater than that of the nighttime skywave. As

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2 The actual reflection may occur at the E, F1, or F2 layer, depending on the ionization, which in turn depends on latitude and the sunspot cycle.
the distance increases, the skywave signal remains fairly constant for some hundreds of miles, since the received signal is coming from progressively lower and therefore stronger parts of the antenna’s vertical pattern. Finally, because of the great distance and the shape of the vertical pattern, the signal drops off to unusable values. The calculated performance of the vertical antenna is likewise plotted in Fig. 3.

It is interesting to note that in the absence of the skywave, as in daytime or at times when high-angle radiation is not returned from the ionosphere, the ground wave is thoroughly usable out to a distance of about 100 miles, producing a signal of some 10 microvolts per meter at that distance. This means that the vertical antenna can be relied upon to maintain emergency communications within a 100-mile radius during those late night periods when the horizontal antenna is tragically useless.

An occasional but unreliable transmission of daytime skywave signals over distances of some 1000 miles has been observed from the vertical antenna. This effect is possibly due to reflection from the E layer, as the relatively intense radiation at low angles may make this mode of transmission possible.

Fig. 3 shows that for the normal nighttime conditions the signal from the horizontal antenna will exceed that from the vertical out to a distance of some 850 miles, with the exception of the vertical antenna’s ground-wave coverage. Beyond 850 miles the vertical antenna’s signal is superior. This presentation may be somewhat unfair to the vertical, since it is being compared with a horizontal of 95 per cent efficiency, 62 feet in the air, and in the clear. It is doubtful that many amateur antennas meet these specifications. The signal from an average amateur horizontal antenna would probably be less than shown, and thus would drop below that of the vertical at a considerably shorter distance. The signal for the vertical has been computed from actual field-intensity measurements of the W5CSU antenna, and therefore has been reduced by the actual losses to which the antenna is subject in an average city lot. These measurements, which determine the character of the surface wave, were made along a straight line extending out from the antenna a distance of some 22 miles and are shown in Fig. 4. The instrument used was an RCA type TMV-75-B field-intensity meter. Comparison with the theoretical attenuation shows that about 400 watts is actually radiated. This is in good agreement with the efficiency figures previously given, which were based on impedance measurements of the antenna.

Measurements of the W5CSU signal at Tulsa, Oklahoma, a distance of 236 miles, on two successive nights in June, 1950, showed the median value of the signal to be from 2 to 3 times the computed value for this distance. This probably indicates that most of the signal was arriving via sporadic-E reflection, which is common during summer months. As this low layer would propagate signals at this distance with an angle of departure of some 25 degrees, it is seen that the vertical antenna would be favored in this type of transmission.

**Impedance Matching**

Measurements with a General Radio type 916A r.f. bridge show the impedance at the base of the W5CSU antenna to be as follows:

<table>
<thead>
<tr>
<th>Frequency in Kc.</th>
<th>Resistance in Ohms</th>
<th>Reactance in Ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900</td>
<td>9.8</td>
<td>-- 400</td>
</tr>
<tr>
<td>3500</td>
<td>15.2</td>
<td>-- 178</td>
</tr>
<tr>
<td>3990</td>
<td>19.6</td>
<td>-- 130</td>
</tr>
<tr>
<td>7200</td>
<td>113</td>
<td>+ 153</td>
</tr>
<tr>
<td>14,400</td>
<td>120</td>
<td>-- 64</td>
</tr>
</tbody>
</table>

The recommended connections for matching this antenna to a 52-ohm coaxial line are given in Fig. 5. For operation in the 75-, 40-, and 20-meter bands, the coil L should be 8 turns of 1/8-inch copper tubing, 6 inches in diameter and 5 inches long, with the taps placed approximately 3 turns from each end. The capacitor C for 40-meter
operation should be 200 or 250 µfd., and should be able to carry 5 amp. r.f.
for operation at 1 kilowatt. It is possible, with only a slight compromise in
match, to find a single tap position that provides satisfactory coupling for both
the 75- and 20-meter bands, thus making it unnecessary to visit the base of
the tower in changing frequency between these two bands.

For the lower-frequency part of the
80-meter band the coil should be in-
creased to 9 turns, with the other ad-
justments unaffected. Provision for
either using or not using one or two
turns of the coil will, of course, provide
the greatest range of frequencies in the
75-80-meter band.

For operation in the 160-meter band
the coil should consist of approximately
21 turns of wire, 6 inches in diameter
and 7 inches long, or some other in-
ductor having an inductance of about
40 microhenrys, with the center con-
ductor of the coaxial line tapped only
one or two turns from the ground end.
The coil will have to carry some 5 am-
peres for 1-kw. operation, so should be
wound of No. 8 wire or equivalent.

Operation in the 40-meter band may be ac-
complished with the 160-meter coil connected,
using the capacitor as before; 20-meter oper-
ation is, however, not advisable.

It must be pointed out that the impedance and
matching information given here apply only to a
cylindrical tower 4 inches in diameter and in-

stalled as was previously described. Towers of
other dimensions would not be expected to have
the same impedance characteristics.

Utility of the Vertical Antenna

From the standpoint of appearance, the ver-
tical antenna is difficult to surpass. With the
transmission line and ground system buried, the
complete absence of overhead leads except for the
mast and its guy wires provides an exceptionally
neat installation. These same characteristics also
make this antenna virtually proof against weather
hazards. The antenna at W5CSU has withstood
high winds and heavy icing without damage and
with only negligible change in operating im-
pedance, and previous operation in Minnesota
has shown that deep snow does not appreciably
affect its operating characteristics.

The question of interference in broadcast
and television receivers is always brought up when
the vertical antenna is mentioned. The following
observations pertain to these effects:

Since the "hot" end of the antenna is high in
the air instead of extending near your neighbors' house,
the most intense part of the electric field is
usually further away than with the horizontal antenna.
A few cases of blacking of broadcast receivers
have been encountered within 100 yards of the antenna.
Since this is principally caused by
currents induced in power wires, etc., all these
cases have been cured by by-passing the a.c. line
to the chassis of the receiver, and occasionally by
including a small by-pass condenser from the audio
amplifier grid to the chassis. Some interference is caused over a fairly wide area by image
response in receivers, due to the strong ground
wave, but these images are sharply tunable and
usually provide no cause for complaint. In gen-
eral, BCI has been found no worse than with the
horizontal antenna, and is of a type which seems easier to cure.

With regard to television interference, let us
first consider the radiation characteristics of a
horizontal antenna at the wavelength of har-
monics lying in the television bands. The wire is

Fig. 4 — Measured ground-wave field intensity of W5CSU anten-
na with one-kilowatt input to final amplifier, 3990 kc.

Fig. 5
Method of matching to 52-ohm coax. Circuit con-
stants are discussed in the text.
Coupling network at the base of the antenna. The feed line is coax buried in the ground.

several wavelengths long, and therefore provides considerable gain in certain directions, principally near the direction of the wire; moreover, it radiates a signal which is largely horizontally-polarized. It is easy to see why a near-by television receiving antenna can readily pick up interference of harmonic nature from such a source. The vertical antenna, on the other hand, will concentrate the radiated harmonics into a relatively narrow cone at very high angles; these are moreover vertically-polarized and therefore are at right angles to the receiving antenna polarization. Any high-order harmonic content of the signal delivered to the vertical antenna is thus directed into space at very high angles where it can do no damage.

Out of 14 cases of TVI encountered by this station, not one single case was attributable to harmonic radiation, although the transmitter contains no special filters or other harmonic-suppressive measures other than having been built in a standard metal cabinet and having reasonably selective tank circuits. As the transmission line is buried underground, there is substantially no radiation from this source. All TVI cases were caused by carrier-frequency voltage picked up by the TV lead-in, and each cured by the installation (by the receiver’s manufacturer) of a high-pass filter.

Any antenna of appreciable height presents a target for lightning. This vertical antenna, with its base resting near an excellent ground system and being connected to the ground through heavy conductors in the tuning equipment at its base, probably gives less danger from lightning or accidental contact with power wires than other types of antennas. Its presence probably gives some measure of protection to the house by its service as a “lightning rod.”

Although there is no d.c. shock hazard from a properly-fed vertical antenna, the operating r.f. potential (which may be several hundred volts on some bands) does cause danger of minor burns. The antenna should therefore be protected in some way from accidental contact with persons.

Among the most important virtues of the vertical antenna is its ability to provide satisfactory operation over several bands. This antenna has been found to operate well in the 20-, 40-, and 80-meter bands, and even in the 160-meter band it has high efficiency compared with that of the short and poorly grounded verticals used in 75-meter mobile operation. However, it is not suitable for operation in the 10-meter band in the form described in this article. The use of this type antenna as a support for another antenna is not in general a recommended practice.

No difficulties have been experienced in using the vertical antenna for receiving. It appears to be somewhat less subject to the disturbances propagated along power lines than is the horizontal antenna, but somewhat more subject to ignition noise in the 20-meter band than is the horizontal. In the 75-meter band the discrimination it provides against the strong signals arriving at high vertical angles from near-by stations relieves in considerable part the problem of intense QRN, making it thereby much less difficult to copy stations at the greater distances.

Conclusions

The results of this study indicate that the vertical antenna is a very practical antenna system for an amateur station. It can be erected in a relatively small space, and can be used successfully on four bands. It is, however, difficult to install, principally because of the requirement of the radial ground system. After being installed, it requires little maintenance because it can be made extremely weatherproof. With the exception of the ground-wave coverage (35 miles or so), the 75-meter nighttime signal within 500 miles is somewhat inferior to that from a good horizontal antenna. Beyond about 800 miles it is definitely superior. Experience has shown that the vertical usually produces an excellent daytime signal within a radius of 300 miles or so, probably by means of E-layer reflection. This daytime signal is somewhat better than that from a horizontal antenna.

**Strays**

While hanging around a railroad station in Tunica, Miss., W5CFL shot out a short Continental code Q3 on the idle Morse wire to see what could be raised. Back came ex-W4FDT of the Commerical Appeal’s press room in Memphis. The short QSO led to an exchange of QSLs. For “antenna,” W5CFL’s card read “longwire.”

W4RJD

16 QST for
A 50-Mc. Transmitter-Receiver for Civil Defense Use

A Versatile Station Designed Specifically for C.D. Needs

BY CALVIN F. HADLOCK,* W1CTW

The equipment to be described was designed as a sample unit to be duplicated by the group of hams comprising the "Amateur Emergency Net for Civil Defense" of Arlington, Mass. At the first meeting of this group the question arose as to whether the primary interest was to get a bunch of stations on the air as an amateur activity or whether the net would be a serious project to provide the best possible service to the community in case of a real emergency such as an enemy attack. The latter aim indicated use of the 6-meter band as giving better coverage than 2, with less QRM than 10 meters. Since only one ham in the town was already on 6, we had to start from scratch and build all equipment.

This is not as much of a hardship as it seems at first. Home stations are of practically no value except to stimulate activity during drills. They are located at the scene of an emergency only by rare coincidence and most of them are out of commission instantly when the commercial power fails. What we needed were interchangeable mobile and portable units designed especially for the job at hand. The local gang turned to with enthusiasm and seem to have gotten as much fun out of building the equipment as they have in operating it. The procedure followed was similar to that of a New Jersey group whose "Civil Defense Club Project" was described in QST for October, 1951. Parts lists were made, material collected, and then one night a week was set aside as "construction night" at the home of one of the members, where the boys gathered around the ping-pong table and went to work duplicating the equipment to be described.

It was decided that we would not ask the town to pay for parts for the individual equipments. The town supplied the spot-frequency crystals for 53,4 Mc. and equipment for the control station, but each unit is paid for and belongs to the individual who builds it. For this reason, the cost of parts has been kept to a minimum consistent with good performance.

One advantage of using 50 Mc. is that, in the majority of cars equipped with broadcast receivers, no special antenna need be installed. The broadcast whip on most cars opens up to 55 inches, just about a quarter wavelength long at 6 meters. The rig sits on the front seat and the ear antenna is removed from the broadcast set and plugged into a coax extension on the unit.

Current drain is kept down to ten amperes or less and the unit can be taken out of one car and installed in another having a suitable antenna in a few minutes. The vibrator pack, a National 6508, is set on the floor and clipped to the back of the cigarette lighter or ignition system. The unit may be taken into the house, connected to the home antenna, plugged into a National 697 power pack and used as a home-station rig. It contains no relays or audio transformers. Both receiver and transmitter draw about 85 ma. at 250 volts, but will work well with only 150 volts, giving excellent coverage of Arlington with the lower power.

Both the transmitter and receiver are built on 7 by 7 by 2-inch chassis, a standard size available at most radio stores. The cabinet is a 12 by 7 by 7½-inch standard size, if the 'speaker is not included. A slightly larger cabinet is available if the 'speaker is to be in the cabinet. This latter practice will require special mounting of the 'speaker to prevent microphonic howling. Connectors are standardized so any unit may be plugged into any power supply.

The Transmitter Portion

The original transmitter was built by Henry Cross, W1OOP, who should receive full credit for its design. Although Henry is not an Arlington ham, he has been of invaluable assistance. He is the type of fellow who, after listening in on a
meter to indicate grid voltage. The same meter is used to adjust the crystal-oscillator tuning. An antiquated S-meter used by the writer peaks at \( S_7 \), about 35 volts.

A Type 12AT7 is used for the speech amplifier. The first half is a microphone coupling tube, eliminating the need for a microphone transformer. The second half is a voltage amplifier and clipper. Its action is to produce "square waves," for more effective modulation for the total power drain. This stage is adjusted to clip the positive and negative halves of the sine wave equally. A 33,000-ohm resistor has been added between the plate of this triode and ground. Essentially fixed cathode bias is provided by tapping the cathode resistor of the modulator tube. These two features provide clipping of the sine-wave input at the desired levels. The coupling capacitor between the first-triode plate and second-triode grid is only 0.001 \( \mu \)fd. In conjunction with the 150,000-ohm grid resistor this value produces intentional cutting of the low audio frequencies. As explained by W100P,\(^1\) lows should be cut before clipping action takes place while the response to lows after clipping should be good.

The modulator tube is a Type 6AQ5, with the Helising system of modulation familiar to many old-timers. It fell into disfavor as, unless power was wasted in a dropping resistor, only about 60 to 65 per cent modulation could be obtained with triode tube types. If we look at the load line of a pentode tube, however, it will be noted that it is considerably longer than that of a triode and a modulation percentage of about 87 per cent is possible. The use of the clipper section more than makes up for lack of 100 per cent modulation.

\[^{1}\] Cross, QST, July, 1951, page 61.

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Discussion of a proposed unit, comes around a few days later and says, "Remember that thing you were talking about the other day? Well, here it is." This transmitter combines exceptional performance with minimum cost. It uses two tube types; namely, two 12AT7s and two 6AQ5s.

The dual-triode crystal oscillator and doubler follow familiar lines. Regeneration may be used in the oscillator circuit to make ordinary 8-Mc. crystals oscillate on their third overtone, but this was omitted in our units as we are using crystals ground for overtone use. The crystals are provided on a frequency of 26.7 Mc. \( \pm 0.5 \) ke. by the Valpey Crystal Corporation. This type of crystal is preferred for accurate spot-frequency calibration, as the third-mode frequencies of 8-Mc. crystals may differ somewhat even though the fundamental frequencies are identical.

The final amplifier uses a single Type 6AQ5 tube, neutralized by means of a slug-tuned coil in series with a 0.001-\( \mu \)fd. mica capacitor from screen to ground. Neutralization is checked in the usual manner, adjusting the inductance of the coil for minimum reaction on the grid voltage as the plate tank is tuned through resonance, without plate and screen voltage on the 6AQ5. Practically complete neutralization is obtained, and if it is done at 52 Mc., the amplifier is stable over the entire 6-meter band. A 100,000-ohm resistor in series with a 1-ma. meter is used as a 100-volt

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Bottom view of a transmitter unit built by W1PLJ, following the original design, except for the construction of the r.f. and audio portions on separate chassis. The r.f. section for 50 Mc. (lower portion) can be removed and a unit for any other band substituted readily. This transmitter also includes a coax relay for antenna switching.

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**Receiver Details**

The writer will take the blame for any troubles that may be encountered with the receiver. This unit, also built on a 7 by 7 by 2-inch chassis, uses seven tubes, not including the OB2 regulator. It is run from the same supply as the transmitter. A p.d.t. toggle switch changes both B+ and antennas from one unit to the other, eliminating relays. Considerable argument is possible on various features of the receiver, especially the tube types, but an attempt will be made to justify those used.

For the sake of simplicity, a single-conversion superheterodyne circuit was used. Double conversion would give a better image ratio and sharper selectivity but would be more expensive and harder to build. The intermediate frequency chosen, 1.73 Mc., is a good compromise between bandwidth and image ratio. The image ratio is better than 35 db. A signal to produce an image on the Arlington frequency, 53.4 Mc., would be on 49.94 Mc., outside of the band. Furthermore, no signal in the c.d. assignment on the low end of the band can produce an image in the c.d. assignment at the high end. This is important in our case, as the low segment will be used for inter-town and inter-section communication in the Boston area. The bandwidth of the i.f. amplifier, about 18 kc. at 6-db. points, is quite suitable for spot-frequency use. It is not too critical as to tuning and some variation in transmitter frequencies can be tolerated. It is also desirable when the receiver is set up on the spot frequency and then squelched until one of the local hams comes on looking for a QSO. In the Boston area,
C — 15-μfd. shaft-type trimmer (National PSL-15).
C1, C2, C3 — 3-section Em. receiver gang condenser, 1
stator and 2 rotor plates per section (1 required).
C4, C5 — 1.5 to 2-μfd. ceramic trimmer.
C6, C7 — 100-μfd. ceramic.
C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20 —
0.005-μfd. ceramic.
C21, C22, C23, C24, C25, C26, C27, C28, C29, C30 — 0.01-μfd. ce-
ramic.
C31 — 5-μfd. negative 750 coefficient.
C32, C33, C34, C35, C36, C37, C38 — 100-μfd. silver mica (part
of i.f. transformer if National type IFS used).
C39 — 500-μfd. mica.

six-meter assignments are 80 kc. apart. At 30 kc.
off the center frequency the i.f. attenuation is
over 50 db.

Let's start at the loudspeaker and work back
toward the antenna. A Type 6AQ5 is used in
preference to a 6AK6 as only 180 volts can be
used on the 6AK6 without exceeding its rated
plate dissipation. Also, a little extra push is
desirable when using a cheap, small loudspeaker.
One half of a 12AX7 double triode is used for the
first audio amplifier, with the other triode as a
squelch tube to be described later. A Type 6AL5
combines second detector, a.v.c., and automatic
noise limiter, all conventional circuits. The two
i.f. amplifiers are 6BA6s, to give good a.v.c. action
and high gain.

The mixer-oscillator is one of the new Type
6U8 converter tubes recently developed for tele-
vision use. A 6X8 was tried, but it has the disad-
vantage of a common cathode for both sections.
The 6U8 has separate cathodes, allowing use of
the familiar Hartley oscillator circuit, with the
oscillator cathode tapped on the coil. A pentode
mixer was considered desirable from the stand-

\[ EQUATION \]

Bottom view of the receiver portion of the 50-Mc.
portable station. The coil on
the form at the left is the oscillator. i.f. stages are
across the bottom, and the audio portion at the right.

QST for
point of stability and gain, high over-all gain being needed to make the squelch open on a relatively weak signal.

Although the oscillator and mixer coils were mounted as nearly at right angles as possible, it was found that adequate injection voltage was obtained without any intentional coupling. This should be about one to two volts on the control grid of the pentode when the mixer and oscillator are properly tracked. This can be checked by a high impedance voltmeter such as a 50,000-ohm resistor in series with a 100- or 200-microampere meter. Actually, too much injection voltage was obtained until the oscillator plate voltage was reduced to about 60 volts, by the insertion of a dropping resistor between Pin 1 of the 6U8 and the 90-volt supply. The use of a grounded-plate oscillator is desirable; the plate then provides some shielding between the "hot" parts of the triode oscillator and the pentode. A 5-μfd. capacitor with a 750 negative temperature characteristic is used across the oscillator tuning capacitor for drift compensation.

A 6BA6 pentode is used as the r.f. amplifier tube. Here again there is a chance for argument but the advantage of low-noise amplifiers at this frequency is debatable when the receiver is used near sources of noise, as in a car. The 6BA6 is a tube to which a.v.c. voltage can be applied, and it is desirable to apply a.v.c. to as many tubes as possible. It was found that, even with two stations separated by only a few feet, the receiver does not block or distort.

The oscillator and mixer coils are below the chassis, so the antenna coil is located above the chassis for isolation purposes. Its tuning capacitor is made variable so that it can be adjusted for different antennas. The tuning capacitor is a three-gang double-spaced fidget from an f.m. receiver, with its sections reduced to one stator and two rotor plates.

The squelch circuit is much simpler than the circuit so commonly used but it is entirely adequate. It lets a small amount of receiver noise leak through so that an operator can tell by listening carefully that the receiver is still operative. The important item is the 0.01-μfd. capacitor which effectively couples the grid to the plate so that electrically they remain at the same potential, virtually making the triode into a diode. The plate impedance becomes very low, of the order of a few hundred ohms, until the grid is cut off by a.v.c. voltage, at which time the plate impedance becomes infinite. This low impedance is connected between the grid of the 12AX7 audio amplifier triode and ground, thereby reducing the voltage input to the grid drastically. Connecting it to the arm of the volume control also makes the squelched noise level relatively constant over most of the range of the control.

As the volume control is advanced the shunting effect increases, maintaining a relatively constant squelched noise level which can be heard very weakly a few feet from the speaker.

The two chassis are mounted to the front panel of the cabinet on which are also mounted the various connectors.

**Adjustments**

Getting the unit properly tuned up is not difficult, especially if a grid-diaper is available.

(Continued on page 118)
A Car-Mounted 10-Meter Beam

Increased Power for Stationary Operation

BY BERT W. MATTHEWS,* W5OME

To many hams like myself, mobile radio is not merely an interesting diversion from home-station activity. For one reason or another, it may be the only opportunity we have to get on the air. Since, even under the best conditions, the mobile ham must compete with home stations under the handicap of strict limitations on power and antenna dimensions, anything that helps to reduce or offset these disadvantages is of more than casual interest. As is often the case, the idea of a 10-meter beam antenna that could be mounted on a car took form during a casual discussion of something quite remote—the problems involved in the design and adjustment of a directional quarter-wave phased system for a 5-ke. broadcast station! The final result that developed is shown in the photograph and sketch. It is a three-element parasitic beam with quarter-wave grounded elements. It is arranged mechanically so that normal mobile operation with the usual single whip antenna is in no way hampered. For stationary operation the parasitic elements can be added easily in a few minutes to provide a gain of 5 db or better, and they can be dismantled and stored in the trunk just as quickly.

Construction

The driven element is the normal quarter-wave whip mounted on the left rear corner of the bumper. The reflector and director are fastened to a length of 1¼-inch pipe slung across the rear of the car, an inch or two below the bumper. The total length of 9 feet is broken up into three 3-foot sections joined by threaded pipe couplings so that the pipe can be quickly dismantled for storage in the trunk. Two ¾-inch steel inverted-L brackets were made and fastened to the frame of the car at the bumper-bracket bolts. The pipe is held in a pair of pipe clamps whose bolts go through holes in the lower ends of these brackets.

The director and reflector elements are telescoping-type window-mount antennas of the sort used for b.c. reception in apartment houses, extending to 120 inches and collapsing to 35 inches. These are fastened, with homemade clamps, to the pipe. The clamps are made so that the bottoms of the elements can be insulated temporarily from the pipe while measurements are being made. The reflector is 0.15 wavelength and the director 0.1 wavelength from the driven element. This brings the reflector about 7 inches beyond the end of the bumper opposite the driven element, while the director is about 3 feet outboard. Obviously, this system is not intended for use while the car is in motion, but this is not usually considered a great disadvantage.

Adjustment

Considerable time was spent in adjusting the system before anything like expected results were realized. At first, recommended lengths for a standard three-element horizontal array were cut in half. But, also, field-strength measurements showed that something was radically wrong. After a lengthy investigation, it was found that while the reflector was behaving quite normally, the director had to be shortened drastically before the array began to produce

* P. O. Box 1470, Haddock Camp No. 3, Las Vegas, Nevada.
real results. Apparently because the director is not close to the car body, the length of mounting pipe between the director and the car body acts as an extension of the director length. The length of the director whip had to be shortened by about 30 inches for maximum gain. The lengths finally arrived at are shown in Fig. 1. Resonance in each case was checked by removing all but the element to be checked. The parasitic elements were insulated temporarily from the pipe while measurements were being made. Impedance and resonances were checked with a General Radio impedance bridge (a grid-dip meter and variable-resistance bridge could be used instead).

The driven element is a Master all-band job whose length is not adjustable. It was found to have a total length, including the mounting and feed-through, of 0.273 wavelength at the desired center operating frequency of 28.8 Mc. Therefore, a 500-µfd. variable condenser was placed in series so that the antenna could be tuned to exact resonance. Measurement showed a feed-point impedance of 22 ohms. Although the antenna is fed from the transmitter through a half-wavelength of 70-ohm coaxial cable, loss resulting from the mismatch is negligible. An antenna current of 1.3 amperes with an input of 54 watts shows an over-all efficiency of 69 per cent.

The coax cable was cut to an exact half wave-

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Fig. 1 — Sketch showing the important dimensions of the 10-meter mobile beam antenna. The director resonates at 30.2 Mc., the antenna at 28.8 Mc. and the reflector at 27.4 Mc.

Cars of various makes and body styles differ in ground-plane characteristics somewhat, so that element length may have to be adjusted experimentally for peak performance. Physical measurements have been made on several types and makes of cars and it seems possible that an arrangement could be provided that could be left mounted permanently on the car. This might be done by placing the driven element on the left rear cowl behind the door, the reflector on the left front cowl in front of the left front door, and the director on the bumper at the left rear side of the car. This would, of course, look like a mobile antenna farm, but those amateur clubs fortunate enough to possess trailer-mounted emergency equipment might find it quite the thing. However, since the array can be put up or taken down in about three minutes and stored conveniently in the trunk, the arrangement shown should find ready application in emergency work.

I want to take this opportunity to thank the many hams who assisted in the testing of this antenna by making comparative 8-meter readings, and especially Mr. E. Noel Luddy and Al Reville, W5WB, for their inspiration and helpful suggestions. The results have been more than well worth the effort. On one test, W5OME and W5DCM, the latter station in motion, were in continuous communication for approximately 40 miles on ground wave. The average ground-wave maximum in the area was only about 20 miles before the car-mounted beam was installed.
Happenings of the Month

21 MC. DUE MAY 1ST

On March 17th FCC released two documents, each entitled Notice of Proposed Rule Making, one which would amend our rules to withdraw from amateur use effective April 1st the frequencies 14,350–14,400 kc., and another which would amend our rules to make available for amateur use effective May 1st the entire new band 21,000–21,450 kc. Canada is taking similar action on its amateur assignments.

These actions are among the first to be taken by our Government to put into effect the Atlantic City table of allocations below 27.5 Mc, in accord with the pattern for implementation laid down by the Extraordinary Administrative Radio Conference. They directly result from meetings earlier this year of government and industry communications groups, including participation by ARRL on behalf of amateurs, to work out plans for removing present commercial services from the 21-Mc. band, and to arrange new commercial assignments in the 50 kc. we relinquish at 14 Mc.

Temporarily, the only emission which will be permitted on 21 Mc. is A-1 telegraphy. This results solely from a desire on the part of all concerned to make the proposed changes in the quickest possible time; any discussion and proposed rule-making concerning suballocations would delay the opening of the new band several months. It is the Commission’s intention to take up shortly the matter of authorizing additional types of emission.

Note: As of press date for this issue, final action to amend our rules had not been taken by FCC — and indeed was not expected until late April. Before firing up on 21 Mc. after May 1st, then, confirm that the band has actually been opened by monitoring WIAW bulletins in late April, or checking with your director, assistant director, SCM, club secretary or other League field official who receives copies of WIAW bulletins or similar material direct from ARRL Headquarters.

BOARD MEETING

A special meeting of the Board of Directors of ARRL has been called for May 9th in Hartford, Conn. At press time we have notice of several proposals which individual directors plan to present. Northwestern’s Roberts will ask that copies of Directors’ Letters on League affairs be sent to retiring directors for two years following termination of office. Roanoke’s Jacobs will ask the deletion of By-Law 12(b) which now makes ineligible for directorship any nominee who is primarily engaged in radio service work: he will also propose an amendment “to prevent the president from succeeding himself in office a second term.” Rocky Mountain’s Matejka has several motions for the expansion of ‘phone allocations: 3750–4000 kc. on 75 meters; a new 7225–7300 kc. band for General Class or higher license (not Conditional); 14,200–14,350 kc. on 20 meters; and 28,250–29,700 kc. on 10 meters.

In addition the Board will most certainly consider the subject of 21-Mc. suballocation. It also will take up the matter of adopting new By-Laws to supplement the Amended Articles of Association put in force last year. There will be reports of committees which will need consideration and possible action. Make certain you or your club are on record with your director concerning these matters and any others which may be currently topics of the day.

The May meeting is termed “special” because under the new charter the regular annual meeting is normally scheduled for sometime in the first quarter. Such a meeting was held, as required, but it was no surprise when no directors appeared inasmuch as they had all earlier indicated inability to attend a meeting so early in the year. The minutes follow:

MINUTES OF 1952 ANNUAL MEETING OF THE BOARD OF DIRECTORS
THE AMERICAN RADIO RELAY Lewis, INC.

March 14, 1952

1) Pursuant to due notice and the requirements of the Amended Articles of Association, the regular annual meeting of the Board of Directors of The American Radio Relay League, Inc., was called to order at the headquarters office of the League in West Hartford, Connecticut, at 9:32 a.m., EST, March 14, 1952. Present: Vice-President E. L. Handy, occupying the Chair; Secretary and General Manager A. L. Budlong; Treasurer David H. Houghton. In the absence of a quorum the Chair immediately declared the meeting adjourned.

A. L. BUDLONG
Secretary

(Continued on page 190)
COY PRAISES AMATEURS

- Every Government agency must appear before Congressional committees on appropriations to answer any questions that might arise concerning planned expenditures for the coming fiscal year. In February FCC, represented by its then Chairman Wayne Coy, was called before a House subcommittee on appropriations. We reproduce below a verbatim excerpt of the testimony, the questions being asked by Rep. Albert Thomas of Texas, and some mighty powerful answers being furnished by Mr. Coy with able assists from Col. E. L. White, chief of the Safety & Special Radio Services Bureau, which has amateur radio matters under its wing:

Mr. Thomas: Would you save any time by having this other work (license-processing in various services) done in the field?

Mr. Coy: We would not. We would not.

Mr. Thomas: Have you given careful study to that?

Mr. Coy: We have. It is just an impossible problem to have information flowing to the field about available frequencies for assignment to particular applicants with the staff we have and would probably result in a loss of time.

Mr. Thomas: Rather than saving time?

Mr. Coy: Rather than saving time. I am convinced of that myself. I have not asked Colonel White, but I think he would say the same thing, because it is just impossible to keep information flowing to the field fast enough to be of any benefit in granting applications — information about frequency utilization.

Is not that right?

Mr. White: Yes. It is even deeper than that. For example, the amateur applications, which is the biggest part —

Mr. Thomas: What do you mean by “amateur” now?

Mr. White: Amateur stations. We have an average intake of around 5000 applications a month from amateurs all over the country.

Mr. Thomas: In other words, they are not people who are engaged in any particular type of business?

Mr. White: No; but people doing radio research and radio communication as a hobby, mostly. It is one of the older of the services. I think it is the third- or fourth-oldest service, and it is the largest service of any of them. They have 104,000 amateurs right now, and we have 9 people handling those 5000 applications.

Mr. Thomas: Are not you fast reaching the point where industry may require some of the time now allocated for use by amateurs?

Mr. Coy: I should say not. They are worth more than the whole confounded industry.

Mr. Thomas: How do you mean?

Mr. Coy: They have done more of the pioneering work and made possible more commercial developments here than anybody else in this country. I think the amateurs ought to get a Congressional Medal of Honor in the communications field, if we could have one.

Mr. Thomas: But here is a businessman operating a fleet of trucks, and he wants to get a new station or a modification of a station, and here in that particular field his biggest competitor in point of time is the amateur who is playing around with this thing for his own amusement and benefit.

Mr. Coy: Let me put it in several other ways. One, this service is so good that the military want it and have established their own amateur service of their own personnel, directed at their own research kind of problems. The next point in the matter is that this is the greatest emergency resource in communications that this country has.

Mr. Thomas: I understand that, but what I am getting at is are not you reaching the point of saturation where you are going to have to take a look at this in future programs?

Mr. Coy: Not at all. If I were speculating and, say, I would be at the Commission for the next 30 years, which I hope would be an expectancy of mine — I would just like to live that long — I hope I could say to you now that I would never be one who would take the amateurs off the air.

Mr. Thomas: There is no conflict of interest in point of time, saturation, or anything between the amateurs and the legitimate commercial interests?

Mr. Coy: Yes; there is a conflict.

Mr. Thomas: There is a conflict?

Mr. Coy: Surely. A fellow’s special interest is always in conflict with the public interest, and the private guy who wants to use something for his special interest as against the general interest is always yapping that the amateur has too much space. At least, we hear that every now and then.

Mr. Thomas: If there is any conflict, then, the business interests are making a sacrifice; are they not?

Mr. Coy: We think we can take care of them in other parts of the spectrum adequately. We think we can take care of every legitimate need of the American businessmen which we believe serves the public interest. We have not denied them; we have set up services for them. We are continually setting up new services. We have ahead of us a pretty dreary outlook of ever getting through with all of them. They pile up faster than we can get through. But when they tell us they can only operate their service by taking away the amateur frequency, we are not for that.
On examining the possibilities of putting the two-control bandpass rig\(^1\) on 21 Mc., it soon becomes obvious that mechanical considerations prevent the addition of a new frequency-multiplier stage. However, by sacrificing the 11-meter band the original 27-Mc. section can be converted into a 21-Mc. tripler. This works out nicely in practice because the actual modification involves nothing more serious than a tube substitution, a change in the values of two components, the addition of one new part and a very small amount of rewiring. The multicircuit tuner in the final amplifier is already capable of being tuned to the new band.

Fig. 1 is a before-and-after wiring diagram of the modified circuits of the transmitter. Section A of the diagram shows the circuits in the original form and Section B shows the changes which permit the doubler to be used as a tripler to drive the 820-B final at 21 Mc. The Type 6N7 tube which served originally in the two high-frequency doubler circuits has been replaced by a Type 6BL7GT double triode, with one triode working as the 21-Mc. tripler and the second as the doubler to 28 Mc. Substituting the huskier 6BL7GT for the 6N7 was necessary in order to insure adequate excitation for the final amplifier at 21 Mc.

As shown by Fig. 1, the revamped set of connections has socket prongs 4, 5 and 6 wired into the 28-Mc. circuit. The addition of a by-pass capacitor, \(C_1\), and a cathode bias resistor, \(R_5\), are the only major alterations in this stage. Prongs 1, 2 and 3 of the 6BL7GT socket are used for the 21-Mc. tripler. This circuit no longer connects to \(S_{1B}\) as was the case with the 27-Mc. doubler. Instead, the grid of the tube is returned to \(S_{1C}\). It should also be noticed that the compensating capacitor, \(C_{10}\), has been removed from \(S_{1B}\) and then reconnected directly to the grid of the tripler tube. The cathode resistor for the 21-Mc. triode \((R_7)\) has been changed to a 1000-ohm 10-watt unit. The plate of the tripler is rewired to the original 27-Mc. coupler, since this coupler can be tuned to 21 Mc.

In the 14-Mc. section of the rig, it is only necessary to rewire \(S_{1C}\) so that the old 27-Mc. contact connects directly to the grid of the tripler tube. Then when the bandswitch is set at this position excitation from the 7-Mc. doubler (not shown in Fig. 1) is fed to the 21-Mc. stage alone.

The 21-Mc. bandpass coupler is aligned in the same way as those for other bands. The only new data are the currents and voltages for the 6BL7GT. With no excitation applied to the tube, the drop across the cathode resistors should be approximately 16 volts. D.c. voltage across the grid leaks for the 21- and 28-Mc. sections should measure approximately \(-115\) and \(-100\) volts, respectively, under key-down conditions, and the cathode current for either triode should be somewhat under 50 ma. with 300 volts applied to the plates.

--- C. V. C.


A Midget Fifty-Watter

A Compact C.W. Rig for the Novice or Old-timer

BY RICHARD M. SMITH,* WIFTX

*N has been used to indicate that an asterisk is to be placed after the name. The asterisk is used to refer to a note or reference at the end of the article.

- After you've built a few "breadboard" rigs, you may get the urge to construct something a bit more "commercial" in appearance. Here's a how-to-do-it article describing an inexpensive c.w. transmitter that can be built in a few evenings.

Nearl fifteen years ago, the late Fred Sutter, W8QBW-W8QDK, created quite a stir in ham radio with a series of Lilliputian transmitters that weren't much bigger than the average QSL card. Apparently his QST articles describing these rigs were devoured and remembered, because we still hear nostalgic comments about the "QSL Forty," the "QSL Sixty," and the "Runt Forty" whenever the old gang gets together. These rigs were pint-size powerhouses, and anyone who ever worked Fred knew that they packed a real punch. We decided that the same sort of thing, in modern dress, might make an appealing rig for present-day hams. We started looking around for ideas, realizing that today's requirements are a bit different, but that the basic features of compactness, simplicity, and power are no less appealing today than they were in the '30s when Sutter and the 6L6G were having their heyday. The midget 3.5- and 7-Mc. transmitter shown here is the result.

Circuit Considerations

Packaged in a standard 4 × 5 × 6-inch utility box, this transmitter has many of the features of much larger units. A two-tube oscillator-amplifier circuit is used, as shown in Fig. 1. Years ago we found that it is much simpler to get a clean-keying signal if you avoid trying to make one tube serve the dual purpose of generating the signal and amplifying it, too. A few cracked crystals convinced us that it is cheaper, also, because present-day quartz crystals are built to provide stability rather than power. The operating simplicity of a one-tuber is retained, however, by using an untuned plate circuit in the oscillator stage, so that only the amplifier plate circuit need be adjusted in operation. The 6AG7 was selected as the oscillator tube because it has shown itself to be reliable and easy to adjust, and it is both inexpensive and easy to obtain. For the amplifier, we chose the 6BQ6GT, originally designed as a sweep amplifier for TV receivers, but having ratings similar to the popular 2E26 transmitting tube. It has a good husky cathode that speaks well for its ability to stand up and take it, and its cost is considerably under that of most transmitting tubes, including the 6L6, the 807, and the 2E26. While we didn't have much information on it as an r.f. amplifier, the results have been good enough to justify the gamble we took in selecting it.

Construction

You'll get the general idea of how the rig is built from the photographs. All we'll do here is point out a few of the less obvious points to keep you from going wrong. The "chassis" is nothing more than a small bracket 2½ inches wide and 4½ inches deep welded to one cover of the utility box (ICA No. 3819). No, you don't have to do the welding; you buy it that way! The tube sockets are mounted in a line across the rear of the

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the chassis, centered 1 1/4 inches from the rear edge. If you use 1 1/4-inch diameter ceramic sockets, they fit in nicely with about 1/8-inch clearance on each side. The 5-prong male power connector (Amphenol 86-CNP5) is centered on the rear apron.

Now, looking at the front, the holes for mounting the crystal socket and the key jack are centered 1 inch above the bottom of the panel so they will clear the lip of the box when the rig is slipped inside. The 3/8-inch diameter hole for the tuning condenser shaft is in the exact center of the panel, and the coaxial output connector, J2, is centered 3/4 inch down from the top. The coil, a cut-down commercial unit, is mounted on 3/4-inch ceramic stand-offs placed 2 inches apart on a line 1 1/4 inches down from the top. If you use a different diameter coil, or a different tuning condenser, check first to make sure that there is enough clearance between the two when the rotor plates are extended.

Now you’ve got all the so-called “critical” mounting dimensions. Actually, the only critical factor is to make sure that you get all the parts in the box. The r.f.

Everything fits behind the panel without crowding in spite of the size limitation. Here, the amplifier tube is in the foreground, the oscillator to the right, and the amplifier tank circuit next to the panel. A 5-prong power plug is mounted on the rear of the built-in chassis.

QST for
leads are bound to be short enough in this rig, no matter how you run them! It is a good idea to use a scrap of $2 \times 4$ lumber as a backing surface when drilling the holes in the chassis to keep the pressure of the drill from bending the light-gauge metal. While you’re at it, drill a $\frac{3}{4}$-inch hole $2\frac{1}{2}$ inches behind the panel and $\frac{3}{8}$ inch in from the edge, for a feed-through bushing (Millen 32150) to carry the high-voltage lead to the plate of the tube. Drill a small hole (to pass a 6–32 machine screw) $\frac{1}{2}$ inch nearer the panel to mount the plate r.f. choke, RFC$_4$. Drill two similar holes $1\frac{1}{4}$ inches and $2\frac{1}{2}$ inches behind the panel on a line through the center of the chassis. The first of these is to secure a tie point below decks, and the second for the rear mounting foot of the tuning condenser.

Don’t put the $\frac{1}{4}$-inch drill away until you have made some holes through the top and bottom of the cabinet to provide ventilation. You can make as many $\frac{1}{4}$-inch holes as you like without impairing the shielding, but don’t use a larger drill unless you are prepared to line the holes with copper screening to keep the harmonics at home.

Before you start mounting parts, clean the paint off the inside of the panel and the lip of the box where they meet. This is to insure good contact, metal-to-metal, so that the shielding will be complete when the rig is “buttoned up.” The easiest way to do this is with paint remover, available in almost any hardware store, but if you don’t mind spending the time, it can be done with a knife, finishing off with sandpaper. This should be done to the rear cover of the box, too.

Now you are ready to mount the parts prior to wiring. Put the tube sockets in first, with soldering lugs slipped under each nut to serve as ground points. Mount the sockets so that Pin 2 of the amplifier socket and Pin 7 of the oscillator socket are nearest the rear of the chassis. Next mount the crystal socket and the key jack. The latter has one side grounded to the panel, and it is a good idea to scrape a little of the paint off around the inside of the mounting hole to insure good contact. This is a good rule to follow whenever mounting a component that is supposed to be grounded. Put the tuning condenser in next, slipping a $\frac{1}{4}$-inch spacer under the mounting foot at the rear.

Modification of the B & W type 40-JEL coil is needed before it is mounted. Remove the coil from its plug-in base by clipping the wires off as close to the ceramic base as possible. Then remove the polystyrene bar from the metal mounting feet by drilling through the eyelets that fasten them together and pry them apart. Do this carefully so that you don’t damage the bar, which is to support the coil in the transmitter. Remove seven turns from the end opposite the link winding. This should be done a turn at a time, “unwinding” the coil with pliers by pulling on the wire until it breaks loose from the polystyrene supports. Trim off all the excess material on the three small supports, but retain enough of the longer mounting bar to permit it to be drilled to pass 6–32 screws into the stand-off insulators. The total length of the mounting bar after modification is $2\frac{1}{4}$ inches, and 18 full turns remain. Mount the coil as shown in the photographs, with the link winding at the left (when viewed from the rear). Connect the stator (fixed) plates of the condenser to the right-hand end of the coil (away from the link winding) by

In this bottom view, the amplifier socket is on the left. The oscillator socket is partly obscured from view by the interstage coupling condenser, C$_4$, and the oscillator plate choke, RFC$_2$. By-pass condensers are mounted directly on the tube sockets and on the rear of the power connector. Cathode choke RFC$_1$ is visible in the center, flanked by the amplifier grid leak $R_4$ and $R_5$, and $G_2$ of the oscillator grid circuit. C$_3$, needed only when TVI is a problem, is mounted right across the amplifier tube socket.

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breaking away another quarter turn of the coil and dropping it down to the condenser. The other end of the coil must be grounded, along with the rotor plates of the condenser. Make this ground connection at the rear bearing on the condenser, even though it might be easier to ground the coil somewhere on the front panel. Unwind ¼ turn from the end to be grounded and connect it to the rotor lug, forming the wire slightly to avoid contact with the rotor plates as they are turned.

Connect the right-hand end of the link winding to the insulated center terminal of the output jack, and ground the other end. Install parasitic-suppressing choke RFC3 between the plate cap of the amplifier tube and the top of RFC4.

The arrangement and wiring of the remaining parts is shown in the bottom view of the transmitter. The heater wiring and the supply leads are made with shielded wire (Belden No. 8885) as a precaution against TVI. Proper use of this wire is described in a recent QST article.¹

By-pass condensers C16 through C18 are used to filter the supply leads to prevent radiation of TVI-producing harmonics from the leads that connect the transmitter to its power supply. Each should be installed right at the point where the wire passes into the power connector on the rear of the transmitter, with the ground connection being made to the shield braid.² The braid itself should be soldered to any convenient grounding lug to insure mechanical rigidity. In addition, wherever shielded wires touch one another they should be soldered together to insure good contact.

After the heater and supply wiring is completed the rest of the small parts can be wired into the circuit. A fairly long lead is required between the crystal socket and Pin 4 of the oscillator socket. Make this of No. 16 bare tinned wire, and it will then be rigid enough to serve as a tie point for one end of C1 and R1. One end of RFC7 is supported by a tie point located about midway between the tube sockets and the key jack. RFC8 has a tapped ceramic base which is used to mount it on one of the screws that holds the power socket in place. This choke should not be mounted until all of the rest of the wiring has been done around the oscillator socket. Looking at the photograph, the oscillator voltage lead is connected to the bottom of RFC5, while the top is connected to Pin 8 of the tube socket behind it. Coupling condenser C4 runs from the top of RFC2 to Pin 5 of the amplifier socket, and screen resistor R5 is connected from the other end of the choke to Pin 6 of the oscillator socket.

By-pass condenser C9 serves as a harmonic filter for the keying lead, and should be installed right at the key jack. Shielded wire is used to connect the jack to the cathode of the amplifier tube, and between the cathodes.

C14, shown in dotted lines in Fig. 1, serves to reduce the amplitude of harmonics generated in the grid circuit of the amplifier, and need be used only when the rig is to be used in TV “fringe” areas. It is connected right across the socket, from Pin 5 to Pin 8.

Adjustment and Operation

After checking the wiring against the diagram, you are ready to apply power to the rig. Note that the diagram calls for 250 volts to be used on the oscillator plate circuit, 200 volts maximum for the amplifier screen grid, and 500 volts maximum for the amplifier plate. The most critical of these is the amplifier screen voltage. Under no circumstances should the screen be operated at more than 200 volts, because it will draw excessive current resulting in possible damage to the tube. We found that the best way to supply the screen voltage is from a well-regulated separate source. The next best alternative is to supply it through a small dropping resistor from the oscillator plate supply. With the 6BQ6GT the customary method of using a dropping resistor from the amplifier plate supply is dangerous, because unless the amplifier is loaded fully, screen voltage can rise to excessive value. In addition, it is an uneconomical way to do it, because an unusually high value of resistance is required. Using the system we have suggested is better, because it insures against the screen voltage rising to more than the oscillator plate voltage. It also results in cleaner keying. With a 250-volt supply, a 4700-ohm 1-watt resistor does the job nicely, resulting in about 175 volts applied to the screen under operating conditions. This is a good safe value, and is plenty to permit full output to be obtained. The resistor can be installed in the power supply with greater ease than in the transmitter, which is a bit crowded for space as it is.

Before applying plate and screen voltage to the amplifier tube, try the oscillator to make sure that it is functioning. Plug in the crystal, and then apply power to the oscillator alone, closing the key. Tune a receiver to the crystal frequency and listen for the oscillator signal. Key it to make sure that it does not chirp. If it chirps, check to make sure that you have the right values for C1 and C2. If you have accidentally interchanged these condensers, the circuit will not function properly, and may not work at all. Next measure the bias voltage developed across the grid leak of the amplifier stage R2. To do this, connect an r.f. choke in series with the negative lead of the voltmeter to avoid loading the circuit too heavily, and ground the positive lead to the chassis. If the oscillator is working properly there will be at least -35 or -40 volts of bias indicated when the key is closed. If there is more than this, it is probably because the plate-supply voltage is too high, and it should be reduced somewhat to avoid overdriving the amplifier stage.

Once the oscillator circuit is working, connect a d.c. milliammeter in series with the positive

² Grammer, “By-Passing for Harmonic Reduction,” QST, April, 1951.

(Continued on page 180)
Armed Forces Day – May 17th

Receiving Competition and Military-to-Amateur Test

The Army, Navy and Air Force offer a double-header program for the radio amateur fraternity on Armed Forces Day, Saturday, May 17, 1952.

The three services will cosponsor a receiving competition and a military-to-amateur test, patterned directly after the successful 1951 Armed Forces Day exercises.

Receiving Competition

A message to amateurs from the Secretary of Defense will be broadcast on 15 military frequencies from Army, Navy and Air Force stations. Any listener who can receive and transcribe the International Morse Code message may send his transcribed copy to Armed Forces Day Contest, Room BE1000, The Pentagon, Washington 25, D.C., where representatives of the three services will check it against the original transmission. All who submit a perfect copy will receive a Certificate of Merit, attesting to their code-copying proficiency. Be sure to state the time, frequency and call letters of the station whose transmission you copy.

The following times, call letters and frequencies will be employed for the Receiving Competition. (Eastern Standard Time has been used throughout. In converting to local time for your area, remember that EST is five hours earlier than Greenwich time, and is one hour later than Central Standard, two hours later than Mountain Standard, and three hours later than Pacific Standard time.)

<table>
<thead>
<tr>
<th>Time</th>
<th>Call Sign</th>
<th>Frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000 (EST)</td>
<td>AIR (Air Force Radio)</td>
<td>3497.5, 6697.5, 27,994</td>
</tr>
<tr>
<td></td>
<td>Washington, D.C.</td>
<td>kc.</td>
</tr>
<tr>
<td></td>
<td>NSS (Navy Radio)</td>
<td>122,1380, 9425, 12,630</td>
</tr>
<tr>
<td></td>
<td>Washington, D.C.</td>
<td>17,090, 21,090 kc.</td>
</tr>
<tr>
<td>2400 (EST)</td>
<td>AIR (Air Force Radio)</td>
<td>3497.5, 6697.5, 27,994</td>
</tr>
<tr>
<td></td>
<td>Washington, D.C.</td>
<td>kc.</td>
</tr>
<tr>
<td></td>
<td>NPO (Navy Radio San Francisco)</td>
<td>115, 9255, 12,540, 16.</td>
</tr>
<tr>
<td></td>
<td>265 kc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WAR (Army Radio)</td>
<td>14,405, 20,994 kc.</td>
</tr>
<tr>
<td></td>
<td>Washington, D.C.</td>
<td></td>
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</tbody>
</table>

Each transmission will be preceded by a five-minute CQ call. All transmissions will be at 25 words per minute. Should characters for any reason be transmitted with errors, such errors should appear in your transcription. It is not necessary to copy more than one station, and no extra credit can be given for so doing.

Military-to-Amateur Test

Here is an opportunity for every licensed amateur to work the headquarters stations of the Army, Navy and Air Force direct, and to receive an official QSL acknowledging the contact and showing the RST report of your emission as logged at the military headquarters stations.

Certificate of Merit to be awarded those making perfect copy of the Secretary of Defense’s Armed Forces Day message.

Each of the military headquarters stations will QSL separately, so if you’re ambitious you can get three different QSL cards.

AIR, NSS and WAR will be on the air between the hours of 1800 and 2100 (Eastern Standard Time) on May 17, 1952, to contact and exchange QTH, signal-strength and readability information with amateur radio stations. The military stations will work on spot frequencies just outside the 80-, 40-, and 20-meter bands. No traffic handling or message exchange will be permitted. Prompt and courteous operating practices will make it possible for the military stations to contact a larger number of amateur stations during the six hours for which the test is authorized.

A word of caution! In the 1951 exercises, a careless few amateurs operated on the military frequencies rather than in the amateur bands. No authority exists for amateur operation outside the amateur bands in these tests. Similarly, amateurs affiliated with MARS or USNR networks, which drill on military frequencies, are not authorized to use the military frequencies for purposes of these Armed Forces Day exercises. AIR, NSS and WAR will limit contacts to amateur-band stations only.

Here’s where to find the military stations:

The Wavelength Factor—II

Propagation, Modulation, and Receivers

BY YARDLEY BEERS, * W2AWH

In the preceding article the discussion was limited to antenna characteristics as related to the operating wavelength. The remaining factors that influence the choice of a band for a particular type of communication may be grouped under three broad headings: propagation phenomena, types of modulation, and receiver characteristics. These factors will now be considered in turn.

PROPAGATION EFFECTS

Atmospheric Effects

Besides ionospheric effects, which are excluded from this discussion, numerous effects are produced in the atmosphere. First, there is regular refraction and also the well-known refraction caused by temperature inversions. The latter may extend the range well beyond the line of sight at times.

One less well-known phenomenon that deserves special mention is superrefraction, "trapping," or "duct" formation. This is due to the formation of a layer containing a gradient of water-vapor density. It is more likely to occur over a large body of water but may also occur over land, especially in evaporation after a rainstorm or during the melting of snow. The existence of such layers is impossible in the presence of strong winds. The general result, normally, is that the rays are bent downward. Then the range of radio communication may exceed several times the line-of-sight range. The necessary conditions are that (1) the height of the duct must be large compared with the wavelength (several hundred feet for a wavelength of one meter) and (2) the transmitting and receiving antennas be low enough to be contained within the duct. Since small ducts are more probable than large ones, this phenomenon is more likely to produce an effect at the shorter wavelengths. It is primarily of importance at wavelengths below one meter, but on rare occasions it may influence communication even at 10 meters. Stations with antennas above the duct (for example, on a high cliff overlooking a body of water) will find that the formation of a duct will tend to impair communication and give dead spots in their ordinary coverage. Two or more amateurs separated by an over-water path somewhat longer than line-of-sight range might find it of interest to maintain a schedule at 420 Mc., or preferably higher, to investigate this effect.

At wavelengths above 10 or 20 cm, the atmosphere is essentially transparent to radio waves. Water vapor has a strong absorption band with a peak at 1.3 cm and extending, for practical purposes, for several tenths of a centimeter on either side of the peak, depending upon the pressure. Oxygen has a strong absorption band centered at 0.5 cm. Therefore the wavelengths between 0.3 cm and 1.6 cm are probably undesirable for radio communication although some interesting refraction effects may accompany the absorption. The oxygen absorption is constant, but the water-vapor absorption will depend upon the relative humidity. In addition to these true absorptions, raindrops will cause scattering of radio waves which, practically speaking, is the equivalent of absorption. This scattering increases as the wavelength is reduced, and the effect probably is not large at wavelengths greater than 5 or 10 cm.

Non-atmospheric Effects

One of the best-known effects in the propagation of very short radio waves is scattering by opaque objects in the path of the waves. In the
case of large regular objects this is more properly termed reflection. Plane surfaces may give either diffused reflection (like the reflection of light from white paper) if the surface is rough, or regular reflection (like a mirror) if the surface is smooth — that is, if the irregularities are small compared with the wavelength. Buildings may be expected to give strong reflections at most of the frequencies we are likely to consider, while smaller objects will have appreciable effects as the wavelength becomes smaller. The strong reflections often present at short wavelengths will cause the signal strength to vary rapidly with a change of a fraction of a wavelength in the position of either the transmitting or receiving antenna. In mobile operation this will give rapid fading, and with fixed stations it may give erratic results. On the other hand, a mobile station may utilize reflections to advantage if it parks in an optimum position. The optimum

- may utilize reflections to advantage

position in front of a large wall or cliff may increase the gain and equivalent area of the antenna by as much as 4 times (6 db.).

Another effect of some importance is the Doppler effect, which is the change of apparent frequency when the transmitter and receiver are in relative motion. The reader no doubt has heard the whistle of a locomotive as it passed him, resulting in a sudden lowering of the pitch. A similar effect may occur with radio or light waves. If the transmitter and receiver are approaching, the apparent frequency will be raised by an amount equal to the transmitter frequency multiplied by the ratio of the relative speed of motion to the speed of radio waves (186,000 miles per second). If the two are going apart, the frequency will be lowered. Thus at one-meter wavelength (300 Mc.), a relative speed of 60 miles per hour will give a shift of about 25 cycles, while at 10 cm. the shift will be 250 cycles, and so on. With radar systems this phenomenon may be used to distinguish moving objects from fixed ones. Also it may be used for measuring the speed of projectiles and other bodies. In other applications this effect is a great disadvantage, especially if reflections are present. Rays leaving a moving transmitter in the forward direction may interfere by reflection with others leaving in the backward direction, resulting in an undesirable beat note equal to twice the Doppler shift.

**MODULATION**

Transmitters employing types of modulation requiring wide frequency channels are usually placed on frequencies higher than 50 Mc, simply because there is no room for them at the lower frequencies. In addition to this very practical reason, there is another one why such systems of modulation should be used at the higher frequencies: frequency instability.

The method of using a very stable oscillator at low frequencies, often crystal-controlled, and then employing a chain of multipliers becomes more impractical as the ultimate frequency is raised, and in the u.h.f. and microwave region is generally not practical except for frequency-standard purposes. The stability of self-controlled oscillators in this region is probably better, on a percentage basis, because resonant cavities may be built with higher Qs than can be obtained with low-frequency LC circuits. Nevertheless, in terms of cycles per second the drifts may be large. In practice it may be desirable to use receivers with f.f. bandwidths of several hundred kilocycles, or even a megacycle or two, to accommodate frequency drift. These wider bandwidths give rise to increased noise. By employing a system of modulation requiring a comparable or larger bandwidth it is possible, in some cases, to overcome some of the loss of signal-to-noise ratio that accompanies wide bandwidth.

**Wide-Deviation F.M.**

The small reflex klystron used normally for local oscillators in microwave receivers, while not very well suited for pulsed operation, has an unusual property which makes it suitable for f.m. The frequency may be varied 10 Mc. or more without a large variation of power by varying the voltage of the repeller by a few volts. Since the repeller is a negative element, it draws no current. Thus effective f.m. can be produced merely by connecting the secondary of a microphone transformer in series. On the other hand, the power supply must be free of hum to a high degree and should be stabilized. The power output of these tubes is generally less than 100 milliwatts, but the high antenna gains practical for point-to-point operation at these frequencies result in ranges of 50 miles or more from suitable locations. Therefore, this type of transmitter offers some possibilities.

However, in undertaking work with wide-band f.m., one should understand what such a system can and cannot do. As widely publicized, f.m. "discriminates against noise," but this statement is a half truth which may lead to wrong conclusions if not understood. The limiting action of a proper f.m. receiver is such that if two signals

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3 If about 10 watts of r.f. generated by a quartz crystal oscillator and frequency multipliers at 90 Mc. is applied to an "S"-band (silicon) crystal holder, harmonics of more than ample strength for frequency-standard work in the 3000-Mc. region are produced.

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enter on the same channel, the weaker will be virtually completely suppressed by the stronger. In a similar way, if noise and a bona fide signal are present, the signal will cause the noise to be suppressed almost entirely, while if the noise is stronger the signal will be suppressed. If the two are comparable, as is the case at the end of the range, either may predominate.

The latter situation is virtually the equivalent of what takes place with a.m. in similar circumstances. Therefore by substituting f.m. for a.m. and holding the transmitter power and receiver bandwidth constant, the range cannot be increased or decreased to any important extent. However, once the signal is greater than the noise, reception will be much more noise-free with f.m. If the deviation and receiver bandwidth are increased, the effective range will be reduced because the receiver will admit more noise, but once the receiver is well within the limiting range, the noise suppression will be even more complete.

Goldman has given a simple physical explanation of the noise suppression of wide-band systems of modulation. In principle, only a single sideband is required to convey a given amount of information. However, in these special systems the energy is distributed in many sidebands. Thus in effect the information is repeated simultaneously in a number of channels, and if at any one time one or a few of these channels are disturbed by noise the relative effect on the whole is small. In conventional a.m. only two sidebands are utilized, and if one of these is disturbed the effect will be relatively large. To paraphrase a well-known proverb, in broad-band systems "the eggs are in many baskets," while in conventional a.m. one is putting "all the eggs in two baskets." It follows, of course, that in single-sideband a.m. "all the eggs are in one basket" and noise suppression would not be as favorable as with conventional a.m.

**Pulse Modulation**

Because of the action of detectors in the presence of signal and noise it is advantageous to replace a continuous-carrier system by a pulsed system when the signal is weak compared with noise and when the receiver bandwidth must be kept moderately large to accommodate frequency instability. It may be shown that when the signal is weak, even so-called "linear" detectors behave in a nonlinear manner, and the noise tends to suppress the signal. Therefore, with constant average transmitter power it is possible, by replacing a continuous-carrier signal with one containing short pulses of higher peak power, to trade a continually-existing signal which is highly suppressed for one which, although existing for only short durations, can rise above noise. On the other hand, as a pulse is made shorter the spectrum of the sidebands becomes wider, and when the reciprocal of the pulse length in seconds becomes larger than the over-all receiver bandwidth expressed in cycles per second, appreciable portions of the signal are lost. This results in distortion of the pulse shape (notably lengthening) and also a deterioration of the ability to detect the signal in the presence of noise. Thus with a bandwidth of 10 kc, pulse lengths greater than 100 microseconds should be used, while if the bandwidth is 1 Mc, pulses as short as 1 microsecond could be used. In the absence of some extraneous reason there would be little or no advantage to increasing the bandwidth and using shorter pulses, because then more noise would be introduced. In radar systems there is such an extraneous reason since the range resolution — the ability to distinguish two targets in the same direction but differing very little in distance — is improved by using shorter pulses. In simple pulsed communications systems there does not appear to be any such extraneous reason for using pulses shorter than can be accommodated in a receiver bandwidth just great enough to take care of frequency instability.

Another advantage of pulsed systems at very high frequencies is that much higher plate voltages may be applied to transmitting tubes than in continuous operation. Therefore, electron transit times are generally much smaller with the result of much higher efficiency. For these reasons tubes may be made to oscillate at higher frequencies under pulsed operation than is possible with continuous operation. Any tube with sufficiently high reserve emission and plate voltage rating may be used for pulsed operation at any frequency at which the tube can be made to oscillate. Since the average power in pulsed operation may be as large as with continuous operation the peak power may be very large indeed. In radar operation the duty cycle (that is, fraction of the total time that the transmitter is oscillating) is usually in the neighborhood of 0.1 per cent, and in pulsed telegraphy systems an approximately similar duty cycle probably would be desirable. In such a case a low-powered transmitter of 10-watt average power would have a peak power of 10 kilowatts, and the plate voltage would probably be several kilovolts! In the u.h.f. and lower-frequency microwave range disk-seal "lighthouse" tubes are very well

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suited for pulsed operation. For use above 2500 Mc. there is available a special form of magnetron, the so-called traveling-wave integrative magnetron. Most of these magnetrons which can be found in the war-surplus market are designed for use only with very short pulses and may not be used for continuous operation. Their efficiency usually is sixty per cent or better.

A simple pulsed telegraphy system could employ a keyed pulsed oscillator whose pulse repetition frequency is in the audio-frequency range, and the receiver would be a conventional a.m. receiver of appropriate input frequency. The pulse repetition frequency would be detected and would appear at the output of the receiver. In the case of triode transmitters the pulsing action could be supplied by grid blocking or "squeeging," the same phenomenon which gives rise to self-quenched superregenerative detectors. It would be essential to provide adequate fuses to protect the tube in case the pulsing action failed and the tube either went into continuous oscillation or failed to oscillate at all. However, such a system, although very simple, would not give precise control of the pulse shape and repetition frequency. To secure such precise control a vacuum-tube pulsing circuit is required, but this would complicate the apparatus. For use with the microwave magnetrons mentioned above a vacuum-tube pulsing circuit probably is essential.

Telephony may be transmitted by pulsed methods using the audio voltage to modulate any one of the following quantities: pulse amplitude, pulse length, repetition frequency, or the timing of the pulse relative to a marker pulse, the last of these commonly being called "pulse time modulation." In order to permit separation of the audio frequency and the pulse repetition frequency in a filter in the receiver, it is necessary to use a repetition frequency at least three times as large as the highest audio frequency to be transmitted. For the transmission of speech a repetition frequency of at least 15,000 pulses per second is required. In such a situation it would be virtually impossible to use small duty cycles, and therefore it is unlikely that the advantages cited previously in the discussion of pulsed telegraphy could be exploited to any important extent in pulsed telephony. On the other hand, these systems involve the excitation of many sidebands, and therefore in principle a high degree of noise suppression is obtainable when the signal is somewhat larger than the noise just as in the case of wide-deviation f.m. However, the complexity of the circuits required for these types of modulation probably makes them unattractive for amateur communication. For commercial applications pulse time modulation has one important additional advantage. Two or more conversations may be transmitted simultaneously by using one alternate group of pulses for one conversation and another group for a second conversation. In the receiver these may be separated by a properly synchronized "gating" circuit.

RECEIVER TECHNIQUES

The most effective type of receiver at all frequencies is the superheterodyne. At the lower frequencies it is desirable to use one or more r.f. stages mainly to suppress images and improve the noise figure but also, of minor importance, to help decouple the local oscillator from the antenna to prevent radiation and to improve stability. Although tubes exist that will amplify even at microwaves, the noise figure deteriorates to such an extent that at higher frequencies the over-all noise figure is better without r.f. amplification. Also, at microwaves silicon crystal converters are definitely less noisy than tube converters. In the 1215-Mc. band, with the tubes now available commercially, it would be very difficult to choose between an r.f. amplifier (using a "lighthouse" tube) and a crystal converter for the "front end." In the next lower band (420 Mc.) the choice would favor the r.f. amplifier, at least if carefully designed and adjusted, while in the next higher band (2300 Mc.), the choice would be completely in favor of the crystal. This situation is likely to be changed by the development of new tubes.

Because crystal converters do not amplify, attention must be paid to the noise properties of the i.f. amplifiers used with them. Furthermore, care must be exercised in the choice of the intermediate frequency. Local oscillators generate noise for a considerable range on either side of the frequency of oscillation, and if the i.f. is too low an appreciable amount of this will be in the signal channel and will be converted by the mixer to i.f. noise. (Also, image discrimination will be

(Continued on page 188)
We'll wager that there aren't many readers of QST who can't remember being caught at one time or another in the act of cutting wire with Mom's best shears or using Dad's pet screwdriver to chisel out a hole in a chassis. Such tactics are hard on the implements, to be sure, but they are early evidence of the ability to improvise — the common trait among hams that has proved to be an invaluable asset in the armed services.

While the abuse of tools is not a practice to be universally recommended, there are many small jobs that most hams have learned to make easier by using some tools that weren't necessarily designed for the purpose. For instance, if you have to do all your chassis work with a hand drill that won't take a drill larger than 1/4 inch, enlarging holes to 1/2 inch can be a tedious process. But if you have a dime-store carpenter's brace, you can clamp a rattle file (minus the handle) in the brace and do the job easily. Simply turn the brace in a counterclockwise direction and the file will walk through a chassis as though it were cheese. You can get these files up to 1/2-inch diameter or more. Don't rotate it in the opposite direction, because the file will lock up in the hole and snap off.

If you have a lot of holes to tap in sheet metal, you can speed up the job of threading by using the tap in the hand-drill chuck. You will have to use alittle care to avoid snapping off the tap, but if you put a drop of oil on the tap every hole or two, hold the drill steady and back it up whenever it sticks, you shouldn't have any trouble. A two-speed drill at low speed is ideal for this sort of work.

If you are making a metal box, or putting a bottom plate on a chassis, it is seldom that all of the holes in the pieces to be joined will line up accurately, making it difficult to get the screws in place. After the first screw has been started, you can line up the others by jabbing an ice pick through the two holes and prying them into line. If they won't stay in line long enough to get the screw started, use the ice pick in an adjacent hole, prying in the direction that will bring the desired holes into line. The ice pick, as well as a machinist's scriber, is also an aid in steering a nut onto the end of a screw in a place where you can't reach it with your hand. If the scriber is of the type that has one end bent at right angles, you can use the bent end to rescue the nut if it falls off. As simple an item as a pair of tweezers can save a lot of wear and tear on the nerves.

Enlarging a hole is an easy job if you have a cheap carpenter's brace and a large rattle file. Use a block of wood for clamping a chassis in a vise.

Tools and Tricks

Some Old — Some New

BY DONALD H. MIX,* WITS

* Assistant Technical Editor, QST.
The right-angled scriber can serve many purposes for which it wasn’t designed.

In most dime and hardware stores, you can buy very cheaply a cast-iron handle that holds tapered keyhole saw blades. The teeth of the blades are fine enough so that they will cut aluminum quite readily and can be used for cutting out large holes in panels or chassis. If you want to hold the chassis in a vise while you’re working on it, place a block of wood a little thicker than the depth of the chassis underneath. The jaws of most vises won’t clear the chassis otherwise.

Several manufacturers have recognized the need for special tools of the gadget class in radio-assembly and repairing work. Most hams are familiar with the screw-type socket punches made by Greenlee and also by Pioneer. But perhaps you haven't noticed that they have four marks around the “cup” part that makes it possible to center the punch when the pilot hole is much larger than the screw. Just scribe lines at right angles through the center of the hole and match up the centering marks on the punch with the lines on the chassis. This makes it easy to increase the hole diameter to take a five-prong socket, for instance, where an octal socket originally was mounted. The easy way to use these punches is to clamp the head of the screw in a vise and cut the hole by turning the chassis or panel instead of the screw.

Most hams working with tools know about the automatic center punch that eliminates the need for a hammer when making hole centers in metal.  

1 Greenlee Tool Co., 1887 Columbia Ave., Rockford, Ill.; Pioneer Tool Co., 5038 West Jefferson Blvd., Los Angeles, Calif.


Simply press down in the handle and an internal spring gives the punch a kick that will go through thin aluminum if you aren’t careful. The tension is adjustable.

Hytron “Soldering Aids” are fast becoming well known as indispensable tools in radio work. In case you haven’t seen one, it’s a harmless-looking gadget with a metal insert at either end of a wood handle. One end is forked so that it can be slipped over the end of a wire that is to be unsoldered. By working the fork up close to the connection you’re working on, you can wiggle the wire to loosen it up without burning your fingers. It is especially effective in removing wrap-around connections. The metal fork is coated so that it won’t get gummed up with solder itself and the mass is small enough so that it doesn’t conduct all the heat away from the joint as a pair of pliers often does. The other end of the tool is a tapered spike that can be used to remove old solder from terminal holes. The “Aid” will be found to have many other uses — in restringing dial cords, for instance.

Most radio-parts catalogs carry a small angle-mounted mirror with a long handle that can be used dentist-fashion to get a peek at some hidden

You can use this dime-store keyhole saw for cutting large holes in aluminum.

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In punching socket holes, turn the chassis instead of the punch bolt.

The automatic center punch (left) speeds up layout work. Cutting a socket hole is child’s play with the screw-type socket punch at the right.

The Hytron “Soldering Aid” is much more of a tool than its name implies.

You couldn’t even get near it with most other types of stripper. The cutter is shear type that makes a cleaner cut than most other cutters. The tool is made of high-grade steel, so it should last indefinitely even though it can be replaced at very little cost.

How often have you tried to hold a nut with

(Continued on page 188)

3 Redman Co., 233 South 5th West, Salt Lake City, Utah.

These “Fingertip” socket wrenches save wear and tear on your fingers if you’re trying to tighten or loosen a nut.
How To Test and Align a Linear Amplifier

Adjustment Procedure for a S.S.B. Amplifier

BY ROBERT W. EHRLICH,* W2NJR

It can generally be said that a transmitter is no better than its final amplifier, and this statement applies as much to a single-sideband transmitter as to any other kind — perhaps a little more so. If the linear final in an s.s.b. rig is out of adjustment, it not only can cause roughness, splatter and TVI but also will put signals right back in the suppressed-sideband space from which the exciter is working so hard to eliminate them. In other words, it can make the best exciter in the world sound pretty sick. When the linear is properly adjusted, however, the distortion or splatter components will generally represent much less than one thousandth of the total power (30-40 db. down), effectively confining the whole signal to just the passband of the exciter.

In the four years since single-sideband techniques were first described in QST, a lot has been learned about the treatment of linear amplifiers — much of which previously had not been of general knowledge to amateurs. Most of these new principles have been gathered together by W3ASW in his recent article, and it should be required reading for the prospective user of a linear. To go a little beyond the general principles that Dick has outlined, this article has been prepared as a guide to the various types of linear-amplifier tests — their procedures, possible oscilloscope patterns, and what to do about them.

One of the more important features of the linear amplifier is that the ordinary plate and grid meters are at best only a poor indicator of what is going on. As the meters bounce back and forth, even a person who is thoroughly familiar with this kind of amplifier would be hard put to sense whether the input power registered is attributable to (a) overdrive and underload, which yield distortion, splatter, TVI, etc., or (b) underdrive and too-heavy loading, resulting in inefficiency and loss of output.

The simplest and best way to get the whole story is to make a linearity test; that is, to send through the amplifier a signal whose amplitude varies from zero up to the peak level in a certain known manner and then observe, by means of an oscilloscope, whether this same waveform comes out of the amplifier at maximum ratings.

Test Equipment

Even the simplest type of cathode-ray oscilloscope can be used for linearity tests, so long as it has the regular internal sweep circuit. If this instrument is not already part of the regular station equipment, it might be well to purchase one of the several inexpensive kits now on the market, so that it will be on hand not only to make initial tests but also as a permanent monitor during all operation. Barring a purchase, it is recommended at least that a 'scope be borrowed to make the line-up checks, whereupon the regular plate and grid meters can serve thereafter to indicate roughly changes in operating conditions.

All linearity tests require that the vertical plates of the 'scope be supplied with r.f. from the amplifier output. To avoid interaction within

* 21 Glenview Drive, West Orange, N. J.

Fig. 1 — The recommended method for sampling r.f. and applying it to the vertical plates of a 'scope. The pattern height can be varied by changing the location of the pick-up loop or by varying C0.

C0, L0 — Resonant to operating frequency.
C0 — 0.01-mfd. mica or ceramic, 500 volts.
R0 — 0.47 megohm. Replaces normal direct connection.
the instrument, it is usually best to connect directly to the cathode-ray tube terminals on the back of the cabinet. A pick-up device and its connections to the oscilloscope are shown in Fig. 1. Normally, the pick-up loop should be coupled to the dummy load, antenna tuner, or transmission

Fig. 2 — Fixed-frequency audio oscillator having good output waveform. The frequency can be varied by changing the values of C1 and C2.

C0, C1 = 0.02-mfd., 600 volts.
C2 = 0.01-mfd., 600 volts.
C3 = 10-mfd. 25-volt electrolytic.
R1 = 57,000 ohms, 1 watt.
R2 = 0.5-megohm potentiometer.
R3 = 2.2-megohm potentiometer.
R4 = 1000 ohms, 1/2 watt.
I4 = Small 'speaker output transformer, secondary not used.

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line — in other words, to a point in the system beyond where any tuning adjustments are to be made.

The only other piece of test equipment will be an audio oscillator. Since only one frequency is needed, the simple circuit of Fig. 2 works quite well. In fact, many stations have a circuit similar to this one built right into the exciter audio system.

**Two-Tone Test**

The two-tone test involves sending through the amplifier or the system a pair of r.f. signals of equal amplitude and a thousand cycles or so apart in frequency. The combined envelope of two such signals looks like two sine waves folded on one another. If this waveform comes out of the final, well and good; if not, there is work to do. More about that later.

There are two commonly-used ways to generate the two-tone signal, and the choice of which to use depends on the particular exciter. For purposes of this article, the two procedures are designated Method A and Method B, and they are outlined below:

**Method A — for Filter or Phasing Exciters:**
1) Turn up the carrier insertion until a carrier is obtained at about half the expected output amplitude.
2) Connect an audio oscillator to the microphone input and advance audio gain until (when the carrier and the one sideband are equal) the scope pattern takes on the appearance of full modulation; i.e., the cusps just meet at the center line. See Chart 1, photo No. 1.
3) To change the drive through the system, increase or decrease the carrier and audio settings together, maintaining equality of the two signals.

**Method B — for Phasing Exciters:**
1) Disable the audio input to one balanced modulator. In the W2UNJ exciter, for example, pull out one 6K6GT; or in the SSB Jr., place a short from plate to B+ on one section of the 12AT7 audio tube.
2) Connect the audio oscillator and advance audio gain to get the desired drive. Note that with one balanced modulator cut out, the resultant signal will be double-sideband with no carrier, hence two equal r.f. signals.

**Double-Trapezoid Test**

When Method B can be used with phasing exciters, it is possible to derive a somewhat more informative pattern by making a connection from the exciter audio system to the horizontal signal input of the oscilloscope and using this audio signal, instead of the regular internal sweep, to cause the horizontal deflection. Those who are familiar with the regular trapezoid test for a.m. transmitters will recognize this set-up as being the same, except that instead of one trapezoid, this test produces two triangles pointing toward each other.

Each individual triangle is subject to the same analysis as the regular trapezoid pattern; i.e., the sloping sides of the pattern should be straight lines for proper operation. Since it is much easier to tell whether a line is straight or not than to judge the correctness of a sine curve, the double trapezoid has the advantage of being somewhat more positive and sensitive to slight departures from linearity than is the regular two-tone pattern.

If the audio can be picked off at the plate of the audio modulator tube that is still working, the input signal need not be a pure sine wave; merely whistling or talking into the microphone.

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*Chart I — Correct Patterns.* 1 — Desired two-tone test pattern. 2 — Desired double-trapezoid test pattern. 3 — Typical voice pattern in a correctly adjusted amplifier, *scope set for 30-cycle sweep. Note that peaks are clean and sharp.*

♦️
should produce the appropriate pattern. If, because of the exciter layout, it is necessary to pick up the audio signal ahead of the phase-shift network, it will then be necessary to use a good sine-wave audio oscillator as before. Also, with the latter set-up, the pattern will probably have a loopy appearance at first, and phase correction will be needed to make the figure close up. This can be done either by varying the audio frequency or by putting a phaser in series with the horizontal input to the scope, as shown in Fig. 3.

**Ratings**

Before proceeding with linearity tests, it is well to have in mind the current and power levels to expect. A suppressed-carrier signal is exactly like an audio signal, except for its frequency, so the audio ratings for any tube are perfectly applicable for linear r.f. service where no carrier is involved. On the other hand, the ratings sometimes shown for Class B r.f. telephony are not what is wanted, because they are for conventional a.m. transmission with carrier.

Class B, AB or A can be used. Audio ratings are frequently given for two tubes in push-pull but, unlike audio service, a Class B r.f. amplifier works quite well in a single-ended circuit. Therefore, if the amplifier is to be a single-tube stage, one-half the power and current ratings given for two tubes should be used.

If audio ratings are not given for the desired tube type, it will be safe to assume that the maximum-signal input for Class B or AB2 service is about 10 per cent less than the key-down Class C e.w. conditions. The input will have to be held somewhat lower in Class AB1 operation because the average efficiency is lower and, also, the tube can draw only a limited amount of current at zero grid voltage.

The maximum-signal conditions determined

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**Chart II — Improper Amplifier Operation.** 4 — Overdrive, indicated by flattening of peaks. 5 — Same as 4, double-trapezoid test. 6 — Too much bias, causing crossover to become pinched together rather than cutting straight across center line. 7 — Same as 6, double-trapezoid test. 8 — Two-tone test with r.h.f. parasitics. Note fuzzy halo or fringe. In milder cases the fuzziness will appear just at the peaks. 9 — Two-tone test with fundamental frequency parasitics, accompanied by overdrive. 10 — Severe overdrive and parasitics. 11 — Voice pattern showing flattening of peaks due to overdrive. When flattening is apparent on the voice pattern, the case is a severe one.
from tube data correspond in s.s.b. work to the very peak of the r.f. envelope. In a correctly-adjusted amplifier, the rated peak input would register on the meters only if one were to whistle into the microphone, otherwise the meters will always read less. In particular, the average input under two-tone linearity-test conditions is close to 65 per cent of the actual peak input for a Class B amplifier, about 75 per cent for a Class AB₂ stage, and 80 to 90 per cent for Class AB₁. With typical voice operation, the meters will kick up only to a smaller fraction of the same peak input—around 30 to 60 per cent for Class B, 50 to 70 per cent for Class AB₂, and approximately 70 to 80 per cent for Class AB₁.

To take a typical example, two 811As are rated for a maximum Class B input of 470 watts. If a single 811A is used in the r.f. final amplifier, its maximum signal input should be 235 watts and, to operate up to this rating, it should be lined up with a linearity test to about 150 watts input. Under normal voice operation, the meter will then read up to around 180 watts.

**Using the Linearity Tests**

The photos accompanying this article have been taken to show many of the typical patterns that may be encountered with either of the test arrangements described previously. They are classified separately as to those representing correct conditions (Chart I), faulty operation of the r.f. amplifier (Chart II), and various other patterns that look irregular but which

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**Chart III — Improper Test Set-up, 12**

— Two r.f. signals unequal. In method A, caused by improper setting of either carrier or audio control. Method B, either carrier leakage through disabled modulator or unequal sidebands due to selective action of some high-Q circuit off resonance. 13 — Same as 12, double-trapezoid test (Method B). 14 — Distorted audio. A clue to this defect is that successive waves are not identical. 15 — Same distortion as 14, but switched to double-trapezoid test pattern. Note that correct pattern prevails regardless of poor audio signal. 16 — Carrier leakage through working modulator (Method B only). 17 — Same as 16, double trapezoid. 18 — (Note tilt to left.) Caused by incomplete suppression of unwanted sidebands (Method A) or by r.f. leakage into horizontal circuits of scope. 19 — Double trapezoid with audio phase shift in test set-up.
really represent a peculiarity in the test set-up or the exciter but not in the final (Chart III).

Aside from the problem of parasitics, which may or may not be tough one, it should be possible without much difficulty to achieve the correct linearity pattern by taking action as indicated by the captions on the photos. It can then be assumed that the amplifier is not contributing any distortion to the signal so long as the peak power level indicated by the test is not exceeded. It is entirely possible, however, that good linearity will be obtained only by holding the power down to a level considerably below what is expected, or conversely that there will be signs of excessive plate dissipation at a level that the tubes should handle quite easily. In such cases, some attention should be given to the plate loading, as discussed below.

The several patterns of Chart IV were made to show how loading affects the output and efficiency of a linear amplifier. In the first two, loading is relatively light and limiting takes place in the final plate circuit. Reserve power is still available in the driver, evidenced by the fact that heavier loading on the final allows the peak output to increase up to the optimum level of the third pattern. With still heavier loading the output ceases to increase but in fact drops somewhat; even though the input power goes up all the time, the efficiency goes down rapidly. In the last two patterns, the driver is the limiting element in the system, and the extra power-handling capability of the final, due to heavier loading, is wasted by inability of the driver to do it justice. The following conclusions may be taken:

1) For good efficiency, the final itself must be the limiting element in the power-handling capability of the system.

2) If the final is not being driven to its limit,

3) If the power level obtained above is less than should be expected, more driving power is needed.

There are several ways to tell whether or not the final is being driven to its limit. One way is to advance the drive until peak limiting is apparent in the output, then move the oscilloscope coupling link over to the driver plate tank and see whether or not the same limiting appears there. Another way is to decrease or increase the final loading slightly and note whether the limiting output level increases or decreases correspondingly. If it does not, the final is not controlling the system. Still another but similar method, suggested by Reque, is to detune the final slightly while limiting is apparent, and if proper drive conditions prevail the pattern will improve when the amplifier plate is detuned.

The intermediate and driver stages will follow the same laws, except that the thing called "loading" on a final is often referred to as "impedance matching" when going between tubes. More often than not, an apparent lack of power transfer from a driver to its succeeding stage is due to a poor match. Just as in Class B audio service, a step-down type of coupling is required between power stages, and the person who is accustomed to the conventional plate-to-grid coupling-condenser technique will be surprised to find how effective it is to tap the driven stage down on its tank—or otherwise to decouple the system. For example, an 507 driving a pair of 811s requires a voltage step-down of about 3 or 4 to 1 from plate to each grid.

**Dummy Load**

For the sake of everyone concerned, linearity tests should be kept off the air as much as possi-

(Continued on page 188)
On the Air with SINGLE SIDE BAND

So far as we (meaning V.H.F. Editor W1HDQ) know, all of the 50-Mc. s.s.b. work is confined to the W1 call area, with W1s FNH, CGY and SCO breaking the trail. As you can well imagine, it's a lonely sort of life, since reception is only possible with crystal-controlled converters, and the faster tuning rate of 50-Mc. receivers makes it easier for stations to pass over the carrierless transmissions. However, patience finally paid off for W1CGY, and he established the first long-hop s.s.b. QSO on 50 Mc. by working VE3AET via aurora last March. Conditions were marginal and changing fast, so extensive tests could not be made, but there is some indication that the s.s.b. transmissions would be readable in aurora when double-sideband a.m. is out of the question.

3800 kc. They find it to be a good spot, and it has the advantage of being tuned first by the DX stations. Walt worked ZS6DW (3695) in February and ZS6KD (3690) in March, both around 8 p.m. Their carrier could be heard on several different occasions, but their modulation could be heard only on the two nights when contacts took place. Walt is sure that contacts will be more frequent when these ZSs get their s.s.b. rigs going. W6EDD and W7IJE have also gotten through to ZS.

W6GGM is using a W20NJ exciter with 2E20s in place of the 696s, with a positive bias of about 30 volts on the screen. The idling current is low under these conditions, of course. Zero screen bias has been tried, but the linearity is not as good. Plate voltages up to 1000 have been used, but with 500 volts there is plenty of drive for the p.p. 100T1s.

At the recent IRE Convention in New York, Murray Crosby delivered an interesting paper on excited-carrier reception and mentioned the "product" detector shown in Fig. 1. No values were given, but R1 and R2 would be normal grid leaks of 0.5 megohm or so. R4 would be a normal plate load resistor for V1 in audio service, and R5C1 an audio and r.f. filter. R5 might require some selection, depending upon the tube types that are used. The circuit is certainly worth a try as a good detector for s.s.b. or c.w. reception.

Ken Sellars, WZ2MTJ, passes along some useful tips to those fellows who have built or are building W1JE0-type exciters (Nov., 1950, QST, or current Handbook). To quote his letter, "A number of fellows have trouble getting adequate carrier suppression in the W1JE0 exciter. The trouble appears to be that the crystal oscillator operates on one mode of crystal resonance and the suppression crystal operates on the other, with a consequent differences in frequencies of 500 cycles or more. A change in the oscillator circuit of the 6K8 triode section will take care of the situation. The arrangement in Fig. 2A, using a Pierce oscillator, works fine at W2MTJ and has been successfully adapted by several others. It results in the oscillator frequency being very close to the frequency of the suppression crystal. By tuning C1, the oscillator frequency can be set exactly in the slot of the suppression crystal. No changes are required in the remainder of the 6K8 circuit. The oscillator injection voltage obtained is adequate for several volts of audio input. In my exciter I limit the audio input to 1 volt, however, to get the proper level for the two-tone test pattern.

"When the Pierce oscillator was first used like this, the amount of carrier at the output of the carrier-reinsertion amplifier was inadequate, and a slight change was required in the circuit, as shown in Fig. 2B. With this arrangement, sufficient carrier reinsertion is obtained to be equal (at the 6N7 grids) to the component obtained with 1 volt of audio input to the 6K8.

Here is a station that is about as far from the average as you can find. W4OIL at Herndon, Va., operated by Jack Brown of crystal-lattice fame, is set up for only two modes of communication: single sideband and radioteletype! The transmitter runs a kilowatt to a 30TL1 — receiving gear is a Super-Pro with provision for crystal stabilization, a 20-ke. selectable-sideband adapter, and a Panadapter. QST for
Fig. 2 — Improvements for the W1TEO crystal-filter exciter suggested by W2MTJ.

The revised oscillator circuit at A permits adjustment of the oscillator frequency and consequently better carrier rejection. $C_1$, 100 µfd., adjustable; $C_2$, 470 µfd.; $R_1$, 0.1 megohm; $R_2$, 20,000 ohms.

The revised oscillator circuit does not offer as much voltage available for carrier reinforcement, and the circuit of B gives more amplification. $C_1$, 47 µfd.; $C_2$, 0.01 µfd.; $C_3$, 0.001 µfd.; $R_1$ and $R_2$, 20,000 ohms; $R_3$, 0.12 megohm; $R_4$, 1000 ohms; $R_5$, 0.2 megohm.

Better sideband rejection is obtained by paralleling additional crystals, as shown by the dotted lines in B. Examples of crystal-channel numbers (although these don’t have to be used — any adjacent channels will be suitable) are: A, 329; B, 322; C, 321; D, 320; E, 321, edge-ground to raise frequency several hundred cycles.

Fig. 3 — The 75-meter "turnstile" antenna used at W2JJC is only 33 feet high at the center and 10 feet high at the corners, but it works out very well. Points $A$ and $B$ are fed with one length of RG-8/U cable and points $C$ and $D$ fed with another length a quarter-wavelength (41 feet) longer. The two coaxial lines are then connected in parallel at the transmitter and coupled in the normal way.

Fig. 4 — The duplexing system at W2JJC uses no antenna relays in the usual sense. The feed line from the antenna runs to an antenna coupler and is tapped across a portion of the coil. A quarter wavelength of coaxial line (41 feet at 3995 kc.) tapped off the main feed line runs to $R_{V1}$ and then to the receiver. On transmit, $R_{V2}$ disconnects the receiver end of the quarter-wave line, so that it has no effect on transmission. During receiving periods the link from the transmitter is shorted by $R_{V1}$.

but during receiving the stub feeds on through to the receiver. In Army's set-up, $R_{V1}$ is a d.p.d.t. relay which the second circuit controls across voltage to his S16s. $R_{V2}$ is also a d.p.d.t. affair; the second arm swings the ground to either exciter or receiver, for control of their respective circuits. Both relays are operated by voice control. The quarter-wave stub must be changed for each band, of course. — B. G.
The 6BQ7 on Six and Two
Cascode-Type R.F. Amplifiers for V.H.F. Use

BY C. VERNON CHAMBERS,* WIJEQ

V.H.F. men, always quick to employ new tubes and techniques that will improve reception at the higher frequencies, are now well acquainted with the 6BQ7 low-noise dual triode and the use of the cascode-type amplifier circuit. This combination, the 6BQ7 and the cascode, has already proven its worth while serving in a v.h.f. converter and, as a result, it does not seem necessary to restate the praises of this hot front end. Rather, we shall immediately commence the description of a pair of simple r.f. amplifiers that will add considerably to the effectiveness of existing 50- and 144-Mc. receiving equipment that may be deficient in signal-to-noise ratio or gain.

Separate amplifiers were built for the two bands because a good one-band job usually outperforms a multiband unit that requires coil changing. Simplicity of construction and alignment also go hand-in-hand with one-band circuits. Fortunately, this version of the cascode is a conservative user of parts and, as a result, cost need not be the factor that determines how many circuits will be used for the job on hand.

Each of the cascode amplifiers or "direct-coupled driven-grounded-grid" circuits, as they are sometimes called, uses a 6BQ7 tube. The amplifiers are broadband affairs which ordinarily require no retuning after the preliminary alignment has been made. Their gain is approximately 15 and 12 db. at 50 and 144 Mc., respectively. The signal-to-noise ratio compares favorably with that obtained with any good triode amplifier and is superior to that of a pentode amplifier having equivalent gain. An inexpensive power supply is an integral part of the unit.

The Circuits

Both of the r.f. amplifiers employ the circuit shown in Fig. 1. The parts list that accompanies the schematic identifies the components having one-band characteristics. In the circuit, $C_s$ and $L_1$ form a high-C resonant tuner that is tightly coupled to the input inductor, $L_5$. The output circuit consists of capacitor $C_s$, the upper section — the part above the tap — of $L_5$ and the output link, $L_4$. A variable padder is used as $C_s$ at 50 Mc. and a fixed 2-$\mu$fd. ceramic is used as the padder at 144 Mc. If a ceramic trimmer having a sufficiently-low minimum capacitance is available, it may be used as $C_s$ at the higher frequency. A Centralab type 822 trimmer having a minimum capacitance of 1.5 $\mu$fd. will serve the purpose nicely.

The amplifier circuits are made completely stable by employing shielding — more about this later — and neutralization. The neutralizing circuit has a 1-$\mu$fd. capacitor, $C_s$, connected between the input grid of the 6BQ7 and the lower end of the plate coil. When used with the power supply to be described, the amplifier tubes operate with low plate voltage and, as a result, the tendency toward self-oscillation is extremely slight. In fact, the circuits will not take off without neutralization under some conditions of loading. However, the noise figure is improved slightly by neutralization.

The power supply for the amplifiers uses a

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* Technical Assistant, QST.

1”Tilton and Chambers, “Using the 6BQ7 on 220 and 144 Mc.,” QST, September, 1951.

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The 50- and the 144-Mc. r.f. amplifiers are at the right and the left ends of the chassis, respectively. The power transformer is to the rear of the filter capacitor and the control switch is centered on the front wall of the assembly.
C1, C4, C6, C7 — 0.001-mfd. disk ceramic.
C2A, C2B — Dual 20-mfd. 250-volt-wkg. electrolytic
(Mallory FP-217).
C5 — 15-mfd. variable (Millen 20015).
C4 — 1-mfd. silver mica.
C7 — 50 Mc; 4.5–25 mfd. ceramic trimmer (Centralab
822).
144 Mc; 2-mfd. ceramic (Erie Ceramicon).
R1 = 22 ohms, 1/2 watt.
R2 = 3300 ohms, 1/2 watt.
R3 = 100 ohms, 1/2 watt.
R4 = 0.01 megohm, 1/2 watt.
R5 = 1000 ohms, 1/2 watt.
L1 = 50 Mc; 6 turns No. 20 tinned, 3/8-inch diam., 3/8
inch long (B & W Miniductor No. 3007).
144 Mc; 3 turns No. 16 enam., 3/8-inch diam.,
turns spaced wire diam.
L2 = 50 Mc; 11 turns No. 20 tinned, 3/8-inch diam.,
11/16 inch long (B & W Miniductor No. 3007).
144 Mc; 5 turns No. 16 enam., 3/8-inch diam., 1/2
inch long.

TV booster-type power transformer, an inex-
spensive selenium rectifier and a resistance-capac-
itance filter. This supply delivers approximately
160 volts at the current drawn by a single
6BQ7, furnishes 6.3 volts a.c. for the amplifier-
tube heaters, and can be put together for less
than five dollars. A.e. input to the power trans-
former is controlled by S1A and section S1B is a
heater switch used to activate either one of the
r.f. stages.

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A bottom view of the amplifier unit showing the
input and the output connec-
tors mounted on the rear
wall of the chassis. Power
supply components are cen-
tered in the chassis.

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May 1952
room for mounting the input coils between the sockets and the antenna tuning capacitors. The antenna coils, \( L_1 \) on the diagram, are mounted directly on the terminals of the panel-supported variable capacitors and the grid inductors, \( L_9 \), are soldered between the No. 7 prongs of the sockets and grounded soldering lugs. As seen from the bottom view, the heater r.f. chokes are connected between the sockets and the tie-point strips which are located to the left of the sockets.

The 50-Mc. plate circuit has the inductor mounted on the ceramic trimmer, \( C_8 \). In turn, \( C_8 \) is supported away from the underside of the chassis by means of metal pillars and 4/40 hardware. A \( \frac{3}{4} \)-inch hole is cut in the chassis directly above the capacitor, thus making adjustment from the top of the chassis possible. The 144-Mc. plate coil is supported at the plate end by prong No. 1 of the tube socket and at the other end by a tie-point strip, which is in turn mounted to the rear of the socket.

Flashing copper is used as the shielding between the input and the output circuits of the amplifiers. This material can be obtained at most hardware stores and can be easily cut into 1-inch squares with the aid of tin-snips and then soldered to the center posts of the tube sockets by using a soldering iron of ordinary weight.

**Testing**

The power supply should be tested with the amplifier decoupling resistors, \( R_9 \), disconnected from the junction of \( R_3 \) and \( C_{3B} \). Under this no-load condition, and with \( S_1 \) set to deliver 115 volts a.c. to \( T_1 \), the output voltage of the supply should measure approximately 200 volts. If the resistors are now connected in place and the supply again turned on, the output voltage should drop to approximately 160 volts after the 6BQ7 (whichever one happens to be in use) has warmed up. Cathode voltage for the amplifier tube should measure about \( \frac{3}{4} \) volt if the circuit is not oscillating. If there is any doubt about the stability of the circuit, it is advisable to insert a 10- or 15-ma. meter in series with \( R_9 \) so that plate-current behavior may be examined. If the current does not remain stationary at approximately 0.5 ma, when the grid coil is touched, it is an indication that the neutralization is not complete. Lack of neutralization at 50 Mc. is corrected for by repositioning the tap on \( L_2 \) and at 144 Mc. by adjusting the spacing between the last two turns of \( L_2 \).

There should be no difficulty in lining up the 50-Mc. amplifier if a test signal is available. It is only necessary to peak the input and the output circuits at the approximate center of the band by means of the variable capacitors. Input and output coupling will be proper if the output link is tightly coupled to \( L_3 \) and if the antenna coil is placed as close as possible to the grounded end of \( L_9 \).

The 144-Mc. amplifier is a little more difficult

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Footnotes:

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May, 1927

... Government radio regulation is rapidly stabilizing and amateurs are warned to observe the band limits which have now become enforceable law.

... "Emergency Transmitters," by Rufus P. Turner, 1AY, stresses the need for such auxiliary apparatus in every truly progressive amateur installation.

... A simple low-power transmitter using UX-171 tubes in a self-rectifying Hartley circuit is detailed by Assistant Technical Editor Harold P. Westman.

... Commercially-available relay applicable to amateur gear are listed and described by Technical Editor Kruse.

... Performance of the UX-832 T-type transmitting tube is thoroughly discussed by Mr. Kruse.

... For good results at low cost, S. E. Hall's article on electrolytic rectifiers recommends the use of sodium bicarbonate as the electrolyte.

... He's a false economy, writes 2PP, to use fifteen-dollar 150-200-meter crystals for harmonic operation in lieu of 80-meter crystals selling for ten dollars more.

... A Five-Meter CQ Party is announced, its object to stimulate activity in this range.

... Seattle's 7BB has logged the 5-meter test transmissions of 2EB, Jamaica, L. L., N. V. Oscillographic detectors with single stages of audio were used by 9EHT and 9BVC to copy 2EB's signals.

... The widely-held belief that 20 meters is strictly a daylight band is being dispelled by numerous reports of DX worked at night.

... A letter from Karl E. Zint, radio operator aboard Zane Grey's yacht Fisherman, thanks amateurs for outstanding service in the headlines of DX traffic.

... 1NF and 9DM are described and pictured as typical up-to-date amateur stations of the day.

14,350-14,400 KC. WITHDRAWN

Effective April 1st, to conform to the new Atlantic City table of allocations, the amateur 20-meter band was modified by FCC to read 14,000-14,350 kc. The top 50 kc. is withdrawn from amateur use. See "Happenings" in this issue for more details.
Tuning Two Meters on the Car Receiver

* A Crystal-Controlled Converter for Civil Defense

BY JAMES H. CREUTZ, W2PMQ

This 2-meter mobile converter was designed expressly for operation in the two bands earmarked by the FCC for civil defense communications—145.17 to 145.71 Mc. and 146.79 to 147.33 Mc. These frequencies are covered completely, merely by tuning the automobile broadcast receiver over the range of 540 kc. to 1080 kc. This makes it quite practicable to enjoy, during 2-meter mobile operation, the ease of tuning and the frequency stability afforded by a broadband crystal-controlled converter. The converter is simple; its three tubes draw only 20 ma. at 150 volts, which even the garden-variety of automobile broadcast receiver can spare. Voltage regulation is not necessary.

Simultaneous Tuning

The trick of tuning two bands, each 540 kc. wide and separated by 1080 kc. on a broadcast receiver having a total coverage of only a little over 1000 kc., is accomplished by simultaneous tuning of both bands. The converter and automobile broadcast receiver constitute a double-superheterodyne receiver in which tuning is accomplished by varying the first intermediate frequency (tuning the broadcast receiver, in other words). Fixing the converter mixer injection frequency at 146.25 Mc. permits the converter to transform all frequencies in one of the desired bands, from 146.79 to 147.33 Mc., into frequencies from 540 kc. to 1080 kc., which the broadcast receiver can select. (In this function the received frequency is higher than the injection frequency.) Simultaneously the converter mixer is transforming all frequencies from 144.71 Mc. to 145.17 Mc. into frequencies from 540 kc. to 1080 kc., which the broadcast receiver can select. (In this function the received frequency is lower than the injection frequency.)

Normally, one of the two frequencies being received simultaneously would be called the desired frequency and the

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* R.F.D. No. 1, Box 199, Red Bank, N.J.

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By selecting the frequency of 146.25 Mc. for the crystal-controlled oscillator of this little converter, it is possible to tune the two c.d. bands of 145.17 to 145.71 and 146.79 to 147.33 simultaneously by tuning the car b.c. receiver from 540 to 1080 kc. This system not only permits a converter of very small dimensions, but also provides excellent frequency stability and ease of tuning superior to any other system. As the photographs show, the construction of the unit is simplicity itself.

Other the image frequency. The receiver would be described as a superheterodyne in which the image ratio is very poor. But inasmuch as the images are within a desired band of frequency coverage, this is an asset rather than a liability. The first intermediate frequency (in the broadcast band) is so low with respect to the very-high-frequency signal being received that one cannot say which is the desired frequency and which is the image frequency. Both are received with essentially equal strength, considering that the fixed tuned circuits in the i.f. portion of the converter can't discriminate much against signals a few hundred kilocycles apart. The selectivity of the entire system, of course, is most excellent, for the broadcast receiver provides not only the tunable first intermediate frequency but also the selective fixed second intermediate frequency (455 kc. or so) of the double-superheterodyne receiver.

Using this system, of course, one cannot determine which of two frequencies is being received; conceivably a station on 145.17 Mc.

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Top view of the two-meter crystal-controlled converter.
Fig. 1 — Circuit of the 2-meter mobile converter.

C1, C2, C3, C4, C5, C6, C7, C8, C9, C10 — 0.005-mfd. disk ceramic.
C11 — 50-mfd. ceramic.
C12 — 0.001 mfd. paper.
C13 — 50-mfd. midget variable.
C14 — 100-mfd. ceramic.
R1 — 270 ohms, ½ watt.
R2, R3, R4 — 1000 ohms, ½ watt.
R4 — 1 megohm, ½ watt.
R5 — 0.1 megohm, ½ watt.
R6 — 3300 ohms, 1 watt.
R7 — 1000 ohms, ½ watt.

Rs — 0.22 megohm, ½ watt.
Rm — 5000 ohms, 10 watts, wire-wound (in carrier receiver).
L1 — 3 turns No. 18, 3/32-inch diam., tapped 1 turn from ground end.
L2 — 2 turns No. 18, 3/32-inch diam.
L3 — 7 turns No. 22, 3/32-inch diam., tapped approx. 2 turns from crystal end.
L4 — 2 turns No. 18, 3/32-inch diam. All turns spaced approx. diameter of wire. See text regarding iron slug.

The bottom view of the converter shows the layout of parts. Mounted on the end near the crystal socket are C8 and L2. The 6J6 socket can be seen near C3. Nearest coil to L2 is coil L1 and adjacent to L4 is L3. Sufficient stray coupling exists between L4 and L3 to provide oscillator injection without using a separate capacitor.

Coils L1, L2 and L4 are made of stripped No. 18 solid copper tinned hook-up wire. They are air-wound, supported at their ends by either convenient tube-socket terminals or small stand-off insulators. These coils are slug-tuned by separate powdered-iron slugs mounted to the chassis. This method of construction is admittedly a junk-box solution; use of efficient slug-tuned forms is recommended.

The top view shows the tube location from left to right (crystal end to plug end) as 6J6, 90002, and 6AK5.

Resistor R10, not shown, necessary to drop the operating voltage for the converter to approximately 150 volts, is located in the ear receiver.

Testing & Alignment

A grid-dip meter, high-frequency receiver, 2-meter receiver, and broadcast receiver are used in testing and aligning the converter. Operating voltages are furnished by the broadcast receiver. The grid-dip meter is not absolutely essential, but the ham who builds his own tuned circuits finds it eliminates many hours of cut-and-try.

Getting the overtone oscillator to work is the
first job. The proper \( L/C \) ratio in the tuned circuit, \( L_aC_b \), is of extreme importance for proper crystal-overtone operation. Use of the grid-dip meter, pruning of \( L_d \) and adjusting \( C_a \) are necessary until the following conditions are met:

a) The tap on \( L_d \) is approximately one third of the way up from the crystal end of the coil. (A little less than one third worked best in this particular case; tap two turns up on a 7-turn coil.)

b) \( L_3 \) and \( C_a \) tune to 24.375 Mc. with the slug of \( L_3 \) in approximately the mid-position of the coil and \( C_3 \) approximately half meshed. This permits making necessary variations in both \( L \) and \( C \) while retaining the same resonant frequency.

The use of the slug-tuned coil for \( L_3 \) usually eliminates the need for changing the position of the coil tap. If adjustments do become necessary in the coil turns or tap, keep in mind that only the plate portion of the coil is tuned by \( C_3 \) (in series with \( L_3 \)) and that the crystal portion of the coil is a feedback winding. Changes in position of the tap will change both the circuit tuning and the amount of regeneration.

Measuring grid current with a milliammeter between the ground end of \( R_7 \) and ground is probably the best way to get an indication of proper oscillation. Tune \( C_3 \) through its range until a sharp rise is detected in grid current, indicating that the stage is oscillating. Monitoring the oscillator signal on a receiver tuned to 24.375 Mc. is almost essential. The circuit should be adjusted until the stage oscillates at 24.3 Mc. and no other frequency. There should be only one point in the tuning range of \( C_3 \) at which any oscillation occurs; if there are more, the crystal is not controlling the oscillations. Tune the receiver back and forth around 24.375 Mc.; if several signals (birdies) are heard, change the setting of the slug in \( L_3 \) and try again for one point of oscillation.

When the oscillator is working properly, a clean, strong signal will be received at 24.375 Mc. and at no other frequency. (There should be no output at 4875 kc.; the lowest radio frequency generated is 24.375 Mc.) The crystal will "plop" into oscillation each time voltage is applied. If the stage refuses to oscillate immedi-

\( L_4 \) can be tuned to 146.25 Mc. by setting a 2-meter receiver to that frequency and adjusting the slug for maximum S-meter reading. One caution — it is possible to pick off the wrong harmonic in the multiplier section of the 6J6 and the best insurance against this is to construct \( L_4 \) so that it resonates at the proper frequency by using a grid-dip meter.

\( L_1 \) and \( L_2 \) are tuned for maximum signal response at 145.5 and 147 Mc., respectively; their peaking will be quite broad.

Installation

The converter is installed under the dash of the author's car, adjacent to other receiving equipment for other amateur bands. The usual mobile receiver suggestions apply, with especial reference to filtering out vibrator hash from the car receiver power supply. A series-type limiter, installed in the car receiver, is helpful.

Operation

The converter has performed satisfactorily in local 2-meter mobile work for a period of several months. In mobile use, the converter and car receiver do not constitute as sensitive a receiving system as a good home receiver, but this is a problem common to all mobile work. When the converter is used in the shack, and fed into a sensitive broadcast receiver, reception is excellent.

Answer to QUIST QUIZ on page 10

Without stating it in his own words, the author's answer is very much the same as mine. Quoting in full: "The author's word as an expert in the field is pretty much the same. Although the time for the transmission of the information from one end of the wire to the other end is considerable, it does not affect the audio signal in any way."
If you've tried to work the weak ones on 50 Mc. and higher, you have long since discovered that all too many v.h.f. stations are deficient in the modulation department. On lower frequencies, where signals are peeled off in layers, it has become almost mandatory to keep modulation characteristics in topnotch form. But the v.h.f. man, whose principal enemy is the noise level rather than other stations operating on the same frequency, tends to be satisfied if his nearer neighbors copy him well and report his signal of good quality.

He may sound fine to the fellows who receive him S9, but what happens at the outer edge of his coverage, when the signal is but a few decibels above the noise level? The chances are good that he is one of the many who would be reported as R2 S5. If the truth were always told in giving signal reports, in the Connecticut Valley this sort of speech is known as "Boston Modulation" because of the many seemingly unmodulated carriers that are heard when 6- and 2-meter beams are aimed to the northeast. But insufficient modulation knows no geographical barriers, and the brethren of Beantown are probably no worse or better than any other group of voice operators.

From San Francisco comes a similar complaint, and a simple answer. W6MHP says he hears countless S5 signals on 144 Mc. that are completely unreadable — something that never need happen if some care is taken along the following lines. Deficient modulation can arise from many sources, but it usually narrows down to one or more of these factors:

1) Insufficient modulator power.
2) Careless microphone technique.
3) Improper operation of the r.f. portion of the transmitter.

The first is least likely. Most 'phone men have

Fig. 1 — Schematic diagram of the W6MHP speech clipper for use in the SCR-522. Where no values are given for parts these should be selected to suit the speech-amplifier tube to be used. Constants in the RC filter in the clipper tube plate circuit can be adjusted for the desired frequency response.
Learn to talk at a fairly constant level, and to enunciate clearly. Proper microphone technique pays off in solid communication, and it makes contact with your station a more pleasant experience for the fellow at the other end.

Last but not least, assuming that the points above have been taken into account, we must still be sure that our r.f. amplifier is operating correctly if we are to have good readable modulation. Too many final stages, particularly on the v.h.f. bands where grid drive comes hard, are operated with insufficient excitation, making linear modulation impossible. If the rig is low on grid drive, lightening the load a little may make it possible to modulate fully and correctly.

Make sure that the final-stage tubes are operating according to their 'phone ratings as to grid drive and screen voltage, if any. Be certain that the final is completely neutralized. Beg, buy or borrow an oscilloscope and check the signal with it. Learn what 100 per cent modulation, as indicated on the 'scope, looks like on your meters; then stay as close to that level as you can at all times. Most of us strain to get the last watt out of our rigs and into the antenna; a similar attention to the characteristics of our modulation systems might be a lot more logical.

A 'phone signal should be solidly readable if the carrier is one S unit above the noise level, but probably not more than a third of the signals heard on the v.h.f. bands meet this specification. A fair percentage of them actually have to be four or five S units above the noise before their modulation begins to amount to anything. Which group are you in?—E. P. T.
Eighteenth ARRL Sweepstakes Results

Last year it was our unhappy task to report the results of a Sweepstakes that did not follow the old tradition of high scores and shattered section and contact records. Like all previous frays, the 17th SS started out with a bang only to have an unlucky stroke of fate intervene. During the second week-end contest atmosphere storms descended on many areas and put numerous contestants off the air. The need for providing emergency communications caused countless SSers to forgo the pleasure of contest operation. During the 18th SS conditions were much different, and better. Once more we are able to report a snappy contest in the old tradition — complete with both score and contact records that provide a challenge to future participants. More about that later!

Winners

Competition for awards is, under the Sweepstakes rules, among amateurs in each ARRL section. The SS is really 144 contests rolled into one, since that many certificates are offered for the top 'phone and c.w. scores. A total of 1063 entries was received in the Eighteenth SS, 861 from brass-pounders and 202 from the 'phone contingent. In the c.w. category, 72 individual section awards are being made. Among the 'phone entrants, 64 are receiving certificates. The winners are those first-listed in each section tabulation under the heading “Scores.” All contestants will certainly join in extending a sincere “well done” to these 18th SS champions for their fine performances!

Sections Worked

All of the League’s 72 sections were active in both the 'phone and c.w. portions of this SS. Working all sections always is a notable accomplishment in any contest, and especially in one as fiercely competitive as the Sweepstakes. Deserving of a special place of honor in the SS Hall of Fame for making a clean sweep of all 72 were the following: on 'phone — W1ATE, W3DHM, W6DEU, W8JIO, W8KEU, W8UKS, W8VQD and W8PRZ; on c.w. — W3BEH, W3GAU, W4KE, W5GEL, W6JUJ, W6EIPZ, W6MBB, W7FBD and W8IOP.

Fourteen contestants missed but one section, and also deserve special mention: on 'phone — W3LTU, W3PWR and W5KC; on c.w. — W3JTK, W3KT, W4GIO, W4RKC, W5CA, W6EAE, WbWIP, W7KEV, W9TKX, K16IJ and VE3SI.

C.W. Highlights

How high is the ceiling on SS scores and contact totals? In the report covering the 1947 frases we ventured a guess that the saturation point had been closely approached with a score of just over 150,000 points and a contact total just under 900. The following year along came a half dozen contestants to smash the previous score record and two SSers to top the 1000-contact mark! Needless to say, we have long since been cured of any tendency to make predictions about the capabilities of our SS experts. Instead of predicting saturation points, we are now given to wondering who will be the first operator to top the 200,000-point mark. That goal was almost reached in this SS by a West Coast operator, Jim Maxwell, W6CUF, who set a new c.w. score record of 191,250 points, worked all sections and had 1064 contacts while operating W6BUU. Jim is an 18-year-old lad who, it is reported, was participating in his first SS. Heartly congrats, Jim, on a superb operating performance that certainly will give the old-time SS experts something to think about! Here’s the equipment line-up used at W6BUU: transmitter, VFO-6V6-parallel 807s; receiver, 75A-2; antennas, 3.5-Mc. long wire, 7-Mc. ground plane, four-element 14-Mc. rotary.

Second highest reported c.w. score was that of contest master Jerry Mathis, W3BEH — 181,080 points from 1011 contacts and all sections worked. The SS rig in Jerry’s shack consisted of an ITT-18 exciter driving either of two amplifiers, an 820

C. E. Smith, W9ZTO, won the Wisconsin section 'phone award and entered the highest 'phone score from the W9 call area.

Eastern Florida entrant Beverley Cavender, W4CKB, chalked up 802 contacts and worked 70 sections to win the c.w. award for his section.
or an 813. The receiving was taken care of by an NC-101X and an HQ-129X.

If you're a regular reader of SS reports, you'll recognize the call W3DMG as that of an SSer who always is in the high score brackets. Mel came through in this shindig right on the heels of W3BES with 181,125 points, 1050 QSOs and 69 sections. His transmitter was an HT-18 driving p.p. 807a and the receiver an NC-100X with preselector.

Following the three highest scores with totals over 125,000 were W4KFC 172,177, W6WIP 168,359, W8IOP 156,816, W9QRM 155,488, W7PGX 149,975, W9TKX 148,390, W7KEV 147,858, W3ALB 144,550, W3GIAU 139,410, W9YCR 138,635, W4CKB 138,425, W9OULU 138,173, W5GEL 135,792, W4BGO 132,859, W3JTK 132,770, W9FO1 131,750, W3FQZ 131,100, W8RSP 130,463, W8CEG 129,075, W9WFS 128,188, W4SZY 127,500, W3GMH 126,098, K2USA 125,388.

The following were the high scorers in each licensing area: W1LVQ 105,274, K2USA 125,388, W3BES 181,980, W4KFC 172,175, W5GEL 135,792, W6BJU 191,250, W7PGX 149,975, W8IOP 156,816, W9QRM 155,488, W9TKX 148,390, C088L 11,900, KHEJW 68,160, KL7WC 15,272, KP4MN 62,306, KZ5CW 2280, VE1TR 53,105, VE2IT 41,374, VE3AGX 78,041, VE4RW 35,496, VE5QZ 100,013, VE6EO 62,169, VE7JO 68,475, VE8BK 4200.

Leading all contestants in number of contacts was Larry LeKushman, W8IOP, with a new all-time record of 1100 QSOs. Larry knocked 'em off at the rate of 27.5 per hour, an impressive performance and one that gives the experts a fancy mark to shoot at in the next Sweepstakes! Following, with 800 or more contacts, were W6BJU 1064, W3DMG 1050, W3BES 1011, W4KFC 972, W6WIP 952, W9QRM 893, W7PGX 873, W9TKX 836, W3ALB 826, W9YCR 825, W4CKB 802, W9OULU 802.

'Phone Highlights

For the third time since SS competition was resumed after World War II, Pete Omigli, W6QEU, tallied the top 'phone score. High man in the 1948 and 1950 contests and holder of the all-time 'phone contact record (854 QSOs in '50), Pete swept through all sections with 807 contacts and a final score of 116,208. He didn't miss any bets, either, and worked 160, 75, 20, 11 and 10 meters in going over the 900-contact mark. His rig ran a kw. input and receiving was done on an S-76. Good going, Pete! Pete's past performances and those of other W6s in the postwar period are worthy of note by SSers in other areas. The top score in each postwar SS has been entered by a Californian!

Second highest 'phone score also came from the West. Warner Thomson, jr., W7PUM, talked his way through 569 contacts with 69 sections for a grand total of 98,155 points. Warner used 75, 20 and 10 meters and his SS transmitter was a home-built VFO feeding an HT-9. His score is particularly noteworthy considering the power input — 90 watts.

Don Phillips, W3LTU, was next in line with 82,300 points from 464 contacts and 71 sections. The 75-, 20- and 10-meter bands bore the brunt of SS operation at Don's shack and he even managed to make a few contacts pay off on 6 meters. The rig on the lower-frequency bands was a 6AG7-807-814 job running 90 watts and a pair of 1825s at 30 watts garnered the 6-meter QSOs. Three-element rotaries were used throughout except on 75, where a half-wave doublet 75 feet in the air did the radiating. Following the top three 'phone scores, all with totals over 40,000, were W1ATE 82,080, W8UKS 80,730, W2MNR 73,015, W3DHHM 67,824, W8REU 65,592, W4BRB 63,700, W2SKE 62,654, W4PJM 62,445, W9PRZ 59,400, W6CHV 58,123, W9AJW 54,075, W8VQG 51,984, W5RY 48,100, W7EYD 46,500, W5MYJ 45,402, W5FKE 44,020, W9ZTO 41,925.

The following were the top scorers in each licensing area: W1ATE 82,080, W2MNR 73,015, W3LTU 82,360, W4BRB 63,700, W5RY 48,100, W6QEU 116,208, W7PUM 98,153, W8UKS 80,730, W9ZTO 41,925, W9PRZ 59,400, KH6AX 30,480, KL7N1X 203, VE1OM 683, VE2AHE 2320, VE4JK 3223, VE6ITK 11,220, VE7JT 11,040.

Leading in number of contacts were W6QEU 807, W1ATE 572, W7PUM 569, W3DHHM 471, W3LTU 464, W8REU 460, W2SKE 454, W8UKS 451, W2MNR 440, W9PRZ 415.

Meet the all-time Sweepstakes champion, Jim Maxwell, W6CIF, of Los Angeles, who set a new c.w. score record while operating W6BJU.
**Club Participation**

In the competition for the engraved gavel award offered to the club whose members submit the highest aggregate score, 44 groups submitted entries. For the Frankford Radio Club and the Potomac Valley Radio Club, the scoring groups, it was a spirited race. Until 1948 Frankford had won each of the eight gavels offered. That year, in the 15th Sweepstakes, Potomac took the award by a handsomely point margin. In 1949 Frankford countered with a determined effort and, by an equally handsome point margin, won their ninth gavel. Potomac came back strongly in 1950 and qualified for a second gavel. Both groups were primed for an all-out contest this year as the results show. After the smoke of battle had cleared, Potomac emerged the winner of a third gavel by outpointing their rivals 2,947,619 to 2,620,744. The Ohio Valley Radio Association, unheard from since 1949 when they placed third in the contest for the gavel, showed up to take third place honors.

The standings of all clubs that submitted aggregate scores are listed in an accompanying tabulation. Certificates are being awarded to the leading c.w. and 'phone operators in each club that submitted the minimum number of entries required by the rules; the calls of winners are also listed in the club row.

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**The Nineteenth Sweepstakes will be held during two weeks in November. Watch the ARRL Calendar of Activities in QST for the exact dates, then make your plans to get in on the fun!**

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**C. W. SCORES**

**Eighteenth Sweepstakes Contest**

Scores are grouped by Divisions and Sections. The operator of the station first-listed in each Section is award winner for that Section unless otherwise indicated. Likewise the "power factor" used in computing points in each Section is indicated by the letter P. A indicates power up to and including 100 watts (multiplier of 1.25), B indicates over 100 watts (multiplier of 1). The total operating time to the nearest hour is given for each station and is the last figure following the score. An example of listings: WB3ES 181.980-1011-72-40, or, final score 181,980, number of stations 1011, number of sections 72, power factor of 1.25, total operating time 40 hours. Stations named by more than one operator are grouped in order of score following single-operator station listings in each section tabulation; calls of participants at multiple-operator stations are listed in parentheses.

### ATLANTIC DIVISION - Eastern Pennsylvania

<table>
<thead>
<tr>
<th>Call</th>
<th>Score</th>
<th>C.W. Winner</th>
<th>Phone Winner</th>
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<tr>
<td>WB3PB</td>
<td>24,600</td>
<td>235-35-25</td>
<td>W3GBK</td>
</tr>
<tr>
<td>WB3TC</td>
<td>16,000</td>
<td>235-35-25</td>
<td>W3GBK</td>
</tr>
<tr>
<td>W3QJL</td>
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<td>235-35-25</td>
<td>W3GBK</td>
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<tr>
<td>W3SLJ</td>
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<td>235-35-25</td>
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<tr>
<td>W3WJL</td>
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<tr>
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**CLUB SCORES**

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<th>Phone Winner</th>
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<tr>
<td>Potomac Valley Radio Club</td>
<td>1,916,280</td>
<td>W3EGK</td>
<td>1,916,280</td>
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<tr>
<td>Frankford Radio Club</td>
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<td>W3EGK</td>
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<td>Salmon Radio Club</td>
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W3FQZ... 121,100- 761-80-8-36
W3YES... 122,935- 723-68-8-39
W3TWC... 122,618- 712-61-8-30
W3TWC... 122,013- 707-90-8-30
W3FQO... 114,713- 605-58-8-40
W3KQP... 110,708- 610-61-8-43
W3QZ... 97,896- 616-88-8-39
W3QZ... 75,934- 614-98-8-37
W3GRB... 59,628- 610-56-8-43
W3MRG... 80,938- 612-56-8-40
W3WYT... 77,910- 645-26-8-37
W3WYT... 69,325- 614-98-8-37
W3QZ... 58,220- 634-91-8-34
W3QZ... 44,956- 625-87-8-43
W3CDZ... 35,698- 626-68-8-38
W3WLT... 33,555- 624-68-8-35
W3E4B... 34,106- 574-32-8-37
W3DVL... 35,225- 413-88-8-22
W3QFU... 33,275- 394-55-8-29
W3QYD... 31,625- 295-78-8-26
W3YR... 28,552- 384-32-8-14
W3EEC... 23,465- 212-52-8-36
W3CVA... 18,120- 162-61-8-30
W3EL... 16,725- 149-58-8-34
W3MSK... 15,365- 139-87-8-34
W3ELD... 12,315- 111-49-8-37
W3JBX... 11,070- 104-17-8-31
W3TF... 9,108- 90-13-8-40
W3OYX... 9,140- 82-39-8-35
W3JZ... 9,150- 86-12-8-40
W3QHA... 7,596- 74-31-8-47
W3DYA... 1,252- 5-9-8-35
W3CDG... 7,560- 79-43-8-11
W3RAH... 4,898- 43-23-8-20
W3HVM... 3,185- 27-6-8-41
W3BJS... 2,135- 14-20-8-5
W3GKT... 1,290- 33-16-8-39
W3JGK... 1,010- 35-14-8-44
Southern New Jersey
W2PWP... 114,885- 696-69-8-34
W2HEE... 102,225- 590-70-8-31
W2DW... 35,370- 317-64-8-31
W2FV... 20,500- 23-42-8-19
W2BW... 8670- 135-34-8-21
Western New York
W2PJM... 105,232- 606-70-8-37
W2BXZ... 58,835- 521-66-8-40
W2IN... 22,900- 559-67-8-37
W2CCW... 62,266- 413-59-8-30
W2CC... 60,368- 420-64-8-23
W2EMW... 56,198- 381-69-8-34
W2DOD... 47,688- 377-26-8-30
W2COT... 43,710- 382-27-8-32
W2COV... 43,590- 336-38-8-37
W2VYJ... 24,510- 241-47-8-26
W2FXA... 22,185- 174-51-8-31
W2ZRC... 19,870- 175-44-8-13
W4YX... 15,170- 133-39-8-25
W4JS... 14,375- 123-6-8-6
W4GRR... 11,393- 150-31-8-33
W4TMC... 11,008- 130-64-8-18
W4X... 9,108- 106-58-8-19
W4NH... 8,949- 99-41-8-10
W4RJ... 5,988- 65-35-8-5
W4YN... 5,935- 88-27-8-31
W4ZC... 5,600- 101-27-8-18
W4ZK... 4,547- 457-12-8-37
W4RDL... 4,441- 7-28-8-26
W4WZC... 4,100- 120-20-8-5
W4FW... 4,025- 262-10-8-21
Western Pennsylvania
W3NRD... 63,000- 420-46-8-32
W3OU... 46,056- 390-48-8-31
W3OW... 38,060- 330-37-8-28
W3TFI... 41,600- 270-41-8-10
W3LBO... 5,255- 17-38-8-10
W3VHY... 3,185- 92-28-8-11
W3DGO... 2,430- 24-10-8-16
W3DJX... 1,852- 38-18-8-4
So often we hear, "I'd like to, but I just can't find time to get on the air." In many cases, how would this broad conclusion withstand cross-examination? Most of us have a vocation, whether it be in business or in the home; and daily we encounter numberless distractions and countless tasks to perform. But these factors notwithstanding, there are not as many YL calls heard as there might be.

Have you noticed, though, that those who are the busiest are those who have time to do even more? YLs who handled hundreds of messages find time to relay a few more. YLs with three or four small children take time out to check into a net or enjoy a bit of rag-chewing. YLs busy teaching code and theory find time to help still another interested person.

The important point is there's so much to be gained by operating more. The more we operate, the better operators we become. The more traffic we handle, the more we help others. And, we YLs who are home during the day have many advantages: we can enjoy uncrowded bands, we have a better chance of working and making friends with DX, we can work in QRM-free nets, we can monitor for band openings, we can do on-the-air testing and experimenting, we can transmit code instruction — to name but some of our opportunities.

Few of us can truthfully say that our planning is so efficient and our day so busy that there just isn't time to get on the air. Let us then "make" time. Surely our amateur licenses are important to us, otherwise we wouldn't have troubled ourselves to get them.

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*YL Editor, QST. Please send all contributions to W1QON's home QTH: 318 Fisher St., Walpole, Mass.

We are proud to present Frances Hooper, W3SBE (ex-WN3SBE), highest scorer in the ARRL Novice Round-up Contest held January 12th through 27th. (see official results, p. 26 of this QST). "Fran" received her Novice license in August, 1951, her Technician license in December, and her General Class ticket after the Round-up. The XYL of W3BYB and the mother of four young children, she is a member of ARRL and RCC, and holds a Code Proficiency certificate for 15 w.p.m. In the contest Fran used a 6V-807 rig and a Viking 1 on the 3.7 and 27-Mc. bands, and a 522 on two meters.

May 1952

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Keeping Up with the Girls

W6PJF is NCS of the YL Rag-CheWing Net which meets Wednesdays at 1300 on 9040 kc. W6C DCL EWY FEA HHD HRO HTC NLM and W6P check in regularly. All interested YLs are invited. W70VY monitors 29.3 Mc., Tacoma's emergency frequency, from 7:00 a.m. till late evening each day. The list of teen-age YLs is ever increasing. W2KAE and WN4UGO are new additions. W6FNP is a member of C.A.P. and the So. Alameda C.D. Net. Betty handles much traffic for the GIs in the Pacific. W1BCU, W3EXZ, and W3MISU took time out from the N. Y. IRE show to rag-chew about matters relating to rag-chewing. W2GZ is in TV, QSL duty. W8GYU is busy building and modifying two-meter converters. And W6FKY is building a modulator for her OM's 80-c.w. rig so she can operate 75 when her Advanced Class license comes through. A recent Vermont contact gave WAS on 10 'phone to K25DG. OM W5DEX writes that W2RUF is the only person he has ever worked "who can take 35 w.p.m. of complicated traffic messages any day of the week without asking for lots of files." W8BGH and W8AYN were featured in a publicity article in the Lincoln (Nebr.) Sunday Journal and Star. W6BDE is "in between antennas." A storm blew one down, and a fit attack has retarded Esther from putting up the new V beam she's been planning. K26FMM usually operates between 1:00 and 4:00 p.m. EST on 28.6, 28.7, or 28.0 Mc. Always alert for W YLs, KH6AF FL works 10, 20, 40, 75 and 80. Louisa is giving code practice on 40 c.w. three days a week.

... I never have any trouble getting an antenna up.

... WN2HJD and WN2BDT are mother and daughter in Smithtown, Long Island, and OM WN2BEM makes it another all-ham family. After winning the San Joaquin Valley section of the Dr. Wing Two-Meter Contest for the third time, W63QG predicts permanent possession of the activity trophy. Newly-elected officers of the KH6 YL Club are KH6AFN, president, KH6TI, secretary and publicity director, and KH6ACF, treasurer. W3RXV and W3RXW believe that they were the first married couple to pass the Novice exam in the U. S. W7BKE predicts an increase in YL activity in W7land, and Dolly reports new YLs in hard-to-work-for WAS/TL Utah. W6FEA participates in the American Legion Net, which distributes traffic from overseas. Gerrie, the YLRL chairman for the Sixth District, traveled 225 miles to attend the joint luncheon of the L.A. and S.D. YL Clubs. Newly-licensed WS6DX is on 10, W3QJF and W3CXC are on 10, W5DXA is on 80, and VE6DF has been at Lake Lebarge in the Yukon Ter. (Continued on page 140)
Final Results — 5th Annual ARRL V.H.F. Sweepstakes

With 365 reporting contestants, the 1952 V.H.F. Sweepstakes (Jan. 12th-13th) retained its established position as one of the major operating activities on the ARRL calendar, yielding top rating only to the Field Day, full Sweepstakes, and the DX Contest in numbers of participants. Scores did not quite reach record proportions, as there was little in the way of good propagation to boost multipliers, but activity was the best ever.

Top honors go to W2NYL, Oak Tree, N. J., with 211 different stations worked in 9 sections, for 3780 points. W2BV, Minotola, N. J., was second with 3258 points. It is of interest to note that these two totals were made entirely on 144 Mc., and the large margins by which W2NYL and W2BV hold the top two places is testimony to the effectiveness of their big antenna systems and their intensive operating effort.

As always, club competition was keen. This time the South Jersey Radio Association topped their rivals from across the Delaware, the York Road Radio Club, and thus became the proud possessors of one of the silver-banded gavels, after giving the first-place clubs a close run for several years.

An important factor in the larger 2-meter scores this year was the enthusiastic participation by Novices, 29 of whom appear in the tabulation. A perusal of the complete file shows well over 150 WN calls worked.

In the tabulation to follow, the columns give the total score, the number of contacts made, the section multiplier, and the bands used, A being for 50 Mc., B 144 Mc., C 220 Mc. and D 420 Mc. No contacts were reported for any higher band. The club listing gives the combined club total and the call of the winner of the certificate for the highest individual score in the club. The first call in each section listing is the winner of a certificate award unless otherwise noted.

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<tr>
<th>CLUB SCORES</th>
<th>Aggregate Score</th>
<th>Certificate Winner</th>
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<td>South Jersey Radio Assn.</td>
<td>31,526</td>
<td>W2BV</td>
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<tr>
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<td>4562</td>
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<td>Lakeland Amateur Radio Assn.</td>
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<td>W2GUV</td>
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<td>W2BNX2</td>
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<td>Old Colony Radio Club</td>
<td>3362</td>
<td>W1MMX</td>
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<td>Rochester Y.H.F. Group</td>
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<td>W1UJ</td>
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<td>The D.X Club</td>
<td>2193</td>
<td>W2NH2</td>
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Atlantic Division

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<td>W3FKK</td>
<td>40-10-2-B</td>
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Mid. Del. D.C.

| W3LMC | 0111-93-6-B |
| W3PNK | 924-93-7-B |
| W3NY | 420-48-5-A-B |
| W3MLT | 216-41-3-B |
| W3NH | 100-20-1-B |
| W3YC | 120-16-1-B |
| W3PK | 120-20-1-B |
| W3RKQ | 60-10-3-B |
| W3NKR | 35-6-3-B |

S. New Jersey

| W2BV | 3258-181-0-B |
| W2UK | 3240-119-0-B |
| W2AJ | 2016-129-8-B |
| W2EHO | 1501-129-8-B |
| W2EGO | 1507-184-1-B-D |
| W2PAU | 1500-100-1-B-A |
| W2BD | 1402-100-1-B |
| W2LD | 1827-94-7-B |
| W2KWH | 1140-95-6-B |
| W2UCY | 1050-105-5-B |
| W3MD | 952-119-4-B-H |
| W3RIO | 900-93-4-B |
| W2TJX | 888-114-1-B |

(Continued on page 142)
The World Above 50 Mc.

CONDUCTED BY E. F. TILTON,* W1HDQ

This issue of QST was to have featured a high-powered driver-amplifier for the 144-Mc. band, but instead, it came very nearly having an obituary for the V.H.F. Editor. It happened like this:

The rig had reached the final testing stage; in fact, it had already been on the air a few contacts at W1HDQ. In the lab it had survived tests runs at 900 watts input, and had delivered a measured output of nearly 500 watts, which is not bad efficiency on 144 Mc. And this while a TV set, running close alongside, brought in a perfect picture on our special weak-signal antenna that we use for TVI checks. Yes, this job looked to be about ready for writing up.

Then, suddenly, a sensation like being close to a blinding flash of light—a feeling of floating through a completely black sky—and the next thing your conductor remembers is picking himself up off the lab floor some six to eight feet away from the transmitter test bench. The new rig lay bottom up on the floor, its big beautiful bottles reduced to scattered bits of broken glass and twisted metal.

The ARRL lab test positions have quite adequate warning devices. There are three big red indicator lights on each power circuit, one close to the switch, one on the meter panel, and a third on the power supply itself. But the writer was taking one of those fatal haste-makes-waste shortcuts. The high-voltage supply at this test position was out of order, so a haywire connection to an adjacent position was being used: its red lights outside the normal line of vision. With fixed bias on the amplifier, and no excitation, there was no constant visual reminder of the high-voltage danger. Omitting the usual test with the grounding stick, he picked the thing up with 1500 volts on the final tank!

If it had been summer, and the writer's hands wet with perspiration instead of dry from March winds—if the working area had been a confined space, so that the involuntary leap backward could not have pulled the high-voltage lead off—

if the Variac had been set for the maximum supply voltage—if there were plenty of 'ifs' that could have given our Editorial Department another obituary job. They all add up to just one thing: never skip any safety precautions! And—need we add it—switch to safety!

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

A few 6-meter men have demonstrated that it is possible to live with Channel 2 in some instances, even without work on the TV set, particularly when the TV signal is strong, and the 50-Mc. rig is operated at moderate power levels. There is another kind of TVI, however, that is a problem in the areas where V.H.F. users have strongest interference in the 50-Mc. band from the TV station. This is centered on 50.75 Mc., and if you're not too close to the TV station it causes little trouble except around that relatively unoccupied spot in the band. If you're really close, however, as WSVB, Belaire, Texas is, it can eliminate anything except the very strongest signals from 50 up to above 51 Mc. The gang around the New York area say it was rather bad there when the Channel 2 antenna was moved to the Empire State Building, but that it has since been reduced to relatively harmless proportions. If anyone knows the exact cause of this interference, and a cure for it, WSVB would like to know about it.

Heard any singi-sideband signals on 50 Mc. yet? There are at least two on almost nightly, W1PNB, Bristol, Conn., and W1CGY, East Longmeadow, Mass., are now putting out some real power on 50.3 Mc. Because it requires a narrower passband than does conventional s.s.b., transmission should be more readable under aurora-reflection conditions, where phase distortion tends to make readability. Because few of the 50-Mc. fraternity have had s.s.b. receiving experience, and thus do not recognize the signal for what it is when they come across it, our s.s.b. pioneers on 50 Mc. have not had much luck in raising stations outside of locals, to date. The first s.s.b. 50-Mc. aurora contact came about on the evening of March 9th, when W1CGY raised W2SFK.

RECORDS

Two-Way Work

50 Mc.: CEIKAH — I9AAO
10,500 Miles — October 17, 1947
144 Mc.: W6ZL — W5QNL
1400 Miles — June 10, 1951
220 Mc.: W1CTY — VE1QY
275 Miles — June 29, 1919
120 Mc.: W6VX6 — W6ZJN6
284 Miles — July 3, 1919
1215 Mc.: G3QCP — GBDDP
73 Miles — Oct. 1, 1950
2300 Mc.: W6FEE — W6EKT
150 Miles — October 5, 1947
3300 Mc.: W6FEE — W6EKT
150 Miles — October 5, 1947
5250 Mc.: W2LGF2 — W7TP2/2
31 Miles — December 2, 1945
10,000 Mc.: W4HPJ/3 — W6FEE/3
7.65 Miles — July 11, 1914
21,000 Mc.: W1NV/2 — W9SAD/2
890 Feet — May 18, 1916

* V.H.F. Editor, QST.
Glenn Falls, N. Y., by calling him on s.a.b. This was Clark's first successful DX call in scores of tries. While this QSO was in progress, VE8AET, Lacoste, Ont., relayed the signal and tuned in successfully. He called W1CGY and established what is, up to now, the 50-Mc. s.a.b. DX record as a result. It is of interest to note that these contacts were made when the band was in extremely poor condition, the aurora being only mildly in evidence. When you find the 6-meter band open to W1, look carefully around 50.2 Mc., for these fellows. Tune with the b.f.o. on, and the r.f. (or i.f.) gain turned down. Get the signal "on the nose" and then adjust the b.f.o. or i.f. gain for best work. When you have the crystal-controlled converter you should make out very well, and if your converter is tunable you can still read the signal by retuning carefully to compensate for drift. Watch for these fellows, and let us know how you make out with them.

Ve6 Ve4 on 145.5 MHz. Then look for VE4W. Brandon, Manitoba, who has 90 watts and a 4-element array on 50.188 Mc. nightly. He makes test transmissions between 1000 and 1005 CST, VE4CF is also on 6, and together these fellows seem to be a stir up activity.

There were plenty of aurora bursts during March, but nothing phenomenal has been reported in the way of DX. The carefully recorded observations of several dozen reporters scattered all over the northern half of the country indicate only very mild interplanetary disturbances, however, and the effort on these reports represent is deeply appreciated, both by the writer and our friends at Cornell University, to whom the reports are forwarded. If you would like to help in the observation program send a card each time you hear a supply of reporting forms will be sent to you at once.

We made some mention of the February 23rd session last month. Now that the observations are all in, this one seems to have been the opening of the year. Reports have come from the whole northern portion of the country. Perhaps the most interesting is from W7MBV, Geraldine, Montana, who heard a W7N7T on 145.52 Mc. between 2345 and midnight, EST. Anyone care to stop forward and identify himself? W7MBV also heard two other unidentified 2-meter signals, and several "phones" on 50 Mc. And he's in Montana, too! W7BYK, Marysville, Wash., reports four VE7 and W7 contacts on 50 Mc. that night.

On March 14th, March operations have come in for the 3rd, 4th, 5th, 6th, 7th, 10th, 12th, 23rd, and 26th. All but the 5th were of quite short duration, however.

W2TBI, Rochester, N. Y., reports the starting of operations by the Zone IX 2-Meter Part of the New York State Civil Defense System. All 2-meter operators in Monroe, Ontario, Wayne, Yates, Steuben, Allegany and Livingston Counties are invited to participate. Any available frequency is used for the present, but allocation of specific channels is planned.

The two WAR nights so far sponsored by the Rochester V.H.F. Group were highly successful, despite rather poor conditions, according to W2GB. John says that the WAR certificate award has boosted activity considerably in the Rochester area, and a record-breaking spring and summer season is expected.

WSUZ, Columbus, Ohio, reports activity on 146.34 Mc. each Monday night at 8 p.m., with W8 CPA, WBN ABO and WAB joining in.

WFTQ, Milwaukee, has added skeds with W9PK, Downers Grove, Ill., daily except Saturday and Sunday. Contact has been consistent, to date, but on about one out of five days the signal is weak enough to require repeats to exchange useful information. W9DDG joins in this netsite activity when time permits.

W9EK, Westboro, Wis., says that the signals of W9BNB have improved slightly with the approach of warmer weather, and with the normals around Minneapolis, plus a couple of newcomers, have been worked fairly often.

There is nothing scheduled like a daily schedule during the winter months to make one appreciate the coming of spring. Your conductor has kept daily skeds on 144 Mc. with W2QED at 0730 EST throughout the winter, though contacts have been few and far between over this 210-mile path. Beginning about the middle of March, we started swapping reports again quite regularly, and though the signal still runs too weak for voice operation much of the time there is a steady improvement noticed. Before long, we expect to have conditions good enough to start checking on 435 Mc. again.

An effective public-relations service can be performed by your conductor has kept daily skeds on 144 Mc. with W2QED at 0730 EST throughout the winter, though contacts have been few and far between over this 210-mile path. Beginning about the middle of March, we started swapping reports again quite regularly, and though the signal still runs too weak for voice operation much of the time there is a steady improvement noticed. Before long, we expect to have conditions good enough to start checking on 435 Mc. again. An effective public-relations service can be performed by

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More on the 6DBQ

Have you tried the 6BQ7 as an r.f. amplifier on 144 or 220 Mc. yet? Judging by our correspondence, plenty of v.h.f. men have, with results ranging from bad to excellent. It has been pointed out that there is an error in the value of the grid resistor, R2, in the converter article in September, 1951, QST, page 42. This resistor should be approximately 600,000 ohms, rather than 50,000, as slated in the cut label.

W2HINH, Syracuse, N. Y., mentions that he was able to boost the performance slightly by using a smaller value of decoupling resistor (R8 in the circuit referred to above). Particularly if the power supply voltage tends to be a bit low, dropping this resistor from 1000 to 1000 ohms will help a bit. In checking this we came across a slip in the 1952 Handbook in connection with the 6BQ7. Obviously, the decoupling resistor in Fig. 16-3 should not be 470,000 ohms, but 100 to 1000 ohms.

W2OWQ, Niagara Falls, N. Y., finds that his 6BQ7 r.f. stage was not the most satisfactory with no coupling. Probably because of variations in layout (very likely multiple ground paths) any feed-back capacitance produces oscillation.

Several users have asked about the best method of coupling to a coax-fed antenna system. 6BQ7 circuits have shown an untuned grid coil, with a tuned pick-up winding. This is suitable for Twin-Lead or open-wire transmission-line systems, but for coupling to cox it would be advisable to tune the grid coil and tap the coax directly on it. The position of the tap should be adjusted for best noise figure.

Simple S.W.R. Check

This is antenna weather. If you want an inexpensive standing-wave indicator for those spring antenna workouts, here's a variation on the Twin-Lamp idea that is particularly useful in v.h.f. antenna work. Make two pick-up loops using 2-volt 60-ohm pilot lamps. The loop portion can be a piece of Twin-Lead about an inch long, with the end away from the lamp bridged with wire. Couple one of these loops to the transmission line and adjust the power input to the line so that a fairly bright indication is obtained with close coupling between the loop and line. Slide the loop along the line until the brighttest indication is found, and fasten the loop in that position. A spring-type clothes pin is handy for this purpose.

Now run the other pick-up lamp along the line until the minimum brilliance point is found, and fasten it in place at this point. A good indication of standing-wave ratio is obtained in this way, and you can proceed with adjustments, trying always for the least possible difference in brilliance between the two lamps. When a change in matching is made the nodal points may shift, so the high and low voltage points should be found after each adjustment. If the work is done in shade, or on a dark day, a glance at the two lamps is all that is needed in trying for minimum s.w.r. If you want approximate figures for the s.w.r., the bulb brilliance can be checked by varying d.c. input to a lamp through a filament rheostat. Such a voltage check will show that a 1.0 to 1 voltage ratio is easily discernible, and quite small steps in either direction can be observed readily.
This advertisement was clipped from a Chicago newspaper by W9RJM:


In these days of high specialization there is still demand for men with diverse qualifications!

Ralph Ziegenbein, W8PLP, 920 Clyde Street, Lansing, Mich., has a copy of the 4th edition of Wireless Handybook, which lists all amateur calls of 1916. The volume is not for sale or loan, but if anyone wants his 1916 call verified W8PLP will help you out. All he asks is that you send him a stamped envelope or postcard for the return information.

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For more than a year now, ARRL has been working closely with the Boy Scouts of America in the promotion of amateur radio in the scouting movement. With the cooperation of Harry A. Harchar, W2GND, circulation manager of Boy's Life, a series of articles on amateur radio has been appearing in the official publication of the Boy Scouts, and from time to time, in Scouting, the professional magazine for Scout leaders and officials. The series was worked out in conjunction with League officials and several of the articles which have appeared were prepared by ARRL. All amateurs and club groups are urged to extend a helping hand to Scouts and Scout leaders interested in amateur radio.

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Captain Henrik Kurt Carlsen, W2XZM, receives the Marconi Memorial Medal of Service from Veteran Wireless Operators Association President William J. McGonigle, W2WNG (ex-W2ASN). The occasion was WVOA’s Twenty-Seventh Anniversary Dinner-Casino at the Hotel Astor, New York City.

Among other organizations recently honoring famed mariner Carlsen were the Garden State Amateur Radio Association of Long Branch, N. J., and the Smithtown, L. I., N. Y., Civil Defense Amateur Radio Association.

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Preview—DX Contest High 'Phone Scores

As early as practicable we present a compilation of high claimed scores for each annual ARRL DX contest. Despite generally unfavorable propagation conditions, 'phone enthusiasts participating in this year’s test — the 18th ARRL International DX Competition — bettered their 1951 efforts in many instances.


Outside W/VE, these claimed scores have been reported: KH6AEK 135,576, XE1SA 97,713, XE2W 95,403, TGSAD 66,519, XE1Q 29,274, KG4AF 15,050, G2PU 15,000, FSSK 14,841, KT1DD 11,396, CTSIQ 5909, DL4NV 5865, VK4FP 5083, KL7WC 5016. Top contact totals: KH6AEK 807, XE2W 593, XE1SA 535, TG9AD 393, KG4AF 394, KT1DD 277, G2PU 200. High multipliers: XE1SA 63, XE2W 59, TG9AD 57, KH6AEK 56, XE1Q 42, G2PU 25.


Watch for high claimed c.w. totals in June QST.

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FEED-BACK

In Fig. 1 of “Using the G6Q7 on 220 and 144 Mc.”, September 1951 QST, the value of R2 should be 500,000 ohms, not 50,000 ohms.
How?  

The rumpus started, as usual, when some obnoxious DXamples of operating tactics were brought forward to be frowned upon. Thrusting their straws deeper into our last remaining Peep, our visitors muffled into the poetic. Paul from St. Louis made an offering of questionable merit, a little ditty not calculated to set well with a crowded stomach:

A DX man lacking in pride
Had a signal nineteen ka, wide;
When he turned on the juice
The learned thing broke loose.
Crawled into the woodwork and died.

Hearing the commotion a mile away, W1RWS called on the landline with his contribution:

A young VQ7 named Spinks
Made ten thousand a year raising minks;
For his card the old pros
Find no new HRO.
So now Spinks thinks raising minks stinks.

Louie from St. Paul ducked a sharp left jab by Jeeves and headed for the window after this one:

A lambhead was Footilet O’Keye
He would walk with the greatest of glee;
Although thirty years old
He refused to be told.
There’s a time and a place to V-V.

These gems may be whimsical but we wish the cases in point were greater exaggerations.

What:  

Twenty continue to crawl along on its hands and knees. W9VDC overcame a severe attack of order disaster and is now putting the peace pipe with his neighbors. Jim’s latest triumphs: C38 SAD (14,069), 7AX (809), CT3AA (840), EL7A (409), E4AB (098), F6SAG (508), F6SAG (404), JABB (74), X66A (870), O95P (803), OT8Y (830), VUQZG (840), Z33s K (809), P (809) and 4X4E (005).

... KG4AF (015), E8BB (068), EL2A (857), GQ4L (950), C65EX (100) and TF6SF (607) were hauled in by W8EXZ’s 20-meter and half-waves-in-phase: W8AJH introduced himself to E4AAP (608), ZD2HAW (609), SA2TI (658), 9S4AX (801). F6QAE (840) and Y?3AT (93) while W4WNQ clobbered TF3AB (940).

... Arkansas’s W6ASU knocked off F6SBB (609), CPIA5 (673), L7ZEB (652), TAZEPA (877), TAZEPA (101), VQ5 SAU (608), 8CB (810), VK1BS (680), Y1ZBZL (818) and a ZD2 ...

Among W4KE’s catches we find O6QRA, O6EIGB and T09GCR. ... YL4WTA’s first tangle with 14 Me, rewarded her with VTVNM, VE2MVS encountered T15PS who claimed to be fishing off the Nicaraguan coast. VE2MVS entered the Greenland market, too, with OX39 IL, JJ and HK in the log. ... SU1D has an interesting one in his log. He said “QXN for QSL,” but SU1D isn’t holding his breath. The latter is still working U.S.S.R. stations but has seen nary a QSL from them. ... VO1AN helps put St. John’s on the DX map. FP8AC (753), H4AB (603), F6DQ (683), O5EL (100), YG5RF (787), ZD2FAR (875), Z35R (848)

and 4X4AH (690) are late entries for John. ... W5YGR needs a South American gal for WAC/YL and now awaits QSLs from OX39 BL, BO (802), EL2A (575) and a CT3. Jack wonders if three hoots in one season with the flu bug is any kind of record. ... A QSO with CE1DC completed W6AIG’s WAC2 efforts. Max then added VFs6 AE, AV, VP2MD, VO2EZ, ZK2AA, ZP2AC and 4X4RE (016).

... The DX Bulletin of the West Gulf Division DX Club reports the following continuous waves: CP5E2 (072), CR4AC (020), EA5 BBC (827), REO (088), 9BC (065), 6AC (108), HAD (085), EL2B (050), F6SAS XX (948), ZZ (047), FD8S AA (048), AB (023), FK3SS (880), FYYT8 (020), FG5A (050), AF (141), KE (001), F6V/QV (082), G2ZCFZ (048), HZ1AA (040), IS1QO (001), JATEN (014), KE5DAAA (052), O5UHY (020), SS2KQ (028), DW1K (123), ST2T7 (838), SVS 15MX (747), PWO (096), one SX7L (074), TS5G (048), YK5XX (020), VP6S AJ (132), AP (042), VQ5CC (101), YO6 EBC (032), Y6Y (032), YO1A Q57 (071), BD (075), ZE5QKU (040), ZC557 (050), ZHL 15D (140), 2GA (852), 4BH (030), 5DU (025), 6HN (083), 9AA (140), ZS7D (814) and ZA2TJ (073) of an evening: DU1A GT (005), MB (085), E6A6 AE (840), FB (005), F5MTF (073), FL6BC (070), F6VAC (803), G4JFBS (090), H12EJQ (017), H65LAA (015), HZIAB (028), ISIFIC (083), KL1X1JW (038), M136L (066), OS (070), MP44BD (108), OJ13DC (828), SF6Z G9KA (946), 4CM (055), 9EU (036), ST2HL (070), SU1A AD (833), G0 (116), FA (017), ZZ (085), SV6WP (797), TAA5F (005), U5KAB (045), Y6KDB (075), VQ3BM (069), V6S8A (078), UV2S BC (021), CQ (068), CS (040), CU (035), E6 (040), JK (020), MD (083), NB (092), Y6A1 GB (085), 1B (640), MU (092), SV3AMC (041), 3VS8S AJ (014), AV (050), 4UAJ (082), 4X4DR (080) and ZA2TJ (088) in the yawning.

No great lack of fire is twenty ‘phone, either. A two-element phased rotary dug up V6YCT (14,325, VSP5B (320) in the Cayman and XU1DD for W45ZP. ... ZP4ER (257) answered W5ASG while W6AJH settled for TAZEPA (379).

... ZD9A takes homes through consistently in the late afternoons, says John DeMaeyer of Lansing, Mich. ... W8FRK’s West Gulf contingent was breathing on the peaks of ‘phones CN1EJ (329), CN1AL (164), DUIAP (157), EAS 8AW (392), 9AR (310), E59A (295), F8BBG (100), F5SBB (440) in Madagascar, FR7ZA (315), 355VFV/FJ (076), G5D1E, HC6MNN (368), HX1TA (028), KM6AY (282),

* Please mail all reports of DX activity to DX Editor Newkirk at ARRL Headquarters, 38 LaSalle Rd., West Hartford 7, Conn.
PY2DV has a business-like installation in Sao Paulo with which he ran a close second to PY2NX in last year's ARRL DX Test. (Photo courtesy of LF1Z)

MF2AA (350), MI3BA (318), MP4KAC (290), OE1SIGK (190), OX3a BD (348), BF (375), MW (356), ST2GL (350), TF3SP (330), VK1BS (150), VQs 3CH (350), SAU (056), SAD (304), VR2s AP (233), CG (280), CY (125), Y1B2L (215-070), ZD8 4BF (155), 4AL (155), 8KD (250), ZK2AA (180), ZS8 TB (330), 7C (045), SA (360), ZA3s TH (164), TP (325), TS (177) and SA9AD (180) ... W2IEV, scanning the band aboard ship just off ZS8, reported some of the mobile boats ringing through in better shape than many W500 home stations. W2CX (CB, MDQ, W3X1J and W8CDY, all in motion, especially stood out. Vertical fans will arise upon this dollop!

Only hang on to your toea and W8EXZ dented it for 4X4XC (322), giving it a 30-watt 7-Mc. WAC. Jim also found K4AGP (082), TIZCR (008) and DU1AP (009) ... OHEOS/CR4 tickled VE3AVS. Jeeves suggests O315X/CR19 for competition ... VR3XX, KH6QY/KK6 (025), LJA9X and C3N8FX came back to W4KE. ... It's always good to hear from guys just whistled with the DX bug. W9N5L broke in with XE1TR and COSM7T while W2LJG flagged down two VQs - first DX for both. ... W2IEV understands KH3DH (009) to be on almost daily. ... Ubiquitous PY7W8 was W5FDR's fifth 20-watt continent on 40 and W2MVP nailed 5A2TT on the low edge. ... Really hot after the stuff on 20, W8EXZ managed QSOsE (006), OASBE (010), KG9PAA (044), a bunch of VK/ZLs and UA1AW (013), of all people ... CE7AA (010), HX3AR (015), VF6AC (010), VPs JWO (014), 8PP (015), ZC4CC (015), ZD9AA (022), Z53K (030), VO4HJP (020) and VQ5AB (010) are recommended by W5KUC's DX Bulletin.

Thunderstorms will be taking over nightly for lengthy transmissions but don't give it up too soon. Fragments from W4BER's 3.5-Mc. eural notebook: W6E AM, SA1 and ZA7L cuddled VR2CG (2800) and ZK2AA (3658) while VE1IZZ sniffed OX3EL (3515). VK9QK may be on 3525 and ZB2I has rocks for 3502 and 3524 kHz. ZB3JP works 3510 kc. Gene, himself, captured EA9AP (322), ZC4XP (3322) and VK2AWL (3508) ... KG4AP (3503) and KV2AA were collected by W4KE and W8EXZ. ... SU1AD reports a W11BB as the only U.S. station breaking through to Eeyot on this band. (That was probably W1HDH.) ... We heard that W1QWM worked H1C1WY - nice Novice DX for 3.5 Mc. ... DL4LQ says 80 is really jumpin' on the Continent; some of those most active are PA3WAD, OK3MIR, SLGAL, HB6QG, DLs 60W, 90L, and ON4IL ... W8XKJ lent the birds off his long highwire by working accumulations stuff like K16QY/K8C, SV6WP, LUSKL, ZD1AB, CT3AB, YU5s 1AD, IAEC, 3A88, PZLZ and F8ARRJ. George has a nice 50-watt 3.5-Mc. WAC with his KB09L.

Like Scruton, VP6PV's call makes sense backwards. Paul likes e.w., but can screen-modulate his 90T final and has been widely worked on most DX bands. (Photo by LF211S)

Where:

Right down to brass tacks we go this time. Good luck with these:

AM1AJK United Nations Hq., Rawalpindi, Pakistan
CR5UP (QSL via CT1C1L)
DL4WC Sat. V. Villaneuva, Co. A. 7774 Szk. Br., AP0 409, 94 Postmaster, New York, N. Y.
F7BB Chateau Meleray, 68, Denin-en-Vel, Frangue
ex-P9LF Francus Mulet, JT 4/5N0, Station Radio Air, Tamatave, Madagasgar
HPI1MVS Victor Salins, P.O. Box 8, Panana City, Panama
I21KAB Box 810, Sofia, Bulgaria
ex-MD2AM 5A2TR (QSL via 5A2TR)
One of the most elaborately furnished stations in Switserland is that of HRK, Wille, can be worked on frequencies from 3.5 to 400 Mc. and also operates a 50-watter in his "MG" sports car. His profession is dental surgery.

May 1952
SIMPLE CRYSTAL MARKER OSCILLATOR

Many present-day communications receivers use two tuning dials, one to set the range, and the other for bandspread tuning. Before the calibration on the bandspread dial is usable, the main tuning dial must be set accurately. A crystal-controlled marker oscillator is about the best way to do this. The circuit shown in Fig. 1 is ideal for this purpose, because it can be built right into most receivers and turned on or off at will by a toggle switch mounted on the front panel.

![Circuit Diagram]

Fig. 1 — A marker oscillator that can be added to any receiver to provide a convenient way to set the main tuning dial to the right spot so that the calibration of the bandspread dial will be accurate. The value of R1 is 27,000 ohms, R2 is 0.1 megohm, and SI is a s.p.s.t. toggle switch.

The 3.5-Mc. crystal found in some of the SCR-274N transmitters makes a good crystal for use in the circuit, although any 3.5-Mc. unit is usable. The fundamental and harmonics of the oscillator make it usable as a band-edge marker for all bands through 28 Mc. — Myron C. Pogue, W7FKO

INEXPENSIVE LOW-LOSS COIL FORMS

If you are looking for an inexpensive source of small-diameter coil forms, try using some of those short lengths of RG/8U cable that ordinarily are thrown away. Cut the cable as shown in Fig. 2, after removing the black vinyl covering, the shield braid, and the center conductor. The polyethylene dielectric is a good low-loss material, and it can be mounted easily as shown.

The simplest way to remove the center conductor is to heat it slightly with the tip of a soldering iron, and then pull it out when the polyethylene starts to melt. — William B. Desnoes, W2HBC

EXTENDING WHIP ANTENNAS FOR MOBILE USE

The arrangement shown in Fig. 3 is a handy way to add precious length to your existing mobile whip antenna. In some instances it is useful to extend ordinary broadcast whips to sufficient length to make them usable with the transmitter.

![Antenna Diagram]

Fig. 3 — Handy method for extending the length of a whip antenna used for mobile work. The dimensions shown may be changed to suit individual applications.

A polystyrene rod is drilled at one end to slip over the top of the whip antenna. The other end of the rod is tapped to take the extension. The length of the rod is then usable as a form for a loading coil. Connection to the whip and to the extension is made as shown in the diagram.

This arrangement has given good results in a 28-Mc. mobile installation, and should be of interest to those who already have b.c. whips mounted on their cars. — John Jarnefeld, W4MBH, ‘9, ex-W2KFC

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QST for
21-MC. OUTPUT FROM THE SINGLE 813 RIG

It is a very simple matter to obtain 21-Mc. output from the single 813 transmitter described in July, 1951, *QST* and in the 1952 edition of *The Radio Amateur’s Handbook* (page 185). All that is needed is a new coil for the 6V6 driver plate circuit. We used 43⁄4 turns of No. 14 enamelled wire spaced to occupy 1 inch of a 1 1/2-inch diameter coil form (National XR-5). This coil resonates at the low end of the band with about 20 per cent of the capacity of C9 in use, and permits the stage to be operated as a tripler from the 7-Mc. output of the 6AG7 oscillator stage.

The 813 stage uses the same coil as that specified for use at 14 Mc. It resonates at 21 Mc. with the main tuning condenser set close to the low-capacity point of its range. — R. M. Smith, W1ETX

MODULATION INDICATOR

The simplicity of the modulation indicator shown in Fig. 1 makes it an interesting addition to any 'phone station. The circuit is non-critical, and once set requires no readjustment.

![Fig. 4 — A simple modulation indicator using a magic-eye tube.](image)

The circuit makes use of the fact that when a signal is modulated 100 per cent or more in a negative direction, periods of no signal result. With the rig turned off, adjust R2 until the eye just closes. This becomes the reference point of no signal. Turn the rig on and couple the pick-up wire to the feeders, increasing coupling until the eye opens up to about 90 degrees width. The eye will close as the transmitter is modulated. The higher the percentage of modulation, the more closure of the eye. When it just closes, 100 per cent modulation in the negative direction is reached. Operating just below that point insures against getting tagged for infraction of the regulations. — Bob S. White, VE7ANR

EFFECTIVE TVI PROBE

In the course of attempting to eliminate TVI, you sometimes reach a point where the harmonics have been reduced below the point where they can be detected by the usual absorption-type wavemeter, even though link probes and high-sensitivity meters are used. The gadget shown in Fig. 5 can be used from this point on to discover points of harmonic leakage.

![Fig. 5 — Simple probe consisting of 300-ohm Twin-Lead for tracking elusive harmonic leaks. The method of use is described in the text.](image)

Having a TV receiver in the same room as the transmitter is a big help, but if you don’t have one, you can use a converter to tune the TV range, as described in earlier *QST* articles. The receiver is turned on, and the end of the probe is connected to the antenna terminals along with the regular TV antenna lead-in. To prevent blanketing by the fundamental transmitter frequency, a high-pass filter should be inserted in the TV lead-in, close to the antenna terminals.

The other end of the probe is then moved around the area of the transmitter. It will produce a marked increase in the interference whenever it comes close to a “leak” in the shielding of the rig. In one instance, I was able to spot a harmonic leaking out from under a metal tube, even though the shell was grounded. — D. J. Gagne, W2LID

Silent Keys

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

W1GE, Everett R. Rogers, Portland, Me.
WITLG, Pasquale A. Antonellis, Waltham, Mass.
W2OLG, Edgar G. Leicht, Lake George, N. Y.
W232J, Edmund D. Miller, Edina, N. Y.
ex-4A4, Wilbur B. Pope, Athens, Ga.
W4ETK, M. Ross Baird, Coral Gables, Fla.
W6LDX, Clifford D. Wylie, Santa Maria, Calif.
W7FOA, Clifford F. Bunn, Glendale, Mont.
W7MW, Frank Zeman, Jr., Medford, Ore.
W8BAC, Jery Trousil, Rocky River, Ohio
W8YQ, Ed H. Foulc, Independence, Kansas
K4QZO, Randall J. Cours, Santa Cruz, P. R.
PY1BG, Aydano de Araujo Salles, Rio de Janeiro, Brazil
VE22F, Otto E. Curtis, Montreal, Que.
VE6A, J. A. Argeo, Saint James, Man.
VE8TC, Sydney Hurbans, Goose Bay, Labrador

May 1952 69
Results of the Novice Round-up

The Novice Round-up can best be summed up in the comments of one of the participants, Wayne Nelson, WN4UGT. Wayne writes: “I enjoyed operating the contest and had a rip-roaring good time while getting operating experience and those needed states. It was particularly gratifying to find that many General Class amateurs operated the contest and did not lose patience with us “lids.” Vic Clark, W4KFC, one of the old-time contest operators, had this to say: “I certainly enjoyed working the WNs. It was a real pleasure to hear them tell me I was their “best DX,” a “new state,” “first W4,” etc. I’m getting a kick out of the QSLs received as a result of the Round-up. Now have worked WNs in 31 states . . . 29 confirmed . . . hi.”

With 92 stations reporting, representing 33 sections, an XYL came up with the best score. Frances P. Hopper, WN3SBE (see photo, page 59), worked 34 sections, 173 contacts for a total score of 6392. West Coast Noyce Merit Arnold, WN6NLO, garnered 2nd honors with a total score of 5069, 122 contacts, 37 sections.

The following scores are those of non-Novice stations and they are given by section: Conn.: W1AW 3000, W1BDI 2020, W1RWS 322, W1BUD 72, W1NJJ 55, W2CP 50; N.Y./J.: W2NYI 2232; S.N.J.: W2LX 60; N.Y.C.-L.I.: W2OBT 16; E.P.A.: W3ADE 1365, W3EAN 90; W.Pa.: W3JSH 928; Va.: W4KFC 2626, W4TFX 9; L.I.: W6WOO 3132.

SCORES

Scores are grouped by Divisions and Sections. The operator of the station first-listed in each section is award winner for that section. Example of listings: WN3SBE 6392-173-34-54, or, final score 6392, number of stations 173, number of sections 34, total operating time 34 hours.

ATLANTIC DIVISION
Eastern Pennsylvania
WN3SBE 6292-173-34-54
WN3SBE 4350-330-20-38
WN3NSV 2320-72-29-18
WN3RYY 2090-85-19-25
WN3SAW 870-58-15-21
WN3SRU 80-4-5-2
Md.-Del-D.C.
WN3RXS 3762-98-34-10
WN3RSC 208-14-7-8
Southern New Jersey
WN2MI 85-7-5-6
Western New York
WN2ML 290-19-10-31
WN2MP 88-7-4-1
Western Pennsylvania
WN3SDV 160-20-8-20
WN3SFP 92-8-4-2
CENTRAL DIVISION
Illinois
WN9QAQ 1271-52-19-21
WN9QGI 1217-86-16-26
WN9QIR 661-36-11-15
WN9PPTT 533-26-13-20
Indiana
WN9PAS 418-36-16-10
WN9PEX 207-12-9-5
WN9OWZ 76-9-4-18

DAKOTA DIVISION
Minnesota
WN9GHX 735-34-15-16

DELTA DIVISION
Tennessee
WN1TE 1288-41-23-34
WN1UO 216-18-12-4

GREAT LAKES DIVISION
Kentucky
WN4JNH 4032-111-39-39
WN4TRY 1356-48-22-15
WN4TC 268-23-7-3
Michigan
WN4KHZ 1020-51-20-28
WN4FL 588-39-12-17
WN4FF 491-29-13-21
WN4ODH 90-10-9-8
WN4IDM 88-11-8-14
WN4SHA 9-3-3-2
Ohio
WN4ISH 3000-95-30-38
WN4SHH 315-48-5-1
WN4HEP 145-5-4-1
WN4SHM 23-5-5-

HUDSON DIVISION
Eastern New York
WN2AP 2300-72-25-10
WN2EPM 1314-58-18-36
WN2BY 850-40-17-20
N.Y.C.-L.I.
WN2FTG 125-32-9-18
WN2KDP 350-35-10-7
WN2B3M 42-7-6-8
WN2ECJ 9-3-5-3
WN2BKN 4-2-2-2
Northern New Jersey
WN2LH 1418-69-22-13
WN2JCO 540-48-18-10
WN2BAS 261-29-19-9

MIDWEST DIVISION
Iowa
WN9EHL 95-9-5-6
Kansas
WN9EZI 240-11-10-11
WN9FKO 25-5-5-30

NEW ENGLAND DIVISION
Connecticut
WN1UFY 790-40-10-35
WN1UCA 611-32-13-15
WN1UPH 455-35-15-15
WN1UFW 147-13-10-4

Maine
WN1TYQ 154-14-11-4

Eastern Massachusetts
WN1UBC 1008-41-18-23
WN1UOV 956-36-16-15
WN1TV 378-20-12-6

Western Massachusetts
WN1UBD 1116-52-18-35
WN1TVJ 36-6-6-2

New Hampshire
WN1UON 4498-134-29-34

NORTHWESTERN DIVISION
Montana
WN7PTT 221-17-13-16
Oregon
WN7PQ 200-7-10-7-10
Washington
WN7PRF 583-43-11-26

PACIFIC DIVISION
Nevada
WN7PRM 330-20-11-22
WN7QH 84-9-6-4

ROANOKE DIVISION
Virginia
WN4YTC 99-11-9-1

ROCKY MOUNTAIN DIVISION
Utah
WN7QDI 207-23-9-10

SOUTHEASTERN DIVISION
Eastern Florida
WNJUCD 1699-72-27-22
WN4JUG 1509-67-27-38
WN4JKD 1156-53-17-20
WN4JTW 616-29-14-1

SOUTHWESTERN DIVISION
Los Angeles
WN4ORB 1531-59-20-32
WN4NCL 910-67-10-33
Arizona
WN4TQV 812-59-14-31

San Diego
WN6NLO 5069-122-37-25

WEST GULF DIVISION
Oklahoma
WN5UO 129-14-9-18

It has happened before but it’s always a stopper, especially with a Novice license involved. WN4TIK’s XYL walked in with his newly-arrived General Class ticket while he was in QSO with W4NTO. TIK signed the transmission “4-WTIK” and was thereupon admonished by W4NTO. The latter joined in the chuckle when given an explanation in the next transmission.

Our April Stray which reported W5TFD, W6NDP, W4TFX, W4TED and W5TFP (then WNs) as filing for the first Novice Class WAS certificates respectively must now be revised. Correspondence verifies that Norma Jean Guile, W1UBM, accomplished and applied for hers considerably earlier than the others. We were unaware that she had performed this feat as a Novice under her former call, W1UBM, and so far as we now know, Norma Jean rightfully deserves credit for this “first.”
Correspondence
From Members-

The Publishers of QST assume no responsibility for statements made herein by correspondents.

7-MC PHONE

302 Shaver Ave.
No, Bayonne, N. Y.

Editor, QST:
In February 1952 QST in "Haunuries of the Month" I noticed some remarks about 7-Mc band planning which used the incompatible words "phone" and "10 meters" in the same sentence. I assume this is a typewriter's error because I know anyone who is old enough to refer to the 7-Mc band as "40 meters" would never say the word "phone" in the same sentence without first inserting the title of some other amateur band where such deprecations are legal even if deplorable. I trust you will never again allow this previous error to appear in the pages of QST.

-- Jared Scott Smith, WDJFX

817 Gracewood
Memphis 12, Tenn.

Editor, QST:
The "phone" boys are restricted to portions of each band, while the c.w. boys have privileges on any frequency in any ham band with exclusive use of 7-Mc. It seems to me the c.w. boys are quite selfish with their frequencies. To be fair to all, half of every band for c.w., the other half for 'phone — that means 7 Mc, too.

-- Howard Benson, WB3BE

1212 Antonia Way
Bakersfield, Calif.

Editor, QST:
Concerning the FCC proposal of allowing 'phone operation on forty meters, I would like to be counted as one who opposes it. If forty-meter 'phone operation were allowed I would be one of the first there. However, I'm convinced that the best interest of the most amateurs would not be served by allowing 'phone operation on forty. All of the foreign 'phone stations that are at present fairly well scattered throughout the band would move down below the new 'phone band, making it extremely difficult for low-powered c.w. stations to operate.

Many people are of the opinion that American 'phone operation on the high end of the band is advisable on account of all the foreign broadcast stations on the high end. However, I see that these foreign stations would attempt to continue operating in an American 'phone band. They would, no doubt, just move down into the c.w. band.

-- Lloyd R. Zander, W0TBE

2210 S.W. 27th Lane
Miami, Florida

SERVICE AS USUAL

Conrad, Montana

Editor, QST:
Just a note to let you know that I appreciate your interest and help on my licensing problem. When I wrote in I was more or less just "gripping" and it didn't occur to me that you would be able to do anything about it.!!

The license was issued Dec. 7th but they didn't mail it until Dec. 19th and I got it Xmas Day!!

Again, many thanks for all your trouble and will say that this service alone was worth more to me than the price of a year's membership.

-- Harold Pyle, WTBPW

ALL DIRECTIONS AT ONCE

South Farm Route
Chadron, Nebraska

Editor, QST:
I've been reading your "Correspondence from Members" and am afraid I'm missing out on something. Sounds like some of the 'phone and c.w. boys really get hot under the collar. I want to get in my bit too so this is to let you know that whatever comes up, I'm against it.

-- Charles M. Christian, W0MZQ

THAT TV LETTER

159 Nott Street
Watertown 9, Conn.

Editor, QST:
I was very happy to hear that the ARRL "called upon all television receiver manufacturers to make construction changes which will eliminate interference with regular broadcasting channels in existing and future sets."

I can appreciate this since I have had more interference trouble with my TV set than with any other set in the neighborhood during my QSOs.

-- William Madison, Jr., WN1UOE

Annette Island
Alaska

Editor, QST:
I got a kick from reading the letters from the TV manufacturers: "Our receivers are so good that they don't have TVI in the first place, but we will cooperate with the..."

(Continued on page 140)
Some Traffic Observations. The National Traffic System has again functioned with excellent success through the current (tenth) season. High commendation is due those operators in key posts and in the section nets who have contributed to this mechanism that serves all amateur operators. It must be noted that "Old Man Skip" has played hob with operations in some net periods during this season. Shifting the time of net operation has helped a little in some cases. Since that interferes with the dinner hour or cuts into other ham activity it has not been a popular solution. However, with the longer days, conditions are now picking up for net operation.

The National Traffic System provides for a complete exchange of traffic between all net levels in one evening... usually section nets operate at 1900 and 2200 Mon. through Fri., with exchanges at regional and time zone levels in between. NTS sets up a plan that will work for amateurs everywhere, regardless of some individual absenteeism. NTS was built for the fraternity, permits participation by the casual traffic handler. This ARRL system was designed for the cooperative-minded individual amateur who wants to handle his traffic in an orderly efficient way, preparing himself for the time when his efforts can be used in emergency. "Big wheels" in traffic sometimes like to work as independents, but there's plenty of room for participation of all such in the over-all traffic-exchange networks.

All that our sectional, regional and area nets need is a sufficient degree of individual support and traffic participation to carry on every night. Rotation of NCS by different nights and enough general participation makes for success for all without undue burdens on each participant and networks are always in being even with some members absent. There has to be an NCS (or alternate) guaranteed for each meeting night, on all nets. The National Traffic System provides an automatic means of fast radio contact between all states, as contrasted to individual links in smaller chain systems of handling traffic which serve particular points or particular states with high efficiency.

What does the existence of NTS mean to the average amateur? (1) That by reporting on his section c.w. or phone net (see periods and frequency in ARRL Net Directory) which is or should be a vital part of the system; an amateur radiogram for any point in the U.S.A. can be sent forward with a plan for its successful early relaying to destination, if that section net properly sends a regular representative to its regional net. (2) The operating sessions in most all nets first cover the regulars in turn, noting and standing by any reporters who come in from outside points. Their traffic can be handled as soon as inside the sections traffic has been cleared. (3) Any amateur with traffic who calls in will be welcomed, or any amateur residing in the section, but each must of course take his turn to clear traffic. Having a message to originate into the net is the best badge of admission.

Armed Forces Day — May 17th. Try your success in the Armed Forces Day Receiving Competition. See the announcement for Armed Forces Day elsewhere in this issue. Make perfect copy if possible of the 25-w.p.m. transmissions to be sent at 2000 and 2400 EST on 15 frequencies! Demonstrate your skill. Send "copy" direct to the Pentagon (Room BE1000), Washington 25, D. C., for checking. Separately from the above, amateurs are on May 17th (6 P.M.-midnight EST) invited to engage in two-way contacts with AIR, NSS, and WAR for friendly QSO and QSL.

Novices, Watch Harmonics. Information has been received that in some cases signals from WN licensees among others are being improperly radiated at harmonic frequencies. Novices may take this as a tip to ask fellow amateurs they work to listen for their exact harmonic to see if it can be heard at any distance. Better yet, check your transmitter output with a grid-dip or absorption frequency meter such as described in Chapter 21 of the Handbook.

Official Observers and Novices themselves are requested to watch the harmonic shadows of the Novice band, especially for 7.1-7.5 Mc. and 11 Mc. and to notify by radio message or postal card any amateurs who can be heard there with improperly strong harmonics. Such action may help a brother ham to avoid an FCC notice.

On Becoming an Official Observer. Would you like to belong to that group of appointees provided with ARRL forms to assist all amateurs in maintaining high signal standards and avoiding FCC notices? General Class licensees experienced in amateur know-how for distinguishing between images and signals themselves, men with tact and stamina who have good receiving equipment and are alert to double-check against the chance of mistake occasioned by receiver overload or propagation conditions, may volunteer to SCM's for Observer work. The ARRL Board has frequently commended OO activity, and on several occasions it has won high FCC praise. Inquiries
about classes of Observer appointment, received by radiogram or letter, will bring our booklet with data on this and other ARRL appointments plus some sample forms. Applicants for OO appointment must reside in one of the field-organization sections (page 6, QST) and have stated experience, interest and qualifications.

FD Reminder. June 21st-22nd is not many weeks away. Plan to put the finishing touches on any new equipment now being built for emergency portable and car-mobile work. Plan to test it out and get in the fun this year in the largest of all ARRL operating activities. Log forms for report of ARRL Field Day stations are now available gratis on request to ARRL. Affiliated clubs received copies of the FD rules in February. These will be repeated in June QST. CU in the FD! — F. E. II.

MEET THE SCM's

Virginia’s SCM, R. Edgar Lindauer, W4FF, became a licensed amateur as early as 1915, and since that time has also held the calls 3U6, W3GRO, and W4CPS. He obtained commercial radio experience as operator for the Marconi Wireless Telegraph Co.—Merchants and Miners Transportation and on the Green Star Line, and as installation engineer for RCA. Following a call issued by ARRL during World War I he was one of the first 500 men to enlist as radio operator in the U. S. Army.

Despite his various SCM duties, Lindy still finds time to take part in ARRL Sweepspeaks, DX Contests, LO-NITes, and CD Parties. A charter member and one of the organizers of the Baltimore Radio Club in 1916, he is a present member and former treasurer of the Potomac Valley Radio Club. In addition he heads Official Relay Station appointment, is a member of the Old Timers Club, and has earned a Code Proficiency certificate for 30 w.p.m.

Equipment at W4FF includes a composite transmitter with a pair of 813s in the final so constructed as to permit disassembly for 30-watt Field Day operation or 100-watt Sweepspeaks participation, plus flexibility to incorporate these units to drive the 813s at a full gallon if necessary, although 400 watts is generally utilized. Screen-grid modulation to p.p. 813s recently was installed. The receiver is a Super-Pro and antenna is a 60-meter center-fed mounted on two sized poles 70 feet high and 14 feet apart. Lindy’s other hobbies are boating and, during the summer months, swimming, fishing, and boating at his summer home on Chesapeake Bay. He is employed in the Office of the Secretary of Defense as Chief of the Special Projects Committee.

CODE-PRACTICE STATIONS

W2JZX, Viola Grossman, 18 Whipori Ave., East Rockaway, N. Y.; 3905 kc., Mon., Tues., Thurs., 1100 to 1130 EST and Tues., Wed., 1830 to 1850 EST.

W7MWQ, Dick Wilhelm, P. O. Box 5013, Phoenix, Arizona; 3750 kc., Mon., Wed., Fri., 1330 to 1350 MST.

W6JZ, Ray Cornel, 909 Curtis St., Albany 6, Calif.; 3590 kc., Mon., Fri., 5, 7.5, 9 w.p.m., Wed., 12, 18, 25, 35, 45, 55 w.p.m., 1815 local time.

W7WJ, Hal C. McCracken, 4603 N.E. 28th Ave., Portland, Ore., 3590 kc., Tues., Thurs., 5, 10, 20 w.p.m., Sat., 18 to 45 w.p.m., 1815 local time.

DXCC NOTES

We are pleased to announce the addition of Singapore, VSI, to the Postwar Countries List. Heretofore, both VSI and VZ2 have counted for Malaya in the Postwar DX Century Club and the ARRL DX Competition. The Crown Colony of Singapore officially came into being on April 1, 1946, so QSL cards from VSI stations worked on or after that date will be acceptable for Postwar DXCC credit. Cards confirming postwar VZ2 contacts will continue to count for Malaya.

Speaking of countries, a brand-new Postwar Countries List is now available upon request. A number of corrections not found in the old list have been incorporated in this revised form which has been designed to withstand plenty of rough usage on the operating table.

DX CENTURY CLUB AWARDS

HONOR ROLL

W4FH .... 216 W4PL .... 227 W3KT .... 230
W8HGW .... 211 W4ENV .... 236 W3TJC .... 229
W9RES .... 241 W4CPY .... 233 W4GRL .... 228
W6VFR .... 236 W4HJD .... 232 W4HVEV .... 228
W9YXO .... 238 W4AM .... 232 W4GSO .... 228
W8FRO .... 214

RADIOTELEPHONE

W4FH .... 215 W4HGW .... 218 W8XRA .... 218
PY2SK .... 212 W9RLH .... 215 W3TLT .... 187
VQ9ERR .... 212 W1NWO .... 183 W6DL .... 181
NE1AC .... 208 W2JCA .... 182

From February 15 to March 16, 1952, DXCC certificates and endorsements based on postwar contacts with 100-or-more countries have been issued to the amateurs listed below.

NEW MEMBERS

G3GN .... 155 G9SRO .... 106 VP000 .... 101
OK4GJ .... 149 G3JU .... 106 SM4EP .... 101
G3DR .... 149 EI3R .... 105 W4RPH .... 101
L0AX .... 115 W3CPL .... 105 G8FS .... 101
W6JDO .... 112 GSWJ .... 105 N8PA .... 101
D8HIJ .... 110 W2RWN .... 104 G8GLY .... 100
W2AXO .... 108 W2CC .... 102 VE2BR .... 100
SC7YO .... 107 2BEVR .... 102 G3M6FD .... 100
K4CU .... 101

RADIOTELEPHONE

W6HR .... 170 G2LS .... 100 W8SBRA .... 100
W2AOX .... 108 W6KSN .... 100

ENDORSEMENTS

W2AGW .... 221 W1WK .... 193 G4JU .... 130
ZL6X .... 219 W9HUR .... 192 G8QV .... 129
W1W .... 219 W2PA .... 192 W4MT .... 123
W3AM .... 319 W4CZC .... 183 VE1PA .... 122
W9KC .... 209 W2REK .... 182 2B8K .... 121
W4PB .... 200 PA1LB .... 162 W8L0 .... 120
H1RC .... 200 W5RKC .... 156 HB9P .... 119
W7PGS .... 182 W4IC .... 112 W4BDW .... 111
W4FVO .... 127 K6HOP .... 110 K6FQ .... 110
W2HY .... 167 W4KFX .... 110 S82AT .... 87

RADIOTELEPHONE

2B8W .... 180 H4AO .... 140 PY2JU .... 117
ZL6X .... 172 L0DL .... 133 W4MM .... 115
W4JW .... 172 C9N4A .... 110 W4G01 .... 110
W1ENE .... 161 W5K6C .... 133

May 1952
TRAFFIC TOPICS

This is the month when we take cognizance of outstanding individual traffic performance for the previous year. You will be reading this in May, well into the time when traffic experts are again beginning to compete for high honors in the BPL, but it is not until mid-March, when S3NMs are reporting February traffic and when copy for May QST comes due, that we are able to make a survey of the previous year's BPL records with the assurance that all figures are in.

The BPL survey is made on the basis of "BPL points." These are awarded at the rate of four points for every individuals-owned and individually-operated station which makes BPL, plus one additional point for every 100 points in his traffic total each month. Thus, five points are the minimum awarded to any station which makes BPL. These points are totaled from month to month and from year to year for every station whose call appeared in the BPL since World War II. On this basis, the following are the "high ten" for 1951 and for the entire postwar period, with total number of BPL points shown in parentheses:

1951

<table>
<thead>
<tr>
<th>Call</th>
<th>Postwar</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>W3CUL</td>
<td>(526)</td>
<td>W3CUL (927)</td>
</tr>
<tr>
<td>W8KYV</td>
<td>(308)</td>
<td>W8KYV (819)</td>
</tr>
<tr>
<td>W4PL</td>
<td>(237)</td>
<td>W4PL (709)</td>
</tr>
<tr>
<td>W71OQ</td>
<td>(170)</td>
<td>W71OQ (793)</td>
</tr>
<tr>
<td>W7CZY</td>
<td>(177)</td>
<td>W7CZY (435)</td>
</tr>
<tr>
<td>W7TQD</td>
<td>(168)</td>
<td>W7TQD (236)</td>
</tr>
<tr>
<td>W8ZJO</td>
<td>(157)</td>
<td>W8ZJO (313)</td>
</tr>
<tr>
<td>W9LH</td>
<td>(155)</td>
<td>W9LH (308)</td>
</tr>
<tr>
<td>W9HJ</td>
<td>(155)</td>
<td>W9HJ (302)</td>
</tr>
<tr>
<td>WGGYI</td>
<td>(151)</td>
<td>WGGYI (377)</td>
</tr>
</tbody>
</table>

Let's pause briefly to goggle at the 1951 record of W3CUL. Mac was not only 100% BPL, but her lowest traffic total was in March, when she handled 2545 messages. Her high was in December, when she made 9956. The grand total for the year was 48,537, which is an average of more than 4000 a month! W3CUL was at the head of the BPL every month except May (when Old-Timer W4PL beat her out) and August (when KG1A, a multipurpose station, was top). We won't say, as we did last year about W0CE, that these records will stand for a long time — but who is going to beat them?

Note that in the postwar list, some of those still in the running are there on the basis of points collected years ago. Last year's champ, W0CE, got started too late to show in the 1951 high ten, but he managed to avoid being outdistanced by the other three of the "big four" on the postwar list.

The W6s were again high in the handling of traffic toward BPL in 1951, placing first both in number of BPLs and number of BPL points, with the W9s and W8s fighting for second place. The total number of stations listed in the BPL in 1951 was 461 compared with 443 in 1949 and 1950, so our traffic fortunes continued to look up. Here is an analysis of 1951 BPL data by call areas:

<table>
<thead>
<tr>
<th>Call Area</th>
<th>No. BPLs</th>
<th>BPL Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1</td>
<td>15</td>
<td>132</td>
</tr>
<tr>
<td>W2</td>
<td>33</td>
<td>185</td>
</tr>
<tr>
<td>W3</td>
<td>32</td>
<td>719</td>
</tr>
<tr>
<td>W4</td>
<td>34</td>
<td>413</td>
</tr>
<tr>
<td>W5</td>
<td>47</td>
<td>424</td>
</tr>
<tr>
<td>W6</td>
<td>78</td>
<td>1102</td>
</tr>
<tr>
<td>W8</td>
<td>48</td>
<td>517</td>
</tr>
<tr>
<td>W9</td>
<td>29</td>
<td>231</td>
</tr>
<tr>
<td>W8</td>
<td>50</td>
<td>694</td>
</tr>
<tr>
<td>W8</td>
<td>54</td>
<td>623</td>
</tr>
<tr>
<td>VE</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>Foreign</td>
<td>27</td>
<td>248</td>
</tr>
</tbody>
</table>

It is interesting to note that in three different call areas the BPL leader is a member of the feminine sex, and that three others have placed in the high three in their respective call areas. In the W9 area, the high three are all YLs. We OMs had better look to our laurels.

National Traffic System. The NT5 record for 1951 was summarized in a recent Emergency and Traffic Bulletin, so we will refrain, for space reasons, from going into it here, except to say that we believe NT5 is reaching its maturity and receiving more general acceptance among the traffic fraternity. This is not to say that we no longer have any problems; on the contrary, we have bigger ones than ever. The difference is that our efforts now are to gain 100 per cent support instead of just some support.

February reports:

<table>
<thead>
<tr>
<th>Net</th>
<th>Sessions</th>
<th>Traffic</th>
<th>High</th>
<th>Low</th>
<th>Average</th>
<th>Consist.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAN</td>
<td>21</td>
<td>815</td>
<td>76</td>
<td>9</td>
<td>39.8</td>
<td>38.8</td>
</tr>
<tr>
<td>CAN</td>
<td>10</td>
<td>288</td>
<td>39</td>
<td>5</td>
<td>15</td>
<td>RN5</td>
</tr>
<tr>
<td>RN1</td>
<td>34</td>
<td>330</td>
<td>49</td>
<td>0</td>
<td>9.7</td>
<td>E. Mass.</td>
</tr>
<tr>
<td>RN2</td>
<td>42</td>
<td>390</td>
<td>26</td>
<td>0</td>
<td>9</td>
<td>JN. NYS</td>
</tr>
<tr>
<td>RN3</td>
<td>40</td>
<td>165</td>
<td>18</td>
<td>0</td>
<td>4</td>
<td>E. Pa.</td>
</tr>
<tr>
<td>RN4</td>
<td>42</td>
<td>505</td>
<td>48</td>
<td>0</td>
<td>12.5</td>
<td>E. Ill.</td>
</tr>
<tr>
<td>RN6</td>
<td>28</td>
<td>1010</td>
<td>62</td>
<td>3</td>
<td>36.7</td>
<td></td>
</tr>
<tr>
<td>RN7</td>
<td>50</td>
<td>485</td>
<td>34</td>
<td>0</td>
<td>9</td>
<td>Wyo.</td>
</tr>
<tr>
<td>RN8</td>
<td>35</td>
<td>143</td>
<td>22</td>
<td>0</td>
<td>3.8</td>
<td>Mich.</td>
</tr>
<tr>
<td>RN9</td>
<td>35</td>
<td>635</td>
<td>65</td>
<td>0</td>
<td>27.4</td>
<td></td>
</tr>
<tr>
<td>TRN</td>
<td>46</td>
<td>955</td>
<td>62</td>
<td>2</td>
<td>22.2</td>
<td></td>
</tr>
<tr>
<td>QIN</td>
<td>68</td>
<td>1094</td>
<td>54</td>
<td>0</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>TQN</td>
<td>21</td>
<td>296</td>
<td>29</td>
<td>2</td>
<td>14.1</td>
<td></td>
</tr>
<tr>
<td>YNS</td>
<td>25</td>
<td>450</td>
<td>42</td>
<td>4</td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>

(N. Y.) 42 sessions held.

Eastern Area Net: All regions reported 100 per cent except 4RN and TRN, each of which missed one session. EAN was in session 19 hours and 19 minutes. The monthly EAN bulletin by Manager W8SCW comments on some of the rough spots.

Central Area Net: No one has yet applied for the membership vacancy created by the resignation of W9CBE.

During the past two or three years the call of W9CBE has climbed steadily in traffic and emergency organizational circles. Here is what he and his station look like. When "Doc" was appointed manager of TEN (Tenth Regional Net) in February, 1950, he promised within two weeks to have a net that would come up to any in the country; and then he went to work. Today TEN, primarily as a result of his efforts, is one of the best, and W9CBE has "retired" as manager. Doc also ORS, RM and EC in his section, holds two ARL Public Service Certificates and a 30-w.p.m. Code Proficiency Certificate.

QST for
Pacific Area Net: Reports have it that PAN is functioning well, but nothing heard from W7HKA.

First Regional Net: Correction to the list of certificate recipients in March QST -- should be Ws FP8 KYQ and LRG instead EPS LYQ and KRG.

Second Regional Net: A 2RN certificate has been issued to W2CGG. The March 2RN bulletin points with pride to the capable operations of 2RN during the present season.

Seventh Regional Net: W7FJX has been appointed Assistant Manager of RN7.

Ninth Regional Net: 9RN certificates have been issued to WS4IL and Ws BCY CEE ESW HUV HCN MEM and SXL.

Thirteenth Regional Net: VK3UR says that he is pleased with the teamwork on TRN. VELOM is to be commended for his untiring enthusiasm in keeping the Maritime active.

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## BRASS POUNDERS LEAGUE

<table>
<thead>
<tr>
<th>Call</th>
<th>9cegq</th>
<th>9rocw</th>
<th>9dfl</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>W3CUL</td>
<td>219</td>
<td>3641</td>
<td>2215</td>
<td>373</td>
</tr>
<tr>
<td>W6KYY</td>
<td>154</td>
<td>1232</td>
<td>258</td>
<td>960</td>
</tr>
<tr>
<td>KG6FAA</td>
<td>1055</td>
<td>701</td>
<td>395</td>
<td>2418</td>
</tr>
<tr>
<td>W7QIU</td>
<td>14</td>
<td>1090</td>
<td>1085</td>
<td>13</td>
</tr>
<tr>
<td>W7QHY</td>
<td>16</td>
<td>885</td>
<td>766</td>
<td>11</td>
</tr>
<tr>
<td>W8AB</td>
<td>76</td>
<td>391</td>
<td>307</td>
<td>884</td>
</tr>
<tr>
<td>K6WAN</td>
<td>175</td>
<td>730</td>
<td>428</td>
<td>102</td>
</tr>
<tr>
<td>W4QWJ</td>
<td>12</td>
<td>673</td>
<td>661</td>
<td>11</td>
</tr>
<tr>
<td>W6GKL</td>
<td>85</td>
<td>519</td>
<td>358</td>
<td>116</td>
</tr>
<tr>
<td>W5COG</td>
<td>4</td>
<td>620</td>
<td>504</td>
<td>8</td>
</tr>
<tr>
<td>K6AEI</td>
<td>23</td>
<td>488</td>
<td>411</td>
<td>32</td>
</tr>
<tr>
<td>JAIK</td>
<td>513</td>
<td>208</td>
<td>21</td>
<td>187</td>
</tr>
<tr>
<td>W7QCO</td>
<td>9</td>
<td>403</td>
<td>379</td>
<td>29</td>
</tr>
<tr>
<td>K6AI2</td>
<td>47</td>
<td>382</td>
<td>355</td>
<td>12</td>
</tr>
<tr>
<td>W7CQY</td>
<td>4</td>
<td>387</td>
<td>341</td>
<td>6</td>
</tr>
<tr>
<td>W4ARO</td>
<td>15</td>
<td>383</td>
<td>349</td>
<td>6</td>
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<tr>
<td>W6AGC</td>
<td>85</td>
<td>716</td>
<td>307</td>
<td>5</td>
</tr>
<tr>
<td>W5MKR</td>
<td>7</td>
<td>304</td>
<td>276</td>
<td>19</td>
</tr>
<tr>
<td>W2JNJ</td>
<td>3</td>
<td>302</td>
<td>292</td>
<td>7</td>
</tr>
<tr>
<td>W5KVA</td>
<td>26</td>
<td>272</td>
<td>258</td>
<td>14</td>
</tr>
<tr>
<td>W6ZT</td>
<td>10</td>
<td>275</td>
<td>273</td>
<td>2</td>
</tr>
<tr>
<td>W5ER</td>
<td>21</td>
<td>264</td>
<td>211</td>
<td>53</td>
</tr>
<tr>
<td>W6HIQ</td>
<td>3</td>
<td>3</td>
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<td>2</td>
</tr>
<tr>
<td>W5COA</td>
<td>5</td>
<td>296</td>
<td>256</td>
<td>3</td>
</tr>
<tr>
<td>W4AR</td>
<td>79</td>
<td>229</td>
<td>171</td>
<td>44</td>
</tr>
<tr>
<td>W2DP</td>
<td>12</td>
<td>257</td>
<td>210</td>
<td>42</td>
</tr>
<tr>
<td>W7WJ</td>
<td>10</td>
<td>250</td>
<td>241</td>
<td>4</td>
</tr>
<tr>
<td>W8AUV</td>
<td>12</td>
<td>250</td>
<td>205</td>
<td>28</td>
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### Late Reports

<table>
<thead>
<tr>
<th>9cegq (Jan.)</th>
<th>300</th>
<th>1440</th>
<th>1232</th>
<th>291</th>
<th>3173</th>
</tr>
</thead>
<tbody>
<tr>
<td>KG6FAA (Jan.)</td>
<td>790</td>
<td>1083</td>
<td>556</td>
<td>559</td>
<td>2986</td>
</tr>
<tr>
<td>W6GKL (Jan.)</td>
<td>405</td>
<td>406</td>
<td>398</td>
<td>8</td>
<td>820</td>
</tr>
<tr>
<td>K6KAJ (Jan.)</td>
<td>256</td>
<td>222</td>
<td>213</td>
<td>9</td>
<td>577</td>
</tr>
<tr>
<td>W8DAW (Jan.)</td>
<td>4</td>
<td>133</td>
<td>253</td>
<td>20</td>
<td>655</td>
</tr>
<tr>
<td>W6COZ (Dec.)</td>
<td>6</td>
<td>289</td>
<td>267</td>
<td>26</td>
<td>592</td>
</tr>
<tr>
<td>W5I (Dec.)</td>
<td>25</td>
<td>299</td>
<td>245</td>
<td>26</td>
<td>575</td>
</tr>
<tr>
<td>K6AEI (Dec.)</td>
<td>12</td>
<td>281</td>
<td>232</td>
<td>15</td>
<td>545</td>
</tr>
</tbody>
</table>

The following made the BPL for 100 or more original calls-pair-dailies:

<table>
<thead>
<tr>
<th>Call</th>
<th>9cegq</th>
<th>9rocw</th>
<th>9dfl</th>
</tr>
</thead>
<tbody>
<tr>
<td>W2BUL</td>
<td>296</td>
<td>W7BA</td>
<td>110</td>
</tr>
<tr>
<td>W6N7Z</td>
<td>221</td>
<td>W4SJI</td>
<td>109</td>
</tr>
<tr>
<td>W4NAI</td>
<td>294</td>
<td>W4JQA</td>
<td>108</td>
</tr>
<tr>
<td>W8UMR</td>
<td>134</td>
<td>W8PAK</td>
<td>107</td>
</tr>
</tbody>
</table>

A message total of 500 or more or 100 or more original calls-pair-dailies will put you in line for a place in the BPL. The Brass Pounders League is open to all operators who qualify for this monthly listing.

- Listed in April QST as K6FAT.

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### SUPPLEMENT TO NET DIRECTORY

The following list of nets will supplement and correct the listing on page 64 of November 1951 QST and subsequent supplementary listings in the January and March issues. These corrections and additions were received between January 17 and March 15, 1952. An asterisk (*) indicates correction from one of the previous listings mentioned above. This is the last supplementary listing until a new net list appears in November 1952 QST.

### Name of Net | Freq. | Time | Days |
<table>
<thead>
<tr>
<th></th>
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<tr>
<td>Barefoot Net</td>
<td>3693</td>
<td>1715</td>
<td>EST Daily</td>
</tr>
<tr>
<td>Bay Area Net (BAN)</td>
<td>3685</td>
<td>2030</td>
<td>PST Mon-Fri.</td>
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<td>Churn Net (Pa.)</td>
<td>144,188</td>
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</tr>
<tr>
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<td>3755</td>
<td>2030</td>
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<tr>
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<td>2100</td>
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<td>Radio Net (Pa.)</td>
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<td>1300</td>
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<tr>
<td>Mission Trail Net</td>
<td>3980</td>
<td>2000</td>
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<tr>
<td>(ATTN)</td>
<td>3984</td>
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<tr>
<td>Sunrise Net</td>
<td>3954</td>
<td>1900</td>
<td>EST Sun.</td>
</tr>
<tr>
<td>Tennessee 'phone Net</td>
<td>3980</td>
<td>0800</td>
<td>CST Sun.</td>
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<tr>
<td></td>
<td>1000</td>
<td>CST Tues., Thurs.</td>
<td></td>
</tr>
</tbody>
</table>

### CODE-PRACTICE AWARDS

Have you received an ARRL Code Proficiency Certificate yet? Twice each month special transmissions are made available to encourage you to qualify for the award. The next qualifying run from W1AW will be held on May 14th at 2130 EST. Transmissions will be made simultaneously on 14, 1010, 28,000, 52,000 and 146,000 kHz. The next qualifying run from W6/01FP only will be transmitted on May 4th at 2100 PST on 3500 and 7245 kc.

Any person may apply: neither ARRL membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the five speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers.

Code-practice transmissions are made from W1AW each evening at 2130 EST. References to texts used on several of the transmissions are given below. These make it possible to check your copy. To get sending practice, hook up your own key and buzzer and attempt to send in step with W1AW.

### Date

**May 2nd:** Instantaneous Prediction of Radio Transmission Paths, p. 11

**May 4th:** Instantaneous Prediction of Radio Transmission Paths, p. 1

**May 8th:** Pointers on the Installation of Mobile H.F. Converters, p. 21

**May 10th:** Twenty Watts Mobile . . . , p. 22

**May 12th:** Getting Ready for #1 Mc, p. 28

**May 18th:** A Power Supply for the Novice Transmitter, p. 32

**May 22nd:** QST Visits "Captain Snap-Put," p. 36

**May 24th:** Some Simple Ways of Erecting Temporary and Semi-Permanent Antennas, p. 40

**May 28th:** 50 Watts Output on Ten and Six, p. 42

A.R.R.L. ACTIVITIES CALENDAR

**May 4th:** CP Qualifying Run — W6OPW
**May 11th:** CP Qualifying Run — W1AW
**June 6th:** CP Qualifying Run — W6OPW
**June 7th, 8th:** V.H.F. Contest
**June 19th:** CP Qualifying Run — W1AW
**June 21st-22nd:** ARRL Field Day
**July 12th:** CP Qualifying Run — W6OPW
**July 18th:** CP Qualifying Run — W1AW
**July 19th-20th:** CD QSO Party (c.w.)
**July 26th-27th:** CD QSO Party "phone
**Aug. 3rd:** CP Qualifying Run — W6OPW
**Aug. 19th:** CP Qualifying Run — W1AW
**Sept. 5th:** CP Qualifying Run — W6OPW
**Sept. 16th:** CP Qualifying Run — W1AW
**Sept. 20th-21st:** V.H.F. Contest

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May 1952 75
With the AREC

With the threat of war and the increasing emergency-consciousness on the part of the amateur fraternity in general, many locally organized AREC units are training at the bit to put their well-trained facilities to work. As a result, we amateurs are getting in on more different kinds of emergencies than ever before, many of them a result of our increasing mobility. In any number of circumstances, mobiles can render a communications service which is needed and which is useful but is not necessarily classed as a "communications emergency." This aids us in figuring more frequently and more prominently in the public press.

Here at Headquarters we are receiving, these days, considerable quantities of clippings describing incidents in which amateurs have participated, some of them in real emergencies, some in minor emergencies, others in mock emergencies and still others simply describing the organizational set-ups and what can be done. Reports of all these, and others, come to us for possible use in this column. Unfortunately, space limitations being what they are, it is not possible to give some of them at all, and others have to be "boiled down" to fit into the space available. We hope you will bear with us if your contribution does not appear a month or so after you sent it in, or even if it does not appear at all. We can make only one promise: That due consideration will be given to all and every contribution which reaches us. And here's a tip: send along a photograph. We would like to have a good photo for this page every month, and if yours is a good one it will put your contribution into a higher "priority" classification.

From mid-December to mid-February, amateurs participated in live known incidents regarding airplane crashes. Let's summarize each one briefly:

Members of the Walla Walla (Wash.) Valley Amateur Radio Club and the Pendleton (Ore.) Amateur Radio Club assisted, on December 20th, in the search for W7QG1 of Walla Walla who disappeared in his plane on December 19th. He was accompanied by his young son and daughter, W7PLT, station of the Pendleton Club, was set up in the hangar of Pendleton Airways, which was designated search headquarters. W7NPN of WWVARC was installed in Pilot Rock, Ore. Ground parties were dispatched from both places, since the weather prohibited flying. A mobile or portable set was transported accompanied each search party whenever possible. Search operations lasted all day on the 20th and resumed on the 21st, when the wreckage was sighted at about 1000, without a sign of life. The emergency network left the air at 1615 h, the 21st after the bodies of the three victims had been brought to Pendleton. Some 37 amateurs from the two clubs and elsewhere in the vicinity assisted in the operation.

The plane that crashed on December 29th near Little Valley, New York, was not located until late in the evening of December 30th. W2ABC and W2GSL in their mobiles attempted in vain to reach the scene of the crash. In the end, communication was supplied with the scene of the crash by portable hand sets provided by the Sheriff's Department, indicating very plainly the utility such units will have in civil defense. The Sheriff of Cattaraugus County praised the amateurs who took part in the emergency.

The crash on January 10th, at Sandspit, B.C., VE77G immediately offered his services, since he was the only amateur in the area. Traffic was handled through W7LWX and W7HVB. A tape recorder was used to catch any parts of messages missed. About 75 messages were handled, mostly information and directions in salvage operations.

Union County (New Jersey) amateurs were in action at the scene of the air crash near Elizabeth, New Jersey, on January 22nd. W2EU/M was at the scene of the crash within 20 minutes after it happened, and was joined by W2CCY/M shortly afterward. Communication was maintained with Red Cross Headquarters, which was kept supplied with information of all participants during the course of the activity, with many other local amateurs standing by to assist whenever possible.

Ralph Roe, WNB2BH, chairman of the local Red Cross Communications Committee, gave high official praise to the amateurs who participated.

Two jet planes crashed in midair near Boulder City, Nevada, in February. W7LYV, who observed the crash, jumped into his car, turned on his mobile rig and headed for the scene of the accident. Contact was made with W7NCR and telephone connection was made with Nellis Air Force Base. W7LYV/M to W7NCR to W2YFV was the sole means of communication for some hours. W7LYV also supplied no news. The value of the amateur radio communication was attested by a letter from the Commanding Officer of the base.

A newspaper clipping ran by WPT9DE tells about an incident in Big Bear City, California, in which a fire was reported by W6HYK who transmitted the information to W6VQ1. Big Bear had been cut off from all normal communication by a heavy snowfall. The same snowfall, however, kept firemen from getting to the blaze, and the house burned to the ground.

In early January, VE1IDW received a call from VE1PB located on Fall Island off the coast of Nova Scotia, to the effect that his daughter was ill and needed medical assistance. A doctor was brought to VE1IDW and diagnosed the case as pneumonia. After prescribing the child's case improved, VE1IDW assisted in relaying information during part of this exchange.

On the morning of January 16th a call was received from a remote radar station near Edwards Air Force Base, California, that one man was killed and one other severely injured in an attempt to return to the base, to avoid being snowbound. W6VR/F/M accompanied the rescue convoy to supply communication with the base. Due to snow and icing conditions the ambulance was unable to reach the scene of the accident, and four hours on foot was required, during which portable hand sets on 3885 ke, were used to maintain communication with W6VR/F/M. The operation was further complicated by skip conditions on 3885, which frequency was also used by W6VR/1, who is GC for the Edwards area.

The February 2nd train wreck in Calera, Alabama, alerted three Alabama emergency nets. Our reports from W4GJW and W4RTI indicate first notification at 2210 on February 2nd. By 2215, W4KYY was clearing the AENP frequency on 75 meters while W4GJW alerted AENG on 3660. By midnight, W4RTI was at the scene of the accident in his mobile, reporting ambulances coming out, road con-

QST for

Ham radio gets a big hand in Erie, Pa. The Radio Association of Erie was the local American Legion Post interested in the KAE's "mobile unit" project, resulting in the presentation to motorists and officers of KAE's of a 24-foot house trailer, at left. Shown receiving title to the trailer are (l. to r.) W30DF, Pres.; Ronald Barker, Treas.; W3QPP, Secy.; W3PIV, Veep. The RAE features an amateur radio column in both Erie Sunday papers.
February was a bad month in the State of Maine. We published paraphrases of reports from SEC W11GW and EC W1KEZ:
The first indication of trouble was at 0746, February 12th. A wet snow froze on telephone and power lines, causing service supplies. W1SDW and W1HIT also got an antenna up to 1000 to make contact on 3961 ke. Meanwhile, W1INT dug his antenna out of the snow and made contact at 1115. All this work was done in a blinding snowstorm. At this time W1QOZ in Bangor came on and took traffic from W1ZX and W1INT. There were telephone connections in the towns but no communications to the outside except by amateur radio.
On return from work, I found my antenna down and finally got on the air again at 1700. At 1720 the Sea Gull Net came on with W1PTL as NC8. From then until 2030 receiving conditions got worse, and it was necessary at one time to relay traffic via 2W2DT.
The only real danger occurred the first day of the event and was caused by the Town of East Millinocket failed. I was able to relay the necessary instructions by radio to W1HIT so that eventually they were able to get the water pump in operation and avert an extremely serious fire hazard.
On February 13th W1INT and W1XMT came on at 0800 and stayed on most of the day handling traffic between East Millinocket, Millinocket and Bangor. At 1050 I relieved W1INT and carried on during the evening handling routine traffic.
On February 14th conditions were much improved with one telephone line open. W1SDW monitored the frequency during the day and I took over in the evening. On February 15th I opened from 0730 to 1800 when operation was terminated.
Traffic was handled for the Great Northern Paper Co., Bangor and Aroostook Railroad, U. S. Weather Bureau, local doctors and commercial concerns. Other stations taking part included W1A LZ NO EBJ LBJ MIR and 8CS. — W1KEZ, EC Millinocket, East Millinocket and Lincoln, Maine.
On February 15th we awoke to find a howling northwest blizzard had us in its grip. When the skies cleared we had received between 27 and 30 inches of snow. The County Civil Defense Director asked the ARBC to stand by, ‘Phone lines were up a circuit between Auburn and Livermore Falls to handle c.d. traffic, Wilr0g and W11JTS took care of Livermore and Livermore Falls, while W1ESE, W1LOZ, W1BHR and W1ICG handled the Auburn end. Everyone was in a very bad shape and appealed to amateur radio. Amateur radio handled the communications into c.d. headquarters and kept them posted on conditions and progress. — W11GW, SEC Maine
Eleven SEC reports were received for January, representing 86 communities, 147 Full Members and 399 Associate Members. We can do better than that, gang.

Ohio River Flood
The following is a roll-up of a report by W8BTV of emergency activities during the Ohio River Flood on January 27th, 28th and 29th:
W8BTV was alerted January 27th when the Red Cross reported that Wheeling would be flooded the following day. Operating from W8SCEP and the Princeton area, we made contact on all stations on 3000, 30000, 30000, and 30000 kHz in Wheeling. W8SCEP was on the air, W8SBC was on 30000 kHz in Washington, D.C., and Cincinnati, where Ohio SEC W8UPB was on the job. W8UDF operated on 35500, the NEN frequency. W8GZC was on 30000 kHz in Washington, D.C., while W8YR and W8Y-runner of the Charleston area, joined the net on 30000, where W8YR was QRX, W8YR in Petersburg answered W8BTV on 3770, and in touch with the Pittsburgh Weather Bureau for river forecasts. W8SCEP, on the Monongahela River, furnished flood reports from there to Pittsburgh and Wheeling, where the information was coordinated. W8UPB furnished information from the river forecasting service in Cincinnati. Communication with Charleston was established when W8RJ and W8QY joined the net about 1700. W3AKC lined up K4USA for the Washington contact, and we then had Washington, Charleston, Wheeling, and Cincinnati. The net was later joined by W8RF who had traffic for the Red Cross in Washington.
This was routed via W8BTV and K4USA. When skip made impossible contact between W8BTV and K4USA, W8SCA in Lincoln, Iowa, acted as liaison and relayed traffic to K4USA.
On Jan. 28th Red Cross called W8BTV, asking for contact with Washington. The frequency 7100 ke. was used at that time, and finally K4USA was raised with the help of W8UJ. Emigrant was lined up and later operations was transferred to 3770.
Operations continued Jan. 29th on 3770 ke. with more Red Cross traffic for Washington, which K4USA handled most ably, getting replies whenever possible. W8RF also had Red Cross traffic for Washington, which was put through K4USA. W8PTJ joined the net at 1215, thus furnishing contact with Huntington.
The West Virginia Net was held as usual Monday night at 1800, with W8NP in AWF reporting in to Washington traffic. Schedules were maintained with Charleston (W8UYR), and Washington (K4USA, W4NBP), until the Red Cross required no further aid. W8YRB and W8PTJ monitored, with other stations reporting in to offer assistance when possible. Ham radio once again proved its value to the community.
W8BTV received the personal thanks of the City Manager of Wheeling, as well as commendations from the Disaster Committee of the Wheeling-Ohio County American Red Cross, who were very profuse in their thanks. Although the amount of third-party traffic was relatively small in this instance, the facilities were available for dissemination of a large volume of such traffic, as well as official information, which was handled between river cities and the Red Cross in Washington/Arlington.

FEBRUARY FMT RESULTS
In the first 1952 ARRL Frequency Monitoring Test, open to both ARRL Official Observers and non-00 entries, 484 measurements; 68 entries were submitted by Observers and 77 by non-00 entries. Each entrant has received an individual report comparing the accuracy of the measurements of the special W1AWF reporting in those made during the test by a professional frequency-measuring laboratory.
The measurements of Warren K. Hamilton, W2FSE, averaged out to an accuracy of 0.2 parts per million, making him the leading entrant in the GO group. Lloyd W. Root, W8SHE, a consistently good performer and leader in many previous tests, submitted measurements which averaged 0.2 parts per million and was third among the non-00 entrants. The standards of other leaders in the test are given below. Since the official readings can only be accredited to 0.4 parts per million, the decimal is shown only to establish listing order, in accordance with the announced rules, no entry consisting of a single measurement was considered eligible in the competition.

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<tr>
<th>Observers</th>
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<th>Non-Observers</th>
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<td>W8H1B</td>
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<td>W8O1Q</td>
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May 1952


**ATLANTIC DIVISION**

**EASTERN PENNSYLVANIA — SCM. John H. Du-Bois, W3XBD — SEC: IBE, RMS: AAX, BIP, B, Pa., NTV, 141 1st Ave, Bellefonte, PA 16823.**

Dozens of clubs attended the meeting of the Philadelphia Area Council of Radio Clubs on Feb. 27th at the Cassidy School, 4601 S. 7th St., Philadelphia. B.A. R. held a talk on TVI by Phil Rand, 1DBM, and an explanation of the FCC’s stand regarding amateur interference by Mr. Fisher, BIP, Field Inspector. Numerous door prizes and also prizes for home-built gear were donated by radio supply houses in the area. TVI committee throughout the report, with 40’ heading up the Southeastern group, Scrap amateurs are conducting a series of meetings with local appliance sales organizations, all with the purpose of opposing the Federal government’s efforts to discourage interference on TV’s circuits.

The civil defense program is shaping up, with UA covering the smoke alarm system state wide. B.B. reported on the N.C. Board’s meeting, and on some reports from phone stations would be welcomed. O2 reports a number of violations. The recent F.T.I. was collected by owners of foreign broadcasting. EU has been designated by the W3RZ memorial station in operation at 35 Mc., running 200 watts. NNW is completing a new type set-up, 5CMQ2Z operating at 52F2A, Sampson Ave., N. Y., running 20 watts to a selenium-powered rig on 3970 kc., phone, and is on the lookout for Philadelphia contacts. DX-chasers report a dearth of “new ones” during February. Yours truly now is eligible for Old Timers’ Club. Speaking of old-timers, how about some reports from Novice Class licensees? B.C. received an unusual signal from W3KSC, Long Island, on 2675 kc., using a 500-watt signal at a distance of 300 miles. The report was noted by W3KSC, Long Island, on 2675 kc., using a 500-watt signal at a distance of 300 miles. The report was noted by the operators.

**MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — S.C.M. James W. John, W5ONIN — Newly-elected officers of the Chesapeake Amateur Radio Club held an executive meeting on Feb. 22nd at the headquarters of the club. The meeting was attended by the officers and members of the club. The officers present were: Pres., J.W. Johnson; Sec., S.D. B. (S.C.M.); Treas., J.W. John, 234 North St., Elkton, Md., and the minutes of the meeting were read. The new officers were elected as follows: Pres., J.W. Johnson; Sec., S.D. B. (S.C.M.); Treas., J.W. John, 234 North St., Elkton, Md.

The program of the club is to hold a monthly meeting on the first Tuesday of each month at 8:00 p.m. at the headquarters of the club. The meetings are open to the public and all interested amateurs are invited to attend.

**SOUTHERN NEW JERSEY — SCM. Lloyd L. Ganey, W3XBD — SEC: E. S. E., RMS: AAX, BIP, B, Pa., NTV, 141 1st Ave, Bellefonte, PA 16823.**

A special meeting was held on Feb. 22nd to initiate the plans for the SCRM. The meeting was attended by the officers and members of the club. The officers present were: Pres., J.W. Johnson; Sec., S.D. B. (S.C.M.); Treas., J.W. John, 234 North St., Elkton, Md., and the minutes of the meeting were read. The new officers were elected as follows: Pres., J.W. Johnson; Sec., S.D. B. (S.C.M.); Treas., J.W. John, 234 North St., Elkton, Md.

The program of the club is to hold a monthly meeting on the first Tuesday of each month at 8:00 p.m. at the headquarters of the club. The meetings are open to the public and all interested amateurs are invited to attend.

**WESTERN NEW YORK — SCM. Edward G. Graf, W3WY — SEC: IBE, RMS: AAX, BIP, B, Pa., NTV, 141 1st Ave, Bellefonte, PA 16823.**

The Western New York Section was established in 1954 and has since been actively involved in promoting and supporting amateur radio. The section has several clubs and activities throughout the region, including the Western New York Amateur Radio Club, which was established in 1954.

In addition to the regular meetings and activities, the Western New York Section sponsors several events throughout the year, including the Western New York Amateur Radio Club’s annual hamfest, which is one of the largest in the region.

The Western New York Section is always looking for new members and is open to anyone interested in amateur radio. For more information, please contact the Western New York Amateur Radio Club at 141 1st Ave, Bellefonte, PA 16823.
On the inside cover of QST for April, National made the announcement of a new receiver, the NC-183D.

What's "new" about it? To those familiar with National products, this receiver is just about as "new" as any receiver can be and still retain its old cabinet.

The dials have been changed to edge lighted lucite for ease of reading. The markings are light on a dark background. The "S" meter scale is of matching colors.

Let's take a look inside this receiver. Probably the things that catch the eye first are the row of I.F. transformers and the miniature tubes. This new receiver uses 5 double tuned 455 kc. I.F. transformers, a brand new crystal filter and two double tuned 1720 kc. I.F. transformers. All of these circuits are permeability tuned for maximum skirt selectivity. The sharp I.F. system which includes 3 stages of amplification makes the signals "pop in" with push-button suddenness. The selectivity of this I.F. system cuts the QRM to a minimum.

Dual conversion is automatically switched in on the 6, 10, 15, 20, and 40 meter bands. The receiver uses dual conversion from 4.3 mc. through the 6 meter band for greatly improved image rejection. The 1st I.F. frequency is 1720 kc.

You switch in the crystal filter and note the 5 evenly spaced selectivity steps and find the sharp position to be only 80 cycles wide at the 6 db point, adequate for separating most c.w. signals.

A look at the tuning condenser reveals that the bi-metallic temperature compensator is missing. It has now been incorporated in the condenser itself. The tuning condenser mountings have also been improved to reduce mechanical vibration effects.

The new miniature tubes give the chassis a clean uncluttered appearance, even though there are 16 of them. New R.F. coils and miniature tubes combine to give the receiver remarkable sensitivity even in the 6 meter band. The second conversion circuit has been carefully engineered to prevent harmonics of the second conversion oscillator from producing "birdies".

Switching to the broadcast band, you confirm that the fine push-pull audio system has been retained, and also that the receiver can double for your entertainment receiver, complete with phono or FM tuner attachment. The accessory socket will still give you power for those QST gadgets that you like to build from time to time to keep your "hand" in radio.

Now that you have seen as well as heard this new receiver, you realize that here is truly a modern receiver, built in keeping with the finest traditions of National quality and engineering know how. Here is the receiver you have been waiting for!

Harry Paul, W1PMS
PERFECTION OF TAPE MACHINE

Better QSO's and more of them!
Effortless sending without fatigue!
Perfect sending—the stamp of an A-1 operator!
Controllable speeds from 8 to 50 wpm!

These are just some of the reasons why the modern CW station should have an electronic key... whether you buy one or build one.

For plus value, take a look at the features of the Eldico Electronic Key, the only commercial electronic bug available.

The Eldico Electronic Bug is a self-completing type of automatic keying device incorporating all the latest improvements in automatic keying known to the art. It features self-completing characters that automatically insure perfectly formed sending; control is provided to give continuous variable speed for any rate of sending from 8 to 50 wpm; there is a separate control for "weight" of characters and ratio of dashes-to-dot length, allowing individual tailoring to your own fist; self-contained with built-in power supply in attractive gray crackle portable case complete with jewel-mounted automatic key mechanism.

At just a little more than the cost of automatic old-fashioned keys you can start using this Eldico Electronic Bug. Performance! Read what one CW man who knows the ropes has to say: "For the amateur who wants to add the finishing touches to his signal, there is nothing that will beat an electronic bug, and believe me distinctive sending made possible by effortless electronic keying makes a difference in results. The good operator always has a definite advantage in making contacts—W8IOP."

Signals of Distinction

Have you heard our "Private Tutor" Novice Course? See your distributor or our ad in QST, November, pages 76-77.

Eldico
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INCORPORATED

EE-1, complete kit with instructions .................. $24.95
EE-1, wired and tested .......................... $29.95
EE-2, complete kit including addition of integral keying monitor with speaker .................. $29.95
EE-2, wired and tested with keying monitor ............... $39.95

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ARROW ELECTRONICS, INC.
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612 Arch St., Philadelphia 6, Pa.

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LINDSAY — SCM, H. F. Lund, W8EQI — Section Nets: IREN, 3940 ke.; HLN, 3516 ke. Sec.: QLZ. Ass't. Sec.: HPG, RM; BKU, PAM; UGT, LIV is QLZ, buildin... XQ is building a control panel for the a.m. G. W. RUSKIN a new 75A-1 receiver. MAR is fighting TVI from his... of 144 Me. The New Tri-City High School sponsored by QFI has 30 licensed lts. TVI is a very serious problem, and the North Suburban Club, JZJ spent a couple of weeks in Florida. GXX now has a qw. on 14-Me. e.w. DX CW BB... YPOT, ECP is building a 144-Me. mobile rig. KKH uses a BC-359 VFO ahead of his Viking. DIF has a marginal receiver that is being furnished to him by the PACE-500 to... et. It was held at 2100 CST at the NCS, MCR, and KZL. The IC-750 is now a Class 1 license, and is now communications manager of DUA. KA has worked 60 countries with 36 watts input and an... DX station is still needed for the west coast. CRD has a miniature version of the "Additive Free Meter" per QST; it is small and does not need the wiring... is working 144 Me. during the day as engineer of a b.o. station. Ascertains that he needs sound on the QSO's, a QSO work. Hamfitters Club officers for 52: WOL, pres.; AVH, vice-pres.; EKT, treas.; CWB, sec. The newcomers to the... certificate chairman of the picnic which will be held Aug. 10th. Now is a good time to find out how the political candidates feel toward an amateur v-tube license for your car. Although they are 100 miles from the nearest TV station the Decatur Club has organized a TVI committee to aid them in their battle in the TV sets... who believes that for all kinds of TVI QV got his son a TV set. It seems that DQ Baby sits once a week with his grand... with the band. The administration building on the campus is a... that GND has already been completed. The owners are: ZRZ, ZBN, DBF, W4M, WVQ, and KLJ. The call signs are:... as a new VHF. ZBN has 56 bands. "27 is a better... the last few days here at the Cougars scoring. "27 is busy with... the TVI program with BGF, RM, and LXY on the committee. WPNWJ is on 80 and 11 meters from St. Lawrence College with a 75A-1 and a PACE-500 receiver. LSF (Ind.) and GPV (III) are now DX. EYN is on at... cheer-up session, and 1614 QSO's have been accumulated. DX CW BB... DX, TQ and DG continue with 144-Mc. RTTY work. The Delta Region Club has 15 mobile units and its own emer... power and its Admiralty power generator from Belford and Janesville. The DCARC will be hosts at the BCN picnic in August at Sturgeon Bay, 10 miles north of Green Bay. The WYX station dates reporting this season, LK2 is new EC for Door and Kewaunee Counties, W3V, W3VJ, W3VY, W3VZ, and W3VR in Door and Kewaunee, are on the air with a swing rig. Fred is Fargo's fire chief and civil defense director. We will miss UNO, now a Silent Key, who we always on and ready for a chat. JN6 is back on the... License No. 44235.ריס: W8SBQ, KXZ, 232, W8WG, 476, KZL 237. The Sierra Falls Club is conducting a WAS Contest with a... 50 watts limit. BJV and CSH maintain twice-weekly skeds on 50 Me., with MZJ and TJ1 joining frequently. TJF... and 600 watts on the VHF. HB9, KJF, and QSA, now with Western Union at Grand Island, Neb., are working... is a member of the Great Lakes Net. FWH is on 4-Me. phone with clamp-base modulation. JAF now has a 250 watt rig on 4-Me. 100 watts on 80 Me. 800 watts on 15 Me. and 2000 watts on 40 Me. FJL is on 6-Me..... 1624 QSO's for 144 Me. ARRL Communications Manager Handy, IBGI, met with the FCC... for 35 Mc., 15 Mc., 10 Mc., 15 Me., 1624 QSO's for 144 Me. ARRL Communications Manager Handy, IBGI, met with the FCC... for 40 Me. 15 Mc. is now a standard operating frequency for 144 Me. ARRL Communications Manager Handy, IBGI, met... is running high power on 144 Me. QGO has a new HRO receiver. UCW CQs are on CW, and 80 meters on 16 Mc. ANU is back on the air on 75 meters after...
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It is believed that only a comparatively few amateurs have taken full advantage of the economy, efficiency, convenience, and reliability Selenium Rectifiers can offer when employed in amateur transmitters, receivers, and test equipment.

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DELTA DIVISION

ARKANSAS — SCM, Dr. John L. Steckton, WSDRW —
A: The University of Arkansas and John Brown University have both returned their amateur radio clubs. Good luck to both.

MISSISSIPPI — SCM, Norman B. Feleman, WJSJS
LPL, new SEC, CQ 7350. SEC is in the Greenville Area in January, with 7 mobile and 3 fixed stations serving 12 counties. SEC is also in the Madison County Memorial Red Cross ARC, with 45 members. SEC is in the Vicksburg area on 144 kHz, and the Hancock County area on 146.9 kHz.

TENNESSEE — SCM, D. G. Stewart, W4AIF — Tennessee amateurs came through again with excellent emergency service during the recent tornado that struck Fayetteville. Complete account and recollection of those participating will appear in ARRL News. 1 KG is due to the efforts of the Opryville Embossed Letter License Plate Co. Do not forget to send him a dime to cover the cost. AADS set up two fixed frequency EME sites on 1.2 GHz and 3.5 GHz. SEC is in the Newbern area on 28.6 MHz for the March 15-16, 7-28 MHz phone, and 28 MHz phone. SEC is on 144, 217, and 220 MHz phone.

GREAT LAKES DIVISION

KENTUCKY — SCM, I. L. Wakefield, Jr., W4RKG — The House and Senate both passed the amateur license bill. Then the Governor signed the bill and it is now law. Under the new laws, you must contact the hacking laws to get a license. A few words about this bill, this new bill has been signed by the Governor, and the bill you are about to receive your license. Kentucky amateurs are now issued a new license that is more comprehensive. The bill will help those who are licensed under the new laws, now are licensed under the old laws. SPR is working to issue all new licenses under the new laws. SPR is also doing everything they can to get the licenses issued as quickly as possible. A new signal on 220 MHz will go in service on KYB with 25 watts. ZLK is working on new 2-meter repeaters in the Central Kentucky area.

The advisory board meeting in Kentucky is scheduled for March 26th at 7 p.m. CST. It is a new 2-meter repeater that will be activated for use in the near future.

The Kentucky 2-meter repeater is looking for 2-meter usage on Sunday at 7 p.m. CST. It is a new 2-meter repeater that will be activated for use in the near future.

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(Continued on page 82)
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(Continued from page 84)

HUDSON DIVISION

EASTERN NEW YORK — SCM. Stephen J. Neumon.
W2LL — RI; TL: W1SC, K1K. PAMs: LS, QJL, NIV, DFC, our very active RAI group that the
15th anniversary party of NYS was a big success. ENY.
chapter members present were QNJ. ITX, and LRW.
Twenty regular members were on hand, and a hidden
hunt was conducted. QNJ and ITX tied for first prize.
YUM received the second, and DFF, of W.N.Y., won the
third prize. Hidden stations were: W2P, W2K, W2Y,
and W2CR. Special net certificates were issued to all concerned,
along with our best wishes. NYS meets on 3600 kHz at
7 P.M. daily, NYSS on 3025 kHz, at 8 P.M. daily, and
W2P will conduct his net QNI on 1200 kHz. QRL from
noon on will not be irregular, FVP to the new announcer
at W1UC, FQL EC for Greene County, has a new gas-
powered generator plus two mobiles operating on 144 Mc.
New members are KFV; Marcella, the KL of CYOM, and
MTJ from a long time in the Hudson Valley. As usual,
please contact the SCM now. FW wants more activity on
100 meters, especially in the Tri-State Area. The lack of
station activity reports is very discouraging. Let us have
this column more interesting. I solicit your cooperation.

Traffic alerts: Much traffic is handled but little is
reported and our total is the lowest in the division. If all
traffic was reported, this section would be on top.
Let's all pitch in, and don't forget your report must reach me
by the fifth of the month. Environments: W1F, W1H, NO.
NY, CYW, LSS, ZIH, and L11 as EC; I1G as PAM; GQG as
ORI, Traffic (Feb.); W2YW197, EYF 83, P3, NY197,
L2J (Jan.), W7E, Y2N-170, LRW 146.

NEW YORK CITY AND LONG ISLAND — SCM.
George V. Cooke, jr., W20BU — Area SCM. 2TRU-
SEC: SYW, RM1, TUK, PAM, YBT. The Long Island
section of the YLRL dinner was a huge success with
Kenem and LOLP as hosts. About 70 hands attended and
surely enjoyed a fine dinner and outlined talks on the female
side of our hobby. Officers were installed for the new year,
and many plans were formulated. New officers of the Long
Island Radio Club are VIF, chairman; GJG, trans.; EDR,
record secretary. Officers were installed at the annual weekender
supervised by PFL. In the N.Y.C.-L.I. 75-Meter "Phone
Net," YBT as PAM, QOW, SJR, and CHG have
powered up and the Net is now held in the QRM time
with QRM. The Net now boasts of 20 to 25 members
reporting in at 1000 Sundays on 3010 kHz, and plans are
being made to create close cooperation with the WNY.
E.N.Y. section nets and to participate in a statewide
emergency set-up, W1N2LJ, formerly operating at
Radiak, Alaska, now is stationed at Coast Guard
station at East Moriches and will move to work into the
Suffolk County AREC Net. The Nassau Radio Club is
now two years old. Its star w.w. man on 90 meters, TNK,
has joined the NLI Traffic Net, is forecasting the role of bachelor
this week end before Field Day and the Club members
wonder whether they will be one of the first Plain City
section stations to achieve QRM. The services of Harry
LEJ hit 100 percent attendance in the Net in New Jersey, New York,
and Connecticut. W4AMC is now QSM. South America.
Both are members of the Mid-Island Club. STG is
the newest member of the MIRC and the Club is
planning a long-day Field Day and promises lots of
competition to the Nassau and Lake Success Clubs. A Novice
Net has been formed in Brooklyn, with E2J as NCS, and
meets Sundays at 0900 on 3745 ke. for all Brooklynians
desiring aid. E2E has been an OO for eight months
and now has received OBS appointment. Our ex-SM,
2K6J, in addition to holding an OBS appointment, has been ap-
pointed Official Observer, Classes III and IV. DIC has
been appointed OBS and reports the TVI Organization
of N.Y. will accept requests by mail for bulletin on high-
and low-pass filters which will be distributed free. Write or
contact DIC and aid in the program to get the kids back on
the air. JAX is conducting code instructions at 1130
Mondays, Tuesdays, and Thursdays at 3805 kHz, and
announces W1AW bulletins at that time. TF has returned
fresh from a visit to W3-B and where he visited many
stations now in AWA. General Class. OJX received 35 w.p.m.
CP certificate on initial test and asks that an outlet for the
DON Net be secured in this area. JA8G has volunteered, step forward and contact the SCM in your section.
WROU applied for Extra Class license under the
"granddaddy" class. Tuesdays at 3600 is the time to
meet PAM, PTC, CEP, and GNF on 1200 kHz. See you on in
a good round table. Much has been done since the last
issue and activity is stirring. Get in on the fun. 10GM says he is
doing much better with 12 watts s.w. on 10 meters than with 28
watts s.w. How come? The Watcher Amateur Radio
Club, also, furnished communications for the Sports Car Hill-
climb near Mahopac. Those taking part were mobiles FAR
and JAM and portable NIE, JAK, with DH, 2, and
(Continued on page 88)
JOHNSON VIKING 1 Transmitter Kit
Conservatively rated at 100 watts AM phone output, 115 watts CW. Features band-switching, crystal control or optional VFO input, p.s.-network output tuning, complete coverage of all amateur bands from 160 thru 10 meters. Clear, complete, easy-to-follow instructions make assembly easy — assure perfect performance. No holes to drill, every part is furnished including cabinet, wiring harness, hardware, etc. Tube line up: 6AQ6 xtal osc., 6AQ5 buffer/doubler, 4D32 amp., 6A06 voltage amp., 6A66 driver. 607 pp modulators, 584 HV rect., 524 LV rect., 6AL5 bias rect. Write for literature. JOHNSON VIKING 1 Transmitter Kit complete, less tubes, crystals, key, mike.
Amateur Net $209.50

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Designed for simple plug-in connection to VIKING 1, readily adapted to other transmitters. Output on 160 and 40 meters. Features accurate calibration for all bands — 160 thru 10, high stability, clean keying, voltage regulation. Temperature compensated. In easy-to-build kit form. Complete, less tubes.
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Reduce TVI caused by capacitive coupling! For JOHNSON Plug-In links or others including non-plug-in types. Screen is metallic plating on polyethylene. Made in two sizes, 150/500 watt and 1000 watt.

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TYPE E & F. Rugged, compact units for low and medium power rigs. Aluminum plates .032" thick, rounded edges. Stainless steel shafts. Air gap .045" to .125" (Type E) and .045" or .075" (Type F). Panel space, Type E 2 3/8" square; Type F 2 1/16" square.

TYPE L. Ideal for mobile applications! Ceramic soldered — no eyelets or rivets to loosen. All brass, soldered construction. "Bright alloy" plated. Silver plated beryllium copper contact spring. Panel space only 1 1/4" sq. Air gap .030", .039", .050" and .080". Buttress, single and differential types.

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10 meters were used. Traffic: W2YNJ 585, BO 606, OBU 385, LPJ 244, OXJ 133, T2S 132, LPJ 108, DZR 85, HZQ 55, LPJ 40, ZKJ 2, JIY 18, BVQ 53, B4Q 17, WZW 26, ZFV 17, WQW 29, YBT 9, BQI 4, IVY 4, DRD 3, BET 2.

NORTHERN NEW JERSEY - SCM: Thomas J. Ryan, Jr., W2KGD - IHF and TPJ are new NO appointees. JEK's XYL presented him with a congratulatory address. JEK, Gours, is the latest WN to be reported. OUS reports the Monmouth County Emergency Net meets on Monday at 2100 on 147.15 Mc., covering the area from Freehold to Manasquan. OUS is WN 22F, is Manager, Hudson County is forming a radio club under the chairmanship of KFC, represented by LSL, EVD, and MED, ex-BIA, RL. K3C, ex-W3Q as a new member in Somersby Red Cross the 2nd and 4th Mondays, are AGA, NJW, ND, JER, and WNLVE. UOY resigned as president because of a serious heart illness and is now president. K3CR resigned as vice-president because of his XYL's illness and RB4R took over the office. The club station call ZYL was issued to ESW for new, traveling stations, and ZYL to ZBY for the same work in Hackensack. Area 1 (Bergen and Passaic Counties) 28-Mc. (6. D. Net now has 125 members; average attendance each Wednesday on 29.510 Mc., is 60 stations. Ex-2Y0B now is IU2YX in Longmeadow, Mass. Ex-2BF now is 01LX in Ames, Iowa. DXU was discharged by the Marine Corps and is returning to 71 Mc. DFT is using new ground-plane on 14 Mc. Tenneck a.s.d. station is J-7, recently assigned. NIT, LQT, LGB, LHC, and LQG are all in the same office of a A. M. New York City FGA reports the following stations active in c. d. work in Orange: VQ, JBN, TQZ, TIV, and FT2. All drill on 28 8, at I3B Sunday with headquarters in the basement of the Orange Fire Dept., ZXM, Cc2, Kurt Carlson, spoke to the Monmouth County 2-Meter Net, the OGU of the OSA. "O" was given honorary membership in the Garden State ARA. At the same meeting ZK addressed the group on the subject, "The Radio Amateur in Case of an Atomic Attack." More than 100 attended the YL-OM Party given by the GSARA. Livingston ARA completed its converter project. The Somerset Hills Club at ZK/TA-X, 14 report cards were received on February activities, plus approximately ten letters. Now, if the other 140 appointees would report, we might have something resembling a column of Northern New Jersey activities!!! Traffic: W2UDI 386, CS 226, WCL 173, LMB 117, EAS 94, ANG 47, XZ 59, DRV 34, JHN 31, GBs 3, OS 3, CJO 3, NBR, COT 1.

MIDWEST DIVISION

IOWA - SCM, William G. Davis, WBBP - DBB now has added a contact with a PBY, in flight, to his list. VBW is the new SEC for Iowa starting with a 95 per cent renewal of EC'os. HJF is new EC for Cedar Rapids Area. The new offices of the Cedar Rapids Club are in MNS, pres.; JTF, vice-pres.; UF, treas.; UQY, secy. Cedar Rapids, Waterloo, and Ames report news interest by the band, even in WEF, now reports in to the Colorado slow-speed net; he also is a member of the CAP communications net. VQ4 is deepening TV, FTE is building a new antenna and has met 21 times during the month. FYN now is working at the new Sylvia plant. A new Novice in Burlington is WNSC. DITW is the proud owner of a new XF, received his Extra Class license. YTA is working on SUPER-exciters. New president of the Waterloo Club is AB3, FZD is in trouble. For both K64G and K64H the YNP put Braille markings on a Viking dial for BDR, who finds it very FB, BXX, the Des Moines Club has a new antenna. The Club elected PC; pres.; BZ4, vice-pres.; CUV, 2nd vice-pres.; FAE, secy.; DITW, t. w. Ex-4AQL now signs 6LYK from Long Hearn. YKN is back on the air after a siege in the hospital. TXW is in the hospital. Check your appointments and if you need renewal send certificates and membership cards to the SCM for endorsement. A list will be sent for Iowa ham activities. Traffic: (Feb.) WSCA 823, YTA 162, QVA 121, NYX 57, DFD 40, PZ 29, DIB 29, NYX 16, SEB 13, ATA 10, FTF 1 (Jan.) WBSR 135, NYX 57.

KANSAS - SCM, Earl N. Johnston, W6LCO - Thanks to Novices who are operating your transmitters, W6PN of Reserve, a new ARRL member, reports he has worked 32 states so far with his 6V6 oscillator with 8 watts input. His neighbor, WBNLW, has another 6V6 oscillator working at 3 states so far but has been on only a month. He also is using a 6V6 oscillator with about 7 watts input and a 75 foot center-fed 50 feet high at Club Hill, and traffic in traffic with the 100 per cent for the month. FYX is now working at the new SEC at Beloit, SSB is a new mobile in Topeka working 3A and 28 Mc. with a Miller 6A3 complement of 6V6. Note, PZD as well as DYN in SSB. KZB of Topeka, is mobile again with Motorola O9-29A working all times on 147 Mc. W8G and 8AA both mobile, have active Wells rigs in their cars. LIX advises of the passing of Ed H. Pugh, YQO.

(Continued on page 60)
"Eimac 4-65A fits exacting requirements"

John M. Kaar, President of Kaar Engineering Co., prominent manufacturers of high quality radio-telephone equipment.

Eimac 4-65A tetrodes are the heart of the Kaar FM-179X mobile transmitter. As Mr. Kaar indicates, his engineers chose these tetrodes because they were known to be outstandingly dependable and because they exhibit highly desirable operating characteristics.

By instant heating the 4-65A does away with stand-by periods and eliminates costly battery drain. It is excellent for power amplifier and modulator service in fixed as well as mobile rigs. The 4-65A operates over a plate voltage range from 600 to 3000 volts with output powers ranging from 50 to 280 watts. Upper operating frequency under normal conditions is 220 mc.

Cordially,

John M. Kaar

Eitel-McCullough, Inc.
San Bruno, California

Follow the Leaders to Eimac TUBES
The Power for R-F

MISSOURI -- SCM: Clarence L. Arundale, W6GJU;

The Tri-State Radio Society has selected the following officers, J. E. van, vice-president, PKI, secretary; J. F. G. vne; and BUL, adjutant. Club meetings are held the tenth and twenty-fifth of each month at the CAP Building at the airport. The Columbia Club has started a program in cooperation with TV owners in an attempt to solve the TVI problem. FIR has a new jr. operator, New QRS appointees went to PMG and CR. W6VAC, a

MARS member, PMB/9 is keeping daily traffic schedules. CQL has been QRL with the Navy and business. QOT has his mobile rig installed and operating in the severe

winds he owns. OUD's OM, DE, got the car license tag with OUD's call; MJD now is 9R9 at Bellevue, IL. New hams in Springfield: HIL, HCD, W6NQ, QXW, FXX, FQW, and GIL. QXO makes BPI again and is taking a two-week vacation trip to Florida. Most clubs and organizations in Illinois are receiving representatives to the divisional conference called by OZN, our new Director, which was held March 9th at Kansas City. Novices are invited to join the SAN (Springfield Area Emergency Group) which meets at 8 PM on the first and third Sundays of each month on 3720 kc., under the net of DJX.

This is a slow-speed net to aid in training Novices in emergency net operation. Among the stations operating in the 1600 kc. range are.


NEBRASKA -- SCM: Guy R. Duller, W6KPJ; BJX is doing a swell job as OM. He reports FVE and FYF, brother and sister at Avoca, now are Cash's B. FVR, of the Air Force, KCA reports the new W6CKD is doing fine; the SCM extending congratulations to LOD and KDW on a perfect appearance. AUR is keeping regular

sked with 7L7D in Portland, OR. The QRM have a farewell party for KDF, who was leaving to enter the service. Among those present were N1P, and XYZ, LPR, KAL, and XYL, IGK, BDK, GMJ, FYF, FVE, and SUS. New Novices are Alvin, HQN; son Hicino, age 12, HQG, daughter Carol, age 15, HKF, also FWI and KDL in Lincoln. VJR now is living in Lincoln. FLK is back on the air with 150 watts and also is mobile on 75 meters. ASE is building a rig for his niece. KCF is out in Lincoln with his receiver. LTE also is mobile in Lincoln. JDJ says NSS still is functioning but QRM is heavy. The 2B-NBC is making big plans for FYIB Day and the committee met at the home of PHW in Omaha to plan Field Day for the Ak-Sar-Ben Radio Club. The Club also delegated PHW and QXR to attend the Midwest Division conference at Kansas City. JDJ says he has been fighting the fire as well as the QRM. Your SCM wishes to thank everyone for the FB reports this month. Traffic: M4KON 154, FQZ 83, JDH 75, LIO 70, KDW 39, W3F 36, K2C 21, JDJ 17, DHO 17, SAT 15, CSH 12, YNB 11, AUC 10, KSP 9, HWS 7, YIM 4, YMU 4, EQI 2, FOW 2, LR 2, RAM 2.

NEW ENGLAND DIVISION

CONNECTICUT -- Acting SCM: Roger C. Amundsen, CWHBP; SEC: LKG, PAM; CT, 3840 kc.; CFR, 3880 kc. ODW offers help with the bulletin, which is the best news of the month of April. He gives second harmonics 7.4 to 7.5 kc. He suspects PI, neat and half-wave antennas combine to give trouble. Let's listen there and help out our newcomers, FVE, YN, and KDF in the service. OTR, associate at the CPN meeting at GB on Feb. 24th. EMF is planning with 75-meter conical. DIO is on with 40-meter ground planes and 20-meter beam. HUM has been traveling. I8T reports the Univ. of Conn. station, LNX, is active again. The V.H.F. Radio Club had its shindig in Hartford on Feb. 22nd. POZ heads the Stanford Club, with NOF, NEB, PXB, NOA, and OUG other brass. They have an FB, set-up, W1NUHU and his dad. USA, along with members KLI, NOA are teaching code, T friedland U, with W1NSU as secretary, received the gift of an 150-B, KYQ 96, AYQV, and BRF, now CEC, new QRM. AFBTRU, and for Telescope, drill Mondays at 9 P.M. on 174.7 kc. MNG, chairman of the program committee of the New England Division Convention to be held in Springfield, MA. On June 14th, promises space for a Connecticut section meeting. See you there. It's to be held at the Eastern States Exposition, LV, A. A. R. C. If you have a new Extra Class license and W1N1GW's V1GWV is new Novice Technician in Danbury, DBM presented the second edition TV book and a talk at operating on Feb. 20th. Traffic: (Feb.) W1AXC 323, SJG 292, HYF 190, LV7 117, KYQ 105, HWM 105, JYQ 103, EMB 100, JUP 70, STM 70, HUM 60, BVR 48, LIG 24, GVR 23, BHH 28, DTE 24, JPB 24, BDD 18, BDD 18, (Jan.) W1LIG 32, HDO 5.

MAINE -- SCM: Orson R. Brackett, W1PFL; SEC: ICG, RM; LKG, Net frequencies, and time: Pine Point Net, 3500 kc., at 1900 Mon. through Fri. Sea Gut Net, 2900 kc., at 1700 Mon. through Fri. It is with much sorrow that we report the passing of Everett S. Rogers, 1GE, who

(Continued on page 08)
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To You, Belden's Golden Anniversary Means something more than a milestone.
It means an ability to co-operate in planning new wire and cable installations that will benefit you.
In the years that have passed since the founding of Belden, we have grown.
We have become more competent, better trained, and more efficient in giving you the service you expect.
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To assure you of the lowest cost and the best in quality, we have recently added to our cablemaking plant.

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GOOD NEWS for MODEL PLANE "PILOTS"

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FREE! RK-61 characteristics plus a wiring diagram for an extremely small, light weight, single tube, model plane radio receiver.

This extremely sensitive receiver, for use in the 50-54 MC band or lower, controls planes at distances up to a mile or more. The wiring information is yours for the asking. Simply write Department Q.

was the foremost Morse operator in the State of Maine from 1908 to 1912, at which time his operation was changed to Continental Code. Later he became a Class A operator. He was a member of the Old Timers Club, Sea Gull Net, Deep Sea Drag Net, Long Beach Club, and ARLR Emergency Corps. We have just received news that there is going to be a hankster held in Portland again this year to take the last Saturday in July of this year. The regular get-together on August 17th, and that the Oxford County Radio Club is planning something but the date is not definite as yet. Don't forget the Peace Revelry for 1958 in Auburn May 31st. Quick action was taken after radio contact from ED to ACO that AE's wife was ill and could get no local help. Thanks to the help on 20 the Gladstone Manor was taken down from Butter Hill, via tobogann, and now is OK. QVB and family spent several days at home after more than two years away in the Navy. A small time he had that PTL's. A Sea Gull Net certificate was issued to SEF.

Traffic: W1G70, PTL 47, SEF 92, HX4 A2, (L1, B1, 26, N81 25, OLO 24, 2JR 15, OJR 14, SEQ 14, KDE 13, KBF 10, KZ 5, BX 5, KTT 8, QEK 3, AUR 2, IXC 2.

EASTERN MASSACHUSETTS — SCM, Frank J., W1ALP — New appointments: SCS as COP, TVZ as ORS, SXM as OO, Appointments, New = A1, AXN, PU, 1H, SAL, SS, and W2 as ORS; HM, ILL, SAL, and SS as ORS; HAI, ILL, and CTR as ORS; SS as QG for Lincoln; AWA as EG for North Reading; B1J as EG, SS in MARS and his call is EASIAM, Activity on 144 Mc.; UZB, KMW, WN1UWO, and TGO in Dorchester; WN1UZ, WN1UFX, and W1VBD in Brookline; WN1TTZ at Squamut Naval Base. VHC is the call of the Brookline Amateur Radio Society. 4TH, ex-C1K, is on 3.9 Mc. JJL has Amateur Station license, but has General Class license. SS is chairman of CPNE, UE is working on amplifiers for his 3 b.e. RMs. LM says 7 Mc. has been dead in the water for the last 2 weeks. JJL has been reporting into 6 nets on 3.9 and 144 Mc. TIS and UHD are on 28 Mc. TBJ/MM is on a traffic, OJG and JZV have JJS & TV as Tx set. TIN is working at WESX. DTV is working on SCS, the only YL in Natick e.d.e., is active in nets. BB, Winiroth, has 12 emergency-powered rigs on 144 Mc. with the following bands active: BDU, DJ, OR, TR, UQN, TQJ, TTH, BJS, CMW, NAX, QEC, MSH, TOT, HJG, GGE, DJH, VOC, NAV, QUK, SBE, PFX, MHS, DPL, and ACV. The show meeting at HBG's QTH. The South Shore Club had Messers. Hall and Terrel, from Workhouse Associates, speak at its meeting. The Braintree Amateur Radio Club held a meeting with a talk by AAJ on operating a Johnson Viking. The Eastern Mass. Club had an auction with AKY doing the job again; Jack Babcock, of Sour Co., gave a talk. QVP has a new Viking transmitter. The Quannapowitt Radio Assn. had a talk by JIM of Hytron on a "Hot 2-meter Converter." WN1UWO gave General 2 classes on 144 Mc. receiver. BSW went to a meeting of Massachusetts DXCC members in Cambridge. E. J. as soon, and hidden, reports TVA is in the Army at Camp Gordon. (a) WI is working on new rigs. The Hingham Amateur Radio Club has been revived, and the headquarters in the Office Building. Officers are MD. pres.; DRL, vice-pres.; OVN, secy-treas. Other members are: AYV, HBY, BW, and CG, and WN1VAV, Hingham's first YL operator, AGX is on 28 and 144 Mc. Helen Wright, WN1UFP, in Brookline, is working on a CW net on 3.9 Mc. All interested Net members please get in touch with her; she will be on 3275 kc. QJ, now in Brockton, is handling some traffic. TVZ, in Sagamore, is on 7 Mc. JYY is busy in MA. In RSC, Whitman EC, has assistants AYN, AYO, SCA, REG, LEM, and WNIUF, CPE is manager of New England 75-meter Phone Net, which meets Sundays at 9 A.M. at 8760 kc. SUK, Mansfield EC, reports a demonstration held in the Gardiner Hall, with ODN/1, TQP, TQJ, TQZ, W1Q, and SCR as taking part; SE is active on 144 Mc. The Old Colony Net meets on 144.144 Mc. each Mon. at 7:30 P.M. The Gypsy Radio Club of Marble Hill has a net on 28 Mc. Tues. at 7:30. The Brookline Net Club now meets the first Thurs., of each month at 8 P.M. John George and Ed Fisk passed Novice Class Exam. Dog and Mrs. King passed Technician Class exam. His call is UIB. New Novice in Wellesley: VAB, VAQ, TEE, and TFC. UY's call is WN0UUU. NWO is a new member of the DXCC Phone Roll. QAP is in Federal Civil Defense Alliance Net on 3.9 Mc. MBQ, Vineyard Haven EC, sent his certificates in for endorsement. WN1UDB, Chatham, passed his General Class license; following mobiles on 3.9 Mc.: QBN, GDJ, MYX, RVP, SFX, portable SXM, and TUI. FZU has a 3-kw, a/c generator and is on 144 and 3.9 Mc. W1M has a Ford generator and a Transmitter. Traffic: W1MEG 291, SS 206, UAC 5, DY 140, LM 100, JCR 8, NUP 75, LQ 59, MME 39, HY 10, WU 8, BB 6, BGW 6, CT 5, HEW 2.

WESTERN MASSACHUSETTS — SCM, Victor W. Benson, W1EBO, — SCM, Frank J., W1ALP, — SCM, Tambor, VM, W8X, — SCM, BVR, WMN meet at 7 P.M., Monday through Friday on 3725 (Continued on page 64)
Keeping communications "ON THE BEAM"

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ke. This Net operates slow speed. A new ham in Agawam is CUR. New QPS is SWJ in Westfield. BDY has completed his gadget, which works F5. Details later. Region 9 Worcester club is in the working end of its TVI, W3EJB, Reverend Boufack, is guest speaker at Region 9 Amateur Radio Club recently. JYH is busy preparing and sending out a 5-page report on 2-FEC progress over the past year. The Hampden County Radio Club received a very enlightening and easy-to-listen-to talk on the ways and wheresof the oscilloscope from JOU. There are not many more days left to get in your advance reservation for the coming ARRL New England Division Convention. Do it now! Traffic: W1RMU 4U, BVY 61, GYV 18, EOB 6.

NEW HAMPSHIRE — SCM, Norman A. Chapman, WJNOC — RM: CRW. The following appointments have been renewed: EC for Hillsborough County: GDE, ORS; BR, CRW, PTF, ORS, CW, POK, and POK's 5th. TC is forwarding your certificates for endorsement. TDI has been newly appointed as Emergency Coordinator for Carroll County. SAL with the able assistance of BWC, has begun traffic from their station operating from Soldier's Home during the Civil Defense Alert at Tilton. TNO/1 is standing by for Dartmouth College traffic. Look for him on 7130 ke. SJS reports that he likes traffic-handling and is active on the Eastern Shutter Net, 7120 ke. AL, TJD, and LCC discovered during a rag-chew on the TVI Net that both of their birthdays fell on the same date. Result: A big birthday cake and "'skim's" at TJD's shack. SAL says he will use n.r. on 75-meter phone very shortly. AO is plenty active and plans to go on his new Extra Class license. Bill got his first ticket in 1916. I would like to hear from all other Extra Class ticket holders in this section. W1HIU is a new Novice in Granville. Don't forget, it is not too soon to start preparations for Field Day. Applications for QSO appointment are invited. Traffic: (Feb.) W1JWQ 4U, PTF 7, POK 7, TNO 7, GMH 5, (Jan.) WISAL 108, QXR 13, VMONT — SCM, Raymond N. Flood, WIWPQ — HM, Bob. Looks like everybody is ready to go, possibly because of a combination of poor conditions and TVI. OAK's Vermont Slow Speed Net on 3740 ke. Mon. through Fri. is improving but needs more Novice to report in. AYP says three more have passed the Novice Class exam in Rutland, EGU has an club-member V4U born on 144 ke. MYD is doing FB on 160 meters with a Viking 1. KRV has 2620 at 25 watts on 50 ke. and will add 225 watt soon. HJF reports via PY3C, Y57CL via W6XJ, X9P ex-11JZ, W1IUHPL, of Brattleboro, passed the Gen. Class exam. AZV is active again after an illness of more than 4 months. AXXN is busy on a new house. N6U is going to invent Rube Goldberg to cut off that extra dash. Traffic: W1NRA 105, OAK 108, AYP 47, FFS 39, 1T 28, ANX 16, BIP 9, TX6 6, EJ5 5, KRV 4.

NORTHERN DIVISION

A LASKA — Acting SCM, Jack M. Walden, KL7BE — NT A is the new SCM, and expects to return from a business trip to State-side about May 1. Anchorage Club set up AA in an amateur c.d. radio booth at the Fur Rendezvous, made a considerable interest in mobile clubs. WL7ASM has joined the ranks of active Novices with his powerful little 20-watter. KM has returned to the 75-meter band, c. 75-meter mobile activity is at an all-time winter high with AN, AGU, ABX, BK, FN, and RZ working regularly from the rolling QTH. EX4K home is out of town—out of a mobile QSO from Homer when he worked AA at the Fur Rendezvous. ADX, at Healy, is on frequently, and is a valuable relay from Anchorage to Fairbanks. NB, ALZ, AID, and several others are heard constantly moving traffic in a mighty business-like way. How about some reports? Or maybe even traffic counts? Traffic: KL7AIZ 709, YG 230, AN 25, UM 17, FN 5, ADX 4.

IDAHO — SCM, Alan K. Ross, W7IWU — Lewiston: FRC for Lewiston, reports 13 new Novices applying for OPS appointment. IFG, Assistant EC, is airborne mobile in his Cessna 140, operating 75-meter phone. CCLM is aloof, FIS, EC, reports R4 still doing good work. EH6Z has '50 Chevvy and is planning mobile job. IFG is rebuilding around a Collins VFO. LDF, long aloof, plans to go on, rumor has it. Egl is active on 20-meter mobile. OMD is on 3.5, 7, and 28 ke. EGK is too busy on the weekend to do much hamming. MIiker, KUS, of the Farm Net, has supplied for an Official Observer appointment. H. A. B. now has PIT's daughter as W7YRC. ETU is president of the club. Home: New house are W7NYF, and W7NHM, and W7RFD, an ex-W9. A Sunday 11-meter hunt turned up on W9. PIT, NPO, ORJ, PRC, DGO, HOF, AIHS, and OCR were TWU "hiding." Sun Valley is a 95 year old town that now is on with a 20 Metal. Traffic: (Feb.) W7NHF 225, GHT 84, FIS 23, IWO 6, (Jan.) W7FFQ 35, EXH 14.

MONTANA — SCM, Edward E. EKJ — CPY returned home the latter part of March from Arizona, where he has spent the winter. BNU returned home March 15th. After spending the winter on the icy roads in Idaho and smashed up his new car slightly. (Continued on page 90)
You rest easy when your rig uses Dependable OHMITE RESISTORS

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PACIFIC DIVISION

HAWAII — SCM, John R. Sanders, KH6RF — A VRLR Hawaii Chapter has been organized and meets the last Thurs. of each month for lunch at The Willows in Honolulu. Temporary officers are AFN, pres.; APL, vice-pres.; T1, secy.; and APC, treas. All interested LAs are welcome to join. The club boasts 2 members now. HARC meets the 3rd Mon. at 7:30 a.m., Hawaii Electric Building, Ward St., Honolulu. All hams and operators on Oahu are invited to attend. More than 100 attended

(Continued on page 108)
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Sensitivity is 2 mv or less for 10 db signal-to-noise ratio. Six steps of selectivity available. Audio fidelity, ± 1.5 db from 200 to 4000 cps. AGC, ± 6 db from 2 mv to 1 volt input. Image rejection, not less than 80 db at any frequency; IF rejection not less than 100 db, IP output, at 70 ohm socket, 300 millivolts (455 kc) with 2 mv antenna input. Carrier level indicators calibrated -30 to +70 db; zero db = 50 mv. Panel controls: RF gain, AC on/off; bfo pitch; audio gain; crystal phasing; selectivity; VFO/Crystal; crystal vernier; band selector; frequency; receive/send; CW modulation; AGC/manual; ANL/off; antenna adjust. All components are built to JAN specs. Complete with 17 tubes, plus rectifier, voltage regulator and current regulator. Panel for standard relay pack is 10 1/4" x 19 1/4"; depth behind panel, 16 3/4". Shpg. wt., 75 lbs.

97-553. Hallicrafters SX-73 Receiver. Net. $975.00
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97-787. R-46 Speaker for above receiver. Net. $19.95

**S-72 4-BAND PORTABLE**

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BUD TRANSMITTER COILS

<table>
<thead>
<tr>
<th>Type</th>
<th>Watts</th>
<th>Description</th>
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<tr>
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<td>75</td>
<td>Fixed end link</td>
<td>$1.80</td>
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<tr>
<td>OCL-15</td>
<td>75</td>
<td>Fixed center link</td>
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<td>MLS-15</td>
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B & W
15-METER COILS

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JOHNSON
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<td>1000H/LCF1</td>
<td>$4.59</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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ciever overloading. PWR is again active with low power on 76 meters. N. built an antenna tower. IKEH likes his new W-Science 270. Trailee: S121 YV33 BZ3 1K8, CX 69, JZ 24, YD 10, EJ 8.
S AN FRANCISCO — S121, R. F. Czekotowa, WSATO — Phone JU 7-5881, SEC, NL: Phone PL 5-6457.

The amateur TV committee for the S.F. Area is in full swing. Many thanks to the volunteers in the area, which includes DZL, SFW, ZLQ, GCV, ATV, ATT, LJT, VPC, QBA, WNS, NCK, JAA, GAM, and OX1, as well as USR, now in San Francisco. The committee now has room for three or four more interested members, who may have either technical skill or, equally important, a friendly and interesting personality, with the ability to help the complainants without bias. If you have TVI and the complainants have not yet sent complaints to the FCC, and you are unable to eave the trouble or contact the complainants as to responsibility for the TVI, PHONE JU 7-5881 and state the facts. UNDER NO CIRCUM- STANCES SHOULD YOU allow the case to go to the state of a neighborhood feud. SEND DIPLOMATICALLY with the complainant — AND CALL THE COMMIT-TEE. The committee will gladly help you and is willing to work to help himself as the facts determine, regardless of his membership or non-membership in any amateur organization. TVI committees also being formed in Marin and Sonoma County Areas, and will work after the same pattern. The factory representatives of a number of manufacturers of TV sets have promised their assistance in installing FREE high-pass filters to cure fundamental blocking in sets of their manufacture. CALL YOUR TVI committee to report your trouble, or to volunteer to do your part on the committee. GS7 has been elected President of the Radio Amateurs, and has been appointed ARRL EC for Sonoma County. His address is 957 Pacific Ave., Santa Rosa, and all amateurs interested in TVI should get in touch with him immediately. We are under the impression that many are urgent to contact him in Sonoma County. IEN has taken over the duties of secretary of SCRA. In the San Francisco Area, BXS, has left, and NL6W, long active in the field, has moved and received financial assistance for the Emergence Corps of S.F. from the TVI funds, and now are engaged in rebuilding and experimenting with many 2-meter rigs. Regular EC drills are being held, with the great emphasis on field operation, also in Marin County, Humboldt County, and in the Tamalpais Radio Club near San Francisco, under ECs KNZ, SNX, and ZUB, respectively. DH6W requests that more financial assistance is solicited for this column from all the many W6 operators anywhere in the S. Pacific section. The Pacific Division ARRL Convention is scheduled for July 4-6 in San Francisco, with many of the Bay County clubs participating in the work and financial arrangements. The chairman is ER, SFCR meets 2nd Thu., at the American Legion Hall, in San Francisco. VRC meets the 3rd Fri. at the Fleischer Institute in San Francisco. Great interest is shown by near Centro East, Tiburon, Sonoma County. RA meets with the 1st Wed., Grace Bros. Brewery, 2nd St., west of the Freeway, Santa Rosa, Humboldt ARC meets the 2nd and 4th Fri., YMCA rooms, Mun. Aud. "E" St., Eureka. When this news is read your term as SCM of the San Francisco section will have come to an end — and a very short two years it has seemed. My thanks to all the amateurs of the section, and to best of luck, Feb., (Fed.) WSG6 B, KAI & (Jan.) WSG6P 60, KAI 2.

SACRAMENTO VALLEY — Acting SCM, Willie van Kamp, W0KRY — is building a 65-meter, monitor, and frequency meter. The SV Net on 28.8 Mc. was discontinued as of Feb. 29th. Mobiles GUP, SUP, UNT, and W6OBH need ideas for new nets. W5NEW and wife ALL visited in the Chico Area. The Roseville gang has monthly o.d. drills in cooperation with the police. HVD and RFF are active on 160 meters. MON is mobile on 1920 ke, from a bicycle. GERC is concentrating on low-power portable gear using 14-volt tubes. FUT is a visitor in Chico. KFB now is located in Live Oak. Trailee: W6KRY 25, GDO 21.

SAN JOAQUIN VALLEY — SCM, E. Howard Hohn, WOFYM — SEC: KYM, RM: EXK, EC: ACL, EBB, FHP, FTC, GCS, KEX, HZE, JPU, and VRF, O169; W0RBF, W0G, GWC, LIT, QBP, O1, QRP, GB, QRA, GS, GW, and QOB, OIE: FYM, RJE, and UYU. OOs: PKL, HZE, and QBP has moved back to Fresno. The members of the Fresno CBA are Dick, EG7, OWL, secy.; and NTK, treas. A new call in Fresno is COU on 75-meter phone. JPU is getting good reports with 5 watts s.s.b. on 75 meters. WDMKOL in Fresno is a new one. FEA, Gertin, garnered 1205 points in the YL-OM Contest. FH7, at Bakersfield, now has 80-foot pole in the front yard. JAS, at Stockton, is a new GIC. The Sierra Nevada Defense Agency has been requested by Governor Warren to contact amateurs along the Sierra Mountain to report snow and water conditions. The request has come down from KAME, SEC for the Sacramento section. Details have been mailed to the RC's. Activity in SJV on 3525 ke. is growing larger. Check in some night, Mon. through Fri. at 1900. ERE has a new Viking I, Major Phil Smith, LJO, stationed at Castle AFB, active on 75-meter phone. VOG, at KSB, is due on Mission Trail. YS6N is a new call in Deshler near Tullock. ZBO (Continued on page 108)
We're swamped

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FM-AM hi-fi tuner
we're selling for

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THESE ARE THE SPECS:
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separate inputs for phone (crystal) and TV-Audio (or mag-
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tubes, dual-filtered AC supply, escutcheon, knobs, brackets,
12-page instruction book. Compact 111/2" W, 6" H, 91/2" D.
Ship. wt. 81/2 lbs.

On June 14, the Hampden County Radio
Club of Springfield, Mass. is sponsoring
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bells on, and hope to see you and yours,
too. Meanwhile, when you think of Col-
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101
and his XYL, aided by WMU and his XYL, hosted a grand party for the Mission Trail Net members at Waseo. Traffic: W9URO 104, JQB 125, TAZ 123, K6FJA 110, W6ExH 101, FEA 67, G1W 24, FYM 6, WJP 2.

ROANOKE DIVISION

NORTH CAROLINA — SCM, J. C., Gasaen, W4DLX — This section is picking up, gang. The SCM received 18 traffic reports this month. That's a record. Thanks a mill of you, and let's keep it up. From Wilmington, NV, is new president of the Cape Fear Radio Club; BBZ is secretary-treasurer. EC is active on 3.5 Mc, and is reconditioning his homebrew equipment. MVP and SXX are high-tower-rotary men and S7/5A "V"-Beamer on 29 Mc. With all that activity down there, how about supplying a 75-meter "phone man" on the Tar Heel Net? LUW reports from Goldboro that the club there is building nicely and is affiliated with ARRL, ONM, and the interclub exchange is heating up. The Mecklenburg Amateur Radio Society, of Charlotte, staged a Red Cross Emergency Drill. The Club station, BFB, was used at the A. C. Head-n Annual and mobiles were FKU, QQQ, and DLX. Rumors from all over the State have indicated at least a dozen new Novice operators. How about hearing from some of you? Notice to all station appointees: Please report your traffic and activities each month DIRECTIONALLY to the SCM and not via the RM. This is your responsibility, not the RM's. Your report is necessary to hold your appointment. ARRL cards to those interested. AKC recently tops the traffic list this time. Concord, Joe. Traffic: W44AC 723, FMH 221, PIC 80, RRH 77, ONM 37, RA5 24, EBF 18, IANH 16, DLX 18, CMG 12, CVQ 12, LUW 5, VMA 8, BBZ 4, SKI 4, DXL 2.

SOUTH CAROLINA — SCM, T. Hunter Wood, W4ANK — THR and CFB are regular members of the ARRL. W4NTW is Net Control for the S. C. Novice Net on frequency 3740 kc., and all S. C. WNs are invited to contact W4NTW for details. A limited number of crystals are available for loan, while they last. The club is building a "phone" pair of 814s. DHT has 6 watts on 75 and 80 meters. HiBB has been transferred to Charleston. The Charleston Amateur Radio Club meets on the first and third Tuesday of the month and hams connected with the Navy are invited to attend. Traffic: W4ANK 323, THR 209, CFB 95, DCE 4.

SECOND ANNUAL VIRGINIA QSO PARTY — MAY 4TH

A QSO party, open to all Virginia hams will be held between the hours of 10 p.m. and 5 a.m. EST, Sunday, May 4, 1952. Every licensed amateur in Virginia is urged to participate, if only for a few QSOs, in this affair!

Rules: 3.5 Mc, 7 Mc, 24 Mc. No power limit, or mode restrictions for this get-together. Objective will be to contact as many fellow Virginians as possible during the eight-hour period, exchanging information with each station worked. Stations may be worked only once on each band (regardless of mode used), but they may be worked again on a different amateur band.

Contact call is "CQ Virginia." QSOs on "phone" or c.w. Information to be exchanged in each QSO is to consist of the following items: 1. Number of QSO (in the party). 2. Your call. 3. Your RfB or RfE report to station worked. 4. Your county. 5. Your name or nickname. For example, W4FF might send the following message on his third QSO in the party: "HI CQ Virginia. W4FF 580X FAIRFAX LINDE:" Scoring: Each message sent counts 1 point and each one received, 1 point. Two points, therefore, are possible from each QSO. Multiply total points by number of different Virginia counties contacted in course of party for final score.

The following frequencies are suggested as rallying points during this affair: 3550-3650 kc; vicinity 3600 kc. (VHF frequency); vicinity 3635 kc. (VHF frequency); vicinity 3900-3950 kc.; vicinity 4000-4050 kc.; vicinity 4000-4050 kc., 3900-3950 kc., 3800-3900 kc. (c.w. and "phone") Use the v.h.f. too!!

There will be prizes for winners. Get on and meet your neighbors, all Virginia hams, except SCM, and members of the contest committee on awards are eligible for awards. All logs should be mailed to SCM before June 1. Send in your log whether you have a QSO or a dastardly score. Scores will be announced in the Virginia Net bulletin (a copy to each participant submitting a log) and the winners in QST.

VIRGINIA — SCM, H. Edgar Lindauer, W4FF — SCM, NAD, RMs: W4FF, PFA, SDB, B5J, and FV. Highlight of activities of this section during the month was the successful campaign for auto license plates with designated call letters. Virginia joins with 14 other states in a far-

(Continued on page 104)
ELMAC 50 Watt XMTR

Fills a long-felt need for a moderately priced mobile transmitter with a real SOCK — or for a low-power regular or stand-by fixed station transmitter.

- 50 Watts input, hi-level plate modulation, built-in Pi antenna Network, compact measuring only 7 1/2 x 7 1/2 x 12, complete with tubes.

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- Power filter network, low power consumption. Crystal controlled output.
- 6 tubes, built-in relay, compact.
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The American Radio Relay League
West Hartford 7, Conn.

sighted approach toward recognition of the necessity for emergency radio communications on an organized level rather than a haphazard catch-as-catch-can should a need for such help become necessary. A number of clubs such credit goes to the license plate committee (JQG, NV, ARV, JRX, and NAD) which, with the aid of the Hon. Paul Coeatz, York County Delegate, steered the bill (House Bill 728) through their preliminary committees and subsequently the House of Delegates and the Senate without encountering a dissenting vote. Members of Virginia's Assembly are congratulated for their open-minded approach and recognition of this organized group who offer equipment and personnel for mutual aid without remuneration of any kind. Hats off to those other fellows in the section who helped rally the yank which made the end result possible. Sunday, May 4th, a good time will be had by all at the start of Virginia's Third Annual QSO Party. BPL received a wallop from NAD, SHJ, and JQG, all by reason of originality and delivery exceeding 100. The lowering of the hogshead for transfer to Japan (J2KWW) is a real blow to this section. His sterling guidance and interest will be missed by all of us particularly your SCM. LW joined Artifice's new Citizens Emergency Group. SHJ is a new RM. RDJ has been appointed EC of Waynesboro. SDR is organizing a Novice group to study for the General Class license. Traffic: (Feb.) W4AD 417, SHJ 344, FY 382, JQG 185, MWH 113, FN 113, SC 82, KYG 44, FX 38, CA 34, OQG 32, KBB 31, PXA 90, RX 21, LX 18, IYF 14, GTC 7, LGN 7, LW 4, TPX 2.

West VIRGINIA — SCM, John T. Steele, W3MCR. — To: RM, retiring the SCM, thanks for a job well done. To: Artifice, the YL of VFO, apologies for a mistake. She was reported as having the call WN6FLF; it should have been W6FLF.

The Tri-City Club reports new officers are in place, pres. D. M. Wallin, secy.-treas., JRN, act. mgr., LGB is EC for the Tri-City Area, with UTV as Asst. EC. A successful emergency test was held through the Club on Feb. 10th. DRF is working on a full gallon. Stations reporting in to WYN during February were ARK, GEC, BTV, YPR, BWK, GDC, NEW, BPT, ZHN, KIN, HCF, YGK, PTT, and XHG. A total of 137 messages was handled. The Charleston Amateur Radio Club had a get-together meeting Feb. 29th to meet the new SCM. To: Bera, EDR, congrats on a job well done. The meeting was well attended, including new members Units, the YLS and XYLs. New appointments: EDR as PAM, BWD as OPS, DRF as OO, VFO, YFD, and WER are doing a good job as NCS on the phone network. Traffic: W3AC 705, BTV 131, BWR 96, DFC 43, EHR 30, GTC 13, FUR 13, GTC 7, GPE 3.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, M. W. Mitchell, W9EQ, SEC-PAM: KHF, Asst. SEC: PGX, RMAs: LZY and ZIO. THE ROCKY MOUNTAIN DIVISION CONVENTION WILL BE HELD AT ESTES PARK, COLORADO, ON JUNE 14TH AND 15TH. It will be sponsored by the Denver Radio Club. Write Walt Reed, W9REO, for details. We have two in the BPL this month, KHF has made it for the past three months and it looks like he may be a close contender for the honor of most consistent BPLer, held at present by ZIO. BXM sends a nice news letter of the Colorado Springs Club, Ent AFB has three purveyors, HKD, HKE, and HIO. ZKM is a new mobile. KSO has a new mobile. COB now has a single and the Rig is all cleaned up. KMS has a new 40 foot tower which holds up 40- and 2-meter beams. BXM is planning a 2-meter jam on Pikes Peak June 14th and 15th. They will have a transmitter on 2 meters and one on 6 meters with two receivers on each band, and hope to set a new record for these bands. Only one letter and two traffic report cards were received this month. Your truly tore down the mobile transmitting antenna on July 1st in the middle of an operation. See you at the Rocky Mountain Division Convention on June 14th and 15th. Traffic: (Feb.) W9COZ 1066, KHF 344, KFGAM 147, (Jan.) W9EQ 1066, KHF 344, KFGAM 147, (Dec.) W9COZ 502.

W7SP — SCM, Leonard F. Zimmerman, W7SP — This will be the last report for yours truly. UTU will take over as SCM of Utah. Let's give Floyd our support, especially in reporting activities. If the regular report cards are too much bother for you, send him a message via one of the local nets. W7ZG informs us that the Denver Club is sponsoring a Rocky Mountain Convention at Estes Park, Colo., June 14-15. Details may be obtained from W9WRO. The Ogden Club is getting its e.d. and emergency organization whipped into shape. The trend up there seems to be toward higher frequency mobile on the lower frequencies. NHI is conducting a Novice class sponsored by the Ogden Club. Anyone interested may obtain details from the SCM member of the Ogden Club, MFIU is on a mission in Norway and says that he is looking for Utah contacts on 14 Mc. from various LA stations. He also would like to be heard on 80. If interested you may obtain the address from us. Traffic: (Feb.) W7UTM 102, (Jan.) W7UTM 60.

WYOMING — SCM, D. Cadell, WHNHI — PXK, (Continued on page 109)
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SOUTHEASTERN DIVISION

ALABAMA — SCM, Dr. Arthur W. Woods, W4GJW — JKO, MEM, and KP are planning 144-Mc. operation. CYL will soon start with a new mobile rig. VFCJ will be on 3.5 Mc. VWC will be on 3.5 Mc. VNCW will be 144-M. Memorials to AEN, RN1, RN2, and JRCV. UAB TV Committee has a functioning TV program. Many new members were enrolled in the current membership drive. VRC is meeting in Tuscaloosa. SCM's ARC will hold their annual meeting at Birmingham. A new 144-Mc. tower is now up for service. W41V's new 144-Mc. tower is near completion. W41V's new 144-Mc. tower is near completion.

GREAT FLORIDA — SCM, John W. Hollister, Jr., W4FW2 — Frequency change: Palmetto Net (FN) from 3675 to 3675 kc, for a try. W4FQ2 has been moved to 3.5 Mc. W4FQ2 has been moved to 3.5 Mc.

SOUTHERN DIVISION

ALABAMA — ECM, Dr. Arthur W. Woods, W4GJW — JKO, MEM, and KP are planning 144-Mc. operation. CYL will soon start with a new mobile rig. VFCJ will be on 3.5 Mc. VWC will be on 3.5 Mc. VWC will be on 3.5 Mc. VNCW will be 144-M. Memorials to AEN, RN1, RN2, and JRCV. UAB TV Committee has a functioning TV program. Many new members were enrolled in the current membership drive. VRC is meeting in Tuscaloosa. SCM's ARC will hold their annual meeting at Birmingham. A new 144-Mc. tower is now up for service. W41V's new 144-Mc. tower is near completion. W41V's new 144-Mc. tower is near completion.
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banks of the Chattahoochee River, A National HRO-50-T receiver will be given to some lucky attendant. K4WAR lost his 14-Mc. beam during the DX Contest because of high winds which cut his score down considerably. 1101 is now in traffic-handling mode on 75 meters. 1238 is using 14-Mc. phone for local contacts and to get away from TVY, G60 has returned to 3.8-Mc. phone after an absence of four years. He now has his Advanced Class license and is active on 3.8-Mc. "phone PUM is the new Net Control Station for the Atlanta Area. "Phone Net, K7C2 has a new 4000B (Global) receiver and is moving to St. Petersburg, Fla. GIW is sending code practice on 7700 kc. every Friday from 8 to 9:30 p.m. on 140, ARW, CMU, and OA-V have their Extra Class tickets. UGI has a new harmonic - a girl, PGM, North Georgia College. Dick opened his "D" house and held day at his new shack near the college called "Dadar Ridge." PGM is interested in making schedules with stations interested in r.f.c. and h.f. traffic. Any member of any net in Georgia is eligible for membership in the Georgia Cracker Radio Club. Any net member interested, please contact the club secretary, NS, 129 No. Copper Street, Decatur, Ga. Traffic: K4WAR 1635, WAKK 104, ABU 63, ZD 49, POI 43, NS 34, FYY 25, OSE 24, MTB 11, H7A 10.

WEST INDIES - SGM, William Werner, KP4DJ - SEC; ES, GP, and CO have been reappointed EC for Aruba, H. and Parry, KG6J, in the new H. new KP4RI, applied for AREC membership. KD is up to 194 countries. We are sorry to hear that GS passed away from a heart attack Feb. 21. VP9A calls are now being heard on 2800 kc. at 1400-1500. KD, AWC, and VRCB, in the ARRC to report to P. R. A. Emergency Net on 3525 kc. KD, AWC, and VRCB, have a new Meisner 121. RD, ARRC, has a new Hallicrafters ARRL bulletin. Monday's 8 p.m. on 3550 kc. has reports into the net with 2800 kc. on 1500 kc. June 2, 1952. KD, AWC, and VRCB, are active on 3525 kc. has reports into the net with 2800 kc. on 1500 kc. June 2, 1952. KD, AWC, and VRCB, are active on 3525 kc. has reports into the net with 2800 kc. on 1500 kc. June 2, 1952.
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Complete coverage for 10-11-20-75 meters. 8 tubes, 4.5 watts audio output. Uses 12AT7 RF stage and B.F.O., 12AT7 oscillator mixer.

Model 6806 I.F. stages
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1 Microvolt signal produces 0.5 Volt audio output. A.N.I. and B.F.O. are push-button operated.

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For Carbon Mike Input. Net $119.00
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Power Supply, 110 volts AC, Net $39.50

SONAR MODEL SR-9 Rcvr. $72.45
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Mounts, tapped for ¼" threaded stud.

Model 132 Universal Body Mount $8.25
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103 West 43rd St., New York 18, N.Y.
suicide "Ham of the Year" award by the Mission Trail Net. CMN still is battling the dentist. Pib (PAM) reports: American Legion Net (3075 ke) last heard messages in February. PMS reports from the hospital and is getting well fast. CE is experimenting with twin carburetors in his new high-powered television. MJ reports: T-Wave is back on the air. NCO is N.C. Cone (Sure hope he never gets together with DTY, the guided missile expert). GWG, N et Mez, announces new 800 KHz frequency, 2000 kHz. BLB (TCB) has a new 800 KHz frequency. KVJ (DKV) has a new 800 KHz frequency. JLF is back from the A.P. WIGL visited JAM 2 and 3. NCP has his hearse up again (he's been heard lately, Ira?). ZFB QSOed the gang while portable radio was at Parker Dam; and LVQ is now Class A. GYH really works his skyline with that new transmitter. KTEK asked for KTMC's loan on 14 and 7 Mc. MVF is completing his "ultimate" rig (how many kws, I hear?). AM went all out in the DX contest with ADFP, BXG, and KPC as contacts. KTEK is listening 3 prospective WNA during lunch hour. Nice to hear IOX back on 80 meters. COZ says he is rebuilding the shack. GME has a new topaz contacted and KVJ is final; KPD has a new beam; and LGR is on 80 and 100 meters. CRK has designed an accurate frequency meter, for 3400 Mc, 1130 Mc (00) suggests that his signal is clean before operating; a good idea for all of us. If in doubt contact CIX, CK, OKE, or WOG (00) for a check. Orchids to FE for arranging a phone patch with a G.I. in Guam and his wife in L.A. within unattached. A2XU should call each other frequently and handle some messages for them — we need public good will now, and this is the way to get it. Rebuilding: EFL and ESR. W9ONJ is running 1000 W on 144 Mc (SE). The So. Bay Net has been absorbed into the Centinella Valley Network. Information: Area Commander in c.h. Details: Area Commander in c.h. EFL and FDF (BCR) for their fine work in AREC organization. Thanks also to BLY and FDR (BCR) for their support of MD and for their support of MD and MD for their support of MD. For more information on: W6KYP 1900, GIC 243, NCP 153, FMG 135, HLF 56, GE 52, BLY 48, FE 47, PMS 41, BLY 60. New members of AREC are listed on page 15 of AREC. FEK 14, MJA 14, FWY 11, OHX 10, AM 8, ESR 8, WOO 8, JFD 7, DCB 2, W9NOJ 2.

SAN DIEGO — SCM, Mrs. Ellen White, W6TYM — Asst. SCM; Shelly E. Trotter, B6AM; Richard D. Huddleston, O6DN; Thomas H. Wells, O6WG; SEC; NBJ; RM; JQG; ECO; BLY and IQR. New stations on the air in San Diego are NEWXU and W6KJ. DLN is handling Japanese traffic in the Valley. KIN is operating the IYARA station, QO, on the Mission Trail Net. DLN is working out with a new ground-plane vertical for 7 Mc. A new full-fledged member of the League's Old Timers Club is EVO, who is very active. New operating conditions are given in QST for 75 Mc. NET is changing to 80 Mc. NET is changing to 80 Mc. NET is changing to 80 Mc. NET is changing to 80 Mc. NET is changing to 80 Mc. NET is changing to 80 Mc. NET is changing to 80 Mc. NET is changing to 80 Mc.
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B-129 — 175 SUP.—25 Watts, 6AG7 Final, Clamped Modulated.............$33.55

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Turn to Page 5 for complete specifications and frequency range

HALLICRAFTERS SX-73

CANADA
MARITIME DIVISION

MARITIME — SCM, A. M. Crowell, VE1DQ — SEC: FQ, RU; EI, RM: OM, TV again leads in traffic this month. The following was issued in the latest "Defence Bulletin" issued by the Coordinator's Office at Ottawa: "EMERGENCY COMMUNICATIONS — The first message transmitted over the new VHF radio facilities in Nova Scotia was sent to Hon. A. B. DeWolfe at his home in Halifax from his Communications Committee Coordinator, Mr. E. S. Cadman. The voice communication was carried on between radio transmitters in provincial headquarters and Halifax target area command center. Radio contact was established with many stations in the Province, and out of the Province to St. Anthony, Nfld., giving an indication of the signal strengths of the headquarters transmitters. Among those present at Provincial Emergency Headquarters for the test were Arthur Crowell, SCM Maritime, ARR, and Sqn. Leader Robert, Director RCAF amateur radio network, and those who are members of the provincial communications committee." There now are about 40 civic and municipal emergency committees set up in Nova Scotia. If you've not already offered your assistance, contact your EC now.

Traffic: VE1C 227, FG 198, VMI 8, AAK 79, AL 71, OM 70, TO 49, ABJ 33, PZ 23, HT 15, ZO 11, AS 10, JD 10, KG 9, XA 9, DB 7, JA 7, ZB 7, AB 6, 2M 6, AAN 3, AB 3, PS 5, FR 2.

ONTARIO DIVISION

ONTARIO — SCM, G. Eric Farquhar, VE9JA — Despite being off the air for two weeks because of illness, Crowell heads the traffic list for this section. GJ is active on 50 Mc., and also is Net Manager of the Ontario section net. Regular transmitters into OSN are A, AV3, AM, KO, M5, BB, BMG, BNC, BOZ, BUR, BUR, DGA, DU, EAU, EAM, GI, HP, OD, 8G, TM, and WX. VD is busy TVing the rig. Recent visitors to Toronto were M. R. and Mrs. J. R. G. (2-meter contacts Saturdays and Sundays at 0650 EST). BUR includes two new mails in its rebuilding program. The Ottawa Amateur Radio Club held a meeting and ARRL auction. One for the book is the report from a "TV viewer" in Carleton Heights that the call signal of the amateur station giving him trouble was "CBQ." Ottawa smithsairs traffic is very capably handled by CAF and MP. The Moffatt Radio Club enjoyed a talk on weather forecasts and how they served industry given by Mr. McCormack. Ontario Weather Office, Hamilton ARC members were given a treat when RCAF instructors of radar and communications school gave demonstrations and theory lectures on the oscilloscope. Toronto and Hamilton Emergency Corps held simulated tests on 28 Mc. Taking part were AAR, AHE, AUF, ARA, AAB, ERF, BQ, B, BYZ, DBQ, DMC, HW, NO, and RU. DGZ was in charge of the Hamilton test. Mnnung headquarters were BHS, BKM, WE, Keith, Bernard, and Alice Skelton. Mobile units were brought by BIE, BV, DND, JD, QT, and VZ. GY and HI, as well as VSDB in the Cagmen Islands, had some W/VE contacts and gave the gang a new country. Fine ships with home were provided by DGZ, BI, delivered one of his fine talks and demonstrated on "Micro-Wave Transmission" to the Sudbury- WaterloT Radio Club, Traffic: (Feb.) VE8ATB 176, BUR 123, GI 97, WY 80, ZX 83, IA 77, EAM 88, BJ 41, HZ 38, EURO 17, SG 16, DME 5, VQ 2. (Jan.) VE3GL 52, TO 16, DFF 3.

QUEBEC DIVISION

QUEBEC — SCM, Gordon A. Lynn, VE2CL — SEC: BR, BK, having completed his term as president of MARC, now finds more time for ham activity, and now is ORS. AQG and AQH are new hands in machine, PX is heard on 14 and 28 Mc., after a long lay-off. EC maintains skeds with AEM, AGF, 2G, and VE, and reports AM, ZQ, TK, PV, and others with their own license plates in his area. AGG skeds AFARS regularly and is hearing down on the new rig with 813 final completed. UA reports reports routine operating, traffic and DX most difficult to work. AAO took part in the Frequency Measuring Test on Feb. 8th and has a new recorder with which to record his observations of modulation and QC has new wide band rig. VFO-controlled with 813 in the final. PQN continues active, but with traffic light QC, ABQ, CD, AMB, and XR are the regular attending rigs. FF has gone to on 14 Mc. to get away from BCI. When this appears it will be time to get the portable gear polished up ready for Field Day. Those who have participated in the past are looking forward to this year's event, and those who have not participated are urged to get some group or join an active group. More reports of activity are needed. Let's have them. Traffic: VE2CD 80, AMB 84, CA 40, EC 15, GE 7, AK 6, AO 6, LO 5, BK 2.

VANALTA DIVISION

ALBERTA — SCM, Sydney T. Jones, VE6MJ — AO is reported to be organizer of the AFARs Net. EO visited Calgary recently in connection with his duties as city eectos.
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Turn to Page 5 for complete specifications and frequency range.

MANITOBA — SCM, A. W. Morley, VE4AM — It is with regret we report the passing of two Winnipeg amateurs, ZK and JA. Our deepest sympathy to both their families. AY is a new call at Baskett and RT is now in Winnipeg. JY and OS are now on phones on 75 meters, with the former promptly joining the phone net. RX has joined brother, ex-PE, in California. HL has gone commercial with a TBS-50, a Viking and an HQ-120X. MARC has applied for affiliation with ARAA. DU reports regularly and is rebuilding the final. Thanks to BARC for the following: BD, Dolorene, and HT, of Hartney, along with EA, who had his call 6 hours, visited the ARRC meeting. EA has p.p. 818s VFO on 80 and 75 meters. SCM now in Winnipeg. 50 Mc. is being pushed, with YW and CT active. YW runs transmissions on this band nightly at 1800 for experimental purposes. Ex-AW is back in the section and is signing EW. A new appointment is that of RB as OO. This is a much-needed appointment and OO is to be congratulated on taking the job. Traffic: (Feb.) VE4AM 92. HG 84. HP 80. DJ 22, DJ 23, CJ 16, CE 14, ER 11, QD 6, DU 4, JM 4, GAAM 32, QD 16. (Mar.) VE4AM 92.

SASKATCHEWAN — SCM, Harold R. Horn, VE8HR — The change of time to 1800 hours for the phone net has been proving advantageous and will remain at that time until conditions are more stable on 75 meters. Two organizational meetings were held during February by your SCM. All KCs were invited. The various phases of operating were discussed. The need for that district being organized in the ARRC was brought forth. As a result VE8H has been appointed Chairman Area EC and your editor received a letter of appreciation from the area. It was suggested that all stations having their own power should be known by the SEC and the chief subject was the coming hamfest to be held there June 30th and July 1st. Civil defense, ARRC, and ways to improve the phone net were discussed. VE8H has been appointed Yorkton Area EC and will need the assistance of hams in that section. VE8L is installing a 50-watt mobile rig on 75 meters and TE puts out an S 2 signal with his new rig. BJ has now Eddystone receiver. PR is now on phone from E2 to E1 and VE4E to AE2. CX and VE4E have set up a new receiving station and held Sunday skeds on 50 and 144 Mc. but still are hoping for their first contact. They invite heard reports. Traffic: VE8BV 27, TE 22, HR 19, PJ 18, DD 2, PG 1.

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440 3 x 5½ x 2½ $ 1.05
442 3 x 6 x 3 $ 1.08
444 5 x 6 x 4 $ 1.33
445 5 x 7 x 3 $ 1.49
447 5 x 17 x 4 $ 3.75
448 6 x 8 x 3½ $ 2.28
449 6 x 10 x 3½ $ 2.69
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POLYSTYRENE ROD AND TUBING

12" Lengths

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

ROD 12" LENGTHS

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A 50-Mc. Transmitter-Receiver

(Continued from page 1)

The three r.f. coils of the transmitter section were checked by the grid-dipper to determine if they would cover the 6-meter band with ease. Initial adjustment of the three r.f. coils of the receiver was also done approximately with the grid-dipper, after which they were tracked in the conventional manner.

The oscillator is on the high side of the signal frequency and the mixer and antenna circuits are tracked to it by coil squeezing and plate bending. The transmitter, in practice, does not use a plate current meter. In some units a single-turn loop in series with a dial light bulb is coupled permanently to the output tank. Maximum brilliance indicates resonance. The antenna coil is coupled up until the bulb becomes very dim, keeping the plate tuning capacitor adjusted for maximum brightness. Of course, a somewhat better scheme is to place the bulb in series with the antenna coil, tuning for maximum brilliance. If the bulb is too bright at full output, it can be shunted by a capacitor of such a value as to give the desired brightness.

In the writer’s unit, maximum output is determined by means of a field-strength meter, both tuning and antenna coupling being adjusted for maximum reading. This field-strength meter is a germanium crystal across which a 1-ma. meter is connected through two r.f. chokes. A 2-foot wire is connected to one side of the crystal, and the other end of this wire is looped around the base of the broadcast whip. The meter, which is mounted with the crystal in a small case, is set on the motor hood. If you use this method, don’t forget to remove the meter before you drive off.

When changing frequency, a new crystal is plugged into the unit through the hole in the side of the cabinet. In some units this hole is omitted and a double crystal socket and a switch are used. The S-meter is plugged into the tip jacks and the oscillator tuning capacitor adjusted until a slight deflection is noted on the meter. The doubler plate tank is then peaked for maximum S-meter reading and the amplifier tank for maximum bulb reading or field strength. Then, the oscillator tank is tuned past the point of maximum S-meter reading until the meter reading suddenly drops to zero. The capacitor is then turned back until the S-meter again suddenly reads and should be left tuned slightly below this maximum. This insures prompt starting of the crystal when the B+ switch is turned off and on. If the above procedure is not followed, parasitic oscillation may occur and the parasitic seems to prefer TV Channel 4!

Extensive use in several ham shacks and a demonstration at one of the local radio clubs have shown this design to be substantially TVI-free in the Boston area, where Channels 4 and 7 are in use. There is a possibility of 4th-harmonic trouble in the top three channels, and

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NEW SX-73 COMMUNICATIONS RECEIVER

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It is the ultimate in all-wave receivers... this jewel of precision craftsmanship! Refined in even the smallest detail, the SX-73 meets the tough military communications specifications. Hallicrafters is proud to place its name on the SX-73.

For complete specifications and frequency range:

Turn to Page 5

(Continued on page 180)
STEINBERGS
SUPER SPECIALS

JACK BOXES

A) BC-345, 3½" x 3" x 1¼" aluminum, 2 standard open-circuit jacks, 3-position switch, 6-contact banana plugs and jacks.
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adjacent-channel interference in Channel 2, but the low power of the rig and the shielding afforded by the metal cabinet should make treatment of any TVI that might arise a relatively simple matter.

This same unit can be duplicated for 10-meter operation and this has been done with very satisfactory results. The only change necessary in the transmitter is to increase the size of the three tank coils and the neutralizing coil. In the receiver, the three r.f. coil sizes will be increased. It is recommended, however, that the intermediate frequency be changed from 1.73 to about 900 ke. as the best compromise between image ratio and bandwidth. This can be done by replacing the 100-μfd. silver mica capacitors of the present i.f. transformers with 360 μfd.

Happenings

(Continued from page 84)

F.C.C. NOTES

In February Wayne Coy, who had served as FCC's chairman since late 1947, resigned the post to enter private industry. Paul A. Walker, who has been a commissioner since FCC's inception, was named the new chairman by President Truman and promptly confirmed. To fill the vacancy the President named Robert T. Bartley, former administrative assistant to Speaker of the House Sam Rayburn, and a former Telegraph Division Director of FCC.

A new district office, No. 24, has been established by FCC with headquarters at the Briggs Building, Washington, D. C., and covering metropolitan Washington—specifically, the boundaries of the District of Columbia extended 10 miles in all directions.

Midget 50-Watter

(Continued from page 50)

high-voltage lead. The meter should be capable of reading at least 200 ma., and should be connected so that its positive terminal goes to the supply, with the other lead going to the high-voltage input terminal of the transmitter. Apply plate and screen voltage to both stages, close the key, and resonate the amplifier tank circuit by turning C5 until the meter reading dips sharply. If a 3.5-Mc. crystal is used, the dip will be near the maximum-capacity point on the condenser (plates fully meshed). With 7-Mc. crystals, the dip will be near minimum capacity. Current at the dip should be no more than 5 or 10 ma. Don't allow the transmitter to operate this way for more than a few seconds, because the screen-grid current in the amplifier is excessive under no-load conditions. In this rig, it is not advisable to use 3.5-Mc. crystals when 7-Mc. output is desired, because the grid drive available from the untuned oscillator plate circuit is insufficient to
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permit efficient frequency doubling in the final.

The best way to couple power out of the transmitter and into the antenna is through an antenna coupler. The circuits of several suitable units are described in recent editions of The Radio Amateur’s Handbook, along with suggestions for various antennas. In selecting a coupler for this rig, be sure that it has provisions for variable coupling through either a swinging link or a variable coupling condenser, because the output link in the transmitter is fixed.

Adjust the coupler so that the amplifier stage is loaded to 100 mA maximum. Recheck the tuning of C’s to be sure that the circuit is still resonant. The dip at resonance will be much less pronounced when the load is coupled to the stage but it should still be possible to notice a dip of a few milliamperes. If it is necessary to tune Cn more than a few dial divisions away from its no-load setting to restore resonance, decrease the coupling between the rig and the coupler slightly and try again. In some instances it may even be necessary to change the method of connecting the antenna to the coupler to get satisfactory operation. This you can tell by experimenting along the lines suggested in the Handbook.

When the rig is put into actual operation, metering can be done by connecting the meter in series with the key leads once you’ve determined the proper settings to obtain full loading of the amplifier stage. When connected this way, the meter reads the total of all grid, screen, and plate currents flowing in the transmitter, so the reading will be considerably over 100 milliamperes. The oscillator plate and screen currents total about 25 ma., the amplifier screen current runs about 5 to 8 ma., and the amplifier plate current about 100 milliamperes. Grid currents in both stages total only a millampere or so, and can be disregarded insofar as their contribution to the total meter reading is concerned.

Wavelength Factor

(Continued from page 86)

poor if the i.f. is too low.) There do exist, however, special balanced circuits employing two crystals for the suppression of local-oscillator noise. On the other hand, if the i.f. is too high, the noise originating in the i.f. amplifier itself may be excessive. At a carrier frequency of 3000 Mc. the optimum i.f. is about 30 Mc. By careful design the natural trend of deterioration of noise figure with the increase of frequency may be confined to surprisingly small limits. Even throughout most of the useful microwave range noise figures of 100 (20 db.) or less may be obtained.

It is frequently desirable to sacrifice the high performance of the superheterodyne for simplicity or compactness. At the low frequencies, the regenerative detector, preferably preceded by an r.f. amplifier, is probably the best “second

(Continued on page 184)
choice.” At somewhat higher frequencies the regenerative detector is replaced by the superregenerative detector. In the u.h.f. and microwave range the crystal detector followed by an audio (or video) amplifier using common receiving tubes would probably be the best “second” choice since it avoids the noise of high-frequency tubes and also the complication of the elaborate power supply required by them.

[In the third article of this series, to appear in an early issue, the information contained in this and the first article will be utilized in reaching conclusions as to the optimum bands for both general amateur activities and civil defense work. — Ed.]

How’s DX?

(Continued from page 67)

there ain’t no such animal as F78AP. This Paris SHAPE Hq. station’s call really was F78IP and it is no more. F3HK hastens to point out that French calls are under no circumstances three-lettered . . . . . . Giving our practically non-existent French a terrific workout, F88AC invites his removal to France. He shipped out over 2000 QSL via bureau. After six months at home he’ll head for another juicy DX spot. Yvon was D5AT for a period just after the war . . . . . . PK4DA informs us of his travel itinerary in outline and this is how it stands: April 10th to May 10th, the West Coast and San Francisco (5G, W6UZQ); May 10th to May 31st, en route New York City via Portland and Detroit; June 1st to June 16th, New York City; June 16th to July 15th, New England and vicinity, and on July 15th will accompany him on this trek, PK4DA (ex-PABUND) intends to remain in the U.S.A. and is without doubt one of the best-known overseas amateurs to visit our shores. We know the W/VE gang will roll out the carpet for him in traditional ham fashion! . . . . “I’m convinced this is the country’s worst DX QTH . . . . used to be W2ECW in N.J. and with 50 to 60 watts worked more DX than I’ve worked in the State of Washington in five years with 200 to 400 watts.” This lament from W7KIL in eastern Washington is no sour grape; we find in the files only one postwar Montana DXCC (W7KVU) and none in Idaho. About 90 per cent of W7 DXCCs were made from locations along the coast, these being postwar data.

. . . .

Jeeves wanted to close this effort with a lim- erick of his own but we held him off. We have him looking for that word to rhyme with “orange.”

BRAZIL’S 21-MC. CONTEST

Brazilian radio amateurs are sponsoring a special 21-Mc. contest during July to “warm” the band and to provide a test of propagation conditions. The phone section of the contest will start at 0800 GCT on July 5th and 19th and will end at 0800 GCT on July 7th and 21st. The c.w. section will start and end at the same hours on July 12th and 23rd. The transmitting contest is for PY stations but amateurs of other countries may participate by logging PY stations called or calling and recording the date/time and series of figures sent by the calling station. The same PY station may be logged more than once, provided there is an elapsed time of at least two hours between each entry of that station. Listeners may claim 2 points for each correct logging. There will be special awards for winners.

Logs should be sent to Liaisons P. O. Box 2852, Rio de Janeiro D. F., Brasil, and should arrive there prior to October 31, 1952.
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6-volt battery operated FM receivers covering 152-162 mc or 30-50 mc. Oscillators are drift-compensated and voltage-regulated for high stability. Include built-in 5" PM speaker. Circuits use 12AT7, 2-6BQ5, 6780, 6AC7, 6BQ5 voltage regulator and 6X4 rectifier. In gray metal cabinets, 11x6x4x5/8". With brackets for under-dash mounting. With tubes, Wt., 10 lb.

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Convert above to quiet standby.
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Tools and Tricks
(Continued from page 93)

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your fingers while you tighten or loosen it with a screwdriver? For 49 cents RCA® puts out a set of "Fingertip" socket wrenches. A wrench slips over the end of the most appropriate finger and not only will keep the nut from turning, but it will hold the nut in place while you're trying to get the screw started.

Most of these tools are inexpensive items and are of the sort that can take the cussing out of otherwise awkward jobs. They are well worth adding to the ham's workshop equipment. If you can't ﬁnd them at your local dealer's, you can use the address in the footnotes.

From your own experience, you will probably recognize that those few tricks with tools by no means exhaust the possibilities. They merely serve to suggest a host of other ways in which construction can be made a pleasant diversion, rather than a chore.

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Thordarson T1539 input choke 300 ma 5-25HY 78 ohm. 5.00
UTC PA51AX Varmatch Driver Trans: all single tubes like: 6CS, 30, 40, 53, 79, 94, 66, 45, 46, 2A3 to 19, 30, 19, 78, 79, 89, 2A3, 45, 46, 66, 42, 59. 3.25
UTC PA593AX Driver from PP tubes like 45, 49, 2A3, 685, 686 to: 46, 4-46, 841, 210, 801, 802, 203A, 838, 805, 50T, 830B. 6.25
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Bud VPO-21 variable frequency oscillator. 42.00
Ampl 9001 D power amplifier with 4 line attenuator and buffer doubler tubes. 53.00

RMV 9122A. $ 86.00
RMV HF10-20. 92.00
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Model 3000 specify band wanted. 44.75
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Penna 6, Illinois, U.S.A.

Linear Amplifier
(Continued from page 48)

They make quite a racket and spurious signals are plentiful in earlier stages of misadjustment. Ordinary lamp bulbs make a fine dummy load so long as it is recognized that their impedance is not exactly the same as the antenna and that this impedance changes somewhat as the bulbs light up. These factors can be taken into account by making careful note of plate and grid currents after the transmitter has been adjusted and is operating with a linearity test signal at maximum linear output into the lamp load. Then, having reconnected the regular antenna, the same loading conditions for the final will be reproduced by adjusting its tuning and loading until the identical combination of plate and grid currents can be obtained. This process will require only a few moments of on-the-air operation.

Conclusion
When the final on-the-air checks are made, it will be convenient to make a few reference marks on the oscilloscope screen to indicate the peak height of the pattern. The scope will then serve as a permanent output monitor for all operations. For best results the sweep should be set for about 30 cycles, in which case the voice patterns will stand out clearly and can easily be kept just within the reference lines. Incidentally, the pattern is really fascinating to watch.

One final plea — don't be a "meter bender." Input power isn't everything. If you have to cut your input in half to avoid overload, the fellow at the other end will hardly notice the difference in level. At the same time, your neighbors, both those on the ham band and those next door trying to watch TV, will appreciate the difference right away.

The writer wishes to acknowledge with thanks the kind assistance and suggestions offered by G. B. Grady, W2SNQ, in making the photos for this article.

Technical Topics
(Continued from page 88)

full-scale reading on the bridge.

Resistance bridges take so little power that it is sometimes a problem to cut it down enough. However, with a tetrode final there is a simple solution — disconnect the screen voltage, ground the screen, detune the plate circuit, and reduce the excitation by detuning somewhere in the exciter chain if no other means is available. Then when the bridge is connected the full-scale initial setting can be approached by retuning the plate circuit toward resonance and, if necessary, increasing the excitation. This method usually gives ample control over the output without requiring a reduction in the amplifier plate voltage, since the plate input will be small with the screen at zero d.c. voltage. — G. G.
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Turn to Page 5 for complete specifications and frequency range

HALICRAFTERS SX-73

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Sweepstakes Results

(Continued from page 68)

W10AK......750- 21-15 A- 4

NORTHWESTERN DIVISION

Alaska

KL1WC........15,272- 192-6 a-25

KL1NC........5,000- 29-25 A-19

KL1MP........7,174- 49-17 A-15

KL1AT........2,000- 49-17 A-15

KL1TR........60- 0- 5 B- 4

Idaho

W7FBD........108,000- 612-7 A-39

W7FZC........35,150- 290-61 B-38

Montana

W7FBL........63,429- 402-8 B-38

W7BSU........51,750- 378-60 B-39

W7INJ........26,193- 186-54 A-22

W7GJ........16,688- 151-45 A-11

W7EWR........6,190- 95-50 A-11

Oregon

W7GEB........93,850- 556-70 A-37

W7YS........90,790- 520-0 A-39

W7NLD........98,425- 515-60 B-33

W7EAW........62,145- 373-7 A-35

W7AYJ........51,520- 440-64 A-39

W7DIL........23,790- 215-23 B-30

W7JLU........20,655- 155-54 A-15

W7LNU........77,240- 155-70 B-18

W7NJJ........4,965- 57-69 A-11

Washington

W7QUV........78,500- 465-59 A-88

W7KUG........71,140- 501-74 B-34

W7JGS........64,101- 466-30 B-39

W7VEE........26,230- 319-67 A-31

W7ORB........84,300- 231-60 A-38

W7QXX........6,184- 259-45 B-17

W7DAB........20,945- 145-57 A-11

W7BYQ........30,400- 173-48 A-23

W7EAU........1,174- 151-73 B-15

W7CWN........7,605- 88-55 A-14

W7KYG........9,105- 95-28 A-17

W7LPI........5085- 50-33 B-13

W7DXY........4,000- 60-26 A-12

W7LXZ........3,670- 57-26 A-10

W7NFM........24,700- 28-26 A-7

W7ETO........2,400- 50-24 B-12

W7MTW........3,250- 25-26 B-7

W7LCS........100- 10-24 B-6

W7BCR........444- 19-12 B-4

W7TFQP........406- 38-5 A-1

W7HDM........49- 4- 4 A-2

PACIFIC DIVISION

Hawaii

KH6J........68,100- 480-71 B-10

KH6DAY.......9- 9 4- A- 1

Nevada

W7KEY........147,858- 839-71 A-40

W7BKS........28,815- 220-51 A-39

Santa Clara Valley

W6EAE........85,525- 605-71 B-40

W7YHM........61,710- 375-66 A-29

W6HBA........32,960- 219-34 A-23

W6UVU........22,600- 171-65 A-15

W6CSB........17,616- 151-63 B-10

W6ZGZ........13,197- 137-53 B-23

W6MMG........6,765- 92-33 A-9

W6MMW........5,760- 72-10 B-9

W6ZIY........2,850- 57-25 B-7

W6WJJ........3,073- 51-36 B-1

W6TYG........344- 14-12 B-2

Hast Bay

W6WBF........151,050- 612-7 A-39

W6WBB........100,260- 559-73 A-58

W6NGC........90,300- 280-57 A-35

(Collapsed on page 128)
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Eastern Florida
W4CEB...128,455...803-70-A-27
W4LNV...121,083...490-66-A-39
W4ACT...57,726...24-42-A-30
W4AZK...57,580...107-76-A-15
W4TXK...20,181...174-47-A-22
W4EJ...14,359...159-57-A-17
W4GCL...10,860...114-36-A-11
W4WEI...3710...45-24-A-20
W4WGC...700...19-16-A-6
W4WKT/6...308...7-2-A-14
W4TRA...118...3-A-22
W4TTY/W4WTT...3600...50-36-A-8

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W4RGO...132,899...759-71-A-40
W4NN...61,945...476-65-B-30

Georgia
W4BH...16,445...127-52-A-20
W4GDD...7930...110-36-B-12

West Indies
K4LHN...62,305...401-05-A-9
KD4M/4...11,900...229-20-A-37
K4BIC...1020...22-A-7-5
K4PI/4...350...24-45-B-30
K4C4/2/4(W4BGO,K4P4 OH, PN)...57,970...480-62-B-39

Carribean Zone
KZC2W...2280...32-24-A-9
KZ8RG...855...19-18-A-9

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W6WIP...108,350...953-71-A-33
W6PZ...122,550...681-72-A-36
W6GEB...73,500...433-70-A-28
W6QUK...49,810...297-62-A-34
W6LFT/8...30,240...236-58-A-31
W6YLF...20,900...880-54-A-9
W6QZS...600...93-36-A-30
W6OHX...6300...93-28-A-12
W6WKC...3908...60-26-A-12
W6WEG...1270...29-22-B
W6NNU...475...41-6-A-7
W6NKF...465...19-10-A-5
W6NWWJ...86...12-2-A-6

Arizona
W7PGX...119,576...873-70-A-40
W7RZQ...89,888...425-60-A-34
W7MTL...38,003...314-61-B-33
W4COB...7,282...254-58-B-32
W7WFK...465...19-10-A-5
W7WJ/2...37,019...195-58-A-23
W7ZP...20,085...183-55-A-21
W7NUL...13,300...133-49-A-18

Turn to Page 5 for complete specifications and frequency range

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- W3LTM... 82,360-141-71-A-38
- W3DHM... 78,321-471-72-B-37
- W3NOB... 18,148-120-53-A-27
- W3BBT... 16,500-164-56-B—
- W3MCL... 932-14-1-B—
- W3SBA... 94-7-1-B—
- W3KSE... 3-1-1-A-1
- W3D-D. C.

**Western Pennsylvania**

- W3PWR... 35,012-251-71-B-12
- W3ZQ... 418-63-33-B-11

**Central Division**

Illinois

- W9NDA... 20,633-131-63-A-18
- W9DOR... 11,700-100-47-A-34
- W9IRA... 11,000-104-A-15
- W9YMZ... 2106-39-27-B-19
- W9LRC... 40-4-4-A-5

**Indiana**

- W9RSZ... 12,514-101-51-A-25
- W9MUR... 8386-98-43-B-11
- W9EGQ... 8181-105-30-B-5
- W9RJ... 7050-100-30-B—

**Wisconsin**

- W9ZTO... 41,952-255-95-A-28
- W9DRJ... 18,520-132-77-A-18
- W9WLA... 8750-97-40-A-13
- W9QBB... 3832-50-30-B-9
- W9FTY... 1725-54-83-A-12
- W9FZC... 2550-43-80-B—
- W9WVX... 810-27-12-A-10
- W9YHA... 690-22-12-A-6
- W9ONY... 50-5-4-A-2

**Dakota Division**

North Dakota


South Dakota

- W9PRZ... 59,400-418-72-B-39
- W9WE... 10,950-91-48-A-14

**Minnesota**

- W9VIP... 23,700-158-60-A-19
- W9RMF... 4943-49-33-A-7
- W9SCC... 112-8-7-B—

**Delta Division**

Louisiana

- W9KCL... 44,020-310-71-B-39
- W9BZR... 5226-67-39-B—

**Mississippi**

- W9HNP... 8970-85-41-B-8
- W9WZ... 884-29-17-B-4

**Tennessee**

- W4PEM... 15,824-139-49-B-12

**Great Lakes Division**

- W4KZE... 35,400-340-59-A-31
- W4CSO... 8500-90-17-B—

**Michigan**

- W8KEU... 65,039-180-72-B-35
- W8WQ... 51,049-341-72-B-30
- W8BGY... 8490-70-49-B-10
- W8FGB... 5380-33-26-A-9
- W8FRU... 1090-33-19-A-12
- W8FYD... 416-10-13-B—
- W8FLM... 100-10-9-B—

**Ohio**

- W8AKS... 50,730-161-22-A-37
- W8AJW... 51,075-508-70-A-37
- W8LIQ... 35,794-251-72-B-35
- W8LAX... 35,604-200-69-B-39
- W8FTX... 27,040-190-64-A-20
- W8AOJ... 12,054-147-41-B-21
- W8JN... 10,604-101-62-B—
- W8BFI... 7830-51-43-A—
- W8VR... 5200-65-32-A-13
- W8UA... 3356-49-29-A-16
- W8FXX... 3500-85-50-B—
- W8NFD... 2150-43-25-B—
- W8VNC... 2061-34-24-A—
- W8G... 1075-39-11-A—
- W8FTH... 1030-27-16-A—
- W8RVM... 728-20-14-B—
- W8SPJ... 690-29-17-B—
- W8DNJ... 516-21-13-B—
- W8SCG... 390-19-9-A—
- W8YGE... 352-19-11-B—
- W8BUS... 220-11-10-B—
- W8NSS... 150-10-6-A—
- W8BSB... 24-4-3-B—
- W8URD... 4-3-1-B—

**Hudson Division**

Eastern New York

- W2BZ... 16,121-174-47-B-24
- W2JLI... 510-117-35-B—
- W2VIK... 105-7-6-A—

**New York City**

- W2MNR... 73,015-449-68-A-30
- W2FKE... 850-49-59-B—
- W2NDO/2... 22,412-216-62-B—
- W2MG... 10,291-126-41-B—
- W2IZK... 4850-73-83-B—
- W2SKK... 6237-96-37-B—
- W2YBT... 600-21-10-A—
- W2NHH... 111-25-7-A—
- W2VL... 280-18-9-B—
- W2KZ... 46-6-4-A—
- W2IXN... 40-4-4-A—
- W2RMQ... 35-7-2-B—
- W2LTV... 8-3-1-A—

Northern New Jersey

- W2JKK... 34,540-232-62-A—
- W2JII... 18,790-179-83-B—
- W2ATZ... 9840-101-19-B—
- W2DME... 1000-40-19-A—
- W2LM... 960-100-18-B—
- W2BAT... 672-31-15-B—
- W2BX... 144-9-8-B—

**Midwest Division**

Iowa

- W6QON... 570-19-12-A—

**Kansas**

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WEST GULF DIVISION
Northern Texas
WSFY... 48,100-300-65-A-93
WSYM... 30,325-242-65-A-15
WSJTX... 1384-31-22-B-3

Oklahoma
WSFAR... 27,714-235-63-B-23
WSIWL... 6890-100-40-A-21
WSMCF... 1930-33-24-A-6
WSVSY... 215-15-8-B-4

Southern Texas
WSHQR... 25,600-201-74-B-23
WSJWI... 7020-77-37-A-12
WSJPC... 2473-53-33-A-10

New Mexico
WSMYL... 45,402-232-69-B-39
WSBEU... 10,695-56-19-A-10
WSMYM... 4781-61-25-A-14

CANADA
Maritimes
VE1OM... 498-22-14-A-4

Quebec
VE2AHE... 29,225-151-54-B-37
VE2GID... 17,752-52-63-B-43
VE2IZ... 12,081-115-53-B-40

British Columbia
VE1TE... 11,290-51-10-B-17

Manitoba
VE4JK... 3232-51-22-B-9

1Ha. staff, not eligible for award.

YL News and Views (Continued from page 59)

ритор for almost seven months. Mary writes that the hands this year have been poor from her vantage point, and she hopes for better conditions soon, particularly on 40 c.w. The Dallas Morning News reported that W5EPV and W5NEE were to be married on the "Bride and Groom" program in New York. W5EPV and W5NEE, are operating portable-five from their farm trailer (complete with three-element 10-meter beam) in Las Cruces, New Mexico. On a recent trip to California, W6KGDW enjoyed meeting many of the W6 YLs. W5SEG has over 125 DX pen pals (all amateur). YLs interested in having a DX correspondent may write Carol for names and addresses. On March 7th at Hinsdale, Long Island, the L. I. Unit of the YLRL had its first installation of officers and dinner party. W1QON installed W2KZ, president, W2KDP, vice-president, W2KCB, secretary-treasurer, and W2KBT and W2KZI as board members. W3 YLs: Don't forget the Chicago YL Gathering, May 23rd—24th. See Hamfest Calendar, page 10, April QST.

YLs Set Traffic Records

YLs can well be proud of their traffic record for 1951. In three cell areas the NPL leader is a YL, and W3CUU, led all other individual stations in the amount of traffic handled for the year and for the entire postwar period! A detailed account of outstanding YL traffic activity may be found under "Traffic Topics" in this issue.

Strays

W6HQF traded some TVI for a little local QRM and is happy with the swap. Neighbor Frank Parker dropped in at Ray's Sacramento shack to register a TVI complaint, accepted an invitation to listen on ten meters and left with a License Manual and Handbook. He recently took his FCC exam.

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The required personal qualifications are as follows: (A) Age, over 21 and must be able to pass a thorough physical examination. (B) Indicate a willingness to serve overseas extensively in any location required.

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Interested personnel are requested to write a brief application letter to Box 1136, Main Post Office, Washington, D.C. Considerable duplication of effort will be avoided if the following outline is adhered to:

1. Experience and training.
   a. Number of months radio training and type (college, service schools, technical and/or trade schools).
   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.
   e. Present or past radio licenses, including amateur.
2. Marital status.
   If your initial application appears promising, you will be sent full application forms upon which detailed information can be entered.

---

DEMAMBRO RADIO SUPPLY
1111 COMMONWEALTH AVENUE
BOSTON 15, MASSACHUSETTS

HALICRAFTERS
NEW SX-73 COMMUNICATIONS RECEIVER
"A Gibraltar of Stability"

It is the ultimate in all-wave receivers... this jewel of precision craftsmanship! Refined in even the smallest detail, the SX-73 meets the tough military communications specifications. Halicrafters is proud to place its name on the SX-73.

Turn to Page 5 for complete specifications and frequency range.

HALLICRAFTERS SX-73

141
EVANS RADIO
10 HILLS AVENUE
CONCORD, NEW HAMPSHIRE

hallicrafters
NEW SX-73 COMMUNICATIONS RECEIVER
"A Gibraltar of Stability"

It is the ultimate in all-wave receivers... this jewel of precision craftsmanship! Refined in even the smallest detail, the SX-73 meets the tough military communications specifications. Hallicrafters is proud to place its name on the SX-73.

Turn to Page 5 for complete specifications and frequency range.

ARROW ELECTRONICS, INC.
82 CORTLANDT STREET
NEW YORK 7, NEW YORK

hallicrafters
NEW SX-73 COMMUNICATIONS RECEIVER
"A Gibraltar of Stability"

It is the ultimate in all-wave receivers... this jewel of precision craftsmanship! Refined in even the smallest detail, the SX-73 meets the tough military communications specifications. Hallicrafters is proud to place its name on the SX-73.

Turn to Page 5 for complete specifications and frequency range.

V.H.F. Sweepstakes
(Continued from page 60)

W2YBH ... 35-18-1-B
W2TEX ... 32-16-1-B
W2BHQ ... 30-15-1-A-B
W2BCL ... 29-13-1-B
W2VMS ... 18-8-1-B
W2ROV ... 15-7-1-A-B
W2AIK ... 15-7-1-A-B
W2ASZ ... 10-3-1-A-B
W2AJO ... 5-1-1-A-B
W2AOA ... 3-1-1-A-B
W2AMH ... 1-1-1-A-B

W27MS ... 700-70-5-B
W29KW ... 288-36-4-B
W2SNA ... 250-35-4-B
W2ION ... 198-21-3-B
W2IKY ... 98-13-1-B
W2WQ ... 6-3-1-B

Indiana
W2HSE ... 360-36-5-B
W2GPF ... 232-29-4-A-B
W2GLW ... 80-10-4-B
W2GWL ... 76-9-9-B
W2FM ... 44-11-2-B
W2RTM ... 40-10-2-B

Wisconsin
W2BFI ... 230-27-4-B
W2RFT ... 200-25-4-B
W2JUM ... 100-21-4-B
W2IHO ... 104-19-4-B
W2VAN ... 54-10-3-B
W2GNY ... 40-10-2-B
W2GSP ... 24-9-2-B
W2Lee ... 24-9-2-B

GREAT LAKES DIVISION
Kentucky
W2JDN ... 138-25-3-1-B
W2KFZ ... 55-12-2-B
W2SMU ... 40-10-2-B

Michigan
W2NHF ... 612-51-6-B
W2RMH ... 520-52-6-B
W2DX ... 410-44-5-B
W2RSH ... 310-34-4-B
W2DIV ... 216-27-4-B
W2GTY ... 130-21-4-B
W2BGO ... 178-22-2-B
W2DDO ... 90-15-5-B
W2MRS ... 50-10-5-B
W2KKB ... 24-8-2-B

Ohio
W2VOZ ... 1000-60-4-B-A-B
W2LFD ... 600-60-4-B-A-B
W2MUC ... 255-55-4-B
W2POF ... 185-55-4-B-A-B
W2NIS ... 110-45-4-B-A-B
W2BT ... 90-35-4-B-A-B
W2WRA ... 90-40-4-B-A-B

W27FN ... 250-75-4-B-A-B
W28FX ... 250-75-4-B-A-B
W28F ... 250-75-4-B-A-B
W28G ... 250-75-4-B-A-B

(Continued on page 144)

HALLICRAFTERS SX-73

142

HALLICRAFTERS SX-73

HALLICRAFTERS SX-73

RADIO • TELEVISION • ELECTRONICS
in all Technical Phases
New Classes (Day & Evening) start
FREE PLACEMENT SERVICE FOR GRADUATES
For Free Catalog write Dept. ST-52
RCA INSTITUTES, INC.
A Service of Radio Corporation of America
350 WEST 4TH ST., NEW YORK 14, N. Y.
Premax Antennas
BRING IN THE SIGNALS

Low-cost, center-loaded Antennas for mobile and marine use between 2 and 8 mc. have 6’ tapered hi-carbon, oil-hardened steel whips mounted above the loading coil and a special base rod. With these Premax Antennas a gain of 6 db. or more can be secured over conventional whip types, equal to multiplying the power by 6.3 times. Ideal for Civil Defense, Marine, Mobile Amateur 75 or Airport.

PREMAX PRODUCTS
DIVISION CHISHOLM-RYDER CO., INC.
5020 HIGHLAND AVE., NIAGARA FALLS, N.Y.

TELEVISION - RADIO ELECTRONICS
Training in all branches of television, radio and electronics.
PCC exam; preparation. Write for free catalog
COMMERCIAL RADIO INSTITUTE
(Founded 1920. Appr. by MD. Board of Education)
Dept. B, 38 West Biddle Street
Baltimore 1, Maryland

No other Semi-Automatic Key so EASY on the Arm!

VIBROPLEX
WORLD'S FINEST RUG
Twice as easy as hand sending
5 Smart Models
Super DeLuxe Presentation, Original, Blue Rider, Lightning Bug, Champion. $17.95 to $39.95

VIBROPLEX, INC.
VIBROPLEX, ORIGINALLY LOPT

C and G RADIO SUPPLY CO.
2502-6 JEFFERSON AVENUE
TACOMA 2, WASHINGTON
Main 2139 and MARket 1039

NEW SX-73 COMMUNICATIONS RECEIVER
"A Gibraltar of Stability"

It is the ultimate in all-wave receivers ... this jewel of precision craftsmanship! Refined in even the smallest detail, the SX-73 meets the tough military communications specifications. Hallicrafters is proud to place its name on the SX-73.

Turn to Page 5 for complete specifications and frequency range

HALLICRAFTERS SX-73

THE VIBROPLEX CO., INC.
853 Broadway
New York 3, N.Y.
NEW ENGLAND
DIVISION

Connecticut
W1HDQ  2112-07-11-A-B-C-D
W1OS  942- 79-6-B
W1TIA  790- 45-N-A-B
W1HDF  659-33-9-A-B-C-D
W1PSX  538- 30-6-A-B
W1OLCO  330- 33-5-B
W1QAS  250- 25-5-B
W1PIFA  228- 26-8-A
W1BDIF  165- 20-9-A-B
W1KHM  150- 25-5-A-B
W1AW  110- 29-2-A-B
W1HRW  108- 18-9-A-B
W1RMU  80- 20-2-A-B
W1LAX  70- 19-2-A-B
W1HHD  48- 12-9-A
W1CEP  32- 6-9-A
W1TXM  24- 6-2-B
W1NUSF  22- 12-2-B
W1DJV  30- 5-2-A
W1LH  16- 4-2-A

Massachusetts
W1CTW  1080-108-5-A-B-C
W1FBJ  940- 94-6-B
W1KJ  930- 93-5-A-B
W1MMY  860- 86-5-A-B
W1AQE  680- 85-4-A-B
W1PLX  630- 65-1-A-B
W1BUN  560- 64-4-B
W1MCR  560- 64-4-B
W1TPZ  450- 65-5-B
W1QOQ  372- 63-2-B
W1NUIQ  372- 63-2-B
W1RUIU  200- 59-2-A-B
W1CPB  276- 45-3-B
W1TQF  276- 45-3-B
W1RPM  204- 34-3-B
W1LZ  200- 25-4-B
W1LQG  198- 33-3-B
W1LKM  174- 30-9-A-B
W1LUAL  144- 23-9-B
W1HCT  118- 25-4-A-B
W1LPY  108- 27-2-B
W1QFO  65- 33-1-B
W1LUN  52- 15-7-B
W1LPE  52- 15-7-B
W1ALP  44- 22-1-A-B
W1QSE  40- 10-2-B
W1BZL  30- 15-9-B
W1UGT  12- 6-1-A

W. Massachusetts
W1RFU  1080- 69-9-A-B
W1CCH  174- 29-3-B
W1OBO  150- 25-3-A-B
W1FTP  150- 25-3-A-B
W1N1UBD  108- 16-3-B
W1RRX  22- 11-1-B
W1PHU  16- 1-8-A-B

New Hampshire
W1FZ  48- 12-9-A-B

Rhode Island
W1KCS  1103- 51-7-A-B
W1SCL  700- 85-5-A-B
W1ITCG  252- 47-3-B
W1RXJ  132- 23-9-A
W1LOG  100- 20-2-A-B
W1NM  10- 5-1-B
W1MJ  10- 5-1-B
W1AEI  8- 4-1-B

Vermont
W1MEP  60- 12-3-B

NORTHEASTERN DIVISION

Washington
W7EYO  50- 23-1-A-B
W7FM  20- 10-1-A-B
W7RYK  12- 6-1-A-B

PACIFIC DIVISION

Santa Clara Valley
W6LOZ  1090-106-5-B
W6ZJZ  1030-105-2-B
W6ZBS  720- 72-1-A-B
W6HER  244- 44-3-A-B
W6GNN  156- 26-5-B
W6WEC  144- 24-5-B
W6WIL  108- 23-9-A-B
W6UYG  122- 23-9-B
W6CGG  34- 34-5-B

East Bay
W6AFJ  700- 79-9-A-B-D
W6NJD  350- 60-2-B

San Francisco
W6MHP  804- 63-4-A-B
W6HMA  147- 25-3-B

Santa Clara Valley
W6CGG  320- 32-5-B

ROANOKE DIVISION

North Carolina
W4CVQ  36- 6-3-B

Virginia
W4HD  348- 29-3-B

West Virginia
W5ZBK  128- 18-4-B

SOUTHWESTERN DIVISION

Los Angeles
W6YZ  342- 57-9-A-B-D
W6NJD  35- 11-1-B

WEST GULF DIVISION

Northern Texas
W4RJ  36- 6-3-B

Texas
W5FEC  204- 34-9-A-B
W5FEK  192- 38-3-B
W5N  90- 23-9-A-B
W5CGZ  39- 15-2-B
W5LLT  18- 9-1-B

CANADA

Ontario
VE3AIB  729- 61-4-A-B
VE3DIK  719- 60-4-B
VE3AQG  478- 69-8-B
VE3ANY  220- 70-3-A-B
VE3UGT  210- 40-9-A-B
VE3BPP  170- 17-6-B
VE3SDR  150- 25-5-A-B
VE3DHL  148- 57-4-B
VE3BSH  100- 25-2-B
VE3DVA  51- 26-1-A-B
VE3AKO  40- 20-1-A
VE3DAT  32- 10-1-A-B
VE3JGJ  12- 6-1-A-B
VE3BBW  10- 5-1-A-B

1 Multioperator station, not eligible for award.
2 Steel City Amateur Radio Club station, W3HXT operator.
3 Headquarters staff, not eligible for award.
ATTENTION RADIO AMATEURS!

Splice recording tape faster...easier with

EDITALL
TAPE SPICING BLOCK*

Precision machined from lifetime Duraluminum.
Will give you PERFECT SPLICES when used with any tape recorder using standard tape. No clips or mechanical devices to go out of order. Popularity priced at only..............................................$6.50

Ask for it at your local distributor.

MANUFACTURED EXCLUSIVELY BY

TECH LABORATORIES, INC. PALISADES PARK, N. J.

Exclusive Canadian Distributor: RCA VICTOR Ltd.

*PATENT APPLIED FOR

RECEIVING SENDING CODE-Speed without strain

CHAMPIONS ENDORSE CANDLER WAY

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

CANDLER SYSTEM CO.
Dept. 4-E, Box 928, Denver 1, Colorado, U.S.A. and at 52b, Abington Road, Kensington High St., London W.8, England

RADIO PRODUCTS SALES CO.
1501 SO. HILL STREET
LOS ANGELES 15, CALIFORNIA

hallicrafters
NEW SX-73 COMMUNICATIONS RECEIVER
"A Gibraltar of Stability"

It is the ultimate in all-wave receivers...this jewel of precision craftsmanship! Refined in even the smallest detail, the SX-73 meets the tough military communications specifications. Hallicrafters is proud to place its name on the SX-73.

Turn to Page 5 for complete specifications and frequency range

ELECTRONICS

Versatile, energetic man wanted in applied physics department for research on electronic circuits as applied to vacuum technology.

National Research Corporation
70 Memorial Drive
Cambridge 42, Massachusetts
Correspondence
(Continued from page 71)
ARRL in keeping ham TVI out of our future receivers." Bah! I have a rig that will TVI any receiver!
Note the QTL. Best darn cure for TVI yet. I haven't worked anyone since I was W7OCH in Portland, because I was putting up my rhombic antenna here on the Island and ran out of space, fell into the water and drowned.
— John E. Fick, KL7AIX

EXTEND A HELPING HAND
Hennessey, Oklahoma
Editor, QST:
I was called on a few days ago to investigate some TV interference and after checking the neighborhood, I found an xmitter built on a breadboard without any shielding, by-pass or other precautions. This rig was in a position whereby any small child or adult could come in contact with high voltages.
Now those newcomers are the finest fellows in this country and they need help. (We were all in that same class years ago.) I suggest that it is up to the ARRL and us old-timers to work more with those fellows and help them over the hump. Some of them are discouraged because they do not understand their rigs and how to operate them. This can be corrected if an older, more advanced operator will pay them a visit and do a little coaching.
May I suggest that every Novice who intends to try for the higher ticket read QST and work with the ARRL, tune in on the code lessons, and make use of other things that ARRL has to offer.
— W. P. Wegganer, W5UOT

NOVICES ON ELEVEN?
3622 N. Kedao
Chicago, Illinois
Editor, QST:
Was just wondering if any Novices are using 11 meters at any time. So far I haven’t heard one sic.
We’re planning to operate on a frequency of 27.1 Mc. soon and to start the ball rolling, we will listen for some sign of life every night from about 7 to 8 CST. Also, whenever we see that 10 meters is hot, we will be operating on 11 simultaneously.
— John Eshelby, WN5QYI

24-HOUR QRM
538 South Wood St.
Fremont, Ohio
Editor, QST:
Needless to say, I, like 95% of the ham fraternity, think that the Novice ticket is the greatest boost ham radio has ever had. It is a much needed shot-in-the-arm that is not likely to peter out. But something that anyone who never listens to 80 c.w. or works the band doesn’t know is that the Novice has actually brought this band back to life. They tell me that before the war it used to be a good band for a QSO at any time, but except for the period immediately following the opening up a few years ago 80 has been deadier than yesterday’s ginger ale during daylight except for an occasional spurt of activity on a Sunday. Not so any more — the Novices has taken over — AND HOW! Good of 80 now sounds like 40 on a Saturday or Sunday and there is at least some activity on the band every day in the daytime. Just hearing those Novices on there has caused a lot of the old-timers to get in on it too. Due to the Novices 80 is again justifying its existence during the daylight hours for the c.w. man. More power to the Novices, 73.
— Ray Grob, jr., W81FY

COMPLETE RADIO TRAINING!
Prepare now to accept a responsible position in Commercial Radio. New developments will demand technicians with thorough basic training. Plus a knowledge of new techniques discovered during the war. Training open to high school graduates, or those with high school courses & 18 months duration in RADIO AND ELECTRONICS. Approved Veteran training in Radio. Write for particulars.
VALPARAISO TECHNICAL INSTITUTE
DEPT. TN
Valparaiso, Ind.
... if you are an **Active Amateur**

you need these . . .

Record keeping can often be tedious. But not with the **ARRL Log Book**. Fully ruled with legible headings it helps make compliance with FCC rules a pleasure. Per book ........................................... 50¢

Mobile and portable operational needs are met by the pocket-size log book, the **Minilog**. Designed for utmost convenience and ease ....................................................... 30¢

First impressions are important. Whether you handle ten or a hundred messages you want to present the addressee with a neat looking radiogram . . . and you can do this by using the official radiogram form. 70 blanks per pad . . . 35¢

If you like to correspond with fellow hams you will find the **ARRL membership stationery** ideal. Adds that final touch to your letter. Per 100 sheets ................. $1.00

**The American Radio Relay League**
West Hartford, Conn.

---

**RADIO and TELEVISION**

Over 30 years N.E. Radio Training Center. Train for all types FCC operators' licenses. Also Radio and Television servicing, FM-AM Broadcasting transmitters at school. Send for Catalog Q.

**MASS. RADIO SCHOOL**
271 Huntington Avenue Boston 15, Massachusetts

---

**ZACK RADIO SUPPLY CO.**
1426 MARKET STREET
SAN FRANCISCO 2, CALIFORNIA

**hallicrafters**

**NEW SX-73 COMMUNICATIONS RECEIVER**

"A Gibraltar of Stability"

It is the ultimate in all-wave receivers . . . this jewel of precision craftsmanship! Refined in even the smallest detail, the SX-73 meets the tough military communications specifications. Hallicrafters is proud to place its name on the SX-73.

[Image of SX-73 receiver]

Turn to Page 5 for complete specifications and frequency range
HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in this field.

(2) No display of any character shall be accepted, nor can any special typographical arrangement, such as all or part capitals, be made which would cause the same to be difficult to understand and so make one advertisement stand out from the others.

(3) The display rate is 75c per word, except as noted in paragraph (6) below.

(4) Text of all must accompany copy. No cash or check discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 25th of the month in advance of publication date.

(6) A special rate of 75c per word will apply to advertising which, in our judgment, is obviously non-commercial, i.e., discussion on personnel, job openings, etc., and is presented by a member of the American Radio Relay League. This advertising shall be depicted by a line strikeout in害 advertising rate, and is issued only to members of the American Radio Relay League taking the 75c rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising by him, takes the 75c rate. Provisions of paragraphs (4), (2) and (6) apply to all advertising in this column regardless of which rate may apply.

(7) No advertising may be submitted in more than 200 words in any one issue nor more than one ad in one issue.

Having made no investigation of the advertisers in the classified columns, the publishers of QST are unable to touch for their integrity for the goods or character of the products or services advertised.

QUARTZ.—Direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Carbons, 111 Wisconsin Ave., Fairview, Reading, Pa. QSLs?


Morningstar, used communication equipment bought and sold, W9BCE, Walnut, Ohio.


Call Books, 50c. Latest Call Books, $2.50. Earl Mead, Huttley, Montana. WLCM.

QSL's SWL's Meade W9CRX, 1507 Central Avenue, Kansas City, Kansas.

5-ELEMENT 2-meter beams. Riverside Tool Co., Box 87, Riverside, III.

WANTED: Your surplus radio receivers, transmitters, ARC-1, ARC-11, ARC-111, we buy apparatus in quantity for profit, even if by an individual, is la commercial and all advertising by him, takes the 75c rate. Provisions of paragraphs (4), (6) and (2) apply to all advertising in this column regardless of which rate may apply.


Call Books, 50c. Latest Call Books, $2.50. Earl Mead, Huttley, Montana. WLCM.

QUARTZ.—Direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Carbons, 111 Wisconsin Ave., Fairview, Reading, Pa. QSLs?


Morningstar, used communication equipment bought and sold, W9BCE, Walnut, Ohio.


Call Books, 50c. Latest Call Books, $2.50. Earl Mead, Huttley, Montana. WLCM.

QSL's SWL's Meade W9CRX, 1507 Central Avenue, Kansas City, Kansas.

5-ELEMENT 2-meter beams. Riverside Tool Co., Box 87, Riverside, III.

WANTED: Your surplus radio receivers, transmitters, ARC-1, ARC-11, ARC-111, we buy apparatus in quantity for profit, even if by an individual, is commercial and all advertising by him, takes the 75c rate. Provisions of paragraphs (4), (6) and (2) apply to all advertising in this column regardless of which rate may apply.


Call Books, 50c. Latest Call Books, $2.50. Earl Mead, Huttley, Montana. WLCM.

5-ELEMENT 2-meter beams. Riverside Tool Co., Box 87, Riverside, III.

WANTED: Your surplus radio receivers, transmitters, ARC-1, ARC-11, ARC-111, we buy apparatus in quantity for profit, even if by an individual, is commercial and all advertising by him, takes the 75c rate. Provisions of paragraphs (4), (6) and (2) apply to all advertising in this column regardless of which rate may apply.


Call Books, 50c. Latest Call Books, $2.50. Earl Mead, Huttley, Montana. WLCM.

5-ELEMENT 2-meter beams. Riverside Tool Co., Box 87, Riverside, III.

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Call Books, 50c. Latest Call Books, $2.50. Earl Mead, Huttley, Montana. WLCM.
NEW crystals for all commercial services at economical prices; also decorative, all-lead crystal replacements for brokens; Link, Moto- rola, G-E, and other radio parts and accessory 10 cent special. Free delivery and first-class service. Edison Electronic Co., Phone 3-3001, 1802 7th St., thursday morning and Saturday afternoon.

TRADE Remington portable and case, excell. on offer or trade for Remington model 10 or differences. Sell Lettie 310, new 48x40-20 slightly used $78. Ford 201, new $12. Buy 7515, 48th Ave. Columbus, Ohio.

WANTED: (For Sale: 1956 Ford electric, asking $1,000 or phone; Dowell D. Kimball, WITX, 1814 Head St., Huntington, W.Va. 25701-017-R. Will sell or trade same. What am I offered?)

SOLD: 940B or equivalent receiver.

FOR SALE: (By Consignment) at dealers, on consignment.

FOR SALE: Chevrolet 1500, 1956, asking $1,000, or trade for 1957 Buick. See 17th St., Baltimore, Md.


FOR SALE: 1950-52 Hudson, asking $500; 1952 Hudson, asking $400.

FOR SALE: 1952 Hudson, 4-door sedan, 1953, asking $400. All parts in excellent condition. No delivery. 1951 Hudson, 4-door, asking $500. All parts in excellent condition. No delivery.

FOR SALE: 1950-52 Hudson, asking $500; 1952 Hudson, asking $400.

WANTED: 1950-52 Hudson, asking $500; 1952 Hudson, asking $400.

FOR SALE: 1950 Hudson, asking $400;

FOR SALE: 1952 Hudson, 4-door sedan, 1953, asking $400.

WANTED: 1950-52 Hudson, asking $500; 1952 Hudson, asking $400.

FOR SALE: 1950 Hudson, asking $400;

FOR SALE: 1952 Hudson, 4-door sedan, 1953, asking $400.

WANTED: 1950-52 Hudson, asking $500; 1952 Hudson, asking $400.

FOR SALE: 1950 Hudson, asking $400;

FOR SALE: 1952 Hudson, 4-door sedan, 1953, asking $400.

WANTED: 1950-52 Hudson, asking $500; 1952 Hudson, asking $400.

FOR SALE: 1950 Hudson, asking $400;

FOR SALE: 1952 Hudson, 4-door sedan, 1953, asking $400.

WANTED: 1950-52 Hudson, asking $500; 1952 Hudson, asking $400.

FOR SALE: 1950 Hudson, asking $400;

FOR SALE: 1952 Hudson, 4-door sedan, 1953, asking $400.

WANTED: 1950-52 Hudson, asking $500; 1952 Hudson, asking $400.

FOR SALE: 1950 Hudson, asking $400;

FOR SALE: 1952 Hudson, 4-door sedan, 1953, asking $400.

WANTED: 1950-52 Hudson, asking $500; 1952 Hudson, asking $400.
SHAFT LOCKS
In addition to the original No. 10060 and No. 10061 "DESIGNED FOR APPLICATION" shaft locks, we can also furnish such variations as the No. 10062 and No. 10063 for easy thumb operation as illustrated above. All types are available in bright nickel finish to meet Signal Corps requirements or black oxide to meet Navy specifications.

JAMES MILLEN MFG. CO., INC.
MAIN OFFICE AND FACTORY
MALDEN
MASSACHUSETTS
Variac - the original continuously-adjustable auto-transformer — is the ideal device for controlling any a-c operated equipment.

VARIACS not only supply perfectly smooth control of voltage from zero, but also furnish output voltages in excess of line voltage. VARIACS are correctly designed for many years of trouble-free operation.

Illustrated below are the more popular units in the complete VARIAC line. Other models are available. VARIACS can be used singly, or in gangs for higher power and for polyphase operation.

### VARIAC Output Single Phase Data

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>KVA</th>
<th>Output Voltage</th>
<th>Rated Maximum Amperes</th>
<th>Type of Mounting</th>
<th>Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
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<td>115</td>
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<td>0-115</td>
<td>1</td>
<td>I</td>
<td>200-B</td>
<td>$12.50</td>
</tr>
<tr>
<td>115</td>
<td>0.86</td>
<td>0-115</td>
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* I Unmounted model.
  II Protective Case around windings.
  III Protective Case, terminal covers, line switch, convenience outlet and line cord.
  IV Protective Case, terminal cover and BX outlet.
  V Two gang assembly — requires type 50-P1 chokes — $12.00.

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DUAL CONVERSION! 12 TUNED I.F. CIRCUITS! 1 M.V. SENSITIVITY ON 6 METERS!

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Less speaker
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These rugged, RCA-developed VHF beam power tubes have no equals for mobile or emergency rigs. Because of their high efficiency and high power gain, they require less drive and deliver more output at lower plate voltage, than any other similar types of comparable price range. Translate these advantages into practical results and they spell power economy, more watts per dollar, and compact transmitter design.

The RCA 5763 miniature beam power tube is ideal as the final in a low-power rig, as a frequency multiplier, and as the driver for an RCA-2E26 or 6146. As a final it will handle 17 watts input on cw and 15 watts on phone with a simple 300-volt power supply.

The RCA-2E26 beam power tube will handle a full 40 watts input on cw and 27 watts on phone... and can be modulated with a 6N7 Class B operated. It also makes an excellent driver for the new RCA-6146.

The RCA-6146—the tube that’s tailor-made for “2”—will take 64 watts on cw and 48 watts on phone at 150 Mc... yet it’s only a trifle larger than a 2E26!

Ask your RCA Tube Distributor for the full story on these VHF beam power tubes... or write RCA, Commercial Engineering, Section EM48, Harrison, N. J.

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