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PODUNK 1953
FIELD DAY
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This ultra low frequency filter has a band pass range of one cycle to 10 cycles... 50,000 ohms... 700 cubic inches.

This 600 ohm miniaturized 1 KC band pass filter is housed in a case only 1" x 1 1/4" x 2 1/4".

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This power line filter provides correct output voltages from sources of 50 to 400 cycles... noise attenuation is from 14 KC to 400 MC... 29 cubic inches.

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has the 3 tubes needed!

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write for another.

ALSO . . . Ham News, Vol. 5, No. 4, tells how to build a
modulator that will add audio transmission. Two
12AT7's and a 12AU7 comprise the tube complement.
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JUNE 1953
VOLUME XXXVII • NUMBER 6

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

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Subscription rate in United States and Possessions: $4.00 per year, postpaid; $4.25 in the Dominion of Canada, $4.00 in all other countries. Single copies, 40 cents. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U. S. and for an equivalent amount in U. S. funds.


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"It Seems to Us..."

FIELD DAY
There's nothing like an ARRL Field Day...
Absolutely nothing!
Sure, we have the Sweepstakes, the V.H.F. QSO parties, DX competitions, CD parties, and a lot more. But Field Day is unique. We know pretty well how the home station performs. We can zero our VFO on the net frequency as quick as a wink. We can rotate our beam on Pakistan almost without looking at the indicator. But Field Day is another story. Chances are, we are going to have to tune someone else's receiver, flick the switches on someone else's rig, maybe even slap someone else's bug. The chair will be uncomfortable, the table height different from what we're accustomed to. And all the while we're being plagued by the buzz of vibrators, the putt-putt of generators, others going on or off watch stopping to kibitz and see how we're doing, the clicks and receiver overloading from more of our crew on another band.

So, granted — when we're operating in Field Day we aren't at our best. Neither is the equipment, in most cases. Yet who among us would prefer a quiet week end at home to the orderly confusion of a FD set-up? Even the rain, a Field Day tradition, fails to dampen spirits, though everything else may be soaked.

That's the way it should be. Field Day is a test of communication performance from gear quickly assembled and put in operating condition as it might be were there a disaster or other emergency. And so, underlying the apparent gaiety of a week end in the open is the deadly serious purpose of preparation and experience by a group of service-minded hobbyists who take no stock in a more complacent view, "it can't happen here."

In 1953, as in the past, the ARRL Field Day is looked forward to as the operating event of the year by clubs and by individuals. See you in FD, June 20th and 21st!

THE NATIONAL CONVENTION
Houston, which we're told is the fastestsprouting city in Texas and the South's largest metropolis, is the site of the 1953 ARRL National Convention. Keeping in pace with the progressive city is the Houston Amateur Radio Club and its more than 30 committees which have been working on convention planning for over a year. With Dr. Charles Fermaglich, W5FJF, as Convention Chairman, these amateurs have arranged a program of interest to persons engaged in practically every phase of our hobby. Most of you have read the convention story in May QST. There should be little doubt that there is lots in store for you at Houston.

An ARRL National Convention is an event all amateurs hope to attend and an event that each of us should experience. By all means plan a trip to Houston for the week end of July 10th-12th. This year's affair promises to be one of the biggest and best ever.

GENERAL COUNSEL SEGAL
Back in the June, 1928, issue of QST there appeared a "Stray" recording the appointment of one Paul M. Segal, 9EEA, of Denver, as ARRL General Counsel — at the magnificent sum of $1 per year. "PMS" was then director of the Rocky Mountain Division and even in the days before his formal appointment as our standard-bearer in legal matters he was distinguishing himself in the successful handling, for the League, of "anti-amateur" local ordinances, one in Wilmore, Ky., and another in Portland, Oregon.

In these twenty-five years Paul Segal has been intimately associated with the growth and progress of the American Radio Relay League. His guiding counsel has been a priceless asset in more aspects of our affairs, and more often, than most amateurs probably realize. Beyond the more striking evidences of his participation, such as handling state supreme court cases involving amateur antenna heights, or redrafting the League's instruments of government, or representation of the amateur at an international telecommunications conference, lie the everyday problems nonetheless important — educating the city's fathers to defeat an undesirable ordinance with restrictive effects on amateurs, consulting over perhaps a period of weeks on a proper course for the League to follow in an FCC conference or Department of State hearing, and often some such thing as getting out of a Texas jail an amateur put there by an overzealous cop who was suspicious of mobile operation.

Whatever may be the immediate problem, Paul Segal has given of his best to the League. We think that is because of his own dedication to the basic amateur principle: "not for the reward, but for the love of the game."
Strays

Ham radio appears to be crashing all fields. We’ve already seen W9HPJ’s call in Dick Tracy and now W6PYG/1 shows us where W6OPU received a plug in recent Mickey Mouse doings.

Excerpt from the Wall Street Journal, via W2RIK, having to do with a newly unveiled machine recently put to work by Northwest Nut Growers:

“The walnut is grabbed in mid-air and at that precise fraction of a second an electrical impulse of approximately 65,000 volts at 5000 amperes shatters the walnut shell. . . .”

That’s a lot of watts in a nutshell or quite a run at the polls, however you choose to look at it.

When high voltage and heat ruined a special-make tube socket and put New Britain, Conn., TV station WKNB-TV off the air for most of an evening it was amateur radio that came to the rescue. Telephone calls and telegrams sent forth all along the Eastern seaboard failed to locate a replacement. Then W1DF, QST Technical Editor, who was apprised of the situation during midnight, dropped over to ARRL’s West Hartford lab and came up with a satisfactory socket.

What is believed to be the first all-transistor amateur station was demonstrated at the April 1st meeting of the Morris Radio Club. Operating on ten-meter ‘phone, the station consisted of a two-transistor a.m. crystal-controlled transmitter and a two-transistor superregenerative receiver. Contacts were established between this station and mobile units of the club within a radius of half a mile. Credit for the receiver goes to W2ZKE; other participants were K3AQMN, W2GNE, W2NOH, W2YCX, W2YTH and W2ZKE.

VE4LC tells us of an application of ham ingenuity that enables VE4VJ, 25-year-old cerebral palsy patient, to keep up with the best of them on c.w. despite the fact that he cannot manually operate keying gear. After investigating the possibilities of foot keying and getting negative results (insufficient speed), Jim hearkened back to September, 1950, QST wherein is described “A Simple Voice-Operated Keyer for Automatic Break-In,” by J. L. Flanagan, W1SJMT.

VE4VJ added a preamplifier and a power supply to make the unit entirely self-contained and operational directly from a chest-set microphone. By juggling the time constants in the relay control-tube circuit, Jim sets the relay action at a point where it faithfully follows dits and dahs articulated into the mike. He’s no slow-poke now!

Has anyone yet successfully applied this “no-hands” technique to mobile c.w. operation?

COMING A.R.R.L. CONVENTIONS

June 20th-21st — Rocky Mountain Division, Estes Park, Colo.
July 10th-12th — National Convention, Houston, Texas
Sept. 19th-20th — New York State, Buffalo, N. Y.

HAMFEST CALENDAR

CALIFORNIA — Sunday, June 26th, at Coyote Point, San Mateo — the 7th Annual Hamfest and Picnic of the San Mateo County Amateur Radio Club. This program will begin at 10:00 a.m. and close at 5:00 p.m., and will feature activities for the OM, YL and XYL. Two main attractions will be 75- and 3-meter transmitter hunts. Have yourself a pleasant day by attending with your family. A picnic lunch should be brought. Admission free; registration $1.00. Further details are available from W6ZBS, 200 42nd Ave., San Mateo.

FLORIDA — Sunday, June 26th, at Sanders Beach, Pensacola — the Pensacola Amateur Radio Club will hold its annual hamfest. Several hundred amateurs and their families from the Southeastern states are expected to attend. Contact Vernon College, 4Q2KL, 1617 East Moreno St., Pensacola, for further data.

ILLINOIS — Sunday, June 26th, in Thatcher Woods near Oak Park — a picnic will be held for all v.h.f. men. Food and drinks should be brought, as none will be available on the premises. Leo Heuer, W9OKF, 531 South Crescent Ave., Park Ridge, will supply further information.

KANSAS — Sunday, June 14th, in Kenwood Park, Salina — the Annual Hamfest-Picnic of the Central Kansas Radio Club. Information is available from E. E. Gemmill, 123 W. Crawford, Salina.

MISSOURI — Sunday, June 14th, at Lake Osage State Park near Eldon — the Missouri Emergency Net Picnic. Bring your own picnic lunch. Admission free. All hams, XYLs and YLs are invited. Details will be furnished by Paul Cooper, W7FGG, 315 West Third St., Eldon.

SASKATCHEWAN — Saturday and Sunday, June 27th and 28th, at Lake Wascana in the Prince Albert National Park — the Official Saskatchewan Hamfest will this year be sponsored by the Northern Saskatchewan Amateur Radio Club. A full program of entertainment has been arranged for the whole family at a spot well known for its excellent facilities for swimming, fishing and hiking. The registration fee of $3.00 per adult covers the banquet. Accommodations must be arranged for separately, but a variety of cabins is available at prices ranging from $9.50 for three days to $7.50 per day. Dr. J. Carriere, VESSD, 11 Knox Block, Prince Albert, will answer inquiries.

WYOMING — Saturday and Sunday, July 16th and 17th, at the South Fork Inn, 20 mi. west of Buffalo on Highway 16 — the Casper Radio Amateur Club will hold a hamfest. All hams are welcome. Write to Betty Ross, WV1DO, 1152 South Willow, Casper, for details.

Quiz Quiz

Our man A claims that signal-strength reports of “20 db. over S9” and the like are meaningless and should be thrown out of ham radio. B says they have a useful purpose because they permit an operator to evaluate antenna and transmitter performance. Who is right?

(Please turn to page 64 for the answer)
Automatic Multiband Mobile Antennas and Mobile Antenna Characteristics

BY A. M. PICHITINO,* WØEDX

• What does a bandswitching mobile transmitter buy you if you have to get out of the car to change antennas every time you want to change bands? That's a question a lot of mobile enthusiasts have asked. Here's how to get multiband antenna operation without switches or any mechanical devices — using a tuned-circuit network that does the switching automatically!

The author also presents some badly-needed information, based on practical measurements, on the characteristics of "eight-foot" whip antennas in the 10- to 75-meter range.

In recent years amateur mobile operation has gained rapidly in popularity, and further activity has undoubtedly resulted from the opening of the 40-meter and 15-meter bands to 'phone operation. Almost all amateur activities are encompassed in mobile operation: emergency, experimental, construction, rag-chewing, DX, and even freedom from TVI!

Several months ago, in undertaking the development of a mobile transmitter, it was concluded that the design objectives of operator convenience and wide flexibility were of paramount importance. Bandswitching of all bands was, of course, a must; and it was also decided to provide true single-dial control, with all r.f. stages gang-tuned. In addition to the operator convenience, gang tuning of high-Q circuits would reduce power supply requirements. However, it made detailed knowledge of mobile antenna characteristics necessary, because coupling circuits had to be designed to cancel reactances which could detune the transmitter final amplifier if permitted to remain uncompensated.

Experience had shown that one of the greatest problems faced by the mobile enthusiast was that of efficiently coupling to and loading the mobile antenna. Obviously, it accomplishes little to have a bandswitched transmitter if separate loading coil taps and/or additional loading components must be hung outboard and attached or adjusted with each band change. We decided to provide individually tailored coupling circuits for each band, to be within the transmitter, and to require no tuning or adjustment. Again, we were faced with the problem of having detailed knowledge of mobile antenna characteristics — that is, the nature of the loads the transmitter would be required to work into. Since the literature lacked the information we required, it was necessary to undertake a mobile antenna measurement program.

This paper will describe the measurement technique, the antenna characteristics and the theory and development of fully automatic multiband antennas.

Measurement Technique

A typical mobile antenna with spring base was mounted on a 1950 Ford automobile at the left rear, slightly above the rear compartment lid. This mounting was chosen as being representative of a popular and satisfactory position. Later measurement of a bumper mount showed little practical difference.

The measurements were made with a General Radio Type 916A r.f. bridge, with a National HRO receiver as the detector. The bridge, detector and operator were too bulky to fit inside the rear compartment, and since it was desired to conduct measurements with the compartment lid down — no volunteers stepped forward at this time! — it was decided to measure the drive-point impedances (at the coax fitting at the base of the antenna mount) through a section of transmission line which would permit remote location of the measuring equipment. As is well known, an electrical half-wavelength of transmission line or multiple thereof acts like a 1:1 transformer and thus repeats the load. In order to isolate the transmission line (RG-8/U

*Chief Engineer, E. F. Johnson Company, Waseca, Minn.

A commercial version of the two-band network.
coax) electrically from the automobile, it was formed into a coil where it left the car through the left rear fender (back-up light removed), the coil being tuned by a variable capacitor to the measurement frequency. This isolation filter, a parallel-resonant circuit of high Q, offered high impedance at the measurement frequency and thereby electrically detached the transmission line from the automobile.

With the car in an open area in position for measurement, the transmission line, with the isolation network installed and tuned, was placed on the ground in a straight line away from the rear left quarter of the automobile. The transmission line was then cut so that it would have an electrical length of a half-wavelength or multiple at the measuring frequency. This line was λ/2 at 75 meters, 3λ/2 at 20 meters and 3λ at 10 meters. The free end of the line was then connected to the r.f. bridge, which was driven by a Viking transmitter and VFO. This measurement set-up is shown in Fig. 1.

Care must be observed in making measurements through line sections and isolation filters because too much of a change from the frequency for which the line is cut or the filter is tuned will introduce errors in the measurements. These are due to reactances introduced by the line and filter, resulting in impedances which should not be attributed to the antenna itself.

**Measurement Results**

Figs. 2, 3 and 4 show the results of measurements on the 75-, 20- and 10-meter bands, respectively. In general, the resistance values are higher than one might expect from figures previously published in the amateur literature. On the assumption that this might have been caused by unusually high ground losses, we laid a system of copper ground radials over 60 feet long under the car and repeated the measurements. There was no appreciable difference with or without the ground radial system.

It should be remembered that what we are measuring at the base of the antenna is the drive-point impedance, which includes the radiation resistance of the antenna, loading coil and antenna losses, ground losses, automobile FR and radiation losses, and connection losses. Since the antenna radiation resistance (which produces practically all of the radiated field) is a small part of the R values shown, particularly on 75 and 40 meters, the importance of maintaining low contact resistances and good bonding cannot be overemphasized. The transmitter power is delivered to R and the greater the value of antenna radiation resistance with respect to R, the greater will be the radiated power.

Note that the 10-meter plot, Fig. 4, shows the reactance changing from plus to minus above the resonant frequency of the antenna and the opposite effect below the resonant frequency. This is caused by reactance introduced by the transmission line. Actually, the 28-Mc. reactance curve would be quite flat over the range shown and would show no crossover within this range.

It can be seen that the 75-meter reactance curve is quite steep near resonance. This shows why it is necessary to return these antennas when the frequency is changed just a few kilocycles. Cancellation of just a few ohms reactance at 75 meters requires more capacity or inductance than is normally provided in the usual coupling circuit, hence the inability to load over a range of more than ± 10 or 15 kilocycles.

![Fig. 2 — Resistance and reactance over the 75-meter band, measured through a half-wave line of RG-8/U. In this and in the curves of Figs. 3 and 4 the resistance of the transmission line used for remote measurement has been subtracted from the total measured resistance.](image1)

![Fig. 3 — Resistance and reactance over the 20-meter band, measured through an RG-8/U line three half-waves long.](image2)
The 40- and 15-meter antenna characteristics lie between those shown for 75 and 20 and 20 and 10, respectively.

**Application of Data**

Having obtained the desired data, we applied it to the design of the coupling circuitry. We had previously determined that a fifteen- to seventeen-foot length of coax would be a satisfactory transmission line from the dash-mounted transmitter to the rear-mounted antenna. Knowing the drive-point impedances at the base of the antenna, we had only to transfer these impedances through the fifteen feet of coax to find the feed-point impedance at the input end of the coax. This was most easily accomplished by the use of a Smith Chart.

Series-tuned coupling circuits were employed to cancel the feed-point reactances. Sufficiently high Q was used in the coupling circuits to effect good loading throughout the bands. In order further to guarantee adequate reserve coupling capability, concentric coupling and tank coils were utilized, thus providing the maximum coupling coefficient.

The finished equipment has shown excellent loading capability and flexibility on all bands — 10, 11, 15, 20, 40 and 75 — which indicates that the antenna measurements were of sufficient accuracy for practical design application.

**Automatic Multiband Antenna-Tuning Networks**

This discussion covers the theory and operation of multiband antenna-tuning networks which, in conjunction with appropriate antenna elements, provide transmission and reception on more than one band. This type of antenna provides fully automatic multiband operation with only one antenna and transmission line, without the use of mechanical switching devices. Adjustable network elements permit easy and accurate tuning in the installed position.

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1 The described networks and ramifications are covered by patents pending.

In Fig. 5A, which shows a dual frequency antenna with the lower of the two frequencies designated $F_1$ and the higher $F_2$, the conductor length $X$ plus $Y$, is so chosen as to be resonant at $F_2$.

Fig. 5 — Development of the two-band automatic switching network.

The values of $L_3$ and $C_1$ are such that series resonance at $F_2$ occurs between terminals $A$ and $B$. Since a series-resonant circuit offers zero impedance at the resonant frequency, terminals $A$ and $B$ are electrically short-circuited, thus still leaving the conductor, $X$ plus $Y$, resonant at $F_2$.

Because there is zero impedance across terminals $A$ and $B$ at $F_2$, circuit elements $L_1$ and $L_2$ may be placed across terminals $A$ and $B$ without effect on the antenna behavior at $F_2$. Circuit element $L_2$ is of a value which, in conjunction with $L_3$ and $C_1$, forms a parallel-resonant circuit across terminals $A$ and $B$ at $F_1$. A parallel-resonant circuit presents infinite impedance across its terminals so that the combination of $L_2$, $C_1$ and $L_3$ is effectively not connected across terminals $A$ and $B$ at $F_1$.

The magnitude of $L_1$ is selected so that in conjunction with conductor $X$ plus $Y$ the system is resonant at $F_2$. The parallel combination of $L_1$, $L_2C_1$ and $L_3$, in itself, is not resonant at $F_1$.

In practical application, either $C_1$ or $L_2$ is made variable to provide adjustment at $F_2$. $L_1$ and $L_3$ are combined in their parallel equivalent and the resultant inductor made variable to provide adjustment at $F_1$, as in Fig. 5B.

In the amateur case, conductors $X$ and $Y$ may be lower and upper portions of a center-loaded Master Mobile antenna with $L_2C_1$ series resonant at 10 meters and $L_1$ having a value which provides over-all resonance at 20 meters. The adjustments are made by shorting $L_2C_1$, grid-dipping $L_2C_1$ at the center of the 10-meter band, removing the short and checking over-all antenna resonance on 10 meters. (This last step is not necessary with Master Mobile or other similarly dimensioned antennas.) If the over-all system is not resonant, the top of section $Y$ should be trimmed until resonance is obtained. The tap on $L_1$ should then be adjusted so that the over-all system is resonant on 20 meters. The system is broad enough to cover the whole of the 10-, 11- and 20-meter bands without readjustment.

(Continued on page 108)
Methods for Compact Construction

Packing the Most into the Cubic Inch

BY YARDLEY BEERS, W2AWH

Civil Defense appears to require a large amount of portable radio equipment with a range of not more than a few miles. Also, many amateurs who may prefer DX operation from their home stations may look mainly to local contacts in mobile operation. While traveling, these local contacts can be valuable sources of information concerning the sights of interest and preferred restaurants. At the same time, many prefer apparatus which is very compact and can be inserted or removed from a car very easily.

In an earlier article1 this author showed that miniature equipment with transmitter power of a few watts could give reliable communication for distances of several miles and therefore could serve these needs. With these thoughts in mind he has built a number of such miniature transmitters and receivers. While these are not suitable for exact duplication, on the whole they have been reasonably satisfactory; therefore the author believes that the techniques which have been employed might be of interest to others. The main part of this article will be devoted to a discussion of these techniques. Then they will be illustrated by a brief description of a 144-Mc. transmitter-receiver. The transmitter, crystal-controlled and having four stages, and the receiver, a five-tube superheterodyne, are contained in a single 4 x 5 x 6-inch box.

Separate vs. Combined Units

Considerable space and weight may be saved when the transmitter and receiver are built as a single unit. The minimum amount of metal for a single box that houses both is always less than the amount required for separate boxes. Second, with very low-powered equipment a single audio-frequency amplifier with suitable switching can serve for both. Third, the send-receive switch may be built into the unit, and thus the use of a separate control box and some long cables may be avoided.

On the other hand, two disadvantages of a single unit must be admitted. If either the transmitter or receiver should prove unsatisfactory and need to be rebuilt completely, usually the other one has to be destroyed. Also, single-unit construction is practical only when the combined unit is small enough to fit into a convenient location. The use of subassemblies avoids the first of these disadvantages of single-unit construction, but requires space and weight approaching that of separate-unit construction.

The Shape Factor

Another principle to be followed comes from the mathematical theorem which states that the rectangular box having the minimum surface area for a given volume is one with all three dimensions equal. A second theorem states that if one of the dimensions is fixed, the surface area is minimum when the two remaining dimensions are made equal. Because the height is generally controlled by the vertical dimensions of the components, the second of these theorems is more directly applicable. But since the height is generally considerably smaller than the other two dimensions, the first theorem suggests

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You might think it unlikely, if not impossible, that a 2-meter crystal-controlled transmitter and a superhet receiver could be built into a 4 by 5 by 6 box — but here's the evidence that it can! Not too crowded in this view, either.

QST for
that the most compact arrangement possible would employ a deep chassis with half of the parts mounted upward and half downward.

To be sure, deep chassis make assembly and wiring more tedious. However, it is possible still to abide by the principles that each component (except tube sockets) be removable independently of all other components and that each soldered joint be accessible for soldering with an iron or gun having a power of at least 100 watts. (By the way, let no one suffer the illusion that midget soldering irons should be used on midget equipment!) Furthermore, with modern soldering guns having their own illumination, soldering in deep chassis is considerably easier than it was formerly. At any rate, the amateur and experimenter can tolerate somewhat poorer access than a commercial production line.

**The Chassis**

A lot of space is wasted in cabinets where the chassis does not make contact with all four walls of the cabinet. Practically all of the many cabinet-chassis combinations available commercially are unsatisfactory in this respect. Therefore often one must make his own. A compact arrangement can be obtained using commercial “utility” cabinets and mounting the components on a homemade chassis that does make contact with all the walls. Perhaps this should be called a “deck” rather than “chassis” since it is sufficient to have vertical sides merely big enough for a few screw holes. Access to the wiring is achieved by removing the bottom of the cabinet.

Another evil which is likely to result from an arrangement in which the chassis does not make contact with all four walls of the cabinet is that it invites bad shielding. The common procedure with such arrangements is to bring all cables through the rear of the cabinet without bonding the shielding to the cabinet, while the principles of good shielding require that shielding on all cables be bonded firmly at the point of entry into the cabinet. If this bonding is done, currents induced in the cable shielding will be forced to flow on to the outside of the box, while if the shielding is not bonded at the point of entry these currents may enter the cabinet and be coupled to the circuit therein. In some cases serious leaks can result from this cause. In fact, the author knows of one piece of military electronic equipment which failed to work entirely until one leak of this type was fixed.

Incidentally, the author has devised a simple and satisfactory but not very aesthetic way of bonding the shielding of a cable to a cabinet or chassis at the point of entry. First, a hole barely large enough to clear the cable with its outer insulation stripped off is drilled in the wall at the desired point. Two holes to accommodate machine screws are drilled on opposite sides of the first hole. Two large soldering lugs, bent in the middle at right angles, are then fastened to the wall with the “fingers” outward. The lugs are oriented in such a way that they surround the outward projection of the cable hole. Then the cable, with its outer covering removed for a suitable length, is inserted and the fingers of the soldering lugs are pinched on to it. solder is applied to the lugs and to the exposed portion of cable shielding. Finally, to give the cable additional strength and to prevent a sharp bend at the edge of the soldering lugs, the whole assembly is wound with a layer or two of electrical tape starting from the wall and extending an inch or so beyond where the outer covering has been stripped off.

**Metering Methods**

In none of the author’s miniature equipments have meters been built in, and only in a few cases have pin jacks for external metering of grid and plate currents been incorporated. The principal reason has been economy of space. Also, the conventional metering methods often are not very sensitive in indicating the performance of low-powered amplifiers, especially in the case of high-frequency multipliers. It was necessary, however, when the equipment was first assembled to be sure that none of the tubes was run beyond its ratings. For this purpose the plate currents have been found by measuring with a volt-ohmmeter the voltage drop across some resistance already in the circuit. For example, the d.c. voltage drop across the modulation transformer has been used for this purpose. For tuning the circuit we use the following accessories:

1) An output indicator consisting of a rectangular coil connected in series with a 1N34 crystal and a pair of pin jacks, the jacks being shunted by a suitable by-pass condenser. The coil has between one and five turns, and its area is about a square inch. One edge of the coil is tightly laced to the antenna lead. A 0–1 milliampere meter, usually the basic meter of a volt-ohmmeter, is plugged into the pin jacks when this indicator is used.

2) Some absorption wavemeters. These need not have indicators built in nor do they need complete calibrations. Usually it is adequate to obtain a few points by coupling these to an existing transmitter.

3) A traveling r.f. indicator which is made by a very simple modification of a volt-ohmmeter. An extra terminal is mounted near the existing common (negative) terminal, and a 1N34 crystal is connected between them. Then a piece of flexible wire — sometimes one of the regular test

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1 Notable exceptions were the blank receiver cabinets sold by the National Company. Unfortunately, these do not seem to be listed in their recent catalogs.
leads—is connected between the new terminal and whichever of the positive terminals gives the desired sensitivity. The wire is bent into a convenient shape to serve as a pick-up loop to be coupled to the circuit under test. For measurement of the wavelength one of the absorption wavemeters, (2) above, is coupled also to the loop, and its knob is turned until a deflection is obtained.

A grid-dip meter could be used in place of the absorption wavemeters and the traveling r.f. indicator, but it would be more expensive and it would not be convenient for portable operation when there would be no 115-volt line available to plug it into.

Adjusting Circuits
The procedure for lining up a transmitter is to couple the traveling indicator (3) to the oscillator coil and tune the oscillator for maximum deflection. Then it is coupled to the first amplifier, and this circuit is tuned for maximum. Then, with the indicator still coupled to the amplifier, the oscillator tuning is retouched in the hope of getting a further increase in the indication. This procedure is repeated with all the other amplifiers except the final one. If there is any question of any stage's being tuned to the wrong harmonic of the oscillator, the absorption wavemeters are employed.

For tuning the final amplifier, the built-in output indicator, (1) above, is used instead of the traveling indicator. It may also be used as an indicator in neutralizing this stage, and in the transmitter illustrated, it was at least as sensitive in this application as a milliammeter in the grid circuit. This output indicator is also useful for checking the over-all performance of the transmitter. Upon amplitude modulation, the meter should remain steady or kick upward slightly; it should never kick downward. For changing frequency within a band this is the only one of these devices required; all circuits are retuned to cause it to indicate a maximum.

Aligning a Receiver
This same procedure may be adapted for preliminary alignment of the r.f. circuits of a receiver. First, with the help of a wavemeter and the traveling indicator, respectively (2) and (3) above, the local oscillator is tuned to the signal frequency. Then the indicator (3) is shifted to the mixer circuit, and this is tuned for a maximum. If there is an r.f. amplifier, the local oscillator is coupled to it with a temporary link circuit, and the procedure used with the mixer circuit is repeated. After these circuits have been tuned, the local oscillator is tuned to its proper frequency. For final alignment, all circuits are peaked on a strong signal.

One other feature which is found to be a virtual necessity on the combined transmitter-

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receivers is a switch for turning on the transmitter oscillator when the receiver is in use so that the transmitter frequency may be located on the receiver dial. This is an invaluable aid in operating. Also, the signal derived this way often is useful in receiver alignment.

A 144-Mc. Transmitter-Receiver
The photographs show a unit which illustrates most of these ideas. It was designed for general portable use, both mobile and otherwise, with the possibility of short-period operation from batteries. Therefore it was designed for use with a telephone handset. Also, it was designed in such a way that with the help of a soldering gun the frequency could be shifted to 220 Mc. with a minimum of difficulty, but this feature has not been exploited as yet.

The r.f. section of the transmitter has three 6J6 tubes and, with one exception to be discussed in detail below, employs the circuit used by the Livingston Radio Club. 4 The receiver has a 6J6 local oscillator-mixer, two 9003 i.f. stages at 10 Mc., and a 1N34 second detector. More i.f. gain could have been obtained with 6BA6s, 6AK5s, or 6AQ5s but at the expense of greater power consumption. A 6AQ5 with suitable switching serves as a modulator in transmitting and as an a.f. amplifier in receiving.

The equipment is housed in a 4 × 5 × 6-inch box with the 4 × 6 top and bottom removable. Most of the components are mounted on a deck halfway between top and bottom. The space above and below the deck is just barely enough to accommodate the seated height of 6J6 tubes. Originally it was intended to mount the transmitter tubes downward with the circuits on top of the deck and the receiver tubes upward with their circuits below, and in this way stray coupling between them could have been avoided. The deck would have been bent when necessary to provide a little extra clearance for the 6J6 tubes. In previous units, "local" bending of a chassis or of a deck is a trick which has been employed to advantage. However, after assembly was started the plan was changed— for no very good reason — and all of the tubes were mounted upward. No difficulty has been experienced with stray coupling. Because of the greater height of the 6AQ5, its socket is mounted on a separate bracket below the main deck, and the tube protrudes through a hole. The audio tube and the 6J6 converter are mounted at the front of the deck.

The r.f. section extends across the center of the box, while the i.f. amplifier extends across the rear. Because of the great height of the i.f. transformers, the i.f. amplifier had to be mounted on a separate deck. On the front panel, at the left, is the local-oscillator tuning dial. The mixer circuit is tuned with a ceramic trimmer mounted on the deck; this circuit is quite broad and does not need to be retuned for individual stations. Also on the panel is a double-circuit telephone jack for the handset and above it a pair of pin jacks for connecting a pair of headphones in
parallel with the handset receiver. A four-pole double-throw send-receive switch is in the right-hand bottom corner. The pin jacks in the upper right corner are for the output indicator, (1) above, and the push-button switch is for turning on the crystal oscillator with the receiver in use, as mentioned earlier. On the right side of the box is the coaxial antenna connector and, not visible, a d.p.d.t. slide switch for choosing between the two crystals mounted internally. The weight of this apparatus is approximately five pounds. About a pound could have been saved if an aluminum box had been used instead of a steel one.

The present design contains one flagrant violation of good practice. Several components can not be replaced without disturbing other components although all soldered joints can be reached with a soldering gun. It is probable, however, that if suitably chosen new components had been used this bad feature could have been eliminated without resorting to a larger box. As it was, most of the components in the present apparatus came from the junk box, and in many cases they were not the most compact available. In one case a 2-watt resistor was used when a ½-watt one would have been adequate. The worst-suited components were the i.f. transformers. These were war surplus of unknown origin. Modern ones designed for f.m. broadcast receivers would have been much better; they are considerably smaller in size and would have permitted mounting the i.f. amplifier on the main deck. Furthermore, the electrical performance would have been better since these modern ones are double-tuned while the present ones are only single-tuned.

The tube line-up in the transmitter circuit of the Livingston Radio Club is as follows: one-half 6J6, harmonic crystal oscillator using an 8-Mc. crystal with output on 21 Mc.; one-half 6J6, frequency doubler; 6J6 push-pull frequency tripler; and 6J6 neutralized push-pull final amplifier. In the present circuit the order of frequency multiplication is interchanged: the second half of the first 6J6 is a frequency tripler while the second 6J6 is a parallel-connected frequency doubler. While a push-pull circuit is often preferred to a parallel one at high frequencies, there are several arguments in favor of the present arrangement. In the first place it has been supposed that greater output from a multiplier chain is obtained by placing the highest multiplying factors as early as possible in the chain. Whether this is always true the author cannot say, but with his home station transmitter operating on 21 Mc. from a 3.5-Mc. crystal, considerably more power is obtained by tripling and then doubling than by using the reverse order. And the present 144-Mc. apparatus produces the same 7 ma. of grid current in the final amplifier as reported by the Livingston Radio Club with their arrangement. Second, if operation is attempted on 220 Mc., the first two tuned circuits need not be touched with the present apparatus, while the output of the second 6J6 is tuned as a tripler and, of course, the final amplifier is tuned to the new frequency. Third, the parallel-tuned multiplier avoids the need for a split-stator condenser and is somewhat easier to assemble.

Performance

Satisfactory contacts of several miles over broken terrain have been obtained from the home location using an indoor dipole on the second floor of the house. Good performance is obtained using a "transformerless" 110-volt B supply. From the ear, similar results have been obtained using the b.c. whip as a three-quarter wavelength antenna. From a mountaintop location a 59+ report was obtained over a 60-mile path with the help of a portable 4-element beam. Reports, however, indicate that the modulation leaves something to be desired. On receiving, some trouble has been experienced from aircraft signals on the image frequency, but usually this is not serious, and if the author had to choose between the present image troubles and a superregenerative receiver, he would choose the former.

Here things are really packed in! But, as the author points out, every soldered joint is accessible. Also, considerable space could be saved by using the newer miniature components instead of older types, many of which came from the junk box in this case.

June 1953
How To Live Longer

Safety Technique for Ham Equipment

BY DONALD H. MIX * WITS

Several years ago, shocked by the sudden death by accidental electrocution of one of its foremost members, the Headquarters staff held a series of conferences. The object was to study current ham practices, particularly in regard to transmitter construction and adjustment, and to formulate a set of rules that should minimize chances of accidental injury or death. This set of recommendations was published in the March, 1939, issue of QST. Although we continue to lose good, but not always careful, hams at the rate of about three a year through high-voltage accidents, we hope that the publication of the ARRL Safety Code has served to save the lives of many others. For this reason, we feel that it is worth while to remind all hams, once again, that any piece of electrical gear is capable of dealing out sudden death.

TVI, still "just around the corner" when the Safety Code was first published, has not been without its beneficial influence on the design and construction of ham gear. Not only has it forced us into the production of cleaner signals, but the requirement of shielding enclosures has made ham rigs vastly safer to operate and work around. Today, the greatest hazard probably is the one that lurks around the test bench with its upsidedown chassis and temporary power leads. This should be borne in mind when reading the recommendations that follow.

There are two ways by which the danger may be minimized. The first is that the operator train himself to follow a procedure of operation and adjustment that will minimize his chances of coming in contact accidentally with any exposed high-voltage point. The second consists of methods of construction that will provide a minimum of exposed high-voltage points with which contact can be made. The second should actually be considered supplementary to the first to reduce the hazard, should the operator forget. It is seldom possible to construct a piece of equipment that can be handled indiscriminately with any degree of safety while the power is turned on. Of course, no ham knowingly will touch a danger point with the power turned on. But by following certain rules, the chances of a thoughtless act having a tragic result can be minimized.

Rules for the Operator

A) Kill all power circuits completely before touching anything behind the panel or inside the chassis or enclosure.

The easiest way to make sure that this rule is followed is to make the operation of turning off all power a simple one. A single main switch should be provided that cuts off all power from the equipment. The use of one plainly-labeled switch for this purpose, instead of several individual switches for various circuits, obviously not only makes it easy for you to become automatic in eliminating all danger, but it also makes it readily possible for someone else not familiar with control-circuit details to cut the power off quickly should you forget and get "hung up" across the high voltage.

Toggle switches and other similar spring-operated switches, or relays of the sort most frequently used by hams for power control, are not sufficiently reliable for this important purpose. While automatic interlock circuits are fine as secondary devices to help protect you in case of forgetfulness, don't let your life depend on them. They have been known to fail, particularly when they control relays that may stick closed at any time.

There are at least two devices for cutting off all power to the transmitter that are about as foolproof as anything could be. The arrangement is shown in Fig. 1. A and B are similar circuits for two-wire (115-volt) and three-wire (230-volt) systems. $S$ is an enclosed double-throw knife
the bench, if the latter is remote from the rig.

B) Never permit anyone else to switch the power on and off for you while you are working on equipment.

Always do the power switching yourself. Having someone else do it is too risky, even though you are giving the orders. There's too much chance of a misunderstanding and, after all, you don't want to make someone else bear the responsibility for your execution.

C) Never put your hands into any gear without first using a grounded probe at all exposed points.

Bleeder resistors, even though conservatively rated, are not infallible, and a fully-charged filter condenser can be just about as lethal as the supply with the power turned on. The probe will also serve as a secondary line of defense in case you should forget to turn the power off. Short-circuit the power supply with the probe instead of your arms. Always jab a bare terminal with the probe before changing plug-in coils. This is a good habit to form, even though you may be using parallel feed in your present rig. It may save your life some day when you're working on another piece of gear of your own or belonging to someone else. Touch the probe to all exposed points just in case a burn-out makes one point cold while others are still hot.

The sketch of a suitable homemade probe is shown in Fig. 2. The handle of the probe ought to be long enough so that you don't have to put your hand close to the equipment to use it. A total length of about 18 inches should be safe. The insulating handle and wire are to save you in case the ground lead opens up. It is obvious,

of course, that you must be sure that there is a solid circuit between the grounding point of the probe wire and the negative terminal of the plate supply (and positive terminal of the bias supply).

If you are working on gear on the test bench, make sure that power supplies and probe are connected to the same ground and that you use the probe at each power-input terminal before touching anything underneath the chassis.

D) When shooting trouble, make sure that you are well clear of the gear before turning on the power.

Don't place yourself in an awkward or unbal-

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**Fig. 1** — Reliable arrangements for cutting off all power to the transmitter. S is an enclosed double-pole knife-type switch, J a standard a.c. outlet, P a shorted plug to fit the outlet and I a red lamp.

A is for a two-wire 115-volt line, B for a three-wire 230-volt system, and C a simplified arrangement for low-power stations. All are discussed in detail in the text.

The outlet J should be placed in some corner out of sight where it will not be a temptation for children or others to play with. The shorting plug can be removed to open the power circuit if there are others around who might inadvertently throw the switch while you're working on the rig. If you take the plug with you, it will prevent someone from turning on the power in your absence and either injuring themselves or the equipment or perhaps starting a fire.

Those who are operating low power and feel that the expense or complication of the switch isn't warranted can use the shorted-plug idea as the main power switch. In this case, the outlet should be located prominently and identified by a signal light, as shown in Fig. 1C.

The test bench ought to be fed through the main power switch, or a similar arrangement at
anced position while you push the key with one hand and try to stretch around a corner to see what's happening behind the panel. If you should slip or lose your balance, you might fall into the high voltage. Use a push button, or other momentary-contact switch on the end of a cord for power control, so that you can keep yourself well in the clear. The push-button-type switch opens automatically and this might at least keep you from frying if an accident happens.

E) Stay clear of grounded metal while you're working on the rig. Don't lean against the cabinet, chassis, or other grounded metalwork. And, above all, don't wear headphones while you're working on equipment or changing coils. While the voltages in a receiver, exciter or speech amplifier may not be above 250, your chances will still be pretty slim if your head is at one end of the circuit. A good rule to follow is to keep one hand in your pocket. There will be less danger of a shock passing through a vital part of your body. If the rig or test bench is in the basement, you ought to provide a rubber mat around it.

F) Never adjust variable links by hand. Adjustable links can be highly dangerous with a series-feed tank circuit. Not only does manual adjustment bring your hand too close to the tank coil, but the clearance between the link and the tank coil is never very great, making contact between the tank coil and link all too easy. If the coil design doesn't provide a means of fitting the link with a panel control, use a long stick for adjustment. Shielded links or links grounded at one side or a center tap will prevent high voltage from appearing unexpectedly on the link cable.

G) Don't work on equipment (or try to change plug-in coils) when you're tired or otherwise not up to snuff mentally.

Mental or physical fatigue is invariably accompanied by a certain amount of absentmindedness. Wait until you are fully alert.

H) Use special care when checking tank circuits with an absorption wavemeter.

The use of absorption wavemeters in checking tank-circuit resonances and harmonics has become everyday practice, and yet what could be more dangerous than a bare coil stuck in a hot tank circuit while the operator watches the indicator rather than where he is putting the coil? Use a well-insulated link line between the tank and wavemeter coils and ground the case of the wavemeter (which should always be of metal) with a clip lead.

I) Never pull test arcs from the transmitter tank circuit.

This warning really shouldn't be necessary, of course. It is singled out from other foolhardy conduct around a transmitter only because a great many of us have a natural temptation to do it. The r.f. may not cause anything more than a nasty burn, but an r.f. arc isn't an insulator and can easily conduct d.c. through a pencil or screwdriver. Play safe and resist the temptation.

J) Teach members of your household how to apply artificial respiration.

Many lives have been saved after electrical shock by the prompt and proper application of artificial respiration by a bystander. The usual methods used by physicians in detecting life in victims of accident often do not apply in the case of electric shock. Cases are on record where victims, apparently dead, have been brought around after as much as four hours of seemingly hopeless pumping. Regardless of other indications, hope should not be given up until there is definite indication of rigor mortis. Prompt action is highly important. Don't wait for a pulmotor to arrive. Instruction sheets can be obtained from your local Red Cross office and often at fire or police stations. If possible, always have someone else in the room while you're working on equipment.

However, a most-important point is that everyone should be warned of the danger of contact with a person who has been injured and who may still be in contact with the high voltage. Make sure that members of your household understand that the power must be turned off first. There have been several instances where women and children have been killed or injured in attempting to remove an unconscious person still in contact.
Equipment Design and Construction

So much for the rules of operator conduct in the presence of electrical equipment. If they are followed religiously, there is small chance of an accident. However, forgetfulness is a part of human nature and the unfortunate part of it is that electricity has no sympathy for a first-time offender. The first moment of forgetfulness may be your last! Therefore, it is the sensible ham who will construct his equipment so that it won't be easy to get hurt even if he forgets.

1) Panel Controls and Metering

It shouldn't be necessary to point out that every control shaft extending through the front of the panel should be at ground potential. To make certain of this, ground every control shaft to the panel either directly or by the use of panel-bearing units wherever an insulating shaft coupling is used. The frames of key or metering jacks must be fastened to the grounded panel. Never mount them with insulating washers. This, of course, essentially dictates metering and keying in the cathode or center tap.

If you want metering in the positive leads, use meter switching instead of jacks. Meters, unless connected in the cathode or center tap lead, should be recessed so that there will be no danger of contact with the adjusting screw.

2) Power Supply

Enclose all power supplies, or construct them so that contact with any part of the circuit is impossible. You don't want to stick your knee into the power supply while you're concentrating on keeping clear of the r.f. units. Power supplies seldom need adjustment, and there is no reason why they can't be enclosed. However, most modern power-supply components are designed so that they may be mounted with their terminals protruding under the chassis where there is normally little chance of accidental contact. Recifier plate caps should be of the insulated type. Similarly there should be no exposed terminals. Use insulated plug-type connectors designed for the proper voltages at the test bench as well as at the rig. In using these connectors, make sure that all live connectors are of the female type. For example, always use a female connector on the power-supply chassis, and another at the transmitter end of the cable. Use a male connector on the transmitter chassis.

All negative plate-supply and positive bias-supply terminals should be connected to the chassis and the chassis connected to a water pipe or other good ground connection. Then there will be no chance of your serving as a ground wire should some component break down, making the chassis hot. For the same reason, all transformer and choke cores and other metalwork not normally a part of the electrical circuit should be grounded to the chassis. If the power supply is to be mounted above other units, its chassis should be provided with a bottom cover plate.

Every power supply should be equipped with a conservatively-rated bleeder resistor. If the bleeder resistor is placed on top of the chassis for ventilation, cover it with screening or perforated metal.

In these days of TVI, it is good practice to use shielded wire for external power cabling. If the shielding is grounded, it will protect you in case of an insulation breakdown.

3) R.F. Units

The requirement of grounded shielding enclosures for TVI makes the use of coil switching highly desirable for the sake of convenience. It also provides a great factor of safety. Since it is almost impossible to change a plug-in coil in a shielded rig without making contact with grounded metal as well as the coil, it ought to be made a general rule to use parallel feed in all circuits where plug-in coils are used. If you must use series feed, use coil switching. However, it doesn't do much good to use parallel feed if there are other exposed high-voltage points in the vicinity of the coil. Use insulated plate connectors for tubes with cap terminals, insulated plate leads, and place r.f. chokes under the chassis or cover up choke terminals and those of blocking condensers.

Pi-section tank circuits do not provide a d.c. path to ground in case the blocking condenser

(Continued on page 110)
Ask any ham what his biggest operating headache is and nine times out of ten it will be the same story — QRM. It can be doggone discouraging to have contact after contact messed up by interference. However, we don’t have to grin and bear it! There are methods of improving receiver selectivity that, when applied, will help relieve the interference problem. The method we are going to discuss is one which uses a device applied to the audio end of the receiver. It is a simple and inexpensive means of eliminating an interfering signal. There is nothing new about this gadget — it was first described in QST in 1939 by W1VW. But like many good gimmicks in amateur radio, such items need to be revived from time to time, to let the newer crop of amateurs know that such devices exist.

The hetrodol (heterodyne-filter) consists of three variable resistors, two fixed resistors, two paper condensers, a headphone plug and jack. The total cost of the unit is $3.50 and it can be put together in about one hour’s time. However, before discussing actual construction details, let’s talk about receiving for a minute so we’ll have a clear picture of what the hetrodol will accomplish.

As we know, a c.w. signal is not modulated. To hear one, we must insert another signal into the receiver and beat the two signals together to hear the c.w. signal. That’s why we need a beat frequency oscillator in a receiver. To get a clear picture in our minds, let’s assume that we tune the beat oscillator signal to one point and leave it there. If we tune a c.w. signal to the same frequency, the two signals will be zero beat and neither will be audible. As we tune the c.w. signal away from the fixed b.f.o. signal, the c.w. signal will beat against the fixed signal, causing an audio note that we can hear. The pitch of this audio note will depend on the frequency difference between the fixed signal and the c.w. signal. If it is 1000 cycles (1 kc.) we will have a 1000-cycle audio note. If it is 2000 cycles we’ll have a 2000-cycle note, and so forth. For practical purposes, it can be said that the average receiver has an audibility range of from zero beat to approximately eight to ten thousand cycles.

Keeping the idea of a fixed b.f.o. signal in our minds, let’s carry our thinking a little further. Suppose we have two c.w. signals separated by 2000 cycles. They are close enough to interfere with each other, and if we want to copy just one of them, our problem is to get rid of the interfering signal. If we tune the interfering signal so that it is zero beat with the b.f.o., the beat frequency becomes so low it can no longer be heard. By the same process, we can tune the interfering signal to such a high pitch that we cannot distinguish it. These two methods are tricks old-timers use in cutting down QRM. This method of tuning out interference works fine when there are only two signals present but what happens when there are three signals coming in together? Here is where we can put the hetrodol to work.

The hetrodol can be adjusted to eliminate any audio beat note that appears in the 300- to 8000-cycle range. Using three signals for an example,
let's put one at 2000 cycles, one at 4000 cycles, and the other at 6000 cycles. We can dispose of the 2000-cycle note by tuning it to zero beat with the b.f.o., thus getting rid of one of the interfering signals via the tuning method. This leaves us with signals having a 2000-cycle note and a 4000-cycle note. Let's assume that the 4000-cycle signal is the one that is interfering. We adjust the heterofoil so that the 4000-cycle note is attenuated, and now we have our 2000-cycle signal free of QRM. If it is the 4000-cycle note we wish to copy, we can adjust the heterofoil to take out the unwanted 2000-cycle signal. This is one example of eliminating two interfering signals. If the receiver in use has a crystal filter, the heterofoil can be used in conjunction with the filter to improve the selectivity of the receiver. We have only talked about getting rid of c.w. interference but the heterofoil will also serve well in cutting down 'phone heterodynes. In the case of a 'phone signal being heterodyned, the heterofoil is adjusted to reject the unwanted beat.

Construction

It was decided to use the lid of a plastic icebox dish for the chassis. These plastic boxes are available in all dime stores and are easy to work with,

![Circuit diagram of the audio heterodyne filter.](image)

**Fig. 1** — Circuit diagram of the audio heterodyne filter.

C₁, C₂ = 0.1-adl paper.
R₁A, R₂ = 10,000-ohm dual variable (IRC No. Q11-116 and M11-116).
R₃ = 50,000-ohm variable (IRC No. Q11-123).
R₄ = 120 ohms, 0.5 watt.
R₅ = 330 ohms, 0.5 watt.
J₁ — Single-pole open-circuit jack.
P₁ — Two-way headphone jack.

although some caution should be observed when drilling the material. If too much pressure is applied to the drill, the plastic is likely to crack. In the heterofoil shown in the photographs, the location of the mounting holes was marked and then drilled with a small drill. The holes were then enlarged with a larger drill.

Before actually wiring the heterofoil, first determine if your receiver has high- or low-impedance output at the headphone jack. Your receiver instruction book may give this information in the description of its audio section. If it doesn't, it is a simple matter to check the circuit diagram and see if it is high- or low-impedance output. If the headphone-jack leads are connected to the secondary of the audio output transformer, the receiver has low-impedance output. If the headphone leads are capacity-coupled to the plate of the audio tube, the receiver is high-impedance output. Most of the present-day receivers have low-impedance output. If your receiver has low-impedance output, the values shown in Fig. 1 are suitable. If the receiver has high-impedance output, R₅ should be 6800 ohms and R₄ should be 15,000 ohms. This is to provide a better match between the output of the receiver and the input of the heterofoil, and thus minimize any loss in receiver volume caused by the use of the heterofoil.

With the heterofoil viewed as in the bottom view photograph, the following terminals on R₁A, R₁B, and R₂ all are joined with a single wire: the twowright-hand terminals on R₂, the two right-hand terminals on R₁A, and the two right-hand terminals on R₁B. A lead is run from this same wire to one of the terminals on J₁. Also connected to this terminal is one side of C₂. The other lead of C₂ is soldered to the left-hand terminal on R₁B. Also connected to the left-hand terminal of R₁B is a lead from the left-hand terminal of R₂, one side of R₅, and one lead from P₁. One lead of C₁ is connected to the left-hand terminal of R₁A and the other lead to a junction of leads from R₄ and P₁. The two remaining leads from R₃ and R₄ are connected to the remaining terminal on J₁.

Operation

After the heterofoil is wired, the plug, P₁, can be plugged into the headphone jack on your receiver. Then plug your headphones into the heterofoil and the unit is ready for use. You will probably notice a slight decrease in audio with the heterofoil in use but most receivers have audio volume to spare. Tune the receiver until you find two signals of nearly the same beat note (this should be easy). Pick out the signal you wish to copy, and adjust the dual potentiometer, R₅, to minimize the undesired signal. After you've reached the minimum response point, adjust R₅ for further attenuation of the interference. This last adjustment will be broad, since the setting of R₅ is not as critical as that of R₁. You'll find that when the heterofoil is properly adjusted, an interfering signal is greatly reduced in volume. Once you become accustomed to using the heterofoil, many of those uncompleted QSOs will be "100 per cent copy."

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Magnetostriiction Devices and Mechanical Filters for Radio Frequencies

Part I—Magnetostriction Resonators

BY WALTER VAN B. ROBERTS, W2CHO

Iron is, of course, the most commonly used magnetic material. But nickel is also strongly magnetic, as is easily seen by the way it sticks to a magnet. In addition, nickel is relatively strongly magnetostrictive; that is, the length of a piece of nickel will change when it is magnetized. The actual amount of change is very small, not over one part in 20,000, but even this small amount is large compared with what is found in most magnetic materials, and is sufficient to be put to practical use.

Fig. 1 shows how the length of a piece of nickel wire varies with its magnetization. The same sort of curve applies to other magnetostrictive materials, except that the amount of change is usually much smaller and some materials lengthen instead of shrinking when magnetized.

Fig. 2 shows how mechanical vibrations can be produced in a nickel wire by means of magnetostriction. The permanent magnet is placed near enough to the wire to cause it to shrink about half the maximum possible amount. Then when current flows in the coil it will either decrease or further increase the amount of shrinkage, depending on whether the magnetizing effect of the coil opposes or aids the field of the magnet. If the current is alternating, the length of the wire will vary at the frequency of the current. The constant field of the magnet will be called the magnetic bias, and the field of the coil will be called the driving field. (The bias could also be produced by a d.c. component of current in the coil, or by permanent magnetization of the nickel.) Thus, the magnetic bias and the driving field correspond somewhat to the voltage bias and signal voltage on the grid of an amplifier tube.

If the frequency of the driving field is not near the natural frequency of vibration of the wire, the variation in the wire length will be extremely small. But if the piece of wire in Fig. 2 is one inch long and the frequency of the driving current is about 100 kc., a much greater amplitude of vibration occurs. The one-inch length of wire has a natural frequency of longitudinal vibration at about 100 kc. When the driving-current frequency is made to match the mechanical resonance of the wire, considerable mechanical power is transferred to the wire and the vibration of the wire reacts upon the driving coil just as though the wire were a sharply tuned electrical circuit loosely coupled to the driving coil. This reaction can be observed by connecting the driving coil to a Q-meter. Then when the frequency of the Q-meter is slowly shifted through the resonant frequency of the wire, the apparent Q of the coil takes a sharp dip. The sharpness of the dip depends on the mechanical Q of the wire resonator.

The term "mechanical Q," as applied to a mechanical resonator, means the number of cycles of vibration required for the amplitude to die down to 4.32 per cent of its original amplitude after the driving force is removed. (This same definition applies to the Q of a tuned circuit.) In general, the Q of a mechanical resonator is much higher than that of the best tuned circuits and this is one of the great advantages of mechanical resonators.

*155 Hodge Road, Princeton, N. J.


**Ferrite Resonators**

The use of nickel and other metal rod resonators in the manner illustrated in Fig. 2 is nothing new, but has not been very widespread because resonator materials known heretofore have been metallic and hence cause large eddy current losses which spoil the $Q$ of the driving coil. Also, the mechanical $Q$ of a nickel resonator is only a few hundred. (Many metals have mechanical $Q$s up to ten thousand, but are not magnetostrictive). There has recently become available, however, a new group of magnetic materials, called ferrites, that are much better adapted to magnetostrictive resonator use. Ferrites are more in the nature of ceramics than metals, and may have high electrical resistivity so that eddy-current losses are negligible. Their mechanical $Q$ is of the order of several thousand, and some are strongly magnetostrictive. Their permeability is usually high and when a ferrite resonator is put in a coil it may greatly increase the $Q$ of the coil itself. The longitudinal vibration frequency of a ferrite rod is about 103 kc divided by the length of the rod in inches.

Ferrites are made by mixing powdered Fe$_3$O$_5$ with various proportions of other metallic oxides, pressing to the desired shape, and firing at 1300 to 1400 degrees C. The mix can also be extruded in the form of rods or tubes. After firing, it is too hard and brittle to machine. It can be ground or cut with a diamond saw. The permeability, magnetostrictive activity, and improvement of coil $Q$ are determined by the proportions of the oxides forming the ferrite. No one composition makes all these quantities maximum; the composition to use depends upon the job it has to do. A good magnetostrictive ferrite can be made of “equi-molar” proportions of iron and nickel oxides; i.e., 150.68 grams of Fe$_3$O$_5$ and 74.69 grams of NiO. More detailed information about ferrites may be found in the September, 1950, issue of the RCA Review.

**Coefficient of Coupling**

When two electrical circuits of low losses are tuned to the same frequency ($f_0$) and coupled together, two resonant frequencies are found in the system. For example, if one of the circuits consists of a coil and the variable condenser of a Q-meter, then as the frequency of the Q-meter is varied, two peaks of the meter will occur as shown in Fig. 3. If the second circuit is sufficiently low-loss, the coefficient of coupling between the two circuits is given by $f_2 - f_1 \over f_0$.

Now let the second circuit be removed and a ferrite resonator (suitably magnetically biased) put in the first coil, as shown in Fig. 4. With the coil tuned to the same frequency ($f_0$) as the resonator, the Q-meter will behave exactly as before. Hence, the quantity $f_2 - f_1 \over f_0$ may be defined as the coefficient of coupling between the coil and the ferrite. This quantity is a more useful measure of the magnetostrictive activity of the material for circuit calculations than the “magnetostrictive coefficient,” which merely gives the amount of stretch or shrink in length that can be produced by magnetizing. The coefficient of coupling can be decreased by removing the resonator more or less from the coil or by decreasing the bias, but cannot be increased beyond an upper limit determined by the nature of the material. This limit is of the order of 10 per cent for ordinary coils and ferrites made for good magnetostriction.

From the coefficient of coupling it is easy to show that a coil with a ferrite resonator in it (Fig. 5A) is equivalent to Fig. 5B. Here $L$ is the inductance measured at a frequency far from the ferrite resonance and $k$ is the coefficient of coupling measured as described above. The condenser and resistor give the equivalent circuit the same frequency and $Q$ as the ferrite resonator.

**Ferrite Oscillator**

Probably the simplest use of a ferrite resonator is as the frequency control element of an oscillator. Fig. 6 shows a suitable circuit. In the absence

**Fig. 3** — Q-meter response as the driving frequency to a pair of coupled circuits, both tuned to the same frequency, $f_0$ is varied. The peak separation increases with the coefficient of coupling.

**Fig. 4** — Set-up for measuring the coefficient of coupling between a tuned circuit and a ferrite-rod magnetostriction resonator.

**Fig. 5** — The equivalent circuit, B, of a magnetostriction resonator coupled to a coil.
of vibration of the resonator there is nothing but inductive reactance between $P$ and ground, and therefore oscillations cannot occur. Just above the resonant frequency of the ferrite, however, the total effective reactance between $P$ and ground is capacitive (see Fig. 5B). The circuit will then oscillate if $L$ and $C$ are tuned to the approximate frequency of the ferrite—that is, provided there are not too few turns on the ferrite coil, the tube transconductance and coil $Q$ are not too low, and the coefficient of coupling between the ferrite and its driving coil is not too small. The cathode resistor provides initial grid bias which makes oscillation start more easily. The magnetic bias not only affects the ease of starting but will also be found to have some control over the frequency of oscillation, perhaps to the extent of a per cent in some cases. With this circuit, oscillations should be obtainable up to a few hundred kc., using a 6J6 tube running about 2 mils plate current per plate, even with the ferrite driving coil reduced to a very few turns.

**Permanent Bias**

A rod of steel or nickel can be permanently magnetized so that it becomes a bar magnet with north and south poles at its ends. Rods of cobalt ferrite can similarly be permanently magnetized. Unfortunately, however, the kind of ferrite that has good magnetostrictive action is demagnetized so easily that the poles at its end, created by magnetizing the rod, act to demagnetize it as soon as the magnetizing field is removed. This drawback does not occur when there are no poles developed by magnetizing. For example, if a ferrite torus (or any piece of ferrite with a hole in it) has a wire passed through the hole and connected briefly to a battery of $1\frac{1}{2}$ to 6 volts, as shown in Fig. 7, the ferrite will be magnetized with closed loops of magnetic flux linking the wire. No free poles are produced so the magnetization remains and can be used as permanent bias for resonator operation in the modes of vibration that require a bias of this sort.

To produce permanent circular bias by means of a flash of current requires that the ferrite have a hole in it. However, it is possible to produce a certain amount of "circular bias" in a solid piece of ferrite by means of magnets, as shown in Fig. 8. Here two horseshoe magnets are put together except for a gap that is considerably smaller than the ferrite to be magnetized. The ferrite is placed against the gap as shown, then moved away. As a result of the easy saturation of ferrite, a small permanent circular bias remains. However, it is much better to use the current method if there is a hole in the ferrite.

**Vibrations Using Circular Bias**

The simplest type of vibration that uses circular bias is the radial vibration of a ferrite torus with a toroidal driving winding on it. The flux produced by the winding alternately adds to and subtracts from the permanent bias flux, thus causing the circumference of the torus or ring to vary at the frequency of the driving current. As the circumference varies so must the radius, and the actual motion of all parts of the ring is in and out from the center. To give an idea of dimensions, a thin ferrite ring one inch in diameter would resonate in this mode at about 65 kc., and for other diameters the frequency would be equal to 65 divided by the diameter in inches.

The maximum possible coefficient of coupling between a tuned circuit and a ferrite resonator is obtained when the coil is wound toroidally on a radially vibrating ring and the bias is optimum. A toroidal winding of many turns is a nuisance to put on, especially since it must not be tight on the ring, which would interfere with the vibrations. However, a few turns may suffice for some purposes. For example, oscillations can be produced in the circuit of Fig. 6 if point $P$ is connected to ground by a single short piece of wire passing through a ferrite ring. This might be called a

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**Fig. 6** — Magnetostriiction oscillator using a ferrite rod.

**Fig. 7** — Method of permanently magnetizing a ferrite torus.

**Fig. 8** — Inducing permanent circular magnetization in a ferrite cylinder or disk.

**Fig. 9** — Transformer-coupled link for coupling to a ferrite torus.
"one-turn toroidal winding." Of course, oscillations are obtained more easily if several turns are used. The effect of a multiturn winding may be obtained to some extent by transformer action, as shown in Fig. 9. Here a multiturn winding, consisting of two "pies" on a magnetic core, acts as one winding of the transformer while a turn or two of wire around the core acts as secondary winding and is connected to a one-or-more turn toroidal winding on the ferrite resonator ring, \( R \). This arrangement works very much as if the many turns were wound directly on the resonator; that is, provided a good high-permeability core is used, such as a piece of high-permeability ferrite. The core, of course, does not vibrate mechanically; it acts only in the ordinary way as the core of a transformer.

**Crossed Fields**

So far it has been assumed that the driving flux alternately adds to and subtracts from the bias flux. What happens if these fluxes are at right angles to each other? One way to figure this out is to suppose we have a square piece of ferrite with a bias field across between one pair of opposite edges and a driving field at right angles, as shown in Fig. 9. The bias field may be represented by a large vertical vector and the driving field by a small horizontal one. But it is equally possible to consider the bias vector as composed of two large diagonal vectors and the driving field as the resultant of two small diagonal vectors, as shown. It is now seen that along one diagonal the fields aid and along the other diagonal they oppose.

Thus, the effect of the driving field is to distort the square into a slightly diamond shape. Such a distortion is called a "shear" and the perpendicular arrangement of bias and driving fluxes can be used to drive resonators whose vibrations set up shearing stresses. Perhaps the simplest example of such a resonator is a cylinder or pipe vibrating torsionally; that is, one end rotates one way while the other end rotates in the opposite direction. The center does not turn but the greatest shearing stress or twisting force occurs there. Fig. 11 shows a ferrite tube, permanently biased as previously explained, with a driving coil located over the node of motion (shown dotted). The frequency of a torsional resonator of this sort depends only on its length, and for ferrite the frequency in kilocycles is approximately 65 divided by the length in inches. (It is just a coincidence that a magnetostrictive ferrite has approximately the same frequency for a torsional resonator of length \( L \) as for a radially vibrating ring of diameter \( L \)).

Another example of a vibration mode involving purely shearing stresses is shown in Fig. 12A. Here the outer portion of a disk rotates in one direction while the inner portion rotates oppositely. Between these rotations is a ring of no motion which is called a "nodal ring." This type of vibration might be called concentric shear because the motions are in concentric circles and the stresses are pure shear. The frequency depends on the size of the hole. If the hole is very small, the frequency for a ferrite disk is approximately, in kilocycles, 215 divided by the diameter of the disk in inches. It will be noted that it is independent of the thickness. If, on the other hand, the hole occupies most of the disk, the frequency becomes approximately 131 divided by the difference between outer and inner diameters. Fig. 12B shows how a flat coil is placed against one side of the disk to drive it in the concentric shear mode. The dotted line represents a typical line of driving flux. The bias flux lies in concentric circles within the material, thus being at right angles to the radial driving flux. A better coupling can be obtained by enclosing the driving coil in a "pot" of magnetic material, as shown in Fig. 12C, and a still further improvement should result from using another similar driving system on the other side of the disk.

The second part of this article, to appear in a subsequent issue, will discuss applications of mechanical resonators and the use of ferrites in filters. — Editor
The Electronic Voltmeter in the Amateur Station

Practical Suggestions for Testing and Servicing Equipment

BY MACK SEYBOLD,* W2RYI

There is an old philosophy among engineers, probably dating back to Archimedes, which states "if it can be measured, it can be fixed." Problems in a variety of fields will yield solutions if an appropriate yardstick is applied. When the magnitudes of the variables involved are measured and recorded, a practical comprehension of the forces at play will often be established. Many times, when an apparent dead-end street has been reached on a development, design, or maintenance problem, an attack with measuring equipment quickly opens up a new road through the problem, and the solution is reached with ease.

In problems that arise from amateur equipment, the primary points of attack are on voltage, current, resistance, capacitance, inductance, and time. The latter three, especially where the time factor represents high frequency, are measurable with oscilloscopes, frequency meters, inductance and capacitance bridges, signal generators, and the like, and much can be learned of circuit behavior with equipment of this type. Some of these r.f. devices are almost indispensable, and the minimum equipment required of the amateur by the FCC includes a meter capable of checking the frequency of the emitted signal. The other high-frequency gadgets are helpful in building and maintaining a station, and a program to construct such equipment assures progress in the development of a station.

Fortunately, much of the behavior of high-frequency radio equipment can be evaluated by measurement of d.c. in the circuits. If equipment is available to measure d.c. voltage, resistance, and low-frequency a.c. voltage, not only the d.c. and low-frequency a.c. circuits can be kept under control, but the high-frequency portions of the equipment can also be controlled.

An ideal meter for making d.c. measurements would produce no change in operating conditions when placed in a circuit to be tested. It would have infinite resistance and zero shunt capacitance. To be flexible enough to handle most

Fig. 1 — Amateurs who are inclined to build their own v.t.v.m. might wish to employ this circuit, used in the RCA Junior Voltomnysut. A 200-μa. meter movement is required. Values marked * are subject to variation in individual instruments.

28 QST for
jobs, it would have a range from 1 to 30,000 volts. A practical meter, of course, would have to be a compromise, because some small amount of power must be consumed to deflect the needle. Meters that take the least power also are the most expensive to buy, are somewhat sluggish, and are extremely delicate. A practical meter is one that is sensitive, yet rugged.

**Amplifier-Meter**

A rugged meter-movement can be made into a sensitive measuring device by incorporating a vacuum-tube amplifier in the system. In this way, a meter movement that might require 1 milliwatt for full-scale deflection could be made to deflect equally with 1-microwatt input to the amplifier; this change represents a power-sensitivity gain of 1000. With the addition of the amplifier, the instrument approaches the ideal condition of being able to be placed in a test circuit without changing the characteristics of the circuit. For example, in a high-resistance circuit, a 1000-ohm resistor carrying 1 ma. of current would have a 1-volt drop. If the usual 1000-ohms-per-volt meter having a 1-volt scale and an internal resistance of 1000 ohms were used to measure this voltage drop, the meter would read 0.5 volt, which is a 50 per cent error. If a vacuum-tube voltmeter having 11 megohms internal resistance were used, however, the drop across the system would be 0.999 volt and the measuring device would read within a gray's eyebrow of the correct value of one volt.

Another feature of the vacuum-tube voltmeter is the ease with which it can be adapted to a variety of measurements. Modification of the input circuits and set-up of various conditions by means of a switch makes it possible to perform a number of operations and encompass a wide range of readings with one instrument. For example, a 1-megohm resistor can be used in the tip of the d.c. probe. The resistor isolates r.f. from the vacuum-tube meter-amplifiers, and only about 2 micromicrofarads shunt capacitance is applied to the circuit being tested. Thus d.c. voltage readings can be taken right at the control-grid terminals of r.f. oscillators and amplifiers. Some of the later designs of vacuum-tube voltmeters also have the ability to measure a.c. in the presence of d.c., as well as being able to measure d.c. in the presence of a.c. Fig. 1 gives the circuit diagram of a representative vacuum-tube voltmeter, and Fig. 2 shows the details for the high-voltage and demodulator probes which add to the usefulness of the equipment.

The vacuum-tube voltmeter, whether a commercial unit or a home-built device, is a versatile yardstick for comprehensive control of transmitters, receivers, and amateur gadgets during design, development, and maintenance operations.

**Equipment Servicing**

The d.c. voltages at specific junctions in a circuit reveal a great deal about the behavior of the circuit. The published diagrams of almost all commercial electronic equipment show the voltages at the important component terminals. These voltages are measured with high-resistance meters on equipment that is functioning properly. In the servicing of these devices, one of the first operations is to check the voltages in the sections that are suspected of functioning improperly. The path to the defect is often discovered by finding a voltage that differs from the published value. Then, the defective component is actually

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*Fig. 2—Safety First! Experimenters who habitually apply ordinary test leads to high-voltage transmitter circuits can improve their life expectancy by using a high-voltage probe as shown at top. The lower photo shows the construction of a crystal diode probe for demodulating r.f. signals. (Photos courtesy of RCA)*

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Fig. 3 — Power supply. Points to measure for evaluation and control of components.

Fig. 4 — Measuring resistance above 1000 megohms with an external voltage supply.

Fig. 5 — Class A audio amplifiers, resistance-coupled and transformer-coupled. If \( E_x \) varies as the input signal-level is changed, the No. 1 grid is drawing current, and the stage is either being overdriven or the biasing voltage between grid and cathode is inadequate. The d.c. voltage, \( E_x \), is measured with a v.t.v.m. that is unaffected by a.c. when d.c. is being measured. A.c. voltages are measured to ground.

Fig. 6 — Class B modulator. Turns ratios on \( T_1 \) and \( T_2 \) can be determined by feeding a 6.3-v. a.c. signal from a filament supply line to one winding, and measuring the output voltage on the other winding. 

\[ E_{\text{out}} = \frac{E_x}{R_x} \]

The modulator can be checked by applying an audio tone signal (WWV is a convenient source) to the amplifier, loading the output transformer secondary with a resistor, \( R_{\text{load}} \), of the correct value, and reading \( E_{\text{out}} \) across the resistor. Watts output = \( E_{\text{out}}^2 \). During the power-output test, record the input signal so that conditions can be reproduced for trouble-shooting tests.

\( E_x \): Power-supply regulation can be checked here, comparing zero signal to maximum-signal voltages.

Fig. 7 — Class A r.f. amplifier. Plate, screen, and cathode voltages are checked as indicated. Voltage on the a.v.c. line with no signal will run between \(-0.2\) and \(-1.5\). With strong signals, it will increase to \(-3\) or more volts. Leakage at \( C_x \) will impair normal a.v.c. action.
Fig. 8 — Pentagrid converter. Other mixer circuits may involve a separate local oscillator. In any case, the No. 1 grid voltage ($E_g$) developed in the oscillator section indicates the behavior of the oscillator. Plate and screen voltages and current should be near the published value for the particular tube used.

Fig. 9 — Beat-frequency oscillator. This is a typical grounded-plate circuit used for b.f.o.s and local oscillators. Amplitude is checked at $E_x$.

Fig. 10 — VR-tube regulator. $R_L = \text{equivalent load resistance. } E_2 = \text{voltage rating of the VR tube. } E_1 \text{ should exceed } E_2 \text{ by at least 50 per cent. } \frac{E_1 - E_2}{R} \text{ should not exceed 40 milliamperes if } R_L \text{ is ever disconnected. } R_L \text{ should be high enough in resistance to maintain ionization glow in the VR tube.}

Fig. 11 — Crystal oscillator. A number of different circuits are utilized as crystal oscillators, but all can be checked for operating values as shown here. Activity of the system should be periodically checked at $E_x$.

Fig. 12 — Frequency doubler. The d.c. voltage at $E_x$ indicates the amount of drive. It is important to maintain the correct screen voltage in doubler and amplifier circuits.

Fig. 13 — Class C amplifier. An r.f. probe can be used as a neutralizing indicator by coupling to the plate tank with a two-turn link.

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located by resistance measurements or leakage measurements.

A similar record of voltage measurements in home-built equipment can save time and worry when difficulties arise. When a device is complete and operating properly, spot the circuit diagram with the observed values of voltage, and keep the diagram handy for subsequent servicing. Also, when equipment is still in the developmental stage, a running record of the voltages available at strategic points is often valuable.

In Figs. 3 through 13, the diagrams of the basic circuits used in amateur transmitters and receivers are marked at the strategic voltage points. In these diagrams, capacitors and resistors are also indicated. A knowledge of the value of each resistor helps in tracking down a short, open, or leakage path. The value of resistors also may change with time and temperature. Capacitors in which high-resistance leakage will cause circuit failures are marked \( C_x \). All other capacitors are subject to the more general problems of short and open circuits.

**General Procedure**

"Safety-first" procedures should be followed when any electrical equipment is used. When voltage is measured with a vacuum-tube voltmeter, the safest and most practical approach is to take the readings with respect to a common ground. In many vacuum-tube voltmeters, one side of the circuit is connected to the chassis and metal case. This arrangement provides for maximum r.f. shielding and eliminates hazards due to short circuits inside the instrument. When such an instrument is used, however, the metal case is at the same potential as the "ground" lead; this lead, therefore, should not be connected to any point which is at appreciable voltage above ground. The voltage between two points above ground can be determined safely and easily by point-to-ground measurements and the simple process of subtraction or addition. For example, it may be desirable to measure the grid-bias voltage in a resistance-coupled cathode-resistor-biased amplifier stage. Off-hand, it would seem that the voltage across the cathode resistor is the bias voltage, but this is not necessarily true. There may be tube-gas current flowing through the grid-return resistor which will make the grid more positive, or there may be contact-potential current flowing which will make the grid more negative.

With a vacuum-tube voltmeter, it is possible to check the voltage between grid and ground, and then subtract or add this voltage to the cathode-resistor bias voltage to get the total effective bias voltage. The d.c. plate and screen current in the tube can be determined by dividing the cathode-to-ground voltage by the value of the bias resistor.

When measuring resistance or capacitor leakage, disconnect one terminal of the component before making the measurement. Be sure to discharge larger capacitors before attempting to check for leakage with the ohmmeter.

Fig. 3 shows the measuring points for examination of power supplies. The output ripple voltage, if troublesome and in the order of a volt or more, can be measured with the a.c. probe. Modern vacuum-tube voltmeters employ d.c.-isolated a.c. facilities which allow direct measurement of a.c. even when d.c. is present. For lower levels of ripple, an audio amplifier connected across the terminals \( X \) and \( Y \), and suitably isolated from the d.c. voltage, may be utilized to check the hum level.

(Continued on page 110)

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*The values given for resistance and charging time are only typical values for the guidance of the experimenter. They should not be considered as limits or quality end points.
A Single-Package Mobile Unit for 28 Mc.

Combining the Converter and Transmitter for Compactness and Convenience

BY ROBERT F. TSCHANNEN,* W9LUO

It is the author's belief that there is many a ham who has denied himself a mobile installation because he has preferred not to clutter up his new car. This is an understandable attitude. Certainly, if we were to examine a typical 10-meter mobile installation, we would see the reason. The layout usually consists of a separate converter, separate transmitter, control box, dynamotor, rear-mounted whip antenna and, of course, the auto receiver. Accompanying these units is usually a rather extensive assortment of interconnecting cables. The use of such individual appendages may sometimes be an advantage and, if reasonably high power is used, they may be quite necessary. It is seldom easy to remove or install such a complete system.

If one is willing to accept a few compromises it is possible to assemble the complete converter, transmitter, and controls in a small single package, and operate the unit from the existing auto-receiver power supply, using the standard 56-inch automobile whip antenna. The single-package mobile unit described does just this. It is small and compact, mounts with three screws and can be installed or removed in about one minute. The panel space needed is only 2 by 7 inches. If you dislike drilling holes in the new car, this is the rig for you. Costwise, the unit appeals to the OM's pocketbook; because it is quite inconspicuous, the XYL is not likely to object, either. Of course, the absence of the long rear-mounted whip antenna makes you less the object of curiosity of neighbors and local citizens.

There was a mention of compromise above. Just what is the nature of the compromise? The output capability of a typical auto receiver with 6X4, 7Y4, or 6X5GT rectifier is about 230 to 250 volts at 70 ma. A few receivers which provide 8- to 10-watt audio capability employ synchro-

uous vibrators and can deliver 240-265 volts at 100-120 ma. with ease. In most cases, the receivers with 70-100 ma. capability can be adapted to provide final-amplifier input powers of 6 to 10 watts and also the necessary current for a Class B modulator, r.f. and a.f. driver stages. Care must be taken, however, to keep the current drain on all stages at a reasonably low value. Therefore, we are somewhat limited on input power when we operate from an auto-receiver vibrator supply.

The other compromise is in the use of the standard 56-inch automobile whip antenna instead of a 96-inch rear-bumper type. The 75-meter mobile hams load 96-inch whips at the center, or at the base, with quite satisfactory results. A 56-inch whip antenna, which is a little more than 1/2 wavelength on 10 meters, can be loaded to 20 Mc. in the same manner. We can couple directly out of a pi network and tune out the capacitance of the short transmission line and also that of the antenna, the reactance of which is capacitive when shorter than a quarter wavelength. The radiated field from the 56-inch antenna is, of course, somewhat less than that from a 96-inch type, but we have kept the system simple, clean-cut, and compact. The receiving

Transmitter and modulator tubes are mounted on top of the chassis. The transmitter-adjustment controls and the crystal are accessible along the side. The output connector is toward the rear. The slug screw on top is the mixer output adjuster.

* W9LUO describes here a compact 10-meter mobile unit that includes the converter as well as a 10-watt plate-screen-modulated rig—all operating from the b.c.-radio power supply, and using the car whip antenna. It should have appeal to the would-be mobile ham who shudders at the idea of drilling holes and running cables which usually characterize such rigs, since only three mounting screws are required. It can be installed in a matter of minutes.

This compact unit contains both a converter and 10-watt mobile transmitter for the 10-meter band. On the front are the converter tuning control, filament switch and b.c.-b.f. switch. Along the side are the microphone connector, power cable and the test jack, J4.
Fig. 1 — Circuit of the mobile converter-transmitter unit for 28 Mc. The circuit is powered from the car-radio vibrator supply through P1. (See Fig. 2.) Power is switched by the relay K1. J4 provides terminals for checking grid current of the doubler stage, and grid and plate current of the output stage.

C1, C7 = 22-pf. silvered mica.
C2, C4, C6, C8, C10, C11, C22, C23, C36 = 0.001-pf. disk.
C5, C9 = 47-pf. silvered mica.
C6, C12, C25 = 100-pf. mica.
C13 = 300-pf. (max.) mica trimmer.
C17 = 75-pf. midget variable.
C18 = 100-pf. midget variable.
C14 = 220-pf. mica.
C15, C18 = 0.01-pf. disk.
C16 = 20-pf. 25-volt electrolytic.
C19 = 10-pf. 350-volt electrolytic.
C20 = 20-pf. 350-volt electrolytic.
L1, L2 = 0.001-pf. 100-volt mica.
C19, C26 = 56-pf. silvered mica.
C19, C27 = 6-pf. ceramic trimmer (Centralab 829).
C20 = 3-section 35-pf. midget variable (see text).
C29 = 1-pf. (twisted-wire or similar).
C30, C32 = 0.005-pf. disk.
C31 = 68-pf. mica.
C33 = 110-pf. silvered mica.
C34 = 91-pf. silvered mica.
C35 = 39-pf. silvered mica.
R1, R2, R3 = 47,000 ohms, ½ watt.
R4, R5, R6 = 47 ohms, ½ watt.
R7, R8 = 1000 ohms, ½ watt.
R9 = 2500 ohms, 1 watt.
R10 = 1 megohm, ½ watt.
R11 = 0.22 megohm, ½ watt.
R12 = 82 ohms, ½ watt.
R13 = 4700 ohms, 1 watt.
R14 = 0.1 megohm, ½ watt.
R15 = 4700 ohms, ½ watt.
R16 = 4700 ohms, ½ watt.
R17 = 0.1 megohm, ½ watt.
R18 = 4700 ohms, ½ watt.
L4 = 3.7 mh. — 26 turns No. 28 enam., ¾ inch long on ½-inch iron-slug form (CTC LSM form).
L5 = 1.5 mh. — 18 turns No. 28 enam., ¾ inch long on ½-inch iron-slug form (CTC LSM form).
L6 = 1.25 mh. — 8 turns No. 16, ½-inch diam. 1 inch, long.
L7 = 2 ½ turns on same form as L6, spaced ½ inch from L6.
L4, L5 = 0.3 mh. — 8 turns No. 16 enam., ¾ inch long on ½-inch iron-slug form (CTC LSM form).
L7 = 175 mh. — 140 turns No. 30 enameled-wound on ½-inch iron-slug form (CTC LS-4 form).
L8 = 25 turns wound over L7.
L9 = 2-hv. 100 ma. low-resistance filter choke (Stancor C-2304).
L10 = 0.3 mh. — 5 turns No. 16, ½-inch diam., ½ inch long, approx.
D1 = 6-volt dial lamp.
J1 = Auto-receiver antenna connector (cable to h.c. input).
J2 = Coax connector.
J3 = 3-way microphone jack.
J4 = Octal female connector.
J5 = 6-volt d.p.d.t. relay.
P1 = Octal male connector.
RFC1, RFC2, RFC3 = Approx. 250 μh. (video peaking coil).
RFC4 = 1-mh. r.f. choke.
S1 = D.p.d.t. wafer switch.
S2 = Push-to-talk switch on microphone.
S3 = S.p.d.t. toggle.
performance is, of course, quite good with the 56-inch antenna.

**The Converter**

Now examine the circuitry of Fig. 1. The converter section is designed to tune from 26.3 to 30.2 Mc, and to spread this range over the full length of an illuminated slide-rule type dial. Bandspread tuning is achieved by padding, thereby reducing the percentage capacitance change produced in the full rotation travel of the tuning gang.

The 3-gang tuning capacitor, \( C_{20} \), was obtained from a surplus GI television tuner, Type 44.\(^1\) Each of the first two sections of the gang, \( C_{20A} \) and \( C_{20B} \), has a maximum capacitance of about 34 \( \mu \)fd, and a minimum of about 5 \( \mu \)fd. The oscillator section, \( C_{20C} \), has a maximum of about 32 \( \mu \)fd. Alternatively, a 3-gang tuning capacitor, such as used in f.m. receivers, might be employed, provided appropriate variations in padding capacitors and coils are made.

The 6BJ6 amplifier tube was selected for several reasons: (1) low grid-plate capacitance, which is desirable for good stability; (2) the remote-cut-off characteristic, which is desirable if the tube is to be a.g.c. controlled; (3) low current requirements; (4) reasonably-low equivalent noise resistance. This figure begins to become significant at about 30 Mc, and low values are desirable for best signal-to-noise performance.

The cathode resistor, \( R_{13} \), is not by-passed, to reduce the effects of tube-capacitance changes.

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\(^1\) The GI tuners employing this gang condenser have been available at a very reasonable figure from Newark Electric, 223 W. Madison St., Chicago, Ill.

Bottom view of the 10-meter mobile unit. The converter circuits occupy the right-hand portion of the chassis with the 3-gang tuning unit above and the two tubes mounted on a bracket below. The components of the transmitter circuits are mounted along the upper flange of the chassis toward the left. The change-over relay is in the upper left-hand corner.

with variation in the gain control. It also helps to stabilize the amplifier.

The 6U8 triode-pentode tube provides very good oscillator and converter action at these frequencies. The Colpitts circuit in the high-frequency oscillator operates at approximately 1.4 Mc above the signal frequency, and the mixer output (and the b.c. receiver) is therefore tuned to this frequency.

The circuit is arranged so that the B supply for the converter is turned off while transmitting. A push-to-talk switch, \( S_2 \), actuates a 6-volt d.c. relay, \( K_1 \), which switches B supply and antenna connections for transmitting and receiving.

**The Transmitter**

The r.f. portion of the transmitter begins with a 12BH7 dual triode. One section functions as a 14-Mc. crystal oscillator; the second section serves as a doubler. The 12BH7 has been found to produce more output than a 12AU7 or 12AT7. The choice of a 14-Mc. crystal was made with the idea of achieving maximum drive at 28 Mc, from a single tube with low power-input requirements. Although 14-Mc. crystals are not so popular as 7-Mc. units, the circuit simplicity and low-current requirements for the r.f. drivers are believed to warrant the slight additional expense.

Low-power beam-tetrode tubes, such as the 6AQ5s, which are adaptable as final amplifiers, usually have comparatively low grid-plate capacitance. However, this is seldom small enough to permit straight-through operation without some indication of instability. There are many expedients that help reduce the tendency toward
self-oscillation, but probably none is more effective than neutralization. The usual problem of neutralizing tetrodes with low grid-plate capacity is conveniently solved by use of the capacitance-bridge method of neutralization shown in the ARRL Handbook. However, the neutralizing capacitor, $C_x$, which is usually a variable, is made fixed and the capacitor $C_z$ is made variable. This capacitor is a compression mica trimmer, one side of which is grounded. The unby-passed cathode resistor, $R_7$, also helps to stabilize the amplifier.

The pi network in the final amplifier is conventional. The comparatively-high capacitance on the antenna side of the network most effectively provides coupling to a low-impedance antenna. (The 56-inch whip antenna has a resistive component of impedance of the order of 10 to 15 ohms in the 10-meter band.)

**Modulator**

In the audio portion of the unit, the combined cathode currents of both sections of the 12AU7 flows through a single-button carbon microphone providing the necessary polarizing voltage. The by-pass capacitor, $C_{25A}$, should preferably be 20 $\mu$fd. or more, because the impedance from cathode to ground of this tube must be low or the 12AU7 will function as a cathode-coupled multivibrator. The 6N7, operated Class B, is well suited as a modulator, since it possesses high output capability and operates with low idling current in absence of audio drive.

A double-pole double-throw wafer-type selector switch, $S_1$, selects normal auto-radio operation or 28-Mc. mobile operation. Of course, only the push-to-talk switch, $S_5$, is used during a normal QSO. A single-pole single-throw toggle, $S_5$, controls filament power.

Test points which permit checking the doubler grid current, and the final-amplifier, grid and plate currents are provided. These test points terminate in an octal socket, $J_4$, mounted on the side of the chassis. The socket is so located that the test points are readily accessible when the unit is mounted in the car.

**Power Supply**

The usual car radio has a resistance-capacitance power filter. To eliminate the voltage drop through this resistor, an inductance-capacitance filter, consisting of $L_7$, $C_{16B}$ and $C_{16C}$, built into the mobile unit, is substituted. The modification in the car-radio circuit is shown in Fig. 2. Fig. 2A shows the alterations for those receivers using a synchronous rectifier, while B indicates the connections for units using a tube rectifier.

The dashed lines show the connections that must be cut in the typical circuit. The resistor, $R$, is removed. Usually, the B lead to the output audio stage is taken off at the rectifier side of this resistor. This connection is transferred to the output filter condenser, $C$, where the B lead to the other stages customarily is connected.

An octal or Jones socket, $J_1$, should be mounted in a clear spot on the side of the auto-receiver chassis. The leads brought to this output socket should preferably be shielded, especially the B-supply leads, since vibrator hash may be present on these leads and be "sprayed" into adjacent leads or near-by components. A single-pole double-throw switch may be added in the a.g.c. lead, as indicated by $X$, in case it is desired to switch off the a.g.c. control for weak-signal reception. The a.g.c. control on the r.f. amplifier will be found very useful when working locals.

**Construction**

The chassis pan for the complete unit is a standard $7 \times 11 \times 2$-inch item. The shield cover, which is principally used for tube protection, is about $5\frac{3}{4}$ inches deep, $2\frac{3}{4}$ inches high, and made to span the chassis.

The drive mechanism for the "slide-rule" dial is somewhat unique. This type of dial was chosen because it was desired to have an illuminated scale on the chassis. The essential idea is shown in the sketch of Fig. 3. The tuning knob drives a $\frac{1}{4}$-inch shaft which has been undercut to about $\frac{3}{16}$ inch near the end. The undercut portion of the shaft drives a dial cord connected to the pulley on the shaft of the gang condenser. The drive shaft is supported in the front flange of the chassis with a shaft bushing and, at the rear, with a small bracket with a $\frac{1}{4}$-inch clearance hole. The dial pointer rides on a small angle bracket which projects about $\frac{1}{4}$ inch in back of the front flange of the chassis. The angle bracket is secured to the...
A ¾-inch foot is bent back at the bottom of this bracket and tapped for two 4-40 or 6-32 machine screws. The tapped holes simplify the mounting of this assembly after components are wired in place. The bottoms of the sockets for the 6U8 and 6BJ6 tubes face the side of the tuning condenser; the slug-tuned coils and tubular trimmers are also mounted on the bracket on the side nearest the tuning gang. The air wound oscillator coil, L1B, is soldered directly across the rear section of the gang terminals. Leads long enough to reach B+, filament and gang terminals should be provided before securing the bracket in place. The mixer plate coil, L6B, is mounted just to the rear of the 6U8 tube and is tunable from the top of the chassis.

The r.f. portion of the transmitter lies to the rear of the tuning gang. The oscillator and doubler coils, as well as the crystal socket, final-amplifier and antenna-tuning condensers, are mounted on the side flange of the chassis to make the controls accessible. The antenna-input connector is located on the same flange near the rear of the chassis. The antenna- and B-supply-switching relay, K1, is near the antenna-input connector.

The modulator and driver transformers are placed on the top side of the chassis. The filter choke is mounted underneath, just to the rear of the 6U8 tube. The power-input cable of the unit enters on the right-hand side, a little to the rear of center; the shielded antenna lead for the auto receiver also exits at the same point. The antenna lead and also the power leads should be made no longer than necessary.

**Aligning the Converter**

After the unit has been wired and checked, we can begin the alignment of the converter. Apply the required supply voltages and compress or stretch the oscillator coil, L1B, until the oscillator covers the range of 27.7 to 31.6 Mc. This is most conveniently done in conjunction with a communications receiver or an accurately-calibrated grid-dipper. Connect the converter output lead to the input of the auto set to be used or, alternatively, to the antenna terminals of an available b.c. receiver. Tune the b.c. receiver to 1400 kc. and set the volume at a reasonable level. Next, set the tuning gang for maximum capacitance and observe a weak signal at about 26.3 Mc. from a grid-dipper, VFO, signal generator or an identified crystal-oscillator harmonic. Adjust the an-

(Continued on page 118)
BOARD MEETING HIGHLIGHTS

The Board of Directors of the American Radio Relay League, Inc., met in Hartford, Conn., on May 8th and 9th to examine and appraise the progress of League affairs and to chart a course for the ensuing year.

After an examination of civil defense communications activities, by formal resolution the Board encouraged greater participation by individual amateurs in the Radio Amateur Civil Emergency Service, and defined League policy to stimulate maximum use by the Federal Civil Defense Administration of all existing amateur facilities including ten-meter operation and more liberal application of matching funds. It instructed the Planning Committee to study facilities provided under RACES leading to a more effective participation by amateurs at local, state and national levels. Increased monies were made available for organizational travel by SCMs and SECs, looking largely toward RACES activities, and these voluntary field workers were urged to make as full use of travel funds to the extent their time permits.

A yearly Merit Award was established for outstanding technical contributions by an amateur to the radio art, and cash awards were set up for the three QST articles adjudged outstanding each year. A new Public Relations Committee was appointed with President Dosland as chairman, and asked to study a possible project of further acquainting the general public with the amateur position in TVI matters.

Referred to the General Manager was a series of recommendations of the Membership & Publications Committee looking to further increasing and strengthening League membership. This Committee was continued for another year, and asked to study the feasibility of reprinting the amateur history, Two Hundred Meters and Down, and a “new equipment” section in QST.

On the administrative side, the Board appointed Northwestern Division Director R. Rex Roberts, W7CPY, as an additional member of the Executive Committee. It gave its formal approval to the new Rules & Regulations of the Communications Department. During the meeting, notice was given of intention to propose amendment, next year, of parts of the Articles of Association to clarify eligibility requirements for director candidates. The Board indicated its desire to hold a 1954 meeting in Denver, Colorado.

A formal resolution was again adopted to express to the Field Engineering & Monitoring Bureau of FCC the League’s continued gratitude for the excellent cooperation extended the amateur service. Additional bouquets were presented to all volunteer League field organization administrative workers for their continued fine performance, to General Counsel Segal on the completion of 25 years’ service in that post, and to Mrs. Cecilia Hatch of the Hq., also to commemorate a 25th anniversary on the staff.

The meeting was significant also from the standpoint of what it did not do. Apparently as a reflection of strong sentiment among members and amateurs generally that the Federal Communications Commission should provide a breathing spell from its continued series of proposals for changes in the amateur rules, the Board offered no suggestions of its own for regulatory amendments this year.
NEW F.C.C. CHAIRMAN

In April President Eisenhower named Commissioner Rosel H. Hyde as the new chairman of FCC. A career employee, Mr. Hyde joined the old Federal Radio Commission in 1928, and rose through the ranks of the legal staff, becoming general counsel in 1945 and a commissioner a year later. With the exception of George Sterling, W3DF, Chairman Hyde because of his long experience and contact with League representatives probably is more familiar than any other Commissioner with the amateur service and its special problems. His selection is, therefore, a particularly happy one from the amateur viewpoint. The appointment is for one year, which is currently interpreted in Washington quarters to mean that the new Chairman has that long to prove he can reorganize FCC policies and procedures to the satisfaction of the new administration, in lieu of bringing in an outsider to do the job.

John C. Doerfer, former head of the Wisconsin Public Service Commission, is the newest FCC commissioner, having been named by President Eisenhower to replace the recess appointment of Eugene H. Merrill.

Former Chairman Paul Walker is expected to remain as Commissioner until the expiration of his term in June, at which time another new member will undoubtedly be named.

LICENSE PLATES

Three more states have been granted call letter license plate privileges since last month's report. They are Kansas, Oregon and South Dakota.

The Governor of Kansas signed a license plate bill on April 3rd authorizing the issuance of the new plates effective January 1, 1954. Much credit is due the Kaw Valley Radio Club of Topeka for its part in spearheading the drive.

The Portland Amateur Radio Club, with able assistance from many Oregon amateurs, successfully sponsored call letter plate legislation. The bill was signed by the Governor on April 10th. No information is at hand on when the plates will be available.

A special committee in South Dakota initiated a license plate bill and followed up with personal contacts with the Governor and legislators. The bill was made law in late March. As in the case of Oregon, no word has been received as to when amateurs may apply for the new call letter plates. W9s RRN, NGM and GQI are known to be among those who participated actively in this undertaking.

STAFF NOTES

We regret having to report that Harry Paston, W1DJV, Assistant Secretary and later Asst. Circulation Manager at Hq., has left to become a manufacturer's representative covering the state of New York. Joseph A. Moskey, W1JMY, has now transferred from the Communications Department to become Asst. Circulation Manager dealing with the many problems of distribution of QST and other ARRL publications through newsstands and radio jobbers, and promotional activities allied thereto.

Phil Simmons, W3VES and ex-W9VES, has joined the Hq. gang as Communications Assistant, handling the administrative details of contests and other operating activities, awards, LO bulletins, etc. Phil's calls are well known to contest enthusiasts, as he has been active in ARRL field organization work for some years.

We should also report that former Assistant Secretary Richard L. Baldwin, W1IKE, much to our regret, has left to become a sales engineer covering upper New England for an electronics manufacturer; at this writing the vacancy at Hq. has not been filled.

SALT LAKE CITY EXAM

The examination schedule published by FCC indicated an engineer will be in Salt Lake City, Utah, on June 13th to conduct amateur examinations. Because of the increasingly large number of applicants, the date has been changed and amateur exams will instead be given on Friday, June 19th, at Henager Business College.

OFFICERS' REPORTS AVAILABLE TO MEMBERS

Each year the officers of the League make comprehensive written reports to the directors. The Board has made these reports available to interested members. The cost price is 75 cents per copy, post-paid. Address the General Manager at West Hartford.

Strays

W5PB, who recently shot rounds of 68, 70 and 72 within a two-week period, takes up the golfing challenge issued by W2KQ, W4HB and W4JQ in March QST on the condition that they tote their clubs to the 1953 ARRL National Convention in Houston next month. Fare! . . .
SOLDERING FEEDERS TO THE ANTENNA

A common method of tapping the feeder to an antenna is shown in Section A of Fig. 1. The heat applied in soldering this type of joint tends to anneal the copper wire at points A and B at either end of the wrap, and may ultimately cause the antenna to snap during some period of unusual strain. Electrically the joint is OK, but mechanically it may be hazardous.

Section B of Fig. 1 illustrates a better mechanical way to connect the feeder. First the feeder is wrapped twice around the antenna wire, then once around itself to form a strain-relief loop which holds the feeder wire without pulling on the actual contact wrap. Then the wrap itself is started by winding two rather wide-spaced turns, followed by six turns close-wound. Adding two more wide-spaced turns completes the wrap, and it's ready for soldering. Good resin-core solder (no other flux) is applied only at the two center close-spaced turns, taking care to keep both solder and heat confined close to these two turns and away from either end of the joint.

Similarly, Section C of Fig. 1 shows a good way to dead-end the antenna in an eye-type insulator. First, a "round-turn" is taken through the eye; that is, the antenna wire is looped twice through the insulator before bringing it out to wrap around itself, thus forming the dead-end. According to old power-line lore, four turns of this wrap following a round turn will hold all the wire will hold. However, in this case, four or five double-spaced turns are followed by four or five close-spaced turns to give even more mechanical strength and permit soldering a feeder to the antenna without danger of annealing the antenna wire at critical point A. The feeder should be looped once through the insulator eye and wrapped around itself once or twice to take any possible strain off the soldered antenna joint. The end of the feeder wire is then interwound with the spaced turns of the antenna dead-end and soldered only at one or two turns in the center of the spaced wrap. It would be a good idea to hold point A with pliers while soldering to keep heat well away.

The feeder-tap joint shown in B of Fig. 1 was used in an old single-wire-fed Hertz, one end of which was tied to a very unstable tree. This antenna was recently taken down and the joint carefully examined. It showed no signs of deterioration, and was apparently as strong as ever after nearly 21 years aloft. — Don Devendorf, W3EGI

RIPPLE FINISH WITH KRYLON SPRAY

A ripple finish that is both durable and professional in appearance may be obtained with the aid of clear Krylon spray. The chassis or panel must first be brush-painted with ordinary black enamel and the spray should then be applied while the enamel is still tacky. The ripple effect will become more pronounced as the thickness of Krylon coating is increased. — Ernest Weiss, W2ZDI/6

INCREASING THE SENSITIVITY OF GRID-DIP METER FREQUENCY MEASUREMENTS

When obstructions such as partitions, partial shields, etc., prevent adequate coupling between a variable tuned circuit and a grid-dip meter, try the following stunt.

First, tune the dipper to the estimated frequency of the circuit to be checked. Next, tune a receiver — with the b.f.o. turned on — to the frequency of the meter. Now, swing the tuned circuit through its tuning range. If the setting for the grid-dip meter has been properly estimated, and providing that the meter is not completely shielded from the tuned circuit, the frequency of the g.d.o. will be pulled as the resonant frequency of the circuit approaches that of the meter.

A change in g.d.o. frequency will be indicated by a change in receiver beat note.

The above system permits a frequency measurement to be made even with coupling conditions which prevent any noticeable dip in g.d.o. grid current. The scheme also allows r.f. signal generators and other types of variable oscillators (as long as they are not too well shielded) to assume the frequency measuring duties of a grid-dip oscillator when the latter is not available. — Dave Tobias, W2JTE
Build Your Own Steel Tower

Sturdy Sky-Hooks for the Beam Antenna

BY W. J. SHEEHAN,* WIIXI

The steel towers described in this article are the result of past disappointments with different kinds of supports for rotary antennas. At one time or another, the author has used all sorts of structures, including telephone poles, guyed wood masts and wooden lattice-type towers. The telephone pole and any type of mast requiring guys are always inconvenient when mounting and adjusting beam antennas, while the lattice tower needs regular servicing to prevent deterioration.

When the new dual 10- and 20-meter beam was built at WIIXI, it was decided to procure a windmill tower which, of course, would be weather-resistant and self-supporting. There are many of these unused towers gracing the landscape locally, so it was thought that there should be no problem in picking one up at little cost. However, when the owners were approached, there was an unexpected reluctance to part with these monuments to a bygone era. “It goes with the place”; “My grandfather put it up”; “I like to see it when I come out”; “I’m going to put my TV antenna on it,” are typical of the various reasons given.

A little investigation indicated that a home-made tower shouldn’t be an impossible task by any means. As a result, the two towers shown in the photographs were built. The first attempt was a 30-foot job, erected at the home QTH. This turned out so successfully that a 60-foot tower was later built along the same lines for WIIXI. The cost of materials for the 30-foot tower was approximately $42, while stock and hardware for the 60-footer totaled about $140, both exclusive of the foundation. This is considerably under the cost of a manufactured tower and is even less than a wood-lattice structure, considering that a certain amount of costly millwork at the lumber yard is usually necessary.

All of the structural material used is known as “hot-rolled” steel and was purchased at a local steel-supply house. Both angle stock and flat strip come in 22-foot lengths. The steel bolts and nuts were purchased at a hardware store. The two tables show the size and amount of material needed. The lengths of the diagonals are given to serve as a guide. It is best to measure these individually after the horizontal spreaders have been installed to allow for variation.

Tools

The job of cutting and drilling the steel is really not an overpowering chore if you have, or can borrow, the proper tools. The cutting is done with a hacksaw and a supply of good-quality

*111 Summer St., South Walpole, Mass.

A homemade 60-foot windmill-type tower assembled on the ground (below) and after raising at WIIXOS (right). (Photos courtesy WIUPL)
blades with 18 teeth per inch. The bolt holes are made most easily by drilling first with a $\frac{3}{16}$-inch drill and then reaming out with a $\frac{2}{16}$-inch drill ($\frac{1}{4}$-inch and $\frac{1}{8}$-inch for the 60-footer). A portable electric drill is a practical necessity and a lot of time can be saved if you have two—one for each drill size. Needless to say, the drills should be kept sharpened. High-speed drills will hold their cutting edges much longer than cheaper drills. The members to be joined should be clamped together with C clamps or plier-grip-type wrenches, and drilled at the same time.

**Assembly**

Considerable thought was given to the method of assembly. Vertical assembly involves endless climbing up and down and hoisting the material and tools. Also, there is a problem in drilling the assembly holes accurately and, in fact, even in devising some way of reaching the points where holes must be drilled. After consideration of all factors it was decided to assemble the towers on the ground and raise them after completion.

For assembling the tower choose the least available area. First, splice the leg sections together, using 4 bolts at each splice (2 on each face), and lay a pair of them out, with the inside of the angle facing upward, approximately in the eventual relative positions. Block them up, if necessary, to make them lie level on the ground.

Measure off and mark the positions of the horizontal members. Clamp the bottom horizontal piece in place and drill the bolt hole at each end. Do the same with the top horizontal member. Put the bolts in with the heads on the inside and bring the nuts up fairly snug. Using a machinist’s protractor, check the angles between the crosspieces and the legs on each side, and adjust until the angles on each side are equal by hitting the end of one leg with a hammer. This is quite important to make sure that your tower will be standing vertically and not leaning when you put it up. As soon as the angles have been equalized, tighten up all four bolts. Then the remaining horizontal members can be clamped in place at the levels marked and drilled and bolted fast.

Assemble the second side in the same manner. In the ease of the 60-footer, it is advisable to assemble the second side with the inside of the angle facing downward, since it is difficult to flop it over after completion.

The remaining two sets of horizontal spreaders are clamped (in a vertical position) to the first side and drilled and fastened. Then, the second side is lifted onto the ends of these and likewise drilled and bolted, while the angles are checked to make sure that everything lines up properly.

**Diagonal Bracing**

In placing the diagonal bracing strips, drill the first hole $\frac{3}{4}$ inch from one end of the strip. Place it over one of the bolts at the second horizontal spreader from the bottom. Then, swinging the lower end of the diagonal over the lower bolt, carefully mark the center of the second hole. Drill and fasten the second end of the diagonal. Progressing up the tower, place one similar diagonal across each bay. Repeat this procedure...
30-FOOT TOWER

<table>
<thead>
<tr>
<th>Horizontal Cross-Members</th>
<th>Diagonal Braces</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(5 each)</td>
</tr>
<tr>
<td>1/4 X 1 1/4 X 1 1/4 in.</td>
<td>1/4 X 1 in. strip</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bottom</th>
<th>6 ft., 8 1/2 in.</th>
</tr>
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<tbody>
<tr>
<td>Second</td>
<td>5 ft., 6 in.</td>
</tr>
<tr>
<td>Third</td>
<td>4 ft., 7 1/2 in.</td>
</tr>
<tr>
<td>Fourth</td>
<td>3 ft., 7 3/4 in.</td>
</tr>
<tr>
<td>Fifth</td>
<td>2 ft., 10 1/2 in.</td>
</tr>
<tr>
<td>Sixth</td>
<td>1 ft., 7 1/4 in.</td>
</tr>
<tr>
<td>Top</td>
<td>3/4 in.</td>
</tr>
</tbody>
</table>

Legs (4) Bottom section — 22 ft.; top 8 ft., 6 in.
Ladder rails (8) — 1/4 X 1 X 1 in. angle, each 22 ft. long.
Ladder rungs (18) — 1/4 X 1 in. strip, each 8 1/4 in. long, spaced 14 in. center to center.
Top plate — 1/4 in. steel, 4 3/4 in. square.
First horizontal 13 inches from bottom; others spaced 5 ft., 6 in.

Material
1/4 X 1 1/4 X 1 1/4 in. angle — 10 22-ft. lengths.
1/4 X 1 X 1 in. angle — 2 22-ft. lengths.
1/4 X 1 in. strip — 15 22-ft. lengths.
Steel bolts and nuts — 72 3/8 in., 18, 7/8 in. long.
— 4 3/8 in., 18, 1 3/8 in. long.
— 72 1/8 in., 20, 3/4 in. long.

The footings for the foundation for the smaller tower were made from 3/16-inch 2 X 2-inch angle stock, 6 feet long, with 3/16-inch-thick 12-inch-square steel footings welded at the bottom end. These were set in 5-foot holes (leaving a projection of about a foot) and the holes filled with rocks. The footings were tilted to correspond with the slope of the tower and held in place with a wood frame. Then cement was poured into the holes.

The foundation for the 60-footer consisted of four holes about 2 feet in diameter and 8 feet deep, filled with concrete in which long hook bolts were imbedded. Base plates were welded to sections of angle and these were fastened down with the hook bolts. The legs of the tower were then bolted to the projecting angle pieces.

Before raising the 30-foot tower, a plumb bob was centered in the top of the tower and a stake driven in the ground at the center of the foundation. Then the tower was placed with two legs against a pair of the base angles. The tower was lifted manually to an angle of about 30 degrees and pulled up the rest of the way by a car with tow ropes fastened to the top of the tower. Another pair of ropes was used at the back of the tower to ease it into place after passing the center of gravity. It happened that there was a 35-ft. crane available when it came to raising the 60-footer. But it should be possible to lift the top end with an auto-wrecker crane to the point where it can be blocked up and then raised the remainder of the way with a tow.

Foundation

on each side. The second set of diagonals is fastened in the same way, except that the second hole in each strip is drilled 1/16 inch short of the bolt. The bolt at this end is removed, and the four holes lined up with a drift pin (or prick punch), the members are then clamped, the drift pin removed, and the bolt reinserted and tightened up. This procedure tightens the diagonals and assures good rigid bracing. To prevent rattling in the wind, the diagonals should be bolted together where they cross with a 1/4-inch bolt, 1/2 inch long.

The bottom ladder rung of the 30-foot model is placed with its center 12 inches above the bottom end of the ladder and the remainder of the rungs spaced 14 inches, center to center. The rails are placed against the tower with the side of the angles facing outward and the rungs are bolted on across the outer surfaces. The bottom end of the ladder comes 3 1/2 inches below the lower edge of the second horizontal member.

In the case of the 60-foot tower, the bottom of the ladder was bolted to the second horizontal spreader. Four rungs were evenly spaced between each following pair of spreaders, the spreader itself serving as the fifth rung in each bay.

To guard against rust, the tower should be covered with good-quality paint. I used red metal tank primer for the first coat and water-tank aluminum paint for the second coat. I loosened up all of the bolts, one at a time, so that I could get some paint down in between the members where they overlapped.

W11X1's dual beam mounted on the 30-foot tower.

June 1953
Pulse-Operated Relays for the Ham Transmitter

Simplified Power Control and Antenna Switching

BY CARL H. ERICSON,* W2PPJ

The control of amateur radio transmitters through the use of relays is a practice that is becoming progressively more common, and it is not without a sound engineering basis. By using relays, rather than direct switching, a number of advantages can be realized, among which are greater flexibility in control, better interlocking, greater personal safety and simpler remote control.

Since the war, most amateurs have availed themselves of the large number of relays on the surplus market. However, most of these are designed for d.c. operation, requiring a rectifier supply. On the other hand, a.c. relays have a tendency to hum and, because of the high current inrush with the broken magnetic circuit, they cause considerable noise and resultant noise. Both of these effects are sources of annoyance when operating on phone.

It appears that amateurs have been overlooking a good bet in the relays introduced a couple of years ago for use with low-voltage remote control of residential lighting circuits. These relays are of the type sometimes known as "remembering" relays, because they operate by pulses of current, rather than by a continuous flow and do thus "remember" the last pulse. A plunger operates in a two-winding solenoid, one winding closing the contacts, while the other opens them. Either coil circuit need be closed only momentarily to operate the relay. Most of the time, therefore, the relay windings already fully loaded to its rating, may be used to energize the coils.

General Electric manufactures a relay of this sort that is known as the Type RR-2 which sells for about three dollars. (Several other firms are producing similar types.) Considering the

Fig. 1 — Basic circuit of control by a momentary-contact relay. S is a double-pole push-button switch. Independent duplicate controls may be added by paralleling, as shown in the dotted lines.

are not energized and this, of course, eliminates the hum. Also, since current is drawn only instantaneously, a very small transformer, or one

* 727 Moore Ave., Kenmore 23, N. Y.

fact that these relays are rated to handle 15 amperes at 115 volts, or 5 amperes at 277 volts, they are hard to beat in watts per dollar, even in the surplus market. The RR-2 is designed for 24-volt operation and draws 0.3 amperes at this voltage. However, it seems to give good positive action at as low as 12 volts. With 24-volt supply, the relay can be controlled reliably up to a distance of 1500 feet without the use of excessive control-wire size.

Another advantage of this type of relay is that duplicate control stations are easily added. Control stations at the rig and at the top of the rotary-beam tower, as well as at the operating position, are often desirable. Fig. 1 shows the basic circuit. The control switch, S, is of the
double-throw push-button type. (GE type RSS-1 is an example.) Any number of duplicate independent control points can be tied in merely by paralleling the control switches (shown dotted). A typical transmitter control system is shown in Fig. 2. A separate relay is used for each circuit (filament, exciter plate and final plate), so that each may be turned on or off at will during adjustments. A master relay is also included so that both high-voltage circuits may be controlled by a single switch during regular operation. An overload relay (contacts closing on overload) may be used to operate the master control merely by connecting the overload-relay contacts in parallel with the off contacts of the master relay, as shown in the dotted lines.

If it is desired to operate all relays from a single push-button control, the relay-coil circuits can be wired through a rotary switch to select the desired circuit to be operated by the push button, as shown in Fig. 3. The master relay can be wired into a separate circuit, or through one pair of the rotary-switch contacts, as desired.

The mounting of an RR-2 relay is simple, although it does require a rather large hole. By inserting the barrel end of the relay into a 3/8-inch hole, it will latch into place by means of two spring catches in the sides. In the original form, it is not weatherproof. However, with a layer of Scotch electrical tape and coats of spar varnish, it can be protected against the elements.

Once weatherproofed, the relay looks like a natural for antenna switching, particularly for antennas of the quick-heading type, since it has a contact-to-contact capacitance of less than 1 μfd., and a closed-circuit contact-to-coil capacitance of approximately 2 μfd.

In conclusion, I might point out that a little experimenting with junk-box relays will quickly provide an over-current relay that will trip at any desired current. By paralleling the winding with a variable resistance, a front-panel adjustment can be obtained. Obviously, if the relay is not connected in the negative side of the high-voltage line, it will have to be insulated for the full voltage of the circuit.

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### Technical Topics

**Ham-Band Transmitting Loops**

In the article, "Ham-Band Transmitting Loops," by Richard R. Hay, W4LW, appearing in QST, September, 1952, I find the statement that "engineers who have been consulted about this antenna system say that its effectiveness will depend upon the ratio between ohmic losses and the radiation resistance." This is true but, by and large, for any loop used by amateurs, it is not the ohmic loss in the antenna that we are concerned with, but rather the reduction of ohmic losses in the circuit or transmitter that is used to couple the radiation resistance to the feed system. It was further pointed out in this article that good results were obtained with the square loop. That this statement is not wishful thinking or just happenstance, it might be interesting to compare the radiation efficiency of a small loop with that of a half-wave dipole, both operating at the same frequency.

The power radiated by the magnetic dipole is equal to the power radiated by the electric dipole as shown by the following equations:

\[
P_e = \frac{40\pi^2|m_e|^2}{\lambda^2}; \quad P_m = \frac{40\pi^2|m_m|^2}{\lambda^2}
\]

where \( m_e \) and \( m_m \) are the moments of the electric and magnetic dipole respectively. For small elements, the moments (and thus powers) are equal.

The electric dipole can be compared with the half-wave dipole as follows: The familiar equation for the far field is expressed by

\[
F = K\sqrt{\frac{P}{R_e}} \frac{1 - \cos G}{\sin G}
\]

in a plane which is normal to the axis of the dipole where \( K \) is dependent on units, \( P \) is power fed to the dipole (watts), \( R_e \) is radiation resistance (73 ohms for half-wave dipole), and \( G \) is the electrical length of dipole (from center of feed to end) = 90 degrees for half-wave dipole. Now consider \( G \) to be very small; that is, approaching an electric dipole. The trigonometric terms in the above equations may be expressed as a series expansion thusly:

\[
\sin G \approx G
\]

\[
\cos G \approx 1 - \frac{G^2}{2}
\]

\[
1 - \cos G \approx \frac{G^2}{2}
\]

(Continued on page 184)
The publishers of QST assume no responsibility for statements made herein by correspondents.

**VE 'PHONE**

Editor, QST:

I would appreciate your publishing this letter as a means of explanation to those who feel that VE operators are unfair in using a portion of the Novice band for 'phone contacts. This letter is being prompted by the letter from WN1WPT, which was published in the April QST.

Although our 'phone band covers from 3725 to 4000 kc., all except a very few of us use 3800 to 4000 kc., as a matter of courtesy to the W stations, except to answer QSOs. This leaves us only 75 kc. for domestic 'phone operation. Of course there are a few who do not observe this custom, but this type of person is to be found in any group. If we were to discontinue using the lower part of our 'phone band, we would not have enough of the spectrum available to us to make 'phone operation worthwhile; therefore I believe that we VE3s are doing all that should be expected of us in this matter.

The VE3 'phone operators also have their problems, such as QRM (both VE and W) on the 'phone bands. If the same courtesy were observed in this matter as we observe on the American 'phone band, our lot would be much happier and possibly some gentlemen's agreement could be reached with respect to the Novice band. I realize that the W band covers the complete 75-80 meter band, but cooperation is a necessity, if we are all to operate successfully.

I wish to emphasize that the opinions expressed here are purely my own and not necessarily those of all VE3s, and are intended only as an explanation of the problems which the VE3s have to face.

— Gerald W. B. Tait, VE1ACV

Box 33
Salisbury, N. B.

Editor, QST:

Lee Warner, Jr., WN1WPT, is indeed a new ham. When he says that VE stations are ruining his hobby and that he would like to see us lose some of our dwindling frequency allotments, he is too real to realize that Canadian amateurs, numbering several thousand, were given the extension of twenty-five kilocycles. This was to compensate for the frequencies lost to American amateurs on 75 meters and other bands. It is well to advise WN1WPT and any other misguided Novices that the Canadians were there first; that the reverse is true when we say that we are operating in his band.

So far as this station is concerned, it would do well for ARRL to consider the rights and opinions of Canadian amateurs, for they are being ignored. What greater proof of this statement can be found other than the placement of Novices in the Canadian 'phone band? Besides this, American teletype stations are operating in our 'phone band. Something should be done in favor of Canadian amateurs.

— Robert W. Service, VE7AA

Editor, QST:

I agree 100 per cent with the article in April QST written by some WOs from Bloomington, Ind., regarding power. A kilowatt is definitely not necessary to carry on a QSO.

The majority of foreign stations' power is limited to 150 watts, their QSOs are just as successful as the fellas' running a kilowatt.

Would like to work the gang in Bloomington, Ind.

— Martin Crider, VE8AA

**LOWER POWER**

Editor, QST:

I have never written in to the League before, but since it's supposed to be of, by and for the amateur, I thought I would try.

I would like to know how someone else feels about this. I am very much in favor of a lower power limit on and above 20 meters. I run about 175 watts and I think it will do as much as a kw. A lower limit of, say 200-300 watts, would cut down on QRM and emphasize operating techniques, rig performance, and a good antenna, etc.

— George H. Wellman, W4SMO

928 Maple Ave.
Salisbury, N. C.

Editor, QST:

Haydon Cottage
Somerset, Bermuda

**KEYING INDIVIDUALITY**

Editor, QST:

W2VVO, in his letter in April QST, fears that the advent of automatic keys may wipe out the individuality of amateur sending; I hope that I can set his mind at ease. Having worked many other amateurs using auto-keys, I can assure him that the differences in lists among the newer gadgets are almost as large as they ever were. We must remember that the operator still has control over several variables in code formation: dot-to-dash speed ratio, mark weight, and inter-letter and interword spacing. The variety of lists that can be acquired by only slight variation, conscious or otherwise, in these characteristics alone is large enough to prevent the dull uniformity that W2VVO and others have shunned. The positive argument for auto-keys, however, is that they do prevent a few extremes — those lists that are a chore to copy and a discredit to their owners.

Probably few amateurs attempt automatic keying with the idea of developing a list indistinguishable from tape. My own satisfaction lies rather in an increased ease of sending and a greater enjoyment of the natural rhythm of cw. operation. Several well-known auto-key operators have lists that are easily recognizable, yet a joy to listen to. "Tape-like." No. Beautifully? Yes indeed. But it is unnecessary to take my word for it; a little listening on the cw. bands will hear me out. Let us hope that W2VVO will not break up his Audiotron after all.

— O. Franklin Montgomery, W5FQB

4657 S. Chelsea Lane
Bethesda 14, Maryland

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**"ECONOMY" POWER SUPPLY**

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— George H. Wellman, W4SMO

Haydon Cottage
Somerset, Bermuda

— Martin Crider, VE8AA

4657 S. Chelsea Lane
Bethesda 14, Maryland

— O. Franklin Montgomery, W5FQB

Cordially yours,

[Signature]

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**A High-Level Mixer**

With 7- and 21-Mc. 'phone now available, a pertinent topic of conversation among the s.s.b. gang these days is that of multiple-band operation. Thus the following description of a BC-457 conversion to a mixer, sent in by Dr. Milton Schwalbe, W4VP, of Louisville, Ky., is quite timely. Any low-level 4-Mc. s.s.b. signal can be fed in, and the resultant 7-Mc. output can be fed to the antenna or used to drive a big amplifier. The same principle is applicable to other bands by working out appropriate crystal frequencies and coil-condenser combinations. When crystal and exciter frequencies are mixed to obtain output at their sum frequency, the original sideband appears in the mixer output. However, when the mixer output is the difference of the input frequencies, the sideband is inverted. This may be especially useful when the exciter has no provision for switching sidebands, as in some of the crystal-filter jobs.

As shown in Fig. 1, the output of a 12A6 crystal oscillator on 3.3 Mc. is fed to the control grids of paralleled 1625s. The output of the 4-Mc. s.s.b. exciter is injected at the screen grids of the mixer. The plate tank circuit of the mixer is tuned to the sum frequency, 7.3 Mc.

The three sockets at the rear of the BC-457 chassis will accommodate the crystal, a 12A6 crystal oscillator, and the 4-Mc. plug-in coil, L2. Remove the flexible shaft under the chassis that couples the front and rear variable condensers. The front condenser is used to tune the plate circuit of the 1625s. The rear condenser (C98) will tune the plug-in coil to resonate the screen-grid circuit to the 4-Mc. excitation frequency. The padding condenser across the plate tuning coil of the 1625s is disconnected and not used. The former grid circuit air-spaced pad (C69 in the shield above the chassis) and the former grid coil will serve as the output circuit of the 3.3-Mc. crystal oscillator. Shaft couplings to adjust the various condensers can be brought out without encountering any serious mechanical difficulties.

With power supplied as indicated in the schematic, tune C50 and check with receiver or absorption wavemeter for crystal-oscillator output on 3.3 Mc. Detune C50 on the high-frequency side so that the 1625 resting plate current with no s.s.b. excitation runs about 100 ma. Connect the s.s.b. exciter and, using steady tone input, tune

---

**Fig. 1 — The BC-457 as W4VP’s 40-meter mixer.**

**New Parts:**
- C2 — 220 µfd
- C3 — 0.01 µfd
- R7 — 4200 ohms
- R3 — 0.1 megohm
- R5 — 300 ohms, 10 watts (1625s cathode)
- RFC3, RFC4 — 2.5 mh
- L3 — 20 turns No. 22 enam. on 1/8-inch diam. plug-in form. Link is 5 turns at cold end.

**BC-457 Components:**
- C2a, b — .05-.06 µfd
- C96 — Oscillator padding
- C98 — 0.006 µfd
- C97 — Oscillator tuning
- C94 — 0.002 µfd
- C93 — Amplifier tuning
- C92 — 0.01 µfd
- C91 — 3 µfd
- C90 — 50 µfd
- R17 — 51,000 ohms
- R28 — 20 ohms
- R27 — 101 ohms (1625s screen decoupling)
- R26a — Parasitic suppressor
- L2 — Oscillator coil T3a. Use "A" winding as is, after removing surplus leads.
- L3 — Amplifier coil T4a. Trim down to 10 turns evenly spaced. Add 5-turn link at cold end.

The informal s.s.b. dinner in New York City during March was attended by these representatives from all of the W call areas. A stranger in back of the camera is explaining why he thinks s.s.b. isn’t here to stay.
A Half-Lattice Crystal-Filter Exciter

W2JJC has a new exciter design that is passed along by W2AMB, Fred Huff, of Jackson Heights, L. I., N. Y. It borrows ideas from several designs and, if you haven't kept up with the s.s.b. literature, it is suggested that you acquaint yourself with the Weaver-Brown articles in the June and August, 1951, issues of QST and the crystal-filter article by Good in the October, 1951, issue. You can also get some ideas from the W7BMF exciter shown in this column in April.

The circuit is given in Fig. 2. The transformer $T_s$ is opened in the primary for a series-tuned connection, since the varistor (four germanium diodes) modulator wants to look into a low impedance. The "bifilar" windings on $L_3$, in case you aren't familiar with the term, are simply two interwoven windings, with the left-hand end of one winding connected to the right-hand end of the other. You can find a picture of such a winding in Fig. 5, page 23, of the January, 1948, issue of QST. The crystals do not need to be the exact channels shown — any combination of channels that gives the necessary 1.8-kc. separation should be satisfactory.

— B. G.

Strays

Have you heard about the careless ham who caught a hot 2000 volts off his final tube's plate cap, came down from the ceiling and started hitting the bottle?

The Voice of America has vacancies for unmarried radio engineers to operate its new million-watt standard-band stations in Okinawa and the Philippines. A shortage of family-type housing precludes consideration of additional applications from married engineers at this time.

Salaries range from $4323 to $5009 per year, depending upon education and experience, plus allowances and transportation.

Applicants must be between 25 and 35 years of age, holders of first-class radiotelephone licenses, and must have had at least three years' experience with standard-band or short-wave broadcasting transmitters.

Apply to Office of Facilities Manager, International Broadcasting Service, Department of State, 251 West 57th St., New York, N. Y.
1953 ARRL Field Day Rules

Annual Test for Emergency-Powered Stations, June 20th–21st

Field Day packs more solid fun and enjoyment into a week end than any other ARRL operating activity. This annual event is a test of emergency-powered stations in the field operating under conditions often approximating those encountered in an actual emergency. Radio clubs and organized groups function as teams in setting up and operating single- or multi-transmitting stations independently of normal power facilities. If you’re not going out with a club this year, but own a mobile rig or gear that can be set up afield, get out alone or with a friend and enjoy the fun. Check out your transmitter and send us your report. Clubs in particular are urged to get every mobile unit owned by their members into the field and to report their aggregate-mobile scores!

The procedure for making Field Day contacts is as follows: call “CQ FD” on e.w. and “CQ Field Day” or “Calling Any Field Day Station” on ‘phone. During contact give each station a signal report and the name of the ARRL section in which you’re located, and stand by to receive similar information. Score your contacts according to the rules listed here and send a report of your FD activities to ARRL Headquarters.

One change has been made in the rules for this Field Day: in the Hawaii and Alaska sections FD will start and end on Pacific Standard Time. Heretofore stations in those areas did not end operation until two and a half hours or more later than continental U. S. and Canada. The change should allow them to make more contacts during the closing hours. Rules for stations in all other sections are the same as those of last year.

Be sure to get the added points to your score for originating a special Field Day message. Many clubs have a session in advance to brief members on efficient operating practices, including order of message parts. The FD message will give you and other participants practice in handling traffic, and will convey information to your SEC or SCM that will enable him to evaluate emergency facilities. Normally the message should be sent to a station in your state or section so your SEC or SCM will receive it quickly.

If you haven’t started preparing for Field Day, start now! Convenient reporting forms are available upon request from League headquarters. You may make up your own report forms but please be certain to include all the required information. Mail your reports on or before July 15th.

ARRL extends to all participants it’s best wishes for a happy, happy FD!

Rules

1. Eligibility: The Field Day is open to all radio amateurs in the sections listed on page 6 of this issue of QST.

2. Object: For portable and mobile stations to work as many stations as possible; for home stations to work as many portable and mobile stations as possible.

3. Conditions of Entry: Each entrant agrees to be bound by the provisions of this announcement, the regulations of his licensing authority, and the decisions of the ARRL Contest Committee.

4. Entry Classification: All entries will be classified according to number of transmitters in simultaneous operation. They will be further classified as follows: “A,” club or non-club portable stations; “B,” unit or individual portable stations; “C,” mobile stations; “D,” home stations operating from emergency power; “E,” home stations operating from commercial power sources. Thus a club group running three transmitters simultaneously will be in the 3A classification, or a mobile station with one transmitter will be in the 1G classification.

Portable stations are those installed temporarily, for FD purposes, at sites away from customary fixed-station locations. Portable equipment or units must be placed under one call and the control of one licensee, for one entry. All control locations for equipment operating under one call must lie within a 1000-foot diameter circle.

Club or group participation is that portable-station work accomplished by three or more licensed operators.

Unit or individual participation is that portable-station work accomplished by one or two licensed operators. Mobile stations are complete installations including power source and antenna, mounted in or on vehicles and capable of being used while in normal motion. If they utilize antennas, supports not normal or suitable for use during motion. Mobile stations must be classified as portable instead of mobile. Each mobile entry call must be different from any other FD station participating.

Home-station participation is that work by fixed amateur stations not operating portable or mobile.

A transmitter used to contact one or more stations may not subsequently be used under more than one other station call during the Field Day period.

5. Field Day Period: The Field Day begins at 4:00 p.m. Local Standard Time (not Daylight Time) June 20th and ends at 4:00 p.m. Local Standard Time (not Daylight Time) June 21st. (Hawaii and Alaska sections use Pacific Standard Time.) All contacts must be made during this period. Class C stations may cross a time-zone line but may not receive credit for more than 24 hours of operation if they do so.

6. Bands: Each ‘phone and e.w. band is regarded as a separate band. The following (and additional u.h.f.—a.h.f. bands) constitute separate bands: A1: 118.0-122.5 1375-1400 "east" or 1300-1325 1475-2000 "west", 3.5-4.0, 7.0-7.3, 14.0-14.35, 21.0-21.45, 20.96-27.25, 28.0-29.7, 50-54 and 144-148 Mc. A2, radioteletype and frequency-shift keying are grouped with A1, in the bands where they are allowed. A3: 1800-1825 1875-1900 "east" or 1900-1925 1975-2000 "west", 3.8-4.0, 7.27-7.3, 14.2-14.3, 21.25-21.45, 23.96-27.25, 28.5-29.7, 50-54, and 144-148 Mc. All forms of voice transmission will be grouped with A3, in the bands where they are allowed. (In Canada and Cuba, their respective ‘phone bands apply.)

The use of more than one transmitter at one time in the same band is not allowed. (Continued on page 138)

June 1953
INTERFERENCE AIDS AVAILABLE

ARRL is pleased to announce the availability of the following items as aids to the interference elimination programs of affiliated clubs. Please address your requests to Communications Department, ARRL.

ARRL Affiliated Club Program re TVI Committees (CD-16): On formation and composition of club TVI Committees. Some suggestions on organization are given which should be followed by all clubs.

QST References to TVI Reduction (CD-4): A bibliography listing articles dealing with TVI reduction that have appeared in QST. The list is conveniently indexed as to specific phases of TVI elimination.

Kaiser Reprint No. 1: "TV Interference Problems." Generalized comments on LF and image interference; troubles with poor locations and the "amateur ailment" used by some technicians.

Kaiser Reprint No. 8: "TV L.F. Interference." The predicament of the amateur operator and the diathermy-using doctor; the technician's role and the manufacturer's duty regarding LF interference difficulties.

FCC on TVI Reception and Interference: General information on the allocation plan, reception limits, types of interference, and suggestions to servicemen and dealers.

The Approach to the TVI (CD-85): How to read a friendly understanding with a complainant.

New York Times News Release: For local publicity (with proper credit line) ... covers the story of TVI-Mc. operation and helps educate the public in their responsibility.

Your TV Receiver (CD-6): Directed toward the TVL, readable and informative.

Radio Interference; Its Sources. Determination, Remedies (CD-85): Sources of BCL solutions — directed to BCLs.


Publicity: Typical letter-to-the-editor and sample committee item to aid in formulating local publicity.

TVI Complaint Form: Sample form successfully in use by the Washington (D.C.) Television Interference Committee.

TVI Quiz: 20-questions multiple-choice quiz with a comprehensive answer and discussion sheet. Excellent item for stimulating group interest.

TVI Film: 16-mm, silent black-and-white film, in use till further TVI visual aids are developed. (Requires advance booking.)

TVI Log Sheet Introduction: Well-written understandable form for TVIs to aid in logging their interference symptoms. (In use by Sioux Falls Amateur Radio Club.)

A.R.R.L. TVI DEMONSTRATION TO "BARNSTORM"

During the past year A.R.R.L has sponsored a series of lectures on TVI by Philip S. Rand, W1DBM, now Technical Consultant to our staff, in a number of cities throughout the country. The aim has been primarily to acquaint servicemen and dealers with the problems involved, and through the use of slide projector illustrations to show how to determine from the picture pattern the probable source of interference. The demonstration gear, prepared by the A.R.R.L Technical Department as a major project last year, is most essential to the effective telling of the TVI story but, unfortunately, its bulk has prevented the arranging of as many showings as would seem desirable.

The League has now purchased a station wagon in which the equipment can be easily transported. This has made possible scheduling the talk and demonstration for a "barnstorming" tour this summer of the central portion of the country, to be undertaken by QST Technical Assistant L. G. McCoy, WI1CP, who has assisted Mr. Rand in previous appearances. The tentative itinerary, consisting of cities where low-band v.h.f. channels are in operation, follows:

June 16th, Rochester, N. Y.; 17th, Buffalo, N. Y.; 19th, Cleveland, Ohio; 22nd, Detroit, Mich.; 24th, Milwaukee, Wis.; 26th, Davenport, Iowa; 28th, Minneapolis-St. Paul, Minn.

July 1st, Omaha, Nebr.; 3rd, Kansas City, Mo.; 6th, Springfield, Mo.; 8th, Oklahoma City, Okla.; 10th-11th, Houston, Texas (ARRL National Convention); 14th, New Orleans, La.; 17th, Memphis, Tenn.; 21st, St. Louis, Mo.; 23rd, Indianapolis, Ind.

Affiliated clubs in these cities have been notified in advance so they can make plans for sponsoring local meetings, to include servicemen and dealers as well as amateurs.

A similar tour is planned for early autumn to cover the southeastern part of the country.

SAN FRANCISCO COMMITTEE REPORTS SUCCESS

We are indebted to SCM R. F. Cseikowitz, W6ATO, chairman of one of the TVI committees operating in the San Francisco area, for the following progress report:

"Our committee, numbering 20 investigators, has been active for 14 months. During this period, the committee has satisfactorily and completely cured almost 100 per cent of all TVI complaints received by the local FCC office. The few exceptions (numbering six) have been cases where the complainant was using only built-in or rabbit's-ear type antennas which filters were unable to protect against fundamental blocking because of the weak TV signal at the receiver. This record is possible only because of the very fine cooperation accorded the committee by the sales representatives and service managers of eight well-known manufacturers."

ADDENDUM: ROSTER OF TVI COMMITTEES

On page 18 of March QST this department presented a comprehensive state-city listing of local TVI committees based on data collected by FCC regional managers. Subsequent correspondence to Hq. from club officials has indicated that the following committees also are very much in business:

California: Cities and towns "in shadow" of Mt. Diablo served by Mt. Diablo Amateur Radio Club TVI Committee (W6RVC committee chairman).

New Mexico: Albuquerque and vicinity served by Sandia Base Radio Club TVI Committee (W6RFF club secretary).
Handling TVI Complaints Due to Poor TV Sets

BY E. M. SHOOK,* WSIT

*227 West Woodlin Blvd., Dallas, Texas.

... read this. He is going to wait until the inevitable happens and then look around for suggestions. If you have read this far, you are probably swamped and are looking for help. What can be done at this late date? Muster a little more courage and join the crusade. It is assumed your transmitter is clear of harmonic and spurious radiations in the occupied TV channels.

Two quotations are given to illustrate further the need for the amateur to get going. Dr. Dan Noble in the November–December, 1952 issue of Motorola Newsgram, writing of development of industrial radio equipment, said in part, "All Motorola men are ordered to keep the feedback loop from engineering to production, to customer, back to engineering in a high state of activity. Every field report of failure, limitation, or substandard performance receives sharp and worried attention until tests either establish the fault as an exception or result in a design change to yield permanent improvement." Mr. Rigsby, representing RCA at the ARRL West Gulf Convention in 1951 at Austin, said, "I recommend you get back on the air and let the chips fall where they will."

If your transmitter is free from harmonic and spurious radiations in the occupied TV channels, the following procedure is recommended to you as an individual or as a group. It has been tested and proven to be adequate to keep the feedback loop in a high state of activity and to make sure the chips fall in the right place. Every action you take and every word you speak to your complainants should have only one objective—directing him back to the dealer from whom the TV set was purchased. The dealer quickly will be forced to complete the feedback loop back to production and engineering. If you engage in fixing the TV sets or in violent arguments with the TV viewer or the serviceman, you will be interrupting the all important feedback loop.

The procedure is:

1) Regain or gain your complaining neighbor’s confidence. Under no circumstances enter into violent or angered argument with him. Speak slowly and calmly with conviction and assurance. Even if his TV set is at fault, it is wise to delay such a statement until he has seen at least part of the evidence you are to show him.

2) Be firm but be fair. Show him, by tests and in words which he might understand, the evidence you are able to produce. The evidence easiest for him to grasp is another TV set operating without difficulty but closer to your transmitter than... (Continued on page 118)
BY ELEANOR WILSON,* W1QON

The majority of YLs are of the “operator” type — it is on-the-air operation which intrigues them most, whether they be engaged in nets, contests, or just plain rag-chewing.

A smaller group of YLs not only operate but build the equipment they use. Their pride and satisfaction in building and servicing their own gear is so keen that they strongly encourage more YLs to enjoy this phase of the hobby.

Let’s see what the experiences of three YLs of the latter group have been.

W5LGY, Helen M. Douglas:

“There is much in store for the YL who builds and/or maintains her own equipment. Shortage of funds and a desire to know what makes everything tick made me learn to build and repair my equipment. Anyone with the money can purchase factory-made equipment to use in the shack, but fun can come from buying parts and putting them together to make them work. It takes time, study, patience and effort to be successful.

“Learning to know what to do when there is trouble has enabled this amateur to find many friends. When you do get into trouble, let it be known. The OMs are anxious to help you get back on the air. If you cannot do it by radio,

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

Y83DEA, Denny Denmark:

“Before I knew anything about radio, a circuit for a small battery receiver intrigued me so much that I took an aluminum sink strainer for a chassis and an old breadbox for a cabinet and wired a set that worked — my ‘Kitchen Model’. On the way to school one day, my daughter bragged about the set to a boy across the street. A ham himself, he came over to see it. His help and encouragement led me to study for and pass the license examination.

“My station gives some indication of my fondness for building. Whatever equipment I have is home-built, although I have settled for a commercial receiver, as one requires an exceptionally good receiver for DX work, I think. My station shall never be ‘complete’ — I want to add more and more. I can’t imagine going to the surplus shops and not having the need of buying something. I love to get all dirty and dusty delving through the bargains in condensers, resistors, etc. (I’ve made up enough filters to supply the army.) There is no ‘junk box’ in my shack. It is not junk to me — it’s very valuable stuff.

“There is a kind of competitive challenge in building and maintaining your own gear. It allows you to prove to yourself you can get results when you want to.”

Then we have an interesting story from the pen of W1QJX, Charlotte Spauleing.

W1QJX at work on a ten-meter converter and power supply. Charlotte finds it a challenge to build and maintain her own equipment.
"All this is fun and a great source of satisfaction to me, but its real value is the ability it gives me to make my own repairs and keep myself on the air. I have a feeling of security and peace of mind in knowing that I can remain a going concern. Occasionally a spell of envy overtakes me for those who just flip a couple of switches to get on the air. This occurs when I have just burned, sliced, or shocked some part of my anatomy. But it doesn't last long. I like things the way they are."

The words of these YLs should encourage us all to learn more about the equipment we operate, and, we hope, stimulate a desire to actually do some building of our own.

**Keeping Up with the Girls**

W1YYM, Ellen, is the third YL (of whom we've heard) to pass the Extra Class exam. . . . All YLs are invited to join the "Tea Party" daily on forty 'phone — 7205 kc. at 1100 EST. W8HLE, Arlene, is NOS. . . . OM W6ONK is happy to report his XYL, Bonnie, is now K6&HA. . . . W9CDO sails in June for a summer in Europe. Lis anticipates visits with several European YLs. . . . A Chicago YLRL unit has been organized by W8GME, Grace. The twelve charter members are W9s AYX BCB GMS KXY MWO OTM OTO E2Z SPI S6L, W9s QIX and WOL. . . . All YLs in the vicinity of Newark, N. J., interested in establishing a YLRL unit in the city are requested to contact W2IQP Lil. . . . Newly-licensed WIYCD, Judith, is fifteen and a sophomore at a Worcester, Mass., high school. . . . W4UMM, Sarah, is on 10 'phone from Atlanta, Ga., and W8HBO, Barbara, is on 40 and 80 from Kansas City, Mo. . . . W4VDL and her OM, W4VDK, of Mobile, Ala., both have Sedan-Eye dogs who stay close at hand even when Ellen and Earl are operating in one of the several nets they check into daily. . . . K6HTI, Dell, has left Honolulu and will reside in W2-land for awhile. . . . W1UPZ, Helen, received an 8-76 receiver as a result of the many hours she spent assisting at an amateur radio exhibit in a Boston department store. . . . Norfolk, Va., now has three active YLs — W4VVT, Claire; W9KXL/4, Bobby; and W4LAS, Mabel. . . . The N. Y. C. YLRL substituted an afternoon at the theater for its regular February meeting. Their March meeting was held at the N. Y. C. Public Library. . . . CR7LU would like it known that she QSLs

(Continued on page 122)
Preview — DX Contest High C.W. Scores

Although s.s.b. has been getting a big play at WØCXX lately, Art operates c.w. and f.s.k., too. He's likely to be on any band from 3.5 Mc. through 28 Mc. where you can work him almost any night or week-end. The call WØCXX was 9CXX when it was assigned in 1923 and 9CXX immediately became a well-known call. Early QSOs that gave Art the biggest kick were on 20 meters with 1QP and GTS. Just the day before, on January 22, 1925, these stations had established on that band the first daylight coast-to-coast contact. Art was also one of the pioneers on 5 and 10 meters and worked both 21-Mc. c.w. and 7-Mc. s.s.b. on their recent opening days. Hamshack wallpaper includes an A-1 Operator Award; WØCXX can qualify for both WAS and DXCC.

Art likes to recall how he was helped by friendly amateurs when building his first transmitters. That he returned the help is known to all of us, since talks by Art Collins at conventions and articles written by him for QST — like the pi-network story in the February, 1934, issue — have inspired many a ham to build a better rig.

AFFILIATED CLUB PROGRAMS

As a note to the many new officers of ARRL-affiliated clubs, this is the time for you to check up on the availability of training-aid items for use at your fall meetings. In addition to the many films and filmstrips now in circulation, we're happy to announce the addition of a brand new slide collection. This slide series is devoted to the Amateur Radio Emergency Corps, with emphasis on its organization and functions. Rules for booking training-aid items, as well as a list of all available material, may be obtained upon writing the Communications Department, ARRL, attention Training Aids.

Here are top scores outside W/VE:

<table>
<thead>
<tr>
<th>Call</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>KG4AF</td>
<td>545,202</td>
</tr>
<tr>
<td>VP9BF</td>
<td>297,480</td>
</tr>
<tr>
<td>VP9BDA</td>
<td>260,640</td>
</tr>
<tr>
<td>KG6MC</td>
<td>339,552</td>
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<tr>
<td>KH6MC</td>
<td>178,574</td>
</tr>
<tr>
<td>KP30J</td>
<td>292,002</td>
</tr>
<tr>
<td>KH6PM</td>
<td>299,054</td>
</tr>
<tr>
<td>KZ5BS</td>
<td>199,015</td>
</tr>
<tr>
<td>K7EEO</td>
<td>147,549</td>
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<tr>
<td>KP4CC</td>
<td>141,706</td>
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<td>102,344</td>
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<tr>
<td>EA0CL</td>
<td>91,828</td>
</tr>
<tr>
<td>V8TFM</td>
<td>66,448</td>
</tr>
<tr>
<td>LUSAE</td>
<td>84,103</td>
</tr>
<tr>
<td>FT0DZ</td>
<td>71,084</td>
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</tbody>
</table>

All entries will be carefully checked before announcement of final results in a later QST.

Answer to QUIST QUIZ on page 10

QST for
How's DX?

CONDUCTED BY ROD NEWKIRK,* W1VMW

How:

Tester O'Riggs roared his disapproval 40 db. over the voices of the rest of us.

"I protest and deplore this projected action of the Echo Hollow Mud- and Signal-Slinging Society. Under no circumstances should we put our club on record as being in favor of the abolishment of all QRM, QRN and QSB!"

We recoiled agaist at this apparent in-league-with-the-devil attitude, this revolting development within our ranks. Indeed, if a vote had been called at that moment there is no question but that the outcome would have been 11 1/2 in favor of the motion and only one against. Tester was alone — an outcast, a probate, a fiend among friends. (That half-vote belonged to Jeeves, behind in his dues again.)

Tester took the floor for the defendants — interference, static and fading — while we 11 1/2 plaintiffs sat back querulously with folded arms.

"I speak from my own experiences as a QRP DX man," he began. "QRN, QRN and QSB are very often my best operating aids. Take that V88 I worked last week — the one you guys dodged yourselves dry over. He started CQing and I barely got his call before he disappeared momentarily beneath three 59 birds calling CQ ZD8. I heard him sign beneath the racket and quickly grabbed him only because I was the only joker calling. Do you guys think my 6V6 would have had a chance if his long CQ had been called in the clear?"

"As for atmospherics, QRN is just what's needed to separate the men from the boys in 80-meter summer DXing. Thanks to noisy nights for sitting-duck shots last year I knocked off ZK2, FUS and a half-dozen others I wouldn't have gotten close to if the band had been quiet and more pleasant for the softies to use.

"And QSB — jimminy! When the Europeans fade out on Twenty to let those rare Oceanians and Africans leak through should you complain? Go ahead, chumps; cut your own DX throats if you like but I request to be recorded as voting opposed!"

This Bryant-like blast was followed by a few minutes of thoughtful silence, after which the motion was discreetly tabled and forgotten. More important business was taken up instead — for instance, the matter of our railroading through a proposal that Jeeves operate the club's 11-meter set-up again this Field Day.

What:

Other DX bands may flare up brightly from time to time but you can't get away from it — good old twenty is still boss. W4AIX (ex-W9RKB) finds time to get back into the thick of things for catches like these: AP2N (14,064), CP18X (202), CR6CZ (040), EA9AP (040), FA3RKH (055), FBSZ (048), FFS8s AG (060), AN (038), FM7WD (048), FQ6AR (045), GC4L1 (036), G0D3U8 (226), H1C1K5 (060), HZ1AB (060), IGO (030-060), J3EKO (028), Q0QEC (050), OX1ULD (015), ODS5 (046), T03A (019), P12CJ (050), SP0TPK (060), TFS5V (078), T0G0C (090), VPS2KO (042), JVN (050), JTF (044), 4LZ (032), SB5 (050), SH2 (040), GBS (060), 7ND (044), SAP (030), VQ5G (024), 4DO (002), ZB1KQ (098), ZD4RL (050), ZB1JP (050), ZB2H (060), 7D (060), ZA3A TR (050), TU (050) and TZ (060). Smitty needed only thirty-five watts and a folded dipole for these babies — all told, 86 countries in less than three months. The rig was a Collins 310-B and W4AIX receives with an H30 — before packing up to return State水产, W9YDZ/KG6 racked up C3GB (043), CRs 7LU (050), 9AF (052), FNS8AD (040), FQ5A1 (042), MI1AT (044), SU1PH (071), SV6WE (071), VSS 2DF (064), 8AP (084), V128A JV (052), 2ZV (017), ZZ2OM (019), ZC5VS (072) and 4X4FW (075). These were worked between 1200 and 1630 GCT, obviously an excellent period for Guam-based DXing.... W8YGR scored with STAR (030) and narrowly missed once V54AB (010) who popped through around suppertime.... CNCSCY, an F8S, GC2PZC (068), D1YCD/Trieste, MFZAA (065), SPS 1KAA (038), ZKAC (048) and FASCR (042) appear on the good side of W2LYO's score sheet. N1AIK and B2AZX were heard but not worked. After a 2-year layoff, VE1PQ dived back in for HRKKS (075), SP2KAC (030), SU1MF (080), VU2JP (060), VSS 4AC (040), 9L0 (070), ZBBU (060) and ZC5PH (040). Doug also knocked off C1P, LZ1, M13 and TA9 entries already mentioned.... W8HFR, thinking about trying an 8J, collected a CNA, FAOVN (058), TF3s AB (030), MB (040) and YN1AA.... E3C (038), J2A 2AD (071), 5AB (055), ODSBN (081), VQ9P (066), VQ9AV (000) and ZE5JA (059) rang the bell with DJ4JN. Bill is still after K6Gs ABJ (070), GJX (032), QO5SL (019) and VQ5DQ (055).... W1UTCQ doing a tour of duty with Arabian-American Oil in Saudi Arabia, found a chance to tune the band one evening and heard M13SL (067), ODSXX (060), SU1CN (060) and VU2CR (082) bowling through.... Some of the gang have been hitting 14 Mc. for pretty good cw stuff in addition to catches previously mentioned. At W1TBQ, we find: CN8s CP HE, CT3AA, V86GT, YU1ADA and V86AK. W8HSZ:

AND WHILE YOU'RE THERE, JEEVES, HIT GD5XX FOR THAT OVERDUE QSL!

June 1953
an ST2, an MI3 and QSLs from V67PM, Y12AM and ZQ4IF. W7ISZ/4: a C73, FOSAC, GC5OU, K7W6C, SU3KL, SU3MS, YR2Z, an Aden V89, Z1DQK, Z1KAA and Z4X4F/1700. W7ISZ/1: IA8U, KAAJ 48J, YS8B 4JJ, MP44BBD, OD5AD, an ST2, VK1EM, ZC4s RS XP, 4X4s DF FG and K6AAX. W7IMX (W4YHD and W5QG operating): a C77, 18F8 AIK CXQ, L85Q, LU25O, CQ6s CP GI, an ST2 and TAT, ZB1EUR E8A, 9F8s 4A AX and V89AP. W7ZJ: CE3AG, K2HQB, K2AA and Q4AN, W7XBB/7: D7USV, J7As 3AC 3AQ, K2LZG, KG4ABN, KV4QX and a C1P. K1AB: CX6AD, OX3RC, V8s 2DQW, Z1DQK and sundry Europeans. K7LZG, CN5EY, EA2 2AG 3MB 75L 8AB, KG4JJ, KROLL, OK9Xs AN MW, PJ7F, TFSV, YU1AD and 5A5TK. V8FSCQ: CE3AG, a C1P, CX7AC, KG4AF, K4s AA AQ, PJ7A AC KB, PJ7CWX, ZF7TG, V8s 6BF 69 75V and a 5A5TK. We’re not sure what’s going on here. 

QSLs from CE3CB of San Miguel, Chile, are to be found on many a W/V/VE ham shack wall. A modest fifty watts input and three-tube receiver do a fine job on several DX bands.

stuff the W/VE gang can’t even hear right now. There’ll come a day, though! Wally heard, but didn’t raise, CNRMZ, EAs 8AX 9AR, FFSAK, Y3W1H, ZD1SW and ZS7C.

Despite the new A3 competition, fifteen o.w. still does quite okay. The WGD-OQ DX Bulletin tells of exploits by W4MSB and his 4-watt V8Q, W5QG and W5QQ6 counters with CE3AB, KG06Q, K7h6S AGX MG PM, LU4D4Y, PYI1ADA, V2KAFWU, V2K3AIH, XE1SA, YV5F6H, ZLs 1AXD 1BY 2G8 2AFA 3J4 and buddy KAA9A .......

QSLs, CQ1BSX, FUVAS, LS1A and ZLs 810K got away from W5VRI’s key. ——— V1FQ9 did well for TAA3A (21.200), YQs Z5D (630), 4F5 (190), 5CB (210), ZD9AA (180), Z38K (100) and Z57C (240). Doug is up to 43 countries on the band. ——— W2GZV was glad to catch V9SAP (090), F8SAS, MI3XL and Z2A while W9HAW made off with KG4AP and K9HEJ. In addition to some already listed, the boys at W1MX accounted for EA9AF, FASRZ, CT2GB and VQ4RP. ——— DL4AN calls attention to V9SAP (090), V9Q4A (105) and ZC4GT (110). ——— We’ll have no more kidding about potential Novice W4s. KN2CHS put his 50 watts on 21 Mc. to raise ZD9AA, SB4AX and F8BB. It may not be too far-fetched to imagine some future Novice scoring DXCC when in 15 meters really gets hot!

Forty o.w. is still quite popular out west. Thanks to W6LRU, we hear that W8s CAB CGQ XYG and L1RU have been working folks like CQ1BSX, FUVAS, LS1A and ZLs 810K got away from W5VRI’s key. ——— V1FQ9 did well for TAA3A (21.200), YQs Z5D (630), 4F5 (190), 5CB (210), ZD9AA (180), Z38K (100) and Z57C (240). Doug is up to 43 countries on the band. ——— W2GZV was glad to catch V9SAP (090), F8SAS, MI3XL and Z2A while W9HAW made off with KG4AP and K9HEJ. In addition to some already listed, the boys at W1MX accounted for EA9AF, FASRZ, CT2GB and VQ4RP. ——— DL4AN calls attention to V9SAP (090), V9Q4A (105) and ZC4GT (110). ——— We’ll have no more kidding about potential Novice W4s. KN2CHS put his 50 watts on 21 Mc. to raise ZD9AA, SB4AX and F8BB. It may not be too far-fetched to imagine some future Novice scoring DXCC when in 15 meters really gets hot!

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Here are three types of mast construction in vogue for raising rotaries up into the blue. KG6HIL does it with twin poles guyed (left), W1FH prefers self-supporting steel (center), and W6LW finds bolted wood (far) sections to his liking. All three stations punch prodigious holes through 14-Mc. QRM with their respective twirlers.
There's a long, long trail a-winding from the spot where this photograph was taken to the shack and antenna site of ZS2MT. This rare Marion Island catch is frequently workable on 20 and 40 meters. (Photo via W5MIS)

**Tidbits:**

**Asia** — TA3MF (W3JQ) spends eight to ten hours on the air daily, mostly between 0600 and 1600 GMT, and is a good bet for Turkey on 20- and 40-meter e.w. and phone. Meade runs 100 watts to a Viking-I on the input end of a two-element beam. He'll have a home-grown half-kilowatt cooking soon. TA3MF's QSLs are in the mail within 20 hours after QSOs — that's service! . . . At this writing W/Ks are still forbidden to work FIs, although Indo-China authorities have licensed stations bearing the calls F18AA through F18AJ. Until FCC, proceeding accordingly through channels, gives us the green light for F18 contacts, the smart and only thing to do is to ignore them. QSLs from Indo-China for DXCC credit must bear dates-of-QSOs not corresponding to the ban period, anyway. . . . Exzon31AL (V82D) has a 100-watt rig cooking on 20-meter phone and 15 e.w. He'll put Malayas on the 15-meter phone map as soon as expected 21-Me. Az authorization for V82S becomes effective.

**Africa** — Via W3EQK, W4OFB sends us a list of 62 Ws who have apparently failed to answer his QSLs. A lot of prominent DXers are on the roster, too. There is undoubtedly a "don't bother to QSL if you get a DX station's card first" school of thought in some quarters but we're inclined to believe that the usual answer is in plain carelessness. It's easy to assume that one has already QSL'd if one receives a card from rare DX because that's the way it almost always works. Still, cases in any doubt should be resolved by log checks before said QSLs are relegated to the shoe box . . . . CN2AS has trouble convincing some people that CN2 isn't the same DXCC country as CN8. As the Countries List stands, CN2 and -31 both represent the Tangier Zone. It's a small world — the scene of the photograph of CN8SEG and BERTA on page 47, March QST, was taken just across the street from the CN2AS shack and antenna. CN2AS was unaware of CN8SEG's visit to his front yard and would like to meet the guy . . . . ZD4BK tells W4EO that anyone still due his Gold Coast QSL is invited to apply or reply, enclosing full QSO particulars . . . . Follows counting on EC21 for Rio de Oro DXCC credit deserve our sympathy. W1WFO has it that the station is not, and never was, in the amateur category . . . . Deck-Clip note from WGDX's (9K6MLY (721M1Y, 4W1MY, et al) is scheduled to secure a CN8 call and looks forward to some possible Rio de Oro and final operation. Dick will have to break his DX call-sig pattern because the CN8MY tag is already spoken for.

**Europe** — ARI (Italy) now makes available "CDM" (Certificato del Mediterraneo) certificate awards to stations working any of 22 of designated Mediterranean-adjacent countries in addition to any 20 provinces of peninsular Italy. Before this the DX clip was the necessary 52 QSLs you'd better check with ARI on full details. Write that association at 1. 8. 10, Milano. . . . Its BJC and BQS were visited by W3TJ8 and XYL WN3JLA during the latter couple's recent four-day European SSB trip, and Garton showed the visiting firemen the sights of Venice as well as the very interesting rotatable-retractable 20-meter beam at 11BJC . . . . DLAAY (W4ALP) hopes that 14-Me. conditions for communication between Wiesbaden and South America improve shortly so that he may further fatten his country's total. That area has been Bill's blind spot for quite a while. . . . DLAAY, located in Germany's French occupation zone, finds 10- and 40-meter local QRM — commercial as well as amateur — plenty rough, although 14 Me. is fairly free of the stuff. Art has a 32V3/75A-2 combo cooking and will remain in DL-land until late 1954 . . . . Amateurs interested in correspondence pending ratification of the ARI ADVISED of these candidates for such activity: W. A. Winchester, ISWL, 4 Woodgate Rd., Eastbourne, Sussex, England; Romano Giovanni, Corso Paleonero 61, Turin, Italy; and DJ1JK (see "Europe").

**Oceania** — KH6MG, says W2VYM/L knobbed off a neat 6-bandie with VE2VYO in the DX Test. . . . KB6AY has had tidings for some. Fred writes that there was no KB6EZ working the Test from Canton Island and he should know. Only Canton calls KB6OA through KB6AZ have been apportioned by FCC to date. KB6s AQ and AY were plugging along in the Test and are now fighting out under better QSL stacks. The last knobbed off in the 10-Me. States in the frazzles, missing only Maine, Rhode Island and Vermont. KB6AF is back on the island and intends immediate 20- and 40-meter e.w. shenanigans . . . . G2M1, via W4LET, advises that ZC2MAC (Cocos Islands) QSLs have arrived in bulk and will be getting around to W/Ea via bureaus.

**South America** — PJ2AJ had difficulty raising something besides Wa during his first few weeks on the air. His first non-W DX was old stand-by CP1BX . . . . GEs AG and DG reported considerable difficulty encountered in carrying through their Easter Island CEsAA plans. W1WFO learned Chile now has legally authorized the prefix CE8 for any amateur stations that become active on the site. A few incidental facts on the place may save you a reach for the atlas. It's roughly two thousand miles west of Chile at 27° 6' south latitude, has an area of 50 square miles and a population of approximately 300 souls. The island got its name via discovery by a Dutch navigator on Easter Day and is famous for many weird archaeological remains of unknown origin.

**Hereabouts** — W6QFE, operating W6AM with W6AM and W6ADP kibitzing, almost fell off his chair when he ran into UAs FFK and KKO calling CQ W/VE in this year's ARL DX Test. They worked 'em both. In addition to this unusual development, W6AM and KH6JL QSOs on some bands in the Test — 28, 27, 21, 14, 7, 3.5 and 2 Me. W2QHH and KP4KD also have 7-banders, theirs accomplished in routine non-contest DXing . . . . KI7AGP writes to agree that amateur radio was of great value in keeping morale high among the Fletcher's Ice Island (T-3)
QLS BUREAUS OF THE WORLD

For delivery of your QSLs to foreign amateurs, simply mail cards direct to the bureau of the proper country, as listed below (bold-face type indicates a recent change from previous listings). Do not send foreign cards to A.R.R.L. headquarters except those for which no bureau is here listed.

For service on incoming foreign cards, see list of domestic bureaus in most QSTs (page 144 of May QST) under the heading, “A.R.R.L. QSL Bureau.”

 Algeria: Via France
Argentina: R.C.A., Avenida Libertador General San Martin 1850, Buenos Aires
Australia: W.I.A., Box 26111W, G.P.O., Melbourne
Austria: Via ARR.L.
Austria: Via Portugal
Bahamas: C.N. Albury, Telecommunications Dept., Nassau
Barbados: V.P.RX, Wood Goddard, Bromley, Welches, Christ Ch., Barbados, British West Indies
Belgian Congo: P.O. Box 2371, Leopoldville
Belgium: U.B.A., Postbox 654, Brussels
Bermuda: V.P.D, James A. Mann, The Out, St. Georges
Bolivia: R.E.B., Casilla 2111, La Paz
Brazil: L.A.B.R.E., Caixa Postal 2938, Rio de Janeiro
British Guiana: Desmond Yong, 152 Sussex St., Georgetown, Georgetown #16
British Honduras: D. Hunter, Box 178, Belize
Burma: R.B.S., P.O. Box 376, Rangoon
Cancun Island: Fred V. Carpenter, KB6AY, U.S.P.O. 06-50000, Canton Island, South Pacific
Cyprus: P.O. Box 907, Limassol
Chile: RC.C. Club de Chile, Box 761, Santiago
China: M.T. Young, P.O. Box 16, Taichung, Formosa
Colombia: L.C.R.A., P.O. Box 584, Bogota
Cook Islands: Ray Holloway, P.O. Box 65, Rarotonga
Costa Rica: F. Gonzalez, Box 385, San Jose
Cuba: Radio Club de Cuba, QSL Bureau, Lealtad No. 690, Havana
Cyprus: MDYTP, P.O. Box 451, Nicosia
Czechoslovakia: C.A.V., P.O. Box 69, Prague I
Denmark: P.O. Box 12, Copenhagen, K.
Dominica: VP2DC, Roseau
East Africa (VQ1, VQ3, VQ4, VQ5): P.O. Box 1315, Nairobi; Kenya Colony
Ecuador: Guayasamil Radio Club, Casilla 784, Guayaquil
Eire: I.R.T.S. QSL Bureau, % E152, 23 Orwell Gardens, Rathgar, Dublin
Faeroe Islands: S.I. Ver, P.O. Box 4, Thorshavn
Finland: SRAL, Box 306, Helsinki
France: R.E.F., 3 Avenue Hoche, Paris 8
Germany (DL2 calls only): QSL Bureau, % Posts & Telecommunications, Warnheide, B.A.O.R., 19
Germany (DL4 calls only): DL4 QSL Bureau, APO 757, % Postmaster, New York, N.Y.
Germany (DL5 calls only): Via France
Germany (other than above): D.A.A.C., Postbox 99, Munich 77
Gibraltar: K.D. Wills, ZB2I, 9 Naval Hospital Road
Great Britain (and British Empire): A. Milne, 29 Kichell Gardens, Hayes, Bromley, Kent
Greece: C. Tavaniotis, 17-A Bucharax St., Athens
Greece: A.P.O. 858, % Postmaster, New York, N.Y.
Greece: VP2GE, St. Georges
Guam: G.R.A.L., Box 145, Agana, Guam, Mariana Islands
Guatemala: Manuel Gomez de Leon, P.O. Box 12, Guatemala City
Haiti: Roger Lanois, % R.C.A., P.O. Box A-153, Port-au-Prince
Hong Kong: Hong Kong Amateur Radio Transmitting Society, P.O. Box 541, Hong Kong
Hungary: U.S.R.L., Postbox 135, Budapest 4
Iceland: Irelundir Radio Amatorar, P.O. Box 1030, Reykjavik
India: Amateur Radio Club, India, P.O. Box 8666, Bombay 20
Indonesia: P.A.R.I., P.O. Box 224, Surabaja, Java
Israel: I.A.R.C., P.O. Box 4919, Tel-Aviv
Italy: A.R.I., Via San Paolo 10, Milano
Japan (JA): JARL, 3-5 Kanda Ogawa-cho, Chiyoda, Tokyo
Japan (KA): FE.A.R.I., APO 500, % Postmaster, San Francisco, Calif.
Kuwait: Doug Taylor, VTIAC, Box 54, Kuwait, Persian Gulf
Lebanon: R.A., B. 1202, Beyrouth
Libya: See Tripolitania
Luxembourg: G. Berger, 40 rue Trevire, Luxembourg
Macao: Via Hong Kong
Mauritania: Alberto C. de Oliveira, CT3AA, Beco Chao da Loba, 4, Funchal
Malaysia: C. E. Salton, Postal Services Dept., Johore
Malta: R. F. Gales, 20, Collegiate Street, Birkirkara
Marshall Islands: V. de Robillard, Box 165, Port Louis
Mexico: L.M.R.E., Apartado Postal 907, Mexico, D.F.
Montserrat: VP2MY, Plymouth
Morocco: C. Granger, Box 50, Casablanca
Mozambique: Ligue dos Radio-Emissores, P.O. Box 812, Lourenco Marques
Netherlands: V.S.R.O.N., Postbox 400, Rotterdam
Netherlands Antilles: Sullilani T24-1, Curacao
New Zealand: N.Z.A.R.T., P.O. Box 489, Wellington C
Nicaragua: L. B. Satre, Bolivar Ave., 106 Managua
Northern Rhodesia: N.R.A.R.S., P.O. Box 332, Kitwe
Norway: N.R.R.L., P.O. Box 598, Oslo
Pakistan: P.O. Box 416, Lahore
Panama: Canal Zone: B.A.R.A., P.O. Box 1616, Panama
Paraguay: R.C.P., P.O. Box 512, Asuncion
Peru: R.C.P., P.O. Box 538, Lima
Philippines: Eiiji G. DeCastro, Philippine Amateur Radio Club, Box 413, Manila
Poland: Polski Zwiez Krolkofalowcow, P.O. Box 320, Warszawa
Portugal: R.E.P., Traveza Nova de S. Domingos, 34-1º
Lisbon
Porto: A.R.E.R., P.O. Box 95, Bucharest
Salvador: YS10, Apartado 329, San Salvador
Siem Reap (Cambodia): Frank Speir (W6FUV), Sihanouk Th., 4th Mansion, Raja Danum Avenue, Bangkok, Thailand
Singapore: P.O. Box 176, Singapore, Malaya
South Africa: S.A.R.L., P.O. Box 3097, Capetown
Southern Rhodesia: R.S.R.L., Box 2777, Salisbury
Spain: U.R.E., P.O. Box 220, Madrid
St. Vincent: VP2SA, Kingstown
Sweden: S.S.A., Stockholm 4
Switzerland: U.S.K.A., Postbox 1203, St. Gallen
Syria: P.O. Box 35, Damascus
Trinidad: MF2AAS, Major M.H. Carragher, HQ V.G. Command
Trinidad: John A. Hoford, VP4TT, P.O. Box 554, Port-of-Spain
Tripoli: Peter Keller, MT2DZ, P.O. Box 290, Tripoli
U.S.S.R.: Central Radio Club, Postbox N-88, Moscow
Vanuatu: R.C.V., P.O. Box 2285, Port Vila
Virgin Islands: Richard Spenceley, Box 415, St. Thomas
Uganda: BAF, Postbox 18, Belgrade

June 1953
June V.H.F. QSO Party

Fun for All in This June 6th-7th Activity—
Special Awards to Novice and Technician Section Leaders

Here it is, v.h.f. mail! Yes, another ARRL QSO Party, open to all amateurs who can work on 50 Mc. or higher, gets under way at 2:00 P.M. Local Standard Time, Saturday, June 6th. Ending time will be 11:00 P.M. Local Standard Time, Sunday, June 7th. And whether you wish to scout for new states, chat with old friends, or check out the rig you'll be using on Field Day, the increased v.h.f. activity during this 33-hour get-together should suit your fancy!

Rules Changes

By popular demand, three rules changes are being introduced in the June QSO Party. First, there is a change in the points earned for contacts on 220 Mc. and higher bands. In this party you may count 1 point for successfully-confirmed two-way exchanges on 50 or 144 Mc., 2 points on 220 or 420 Mc., and 3 points on the higher bands. It is felt that this new contact-points system will provide sufficient incentive for working the higher bands without unduly penalizing the fellows able to work only 2 or 6 meters. Secondly, certificate awards will go to the top-scoring Novice and Technician in each ARRL section, where applicable, as well as to the over-all top scorer in the section. Lastly, the party will end one hour earlier than in the past — this to give participants desiring to work straight through a bit more time to recuperate before reporting for work Monday.

How To Take Part

Call "CQ contest" to get in touch with other contestants. When you contact another v.h.f. amateur, you must give him the name of your ARRL section. Though not a contest requirement, it is suggested that operators exchange signal-strength and readability reports, as many of the gang will be trying out new equipment.

Scoring and Reporting

The idea is to work as many stations on as many v.h.f. bands as possible. Count 1 point for successfully-confirmed two-way exchanges of sec-

(Continued on page 184)

<table>
<thead>
<tr>
<th>SUMMARY OF CONTACTS, JUNE V.H.F. QSO PARTY</th>
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<tr>
<td><strong>Freq. Band (Mc.)</strong></td>
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<td>1215</td>
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Number of contacts: 60 Mc. 8 144 Mc. 5 220 Mc. 3 420 Mc. 2 Other 1
Total contacts: 17 Total contact points: 22 Multiplier: 8 x 2 = 16
Claimed score: 22 x 14 = 308 Points Final Score

Names of operators having a share in above work

I hereby state that I have abided by the rules specified for this contest and that, to the best of my knowledge, the points and score as set forth in the above summary are correct and true.

Transmitter: Signature

Receiver: Address

Antenna:
It's nearly fifteen years since ARRL sponsored the first v.h.f. contest. We didn't know, then, if the idea would take hold. Maybe inhabitants of the world above 50 Mc. were all pure experimenters who would turn thumbs down on any sort of competitive operating activity. Signs pointed the other way, however. For some years there had been increasing v.h.f. participation in the Field Day, the only spot in our operating program that made room for the v.h.f. man, and more letters were coming in all the time asking for a contest for v.h.f. men only.

But how to run it? None of the contest set-ups that had proved popular on lower frequencies quite fitted the v.h.f. picture, so new formulas had to be devised. In the years since 1939 many varieties of v.h.f. contests have been tried, and the form has been revised and streamlined whenever practical ideas have come up. We've had message-relaying parties, contests based on distances covered, long-term activity competitions, one-day QSO parties, week-end parties, and various modifications of popular low-frequency contest forms such as the Annual V.H.F. Sweepstakes.

Certain factors are musts in making up a contest form. From the viewpoint of the participant, any contest should be simple. Nobody likes extensive bookkeeping! It should be set up so that anyone who is caught in the contest unaware (and quite a few always are) can get going and have fun, without extensive reading or briefing. The scoring should be so contrived as to give everyone a fair chance, so far as possible. Awards should be plentiful, but not to the extent of becoming meaningless. Anyone who wins a contest certificate wants to be proud to display it as a symbol of achievement.

For those of us who wade through the reports, the ideal contest must be simple to check. This rules out many of the pet ideas that come in after each party. It must be so set up that the results can be displayed in QST without undue use of space, and in a form that can be interpreted readily by the reader. Of course, any contest should promote desirable ends, such as increased use of bands now sparsely occupied, and greater occupancy in areas where v.h.f. interest has been low. Most important, it should provide real operating enjoyment, for if this end is served well all other aims are achieved in proportion. Before each contest is announced in QST, the Headquarters Contest Committee goes over the current batch of suggestions, arguing out all conceivable angles. The latest session of this body resulted in the revised rules for the June V.H.F. Party, appearing on the facing page.

Novices and Technicians have complained that the contests offered them little incentive, as they had almost no chance of winning an award. Now they are in; see Rule 8. Contestants have claimed that the 5-point credit for contacts on 220 and higher gives operators who work those bands an unfair advantage. We agree — and the multiplier for 220 and 420 is reduced to 2 now, with 3 points credit for contacts made on 1215 or higher bands.

And, of course, everybody who works only one band objects to a scoring system that gives the multiband operator an advantage. The only solution to this would be to run a separate contest for

No Johnny-come-lately is Eddie Collins, W4MS-WIRE, one of the South's most active v.h.f. men. Eddie was licensed in 1915, and he's been active ever since, except for wartime interruptions. W4MS is heard on 50 Mc. whenever the band is open, and on 20 meters otherwise, where he uses his kilowatt rig to talk v.h.f. with many of the gang. He is also set up for 2-meter operation, and is currently working on a 430-Mc. TV rig, the camera unit of which is visible in this shot of Eddie at his operating position. The lady of the house is also licensed, as W4AXP. Eddie has served a total of more than 10 years as SCM of the Western Florida ARRL Section.

June 1953
each band, a highly impractical idea at this stage of the game. After all, one of the purposes of the contest is to promote versatility, and greater use of all our bands from 50 Mc. up. Why shouldn’t the fellow who can work at least two bands win over the man who is stuck on one? We plan one concession to the one-bander, however: the QST report will carry a separate listing of the outstanding one-band scores.

Well, boys and girls, there it is. We hope you like the new set-up, and we urge you all to get into the June Party for all you’re worth. We’ve placed an order for good conditions throughout the week end of the 6th and the 7th. The rest is up to you!

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

Transatlantic contacts on 144 Mc.? Seems like a long shot, doesn’t it? And so it is, but who is willing to state flatly that it is impossible? Certainly not the International VHF Society!

This group, formerly the VHF Society of Ireland, but recently renamed in view of the interest they’ve developed in many other countries, is making a real try for a 2-meter transatlantic crossing in July. The date has been moved forward from the original schedule in order to put the test in a better spot in the sporadic-E season. The site has been selected and the station is in the works as we write.

Harry Wilson, EI22W, writes that a 200-watt c.w.-phone transmitter will be in continuous operation July 6th through 12th. The frequency will be 144.186 Mc., and the location will be a seaside spot in Kilkee, County Clare, just north of the Shannon Estuary. Several receiving monitors will be in operation in the area but remote from, although in contact with, the transmitting site, so that if signals are heard in either direction arrangements can be made quickly for a two-way test. At least one station will be maintained on 14 Mc. for a check channel. Final details in July QST.

How far can you work regions of 144 Mc.?! We need to think that the reliable distance that could be covered from the average well-equipped station was about a hundred miles, but many schedules now being maintained call for an upward revision of this figure. There’s the 275-mile hop from W2UK, New Brunswick, N.J., to W2ORJ, Lockport, N. Y., for example. These two have been working nightly since late in the winter. It’s a weak-signal c.w. proposition, and it takes high power and big antennas, but they work.

More recently, W2ORJ has been keeping good links with W1CCH, Springfield, Mass. This is more than 300 miles, and while it is far from a solid circuit, signals get through fairly often. You have to be familiar with the terrain west of Springfield to appreciate this one fully. If it is the roughest country in Southern New England, W1CCH has nothing special in the way of a location. His antenna is something to behold, however: 12 5-element arrays full-wave spaced, 3 high and 4 wide. This structure is mounted only a few feet above ground, which would be considered a disadvantage if it weren’t for the fact that he swaps good signals regularly with W1MEP and W1NH, both in Bennington, Vt., nestled deeply in the Green Mountains, 65 miles northwest of Springfield.

Vermont, long sought on 144 Mc., as well as on most other bands, is now being worked more often as the result of good work by a recent convert, W1MMN, of Orange. George has a 1600-foot elevation, a sizable rhombic aimed south, and a twin-five for either horizontal or vertical. He works north to Montreal regularly, and sends a series of surprising signals down to W1HDQ, 176 miles to the south. He’s on 144.18 nightly at 3800.

Morning skeds kept for nearly two years show that the 110-mile path between W1HDQ and W2QED can be negotiated a high percentage of the time. In winter it is a ragged-edge proposition, except when marked inversions are present, but with the advent of warmer weather good voice contacts are often possible. The 320-Mc. band provides some surprising signals over this hop when conditions are right.

Examination of the records indicates that we have no very concrete idea of the best distance that can be covered when the 2-meter band is open, even the 1400-mile DX between Southern California and Europe has been established by fairly strong signals at each end. How much farther could have been covered if there had been good stations in the right places?

Several times we’ve had good signals between stations in the East and those in Western Iowa, in Missouri, and even Kansas. How much farther could the path have been extended than the 1200 to 1300 miles worked on these occasions? Wanted: some really hot 2-meter stations in Western Kansas, Nebraska and the Dakotas whose operators will guarantee to be on deck whenever the band is open. Don’t wait until the summer and fall! W8GUD, Conway, Iowa, offers some hope for Nebraska contacts. He says that W8QOV, Snyder, Neb., is a regular customer these days.

North Carolina has invariably been the end of the line for Eastern stations working down the Atlantic Seaboard. Why no contacts in South Carolina, Georgia, or even Florida? Chances are that it was mostly a matter of nobody being on in the right spots at the right time. W4LNG is planning an effort for the June V.H.F. Party. Ruddy will be operating from Pine Mountain, near Thomson, Ga., the 6th and 7th, using 145.3 Mc. horizontal polarization. It represents considerable 2-meter business around Atlanta these days, with W4s LRR MZQ HDG LND and WN4WIA most active. W4DBY is on in Rome, Ga., W4PYM in Dalton, W40ZE works from Alabama City, Ala., W4FDW in Birmingham, W4ECK in Tuscaloosa, and W4s VCC and AXU in Oneonta.

W9KLR, Renellea, Indiana, feels that organization of
message relaying routes would help maintain regular interest in 144-Mc. work, regardless of conditions. It might also provide a more interesting DX section when other frequencies are heavily loaded. Two-meter relays have been pulled off before, with distances up to as much as 1500 miles being lined up for a one-shot proposition. There is no stretch of 100 miles between New York and Chicago, for instance, which does not have sufficient DX relay between these cities work any time, if the effort were properly organized. Boston to Dallas should be practical, too, and even a transcontinental relay is not beyond the realm of possible. WYQKL says he has never experienced trouble working W0ORZ, 95 miles away in Anderson, though he runs only 15 watts. And W0ORZ’s antenna is only 15 feet above the ground. Such hops are long-distance circuits made, we have the stations — will someone volunteer to organize some 144-Mc. We hear often of the 75-meter band being used to promote contacts on 144 Mc., but seldom does it happen the other way around. One night recently, W6UDD, Ft. Wayne, Ind., was working W5PIN, Columbus City, on 147.5 Mc. Nothing tough about that, as it’s only 20 miles or so. W5PIN mentioned that he was in contact with a local mutual acquaintance on 75, so UDD asked both to listen for his new low-powered s.s.b. rig on 2000. Result: no satisfactory communication on 75; too much QRM from DX, Signals on 147, meanwhile, remained a solid QRM-free S9.

V.H.F. Doings at the National Convention

Made your plans to attend the ARRL National Convention in Houston, July 10th, 11th and 12th? Better put the big party on your list. W5FEK, looking out for the v.h.f. gang, has a full program lined up for us. There will be informal get-acquainted session Friday afternoon. No formal program for this one — just a gabfest, with plenty of time and room to circulate around and meet fellow inhabitants of the world above 50 Mc.

The entire morning Saturday will be devoted to technical talks of a v.h.f. nature. Speakers will include Cal Hadlock, WICTW, Bill McMann, W5FEW, B. D. Lee, W5AYU, and your correspondent, Will. Many other speakers will cover subjects of interest to the v.h.f. fraternity during the three-day convention. A v.h.f. men’s luncheon will be held Saturday, following the technical sessions.

V.H.F. men will be provided with badges of a distinctive color, to permit spotting of kindred souls at a distance, and a special room will be set aside for us to congregate in whenever the spirit moves us. A v.h.f. register will be kept available here, along with a p.s.a. system to permit calling anyone you wish to meet. This convention-within-a-convention promises to be the largest gathering of v.h.f. operators ever, so you won’t want to miss it. See May QST for convention arrangements, and July QST for final details. Remember, it’s Houston, July 10th, 11th and 12th. See you there!

What About 220 Mc.?

There are more letters from Technician Class licensees in our mail every week, all with the same story: "What can I do to get started on 220 Mc.?" These fellows are beginners. It does little good to point out that we have designs for crystal-controlled transmitters and converters in QST and the Handbook. Such gear is beyond them, at this stage of the game. They want (1) Commercial equipment ready to use, or in very simple kit form, or (2) Extremely simple gear that can be built with only the most rudimentary radio knowl- edge and little or no construction experience.

Item 1 seems out of the question at present. Few manufacturers are inclined to spend money developing new gear for the limited market 220-Mc. interest affords. How about item 2? If the 220-Mc. gang want it, we can get out a series of QST articles describing elementary gear. The transmitters will, of necessity, be low-powered modulated oscillators, and the receivers will have to be superregens. What say, gang, shall we encourage the use of this sort of equipment on 220? It’s legal, and with some thought on the design we probably will come up with some gear that wouldn’t sound too bad on the air, at least on a tolerant receiver. It looks like this is the only way to get the ever-growing beginners’ class started off on the right foot. The question is, do you, the present and potential occupants of 220 Mc., want it that way? Let’s have your answer! Division of the band according to the type of rigs used could keep QRM down. The advanced control and selective-receiver gang need no more than the first megacycle. Shall we encourage use of modulated oscillators on 221 and up?

Several areas report growing activity on 220. WICTW says that the Sunday night 220-Mc. workouts in the Boston area are attracting new customers. Most of these are crystal-controlled, but several modulated oscillators have come on recently. There is room enough for all, and most of the simple rigs can be copied from the experiments, once the transmitting operator can be convinced that he must modulate only an infinitesimal amount.

W1VAS, South Portland, Maine, reports that several stations are working on 220-Mc. gear in the Portland area. (Continued on page 146)

### 2-METER STANDINGS

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**June 1953**

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Listen Before Transmitting. How many times have we amateurs engaged in casual QSOs or net operation discovered another signal right on frequency sending a CQ? Such CQ calls are ordinarily fruitless and ineffective, since stations already in contact on a channel will usually add selectivity (crystal filter, Q5-er, or FL-8 variety) to overcome the difficulty, or a net member may briefly and courteously ask the station to choose a clear channel instead of the one in use. WIKC points up this problem in a recent letter: "Too many operators are not taking necessary pains to listen on their frequencies before transmitting. In recent months I have observed this condition getting worse. Personally, I always listen on a frequency to see if it is clear. It has paid dividends many times over. I refer to 75 mostly, but such procedure will pay off on all bands. . . ."

Portable or Mobile? The rules governing the amateur radio service, Sections 12.4 and 12.5, define amateur portable and mobile stations. Section 12.82 should be followed closely in complying with the requirements for identification of portable and mobiles. Note also that Section 12.91 requires that whenever portable operation is, or is likely to be, for an over-all period in excess of 48-hours away from the fixed transmitter location, the licensee shall give prior written notice to the Engineer in Charge of the radio inspection district in which such portable operation is intended. Mobiles likewise!

In doubt as to whether your contemplated operation is "portable" or "mobile"? This depends on your customary operating use situation and its inherent installation ability to operate mobile. When you suffer the handicap of being hitched or immobilized by a fixed antenna or power supply it follows from the definition that you are operating portable. While a set that is "conveniently moved about from place to place, but not operated while in motion" cannot be anything but a "portable," a "station that is so constructed that it may conveniently be transferred to or from a mobile unit . . . and is ordinarily used while such mobile unit is in motion" is bound to be a mobile — even if stopped at a stop light or at the side of the road, etc. Follow the definitions of 12.4 and 12.5 and you cannot go wrong.

Just in passing, it should be noted that amateur mobiles water-borne on inland waterways should not sign "/MM," a designation reserved for work "on the high seas or aboard an aircraft on an international voyage." (12.82c). Instead, in keeping with FCC-specified practice, the appropriate "/numeral" should be used (c.w.) or the geographical location given per Example 3 (12.82b) when telephony is used.

Operating Pointers for New and Old Stations. brevity of expression is especially desirable in our Novice QSOs so we can say more in a limited time. A simple "R." tells your man that you copied him 100 percent, ND, NH or just RPT (repeat) if you did not copy. Use AS, for wait. It is quite unnecessary to spell out "wait just a minute, stand by until I start sending again . . ."? WA asks for the word after when a word has been missed in a message or address. ?AA means all after or use TAB for all before. Be sure to make use of the International Q signals liberally. These are the world-wide international standards for abbreviations. They are always fully used by the top operators on communications circuits. Amateur radio is two-way communication. To be most respected as a communicator, emulate standard communications practices! Use QT7? and QR7? to ask for an address or concerning interference conditions. Meaningless expressions that take several words are too often employed in ending contacts. HIW? or OK? before your final call will convey your meaning. More operators will call you spontaneously for a contact if you develop a little snap and brevity in operating. You can use the time to say things more interesting than just a formula report. CI should be used when leaving your station (closing down), as a courtesy so other stations will not call you.

ARRL Field Day — June 20th—21st. To give one’s emergency transmitter a workout, to test precut antennas afted, to review equipment needs and add emergency power, to renew one’s Amateur Radio Emergency Corps card by asking annual EC endorsement — all these things can fulfill the true intent and meaning behind our greatest annual ARRL operating activity, the Field Day. Each is a worthy objective. In combination they’re the best. To complete one emergency-powered QSO, whether your rig battery or gas-generator powered, is to give personal proof of your ability to usefully employ amateur communications in the interest of community, state or one’s own person when the chips are down. The Field Day is a top value, for the individual or for amateur radio as an institution.

ARRL Field Day features teamwork. We encourage advance club planning; also group discussion of message handling form and the systems of operating procedures applicable in Field Day and emergency situations. We want you to find fun and profit in FD activities; likewise we want
to strengthen our operating position individually and group-wise through the scheduling of this test or outing. There is not one but many combined values, highly positive values too, in an ARRL Field Day. Mobiles can and should be given a workout at the very same time completely-transportable units are given the test without which no unit really can be assured of workability. The club-and-group entry in any desired transmitter class is a natural, but the ARRL staff will be just as happy to receive unit and individual reports which most fully carry out the full spirit of the Field Day. A box listing of all amateurs making either one to ten FD QSOs or one contact and FD message sent on these dates, as a successful tryout of gear but limited in score to such values due to lack of time, etc., might be an interesting feature to stimulate interest in the personal progress department of the FD. Postal-card size reports of "I QSO and msg." or 1 to 10 contacts, showing FD results, will be examined for such type credit.

The suitcase portable or set with handles, as well as mobiles, are fine for vacation work as well as operation from emergency power when called for, if designed with an eye to 6- or 12-volt connections. A good number of amateurs make a point of using such small transmitters as regular station adjuncts. Try to make this FD the one for a personal test of gear, if ever so briefly, in addition to hitching your plans to club-arranged or coordinator-sponsored treks to the field. The sharing of problems and Field Day doings makes a never-to-be-forgotten experience which many amateurs find engenders an irresistible urge to return year after year. If you have never taken a share of cooperative working in the FD we point these things out to suggest you give it a try. There's a lot of operating know-how to learn. Working with people instead of alone develops fraternality and understanding, pointers on radio propagation, and a wealth of new ideas, all in addition to checking the capabilities of equipment and showing up the weak and strong spots in design of gear in a true communications test. The FD is a flexible activity to accommodate everything from "aggregate mobile" club scores to the individual test.

Whatever your style of participation, whatever your transmitter class, see the FD rules elsewhere in this issue for guidance and information. Take part and report your luck. BCNU in the FD!(1)

--- F.E.H.

GROUP CODE INSTRUCTION

Affiliated clubs planning a summer or fall series of lessons designed to aid the code trainee would do well to note the availability of ARRL equipment. One of the most useful items, a TG-10 keyer, produces an audio tone from inked paper tapes. The tapes are available for use with the keyer or may be made by use of another training-aid item, a BC-1016 inked tape recorder. We'll be pleased to supply copies of our Reference Guide for Code Trainees to help get things started. Now is the time to have a club officer write to the Communications Department ARRL for further information on reserving a keyer or recorder for one convenient month-long period.

--- CODE-PRACTICE STATIONS

Along with the stations listed on page 79 of April QST, Ray Cornell, W6JZ, has long been an active participant in ARRL's on-the-air code practice program. Ray's amateur interest was aroused in 1916, and his first license was issued in 1917. Since that time he has held additional calls W6CC, W6AGW, W7VV and W0ZAP. Other amateur activities of W6JZ include being SCM of the East Bay Section, MARSA-6JZ, traffic, CD and DX progress, participation in many of the clubs in the Pacific Division, etc.

Special equipment for his code-practice schedules include a Kleinheintz perforator and a Boehme keying head with drive. His potent signal is due to a full gallon input to a pair of 250-TF's.

His up-to-date listing is as follows: Ray Cornell, W6JZ, 909 Curtis Street, Albany 6, California. 3590 kc., Mon. and Fri. 5, 7½, 10, 18 and 20 w.p.m., and Wed. 15, 25, 30, 35 and 45 w.p.m., 1845 Pacific Daylight Saving Time. KGUSN will round out the above schedule by transmitting code practice on Tuesday and Thursday at the same times, frequency and speeds as the Monday and Friday schedule of W6JZ.

--- CODE-PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made on June 15th at 2130 EST. Identical tests will be sent simultaneously by automatic transmitters on 1567, 3555, 7130, 14,100, 21,020, 28,060, 52,000 and 144,000 kc. The next qualifying run from W1OWP only will be transmitted on June 7th at 2100 PST on 3500 and 7130 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 six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers.

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. For practice purposes, the order of words in each line of QST text is reversed during certain of the slow-speed transmissions. To get reading practice, hook up your own key and buzzer and attempt to send in step with W1AW.

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June 1st: Meteor Scanner, p. 11
June 5th: TYI Hints for the V.H.F. Man, p. 16
June 9th: Folded and Loaded Antennas, p. 21
June 11th: A Sweep-Tube C.W. Rig for 80 and 7 Mz., p. 35
June 17th: A Different Approach to High-Power Mobile, p. 28
June 19th: Improving the Sports Noise Limiter, p. 30
June 23rd: The Antenna Coupler Helps . . . , p. 47
June 25th: Wide-Band Re-Entrant Networks, p. 48
June 26th: Design Notes . . . , p. 51

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Recent correspondence on the subject of RACES has been most interesting, showing the variety of attitudes and reactions. AREC leaders exhibit on this subject. It keeps our job from being dull, but at the same time makes it very exciting, sometimes even fascinating. We want each of you to know that for every other AREC member who feels the way you do, there are probably two or more who feel differently. For each one who feels that the amateur hasn’t been given enough responsibility in RACES, there are others who think he has been given too much. For each one who thinks that emergency work is the ultimate in amateur radio, there are others who think the same of traffic work, of experimenting, of rag chewing, of DXing, of contest work, etc. Don’t ever be misled into feeling that the majority opinion in your circle is representative of the majority opinion everywhere.

But about RACES. Gratifyingly enough, most of the comments on the recent series of QST articles have been favorable. Admittedly, it didn’t cover everything. It was an attempt to sort things out so we’ll all know where we stand, and it seems to have accomplished something in that direction. There still exists an incredible inability on the part of amateurs and civil defense people alike to decide who is going to be “boss.” Temps have flared on this subject, all for no good reason, because RACES has to be a combined effort of amateur radio and civil defense. Without the combination, it just cannot exist. Let’s review, just briefly, some of the questions that have been asked us, and the answers we have given:

1) Do we have to “sign up” in civil defense to get into RACES? Certainly! RACES is a part of civil defense communications.

2) Who is the policy-making official in RACES? This may vary locally, but in general it can be said that the RACES radio officer calls the shots. He does this in accordance with local civil defense requirements, which are set down by the civil defense director in consultation with his head of services, including the communications service. In other words, the “boss” bosses with the advice and acquiescence of the boss.

3) How many “stages” must a RACES application pass through before it reaches FCC? Up to state level this may vary, depending on the set-up within the state. It definitely must have the approval of local and state c.d., whence it goes through the regional FCDA office, FCDA Washington, thence to FCC for final approval and authorization. Notice of approval and authorization is returned to the applicant, the same way. This applies only to the communications plan and certification of the radio officer, not to station authorization applications, which may be sent directly to FCC after the plan is approved.

4) Is FCDA approval contingent on compliance with FCDA equipment specifications and/or FCDA-recommended frequency channelization? No, not on either. FCDA’s equipment specifications apply only to equipment for which “matching funds” are being sought, and this entails filling out a long and complicated form in addition to the communications plan. The FCDA frequency channelization at this stage is only tentative. Perhaps these will start the ball rolling. Let’s throw the floor open to further questions. If we don’t know the answer, we’ll try to find out for you.

W6JDN informs us of some calls left out of the report of the Northern California snowstorm emergency written up in March 1963 QST, page 71. In addition to those mentioned, the following also participated: W6s DFL ELO EXP IOP ZGA and W7MD1/6. Also W6OMR, W6EGW and W6PNU set up a station at the Forest Service station in Mt. Shasta and materially assisted the Southern Pacific Railroad and the telephone company.

NATIONAL CALLING AND EMERGENCY FREQUENCIES

C. W. 
3560 kc. 14,050 kc. 3875 kc. 14,225 kc.
7100 kc. 28,100 kc. 7250 kc. 20,640 kc.

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

The following are the National Calling and Emergency Frequencies for Canada: c.w. — 2535, 7050, 14,060; phone — 3815, 14,160 kc., 28,250 kc.

NATIONAL RTTY CALLING AND WORKING FREQUENCY

3820 kc.

This frequency is generally used by amateurs using radioteletype throughout the United States. Other frequencies are under discussion and will appear under this heading in future issues of QST.

On January 17th and 18th heavy storms and very serious floods occurred in the Eureka and Crescent City areas of Northern California. Amateur operators, urged prominently in emergency communications work over the emergency period, both independently and in conjunction with civil defense. Operations were conducted on 160, 75 'phone and 40 c.w. In the Eureka area, W6XY operated on 75 meters intermittently for five days, W6YUH and W6JSV, with the help of W6CWR and W6EQQ, set up a station in the civil defense headquarters on 160 and 75 and operated it until late Sunday night (18th). W6KTV directed operation of commercial mobiles, W6BIV and W6BWW were active at Loleta and Fortuna on both 'phone and 40-meter c.w. The Humboldt County EC, W6SLX, doesn’t say much about what he did, but other sources report he was plenty active. W6BME reported formation of a net on 1980 kc. on Sunday morning consisting of the following: W6s BME CHP GOS IOP JSY JYU RKF LRU NCV OM1R WQYQ and others. This net handled much emergency traffic and secured at 700 Monday. During the day Monday (20th) and Monday night a number of additional stations reported in to assist, including W6s HBI REP RQL SIY W7s BTF EJP KZU MKA.

When the civil defense and AREC organization of Quebec, P. Q., have a drill, this well-equipped shack is activated as a civil defense auxiliary station. The gentleman on the left, VE2ZL, is the proprietor. VE2ALV and VE2OE are operators, and on the extreme right is the EC, VE2QN.

QST for
and others. Traffic consisted of drug orders, food orders, press dispatches and official state and highway patrol messages. The 1989 frequency proved to be excellent for the perhaps 30 NSC, with WO6G doing exceptionally good work in San Francisco and W6GOS in Crescent City. Total traffic was estimated in the hundreds.

On February 14th a USAF three-passenger liaison plane crashed near Atlanta, Ga., after the three occupants parachuted for safety. Amateur radio was the first source of communications on the scene and remained a vital part during the 48-hour searching operation. Mobiles participating in staggered duty were W6B PSR SLH IKT FFA EPN SYH CRB BPO WIEX WW2G and others. Fixed stations operating during the disaster were W4C ACH PFA SLH MZO MNZ and others. The mobiles were operating both 10 and 75 meters, while most of the fixed stations were on 75. Some stations operated the emergency equipment but went with searching parties, and W4DZ and crew helped scour the river for the one missing flyer. Through the facilities of W4OPS and W4PFA the news services and radio stations were able to get first-hand news concerning progress of the search. All of the many participating amateurs did a fine job. — W4YVE

On March 28th, at the request of Maine SCM WIPTL and WISS, the FCO Regional Manager in New York invoked Section 12.156 of the regulations to clear 3055 kc. for emergency traffic in Maine, which was having severe floods. The clearance went into effect at 0900. Later the channel 3055-3062 was specified, and still later it was widened to 3055-3065 kc. The declaration was terminated Monday, March 30th at 1800 after an FCC offer to extend it had been declined by the amateurs concerned. Little else is known so far except the identity of the stations who participated, furnished by WIPTL. They are W4S ACO ATR AWR BTV BYK COV CMG KOP ED FV GJ GJZ GYS HIL HZE HUL HUT HUM INC JTH JIH JYJ KEZ LSS LHA LRQ LBJ LBO LED LEH LKP LUP LQG LBH MBH MDG MBF PBL PTL PTF PS FXQ PSQ QTA QSL RAU RAB RAB RRJ RDF RIL RWH RIL RP SJF SPJ SPD SNT SMQ SSF SWZ SUK SMP TVB TKE TNS TDI TZL TAL TSN TDE TKY TB TAM UXU UVX UVW WRL WDX WJX WXX WXX WXX WXX WXX YDA and YDB. W4S KZ7 I QBC BQM. W4S BRC PFT.

Fourteen SSB reports for February representing 178 ARRL members have been filed, a decline of one from January. The February list included three new (for 1953) sections: Washington, Nebraska and Santa Clara Valley (Calif.). Eleven of the others maintained 100 per cent status for 1953.

ARRL-AFFILIATED CLUB HONOR ROLL

In accordance with the League policy for special recognition to all affiliated clubs whose entire membership consists of members of the League, it is a pleasure to present here with the latest Honor Roll of such affiliated clubs. Clubs having 100 per cent ARRL membership are determined from information supplied in the 1953 affiliated-club questionnaire or Annual Information Survey. An additional QST Honor Roll will be published somewhat later this year to take care of those clubs reporting results of ARRL membership drives being conducted currently. Such list will include consideration of full reports from affiliated societies whose questionnaires gave unsolicited information and others that qualify for listing on completing their membership program. Each below-listed club will receive the handsome certificate "100% ARRL Club" (described p. 71 July 32 QST) shortly after publication of this Honor Roll.

Amateur Radio Club of Augusta, Ga.
Amateur U.H.F. Club of Jamaica, N. Y.
Batavia Amateur Radio Association, Batavia, N. Y.
Big Spring Radio Club, Big Spring, Tex.
Binghamton Amateur Radio Assn., Binghamton, N. Y.
Central Illinois Radio Club, Bloomington, Ill.
Central Kansas Radio Club, Salina, Kans.
Charlotte Amateur Radio Club, Charlotte, N. C.
Connecticut Wireless Association, Hartford, Conn.

Daniel Boone Radio Club, Columbia, Mo.
Enid Amateur Radio Club, Enid, Okla.
Haslett Amateur Radio Club, Haslett, Pa.
Kern County Radio Club, Inc., Bakersfield, Calif.
Martha’s Vineyard Amateur Radio Club, Vineyard Haven, Mass.
Medina County Radio Club, Medina, Ohio
Muskingum Amateur Radio Association, Zanesville, Ohio
Niles Amateur Radio Club, Niles, Mich.
Northwest Amateur Radio Club, Mt. Prospect, Ill.
Providence Radio Association, Providence, R. I.
Queen City Emergency Net, Cincinnati, Ohio
Ridgewood Amateur Radio Club, Paramus, N. J.
St. Louis Amateur Radio Club, Brentwood, Mo.
Skagit Amateur Radio Club, Sedro Woolley, Wash.
South Lymle Beer, Chorier and Propagation Society
West Hartford, Conn.
South St. Louis Amateur Radio Club, Affton, Mo.
Southern Oregon Radio Club, Grants Pass, Ore.
Suburban Radio Club, Overland, Mo.
Sussex County Amateur Radio Association, Sparta, N. J.
Treaty City Amateur Radio Association, Greenville, Ohio
Vallely Radio Club of Eugen, Ore.
Westside Amateur Radio Club, New Orleans, La.

DX CENTURY CLASS AWARDS

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RADIOTELEPHONE

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| W9CW ... 204 W1WOW ... 198 |
| W9QU ... 204 W8AGW ... 200 |
| W9QJ ... 204 W8AGW ... 200 |
| W9QU ... 204 W8AGW ... 200 |

From March 15, to April 15, 1983, DXCC certificates and endorsements based on postwar contacts with 100-or-more countries have been issued by the ARRL Communications Department to the amateurs listed below.

NEW MEMBERS

| W9PF ... 151 G6S ... 105 W8FR ... 100 |
| G3HL ... 117 G8FPC ... 102 W8SS ... 100 |
| E9GA ... 104 E9U2D ... 102 E2AB ... 100 |
| E1AP ... 108 E1VRE ... 107 CTIFM ... 100 |
| FY2AJ ... 107 W7HEL ... 101 O2WHM ... 101 |
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| V14CB ... 106 G2MQ ... 106 W3AEV ... 100 |

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| W5AG ... 320 F9PO ... 172 FY1AD ... 120 |
| W6MX ... 220 W7XTN ... 170 VESS ... 120 |
| W1CLX ... 220 W3ALB ... 185 HD6AO ... 129 |
| W5KF ... 218 ON4GU ... 183 O2HTM ... 124 |
| W8QJ ... 215 E2A2C ... 182 F3PA ... 203 |
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| GM3BDH ... 190 W3LAV ... 140 W1JO ... 112 |
| W6THA ... 186 E2ACR ... 140 G2CUC ... 110 |
| W8AND ... 181 ON4FL ... 140 ZL1AH ... 110 |
| W8EKL ... 180 G2FPT ... 132 ZS2W ... 110 |
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| GM3BDH ... 181 W3KT ... 160 ZS2D ... 140 |
| G6H ... 170 W4OM ... 135 F3RM ... 131 |
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TRAFFIC TOPICS

Generalities are not particularly useful unless they are accompanied by specific action. At the same time, all the implementation in the world will become tangential unless there is some basis for it, some broad directional planning to guide it along effective lines. One of the troubles most of our traffic nets today is that they spring up spontaneously as somebody's whim, and have no real purpose or foundation except congeniality; or if they have a purpose in the beginning, it eventually turns out to be more utilitarian than1 utilitarian by common unspoken consent. The social aspect usually attracts more participants than the utilitarian aspect, and the net spreads and broadens until it becomes a fraternal meeting place as much as a traffic net with a purpose—sometimes more. At the same time what purpose is left spread, broadens, becomes dilute and eventually is engulfed in bigger and unwieldy.

At Headquarters we have occasionally been criticized for indulging in lofty idealisms and vague generalities instead of coming to grips with the problem at hand. Actually, we are amassed every day in floods of details. If we tried to consider and act upon each one separately, we would be in constant turmoil. Instead, we must back off and look at the whole picture, to consider bases and principles and underlying philosophies. The procedure then is to apply the general rule to the detail, after which the action indicated is pretty obvious. The only alternative is chaos.

Applied to traffic handling, we have to ask this question: What are we trying to do? Handle traffic speedily, train ourselves to be better operators, enjoy ourselves, impress others or do something for the public? The answer is, of course, all of them. There are certain of them which can quickly be discounted because no emphasis is necessary. For example, every amateur will seek enjoyment, and most of us want to impress someone, even if it's only ourselves. To a lesser extent, amateurs will want to improve their operating ability and see that traffic they handle is handled speedily (but most of them care little once they get rid of the message). All too few, alas, are interested in the public service aspect as such.

Then we have to throw in a good measure of the popularity aspect, perhaps a pinch of politics, stir well and let simmer. The combination that results is strongly suggestive of the need for emphasis on system, and on the necessary teamwork toward that system to accomplish, in the end all of the objectives mentioned in the previous paragraph—to accomplish them all together, at the same time, in the same system, rather than separately and tangentially. For the teamwork among traffic men necessary to establish an efficient net must be extended to teamwork among traffic nets to establish an efficient system. In all our generalizations, that's the main thing we've been trying to get across, after all, traffic handling is a lot of fun, but it's much more fun to do it right than to do it slapdash.

W6KYV has received a letter of commendation from the commander, 22nd General of EOTFAMA for his extraordinary work in handling traffic from and to GIs overseas. It's quite a tribute, but Dave deserves it. Take a look at his consistently high BPL totals; most of those messages are (115-type) hampograms. Says the letter, in part: "The courtesy, cooperation and long hours you have contributed...reflect great credit on yourself and the American Radio Relay League."

W4SRIJ is interested in handling transcontinental traffic on RTTY and is looking for a W6 who would like to attempt this on 14 Mhz. Any takers?

W1SJO reports that 38 participating stations in the Transcontinental Phone net handled 2814 messages in March. W5CWE reports the March total for the Transcontinental Relay Network as 3090 in 31 net sessions averaging 118 messages per session, with ten stations participating.

National Traffic System. Although we measure progress of nets and net systems on the basis of the calendar year, it has been our practice to think of the "traffic season" as beginning in October and ending in May of the following year. That's because, after all, traffic is enjoyable to those of us who do it, and it's not so much fun sitting with perspiration dripping trying to gow a weak signal through static when you could, maybe, be sitting out in the shade with something tall and cool. But there is one advantage to the generally poor propagation conditions we have been having this past season: how can conditions be any worse this summer? Some of the traffic men are even looking forward to summertime operation, QRN and all, in the hope and expectation of being relieved of the abnormal skip we have had during the winter months.

NTS improves every year. This is fast, although we're not James Bond tales about how near it is to being perfect. Considering the conditions we've had, the fact of improvement is little short of astounding. How much could have been done if conditions had been like those in, for example, 1946? Some day we're going to get around to winter conditions like that again. Meanwhile, our frustrations, gang?

March reports:

<table>
<thead>
<tr>
<th>Net</th>
<th>Sessions</th>
<th>Traffic</th>
<th>High</th>
<th>Average</th>
<th>Consistent</th>
<th>Most</th>
</tr>
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<tbody>
<tr>
<td>EAN</td>
<td>22</td>
<td>896</td>
<td>78</td>
<td>40.3</td>
<td>All</td>
<td></td>
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<tr>
<td>CAN</td>
<td>21</td>
<td>576</td>
<td>58</td>
<td>27.4</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>PAN</td>
<td>22</td>
<td>453</td>
<td>54</td>
<td>20.5</td>
<td>QRN</td>
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<td>1RN</td>
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<td>350</td>
<td>23</td>
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<td>W. Mass.</td>
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<td>356</td>
<td>17</td>
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<td></td>
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<tr>
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<td>38</td>
<td>239</td>
<td>23</td>
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<td>401</td>
<td>26</td>
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<td>N, C</td>
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<td>5RN</td>
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<td>400</td>
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<tr>
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<td>413</td>
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<td>244</td>
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<td>Wash.</td>
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<td>8RN</td>
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<td>106</td>
<td>16</td>
<td>3</td>
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<tr>
<td>9RN</td>
<td>25</td>
<td>222</td>
<td>55</td>
<td>29.1</td>
<td>Ind.</td>
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<tr>
<td>TEN</td>
<td>30</td>
<td>742</td>
<td>62</td>
<td>51.7</td>
<td></td>
<td></td>
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<tr>
<td>TRN</td>
<td>40</td>
<td>115</td>
<td>13</td>
<td>3.5</td>
<td>Ont.</td>
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<tr>
<td>Iowa (TLCN)</td>
<td>22</td>
<td>450</td>
<td>100</td>
<td>20.4</td>
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<tr>
<td>Kans. (QKS)</td>
<td>22</td>
<td>135</td>
<td>13</td>
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<td></td>
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<tr>
<td>Kans. (QKS)</td>
<td>22</td>
<td>112</td>
<td>12</td>
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<td></td>
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<tr>
<td>QIN (Ind.)</td>
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<td>667</td>
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<tr>
<td>Minn. (MSN)</td>
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<td>67</td>
<td>10</td>
<td>3</td>
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<tr>
<td>Minn. &quot;Phone&quot;</td>
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<td>298</td>
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</table>

EAN almost reached the ultimate in attendance during March. All 30 stations but one were 100%, and that one missed only once. 4RN has been 100% all year so far! EAN will remain on standard time.

3RN didn't actually loss any sessions, but there were nights when conditions were so bad that no one could hear anyone else. The boys were in there pitching, just the same. 3RN certificates go to W3s DDI, NOK, HC and UGF.

W6JQG is resigning as manager of RN6 due to a promotion. Representation is needed from Colo. and New Mexico to complete the absorption of the former 12th Regional Net. VE7QG, VE7TF, and W7RZH have received RN7 certificates.

The February-March 8RN bulletin announces 8RN will discontinue the live session but remain on standard time. 9RN will continue on CST, no change in schedule. W6HLY and W6UNJ have earned 9RN certificates.

VE3BUR reports lots of trouble covering the Thirteenth Region with conditions the way they've been, but traffic-wise March has been the best month yet.

A.R.R.L. ACTIVITIES CALENDAR

| June 6th-7th: V.H.F. Contest |
| June 7th: CP Qualifying Run — W6OWP |
| June 15th: CP Qualifying Run — W1AW |
| June 20th-21st: Field Day |
| July 3rd-CP Qualifying Run — W6OWP |
| July 14th: CP Qualifying Run — W1AW |
| July 18th-19th: CD QSO Party (e.w.) |
| July 25th-26th: CD QSO Party (phone) |
| Aug. 1st: CP Qualifying Run — W6OWP |
| Aug. 12th: CP Qualifying Run — W1AW |
| Sept. 6th: CP Qualifying Run — W6OWP |
| Sept. 17th: CP Qualifying Run — W1AW |
| Sept. 18th: Frequency Liberation Test |
| Sept. 19th-20th: V.H.F. Contest |
| Oct. 2nd: CP Qualifying Run — W6OWP |
| Oct. 3rd-4th: Simulated Emergency Test |
| Oct. 10th-11th: CD QSO Party (phone) |
| Oct. 16th: CP Qualifying Run — W1AW |
| Oct. 17th-18th: CD QSO Party (phone) |

QST for
BRASS POUNDERS LEAGUE

Winners of BPL Certificates for March traffic:

<table>
<thead>
<tr>
<th>Call</th>
<th>Orig.</th>
<th>Rnd.</th>
<th>Rel.</th>
<th>Del.</th>
<th>Total</th>
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<tr>
<td>W6LAB</td>
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<td>2762</td>
<td>2760</td>
<td>35</td>
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<td>1832</td>
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<td>3492</td>
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<td>991</td>
<td>870</td>
<td>39</td>
<td>1992</td>
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<td>16</td>
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</tr>
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<td>283</td>
<td>256</td>
<td>18</td>
<td>569</td>
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<td>W4PJU</td>
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<td>256</td>
<td>220</td>
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<td>W2LJP</td>
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</table>

The BPL is open to all operators who report to their SCM a message total of 500 or more or 100 or more origina-
-tions-plus-deliveries for any calendar month.

WIAW OPERATING SCHEDULE

The current WIAW operating schedule may be found on page 79 of May QST. The next listing of Headquarters
Station operations will appear in the July issue.

BRIEF

In the April QST report on the Governors-to-Presidential Relay, the Maryland message route from W3JE to W8KTR
was inadvertently omitted.

ELECTION NOTICE

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

You are hereby notified that an election for Section Com-
munications Managers is about to be held in your respective Sections. This notice supersedes previous notices.

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

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

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

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


<table>
<thead>
<tr>
<th>Communications Manager, ARRL [place and date]</th>
<th>[place and date]</th>
</tr>
</thead>
<tbody>
<tr>
<td>38 La Salle Road, West Hartford, Conn.</td>
<td>38 La Salle Road, West Hartford, Conn.</td>
</tr>
<tr>
<td>The undersigned full members of the</td>
<td>The undersigned full members of the</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>ARRL Section of the</td>
<td>ARRL Section of the</td>
</tr>
<tr>
<td>Division hereby nominate,</td>
<td>Division hereby nominate,</td>
</tr>
<tr>
<td>as candidate for Section Communications Manager for this</td>
<td>as candidate for Section Communications Manager for this</td>
</tr>
<tr>
<td>Section for the next two-year term of office.</td>
<td>Section for the next two-year term of office.</td>
</tr>
</tbody>
</table>

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The
ballots mailed from Headquarters to full members will list in alphabetical order the names of all eligible candidates for
the position. The ballots will be mailed to the attention of the proper SCM. The Nominating Committees will be
asked to endorse candidates which they believe to be the most qualified. The ARRL Board of Directors, at its
next meeting, will then select the nominees. It is expected that two or three candidates will be nominated, but
the Board retains the right to select one or none at all.

In the event that the process outlined above is not followed, or if the Board of Directors is unable to select a nom-
inee, the Board will make its decision at hand. It is expected that the Board will make this decision at the time of
the meeting of the Board, which will be held between September 1 and December 31, 1952.

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the meeting of the Board, which will be held between September 1 and December 31, 1952.

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections,
completing their election in accordance with regular League policy, each term of office starting on the date given.

North Carolina:

East Bay:

West Indies:

Maritime:

Hawaii:

Southern New Jersey:

Western Maryland:

Western New York:

San Juan:

Eastern Pennsylvania:

Indiana:

South Carolina:

Vermont:

Wisconsin:

* In Canadian Sections nominating petitions for Section Managers must be addressed to Canadian Director Alex Held, 169 Logan Ave., St. Lambert, Quebec. To be valid such petitions must be filed with him on or before the closing dates named.

** Note: The deadlines for the election results have been updated to reflect the current format.
ALL operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, John H. DuBois, W3XKE; SEC: IQW, RMH: AXA, BIP: PAM, P413, PA, Neta, 6510, 3915. News of new officers is desired for inclusion in the club's Field Day Planning will be discussed at the next meeting on TBA. Presidents of newspapers throughout the section was that this activity claimed the efforts of DXers and traffic handlers. No DX events have taken place. Those interested should contact IQW. During the DX Contest, KB5U reports that W3KX's Q农田 got its "bath of fire" in the same fracs. P57 now is at SNO and GTO got hitcheed while spending a month in Wisconsin. Yours truly has a new QTH at 4091 Chestnut Ave., Pennsauken, 8, NJ, and because of my ineligibility as SCM for W3X, I'm requesting the Communications Manager to declare an election for this position. I would like to take this opportunity to thank all of you for the fine cooperation during my stay in office. Not only is the outstanding organizational work of AXA, BIP, IQW, and P413 to be particularly commended, but also the many mailings of news events which made it possible. I would also like to thank the clubs for the courtesy extended me at their meetings and the opportunity to meet many new friends personally. If I can continue these friendships on the air under my new call, K2CPR. Under a new SCM is elected, please continue to provide me with a means to use the SCM for the good of the month. Best personal regards. Traffic: (Mar.) W3XGQ 137, HBP 123, HBP 84, P413 78, IQW 74, P217 70, AXA 84, P413 14, BIP 27, Church 9. It seems to be a fine month. QSL 21, AD 19, HSB 12, PV3 Y, CRD 6, CDT 5, BES 7, LYY 2, VEF 1 (Feb.) W3XGQ 174, LYY 4.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Arthur W. Plummer, W3EQQ; Mobile support for the Muscular Dystrophy Telethon held Dec. 27th in D.C. was furnished by the Washington Mobile Radio Club and not the Washington Radio Club, as reported in March QST. A movie, "Lightning Masters," was shown by the Washington Radio Club Mar. 24th. ROG, newly-appointed OBS and OBS, Eke traffic-handling, LDL joined the ranks of ROG, EE, GA, and JE also joined the group. A new amplifier was built and advertised efforts of President PLR produced another ideal speaker for the BARC in the person of ROG, who spoke on a.m. at the Mar. 12th meeting held at the home of a "W" of WFB. The BARC learned something about Class B modulators from FPB at the Apr. 6th meeting. FPB sold his 23V and expects to be on the air soon with a home-brew 50-watt J8. Also says he has no further use for a Panadapter with 30-Mc. input. QZQ says school is QBMing his ham activities and that he is using a radiator for an antenna. UQY, of Aberdeen, MD., newly-appointed OBS, has been magnifying on 435 with a written out experiment for those who are able to QSO anyone. Let's do something about it, guys. TKB, at Bainbridge ISNTC, under the supervision of RNC, will do a fair job of receiving up where he is on 40, 80, and 160-meter phone and c.w. JIH apparently still is going strong despite one end of his skywire being wiped off. TKB is truking GM in Chester, PA., is making mobile noise around Aberdeen and Baltimore. SGWY/3 is Harvey-Welling on voice from MATS base at Andrews AFB. A phone call was received soon via long wire on 20, 40, 80, and 160 meters. Your new SCM would like to see some applications for OP appointment. We have only 10 for Class 1. The SCM also is wondering about the possibility of a 10-meter phone net to cover Maryland first then eventually take the entire section and then go into a relay net in its fullest sense. Are there sufficient 10-meter operators strategically located to make this possible? Let's hear from you. RLR's shack soon will take on the appearance of a modern control room with operating console and everything. BARC stations at PFC, recently acquired several motor generators and dynamos. EF is having a loading coil in each leg of the driven element, and reports success. Lecco-Neville Alternator equipment may be obtained by the use of an Interchange list by contacting EQN. The SCM wants to hear from the Delaware gang. He's sure there are hams there because thousands of phone cards have been found. How about it, fellows? Senate Bill No. 108, providing an amateur call-letter license plate for Maryland hams in addition to the regular license is up for hearing. How about it, WMC? McKeldin's signature to become law on June 1st. Traffic: W3ZQW 802, CAR 184, JE 90, UDF 85, KIE 32, ZQZ 43, EOU 27, QNB 28, NNX 24, QCB 15, CQ8 12, JIU 9, EQK 7, SOUTHERN NEW JERSEY — SCM, Lloyd L. Gaines, W3VY; SEC: E. EG. SCM: C.W. Net started operation Apr. 18th. This is an excellent opportunity to learn traffic procedure and not feel lost if you change your speed or if you are just beginning. The monthly meeting at 7:00 p.m. EST. PFC is not superfluous, having rehearsed his fist-class telephone and phonograph telegraphy. K2B received his A-1 Operator's certificate and seems to be having a fine time on 2 meters. LS, BEI, and EIT all turned in very close readings on the February Frequency Measuring Test. They are all Class 1 Observers so if you have any doubt of your operating frequency get in touch with one of them. FXT won the Heatlith Grid Dipper at the March meeting of the SJRA and proceeded to 20-MV and K2NY made his usual appearance. Nothing to report. SCM: CRK 143, CVF 50, ASG 33, ZL 16.

WESTERN NEW YORK — SCM, Edward G. Graf, W6TV; SEC: ROG. SCM: WSTN 1, 3015 kc. at 7 and 10 p.m. and 8-300 kc. at 6:30 p.m. daily. NYS 3015, 3305 kc. at 8 p.m. and 3305 kc. at 1:30 p.m. NYS C.D. — 3600.5 and 3800 kc. at 1:15 p.m. SCM: RVC, HSB 25. New officers of the Kenmore High School Club are FTY, pres.; GMV, vice-pres.; KNCFR, secy.; KLK, reg. secy.; and GVG, treas. The RAWNY was sponsored by a New York State Convention in Buffalo Sept., 19th and 20th. New officers of the Keenmore High School Club are FTY, pres.; GMV, vice-pres.; KNCFR, secy.; and KNCFC, treas. DANS is sponsor. We regret to report the passing to Silent Keys of CEF, DVE and JIH. SCM: CEF 413, DVE 168, JIH 124. QST 9, EQK 7.

(Continued on page 74)
You will undoubtedly recall some of our previous ramblings on the subject of SOJ (Select-O-Ject) audio filter and some of the letters published in this column. In each instance the SOJ was first condemned then later praised after its operation has been mastered.

As sales of this item continue, the problem still persists, to a lesser degree. This is not unexpected, since if we packaged a crystal filter the same problem would exist, and the SOJ essentially gives many of the results expected of a good crystal filter.

First, let us review the proper operation of the Select-O-Ject with its dual ability to select or reject.

In select or “Boost” position, the SOJ is used to boost a c.w. signal above neighboring signals to the tune of 35 db (7 “S” units!). When the SOJ is switched into the circuit, all signals are attenuated 20 db, thus providing a quieting action. The boost control is then advanced to a spot just below where audio oscillation occurs. The frequency control is then set to the audio frequency of the desired c.w. signal which has previously been tuned in normally with the receiver main tuning control. As the Select-O-Ject frequency control nears the audio frequency of any signal, the signal will “pop out” of the quiet background, and appear to be all alone, even in the middle of a crowded band. It almost sounds like a code readout. Code can then be copied under extremely difficult conditions.

Operation in the “Reject” position is similar although the device is then used to phase out unwanted signals such as heterodynes. When used to reject, the SOJ is switched to the “Reject” position and the SOJ frequency control is varied until the unwanted frequency is rejected 35 db or more. This is generally sufficient to take out most serious interference. Once it is set, the receiver tuning can be varied without affecting the phasing of the heterodyning signal.

Comparing the Select-O-Ject with a crystal filter, there is much to be said for either. First, the Select-O-Ject can be easily added to any AC receiver, since its low power drain will not upset the receiver voltages and it needs no alignment. A crystal filter, on the other hand, is usually rather difficult to install in any receiver not specifically designed for it. Second, the degree of “boost” or regeneration in the SOJ can be controlled so that the annoying “ringing” can be eliminated. In a crystal filter in the “sharp” position, this “ringing” can not be easily eliminated. The crystal, however, can be used to boost and reject at the same time, something the SOJ cannot do.

When the receiver is equipped with both crystal filter and SOJ, many operators use the SOJ almost exclusively, using the crystal only under conditions of extreme interference. Of course, with both devices you can reject two heterodynes or get other combinations of selectivity and boost, combinations which aid in getting thru when the QRM and QRN are at their worse.

Because its selectivity is a percentage of frequency, the SOJ is noticeably sharper when the audio beat note is say 300 cycles instead of 3000 cycles. It can be used in this position only in an extremely stable receiver, such as the HRO, since a shift in H.F. Oscillator frequency of only 300 cycles would take it down to zero beat. Under conditions of extreme interference when you use that “last ounce” of selectivity, try copying thru the SOJ at a low audio frequency.

Many c.w. men have spent much time and money developing selective filters to help when the going is tough. The SOJ will compare favorably with any of them and is more versatile than most filters. At $28.75, it’s a must in any good c.w. station.

W. W. Bartell, W1PIJ
ELDICO TR-75TV’S GO

ELDICO TR-75TV — MD-40P

Thousands of satisfied amateurs have constructed and are operating Eldico’s TR-75TV Transmitters on the amateur bands. With the current FCC ruling permitting all classes of amateurs (except Novice and Technician) phone operation on the amateur bands formerly restricted, the swing is to Eldico’s MD-40P Modulators.

This combination—TR-75TV Transmitter and MD-40P Modulator provides for CW or 100% AM phone operation on 160-80-40-20-15-11-10 meters and best of all—TVI proofed.*

Following are unsolicited testimonials received by Eldico from amateurs:

“You may be interested to know that the TR-75TV continues to serve and that without exception my signal reports are equal to those I received in pre-television days with my 500 watt transmitter — and with no TVI, even to my own TV set 10 feet from my transmitter.”

W2RME

“Very satisfactory results both on phone and CW from your TR-75TV transmitter and MD-40 modulator.”

VE6WM

“Operating on the air for six months and nothing but praise for my TR-75TV transmitter. It’s second to none in its power class.”

W1WAC

“I operate the TR-75TV transmitter about 5 feet from my TV set with no TVI. Congratulations to Eldico!”

KN2BZD

“My boys and I have recently assembled one of your TR-75TV’ kits with much fun and considerable success in operation. It surely is a nice job.”

W2PQ

“Purchased TR-75TV and assembled it according to your easy instructions (Plenty excited — Hi Hi) it works perfectly and has never ‘ailed to operate. Antenna right over TV antenna and no TVI.”

W6MJJ

* TVI proofed means: Special circuitry, shielding and filtering to eliminate spurious and harmonic energies that result in television interference.

44-31 DOUGLASTON PARKWAY, DOUGLASTON, L. I., N. Y. • Bayside 9-6666
LOOK AT THESE OUTSTANDING FEATURES OF TR-75TV — MD-40P

- Simple enough for the beginner to assemble, sturdy enough for years of trouble free operation.
- Uses the time proven crystal oscillator—final amplifier combination.
- Permits use of 80 or 40 meter crystals to cover all bands.
- Modulator provides 40 watts of 100% amplitude modulated audio. (No trick circuits)
- Built-in husky power supplies in each unit employing 5U4G rectifiers with more than adequate filtering.
- Transmitter has built in antenna tuner which provides easy loading of transmitter with all type of antennas. Ideally suited for multi-band operation.
- All stages are metered using a meter which can be switched to oscillator plate or final grid and final plate. Separate meter used in modulator.
- All units completely shielded in modern designed Eldico cabinet to minimize television interference.

Complete kit—not another bolt or wire to purchase. For 110-120V, 50-60 cycle operation.

TR-75TV complete kit with instructions $64.95
TR-75TV factory wired and tested 94.95
MD-40P complete kit with Instructions 59.95
MD-40P factory wired and tested 79.95
THE NEW
"HQ-140-X"
with modern receiver circuitry and improved performance

When you rest your hands on the large, convenient tuning knobs of the “HQ-140-X” and listen to its outstanding performance, you know it was built “for amateurs who appreciate professional standards.” And the modern appearance, the smooth hammer tone finish, the convenient layout of controls are only the frosting for the fine engineering and construction to be found inside.

The new circuitry makes use of modern miniature tubes wherever superior performance results. Now, there is also a more efficient, separate oscillator (GC4) and an independent mixer (6BE6). Also many other circuit improvements have been incorporated.

For the amateur, the newer 15 meter calibrated bandspread has been added, in addition to the direct reading calibrated bandspread on the 80, 40, 20, and 10 meter amateur bands. In addition, there’s an arbitrary logging scale for bandspread tuning of other ranges.

Now is the time to write to The Hammelund Mfg. Co., 460 W. 34th St., New York 1, N. Y. for information about this fine new receiver. Just ask for Bulletin Q4.
When design considerations are critical—

Put in HAMMARLUND CAPACITORS

Long, trouble-free service and continuous fine performance is assured when Hammarlund variable capacitors are used in your gear. You wire them in with the certainty that they will continue to function efficiently for the life of the set.

Here are descriptions of three capacitors that have become amateur favorites. They are all built with the same sturdiness and quality that have made Hammarlund products famous for more than 40 years.

"MC" CAPACITORS. The "MC" is a versatile, single section tuning capacitor designed to give the user a choice of mountings, connections and capacity characteristics. The threaded brass front bearing and tapped aluminum end brackets permit panel or base mounting. A rotor stop permits 180° clockwise rotation for increasing capacity. "MC's" are available with capacities ranging from 5.5 mmf to 320 mmf.

"MAC" CAPACITORS. The new miniature "MAC" was engineered to provide the low minimum capacity essential for use as a trimmer in the VHF range. Its silicone-treated base is only 3/4 x 3/8 inches. The rotor and stator are soldered assemblies of brass, silver-plated for low losses. Models are available with capacities ranging from 1.4 mmf to 19.6 mmf.

"VU" CAPACITORS. For those interested in VHF or UHF equipment, the "VU" offers a uniquely designed capacitor using completely original concepts. With it, conventional "lumped constant" circuits, rather than tuned cavity techniques, can be efficiently used up to 500 megacycles. Models are available with capacities ranging from 3.35 mmf to 45 mmf.

If you don't have your new Hammarlund Capacitor Catalog describing and illustrating these and many other standard parts in detail, write to The Hammarlund Mfg. Co., Inc., 460 W. 34th St., New York 1, N. Y., for one today. Ask for Bulletin 71.
(Continued from page 74)

KPM, JRB, and UUN gave a talk on TVI to the FWRCC. TVI has 960 members and is located on a 75 acre site near ground plane. LWX works mobile on 75 meters, AZ2 and VDD got married. New officers of the MARC are ZIB, president; MGX, vice president; and FTW, treasurer. AZ2 will be able to handle all license license plates effective Jan. 1, 1951. TVK needs 11 cards for DXCC. FYM has an interest in TVI, and is building a new QTH. Getting new QTH, TVK gave a talk to the IRC on DX operating. VJM and JVN have new Viking rigs. JAY works social for the 100 club, and is organizing new regular schedules on 10 meters with GQH and says it works well for short-haul. (SWX) W is assigned to foreign duty and ex-SX5N, just back from Korea, says severe drought continues. (SWX) VQX, former operator of Viking II and UC-125 at home, is conducting ham classes at HCAF. HVB and GQG have graduated from the Amateur Radio Emergency Service with Class IBO with an error of only 0.9 meters per year. GQH made Class II. LRM has organized the South Detroit City ham club, now has 20 members. DVR of GQH, formerly of Sioux Falls, announces the arrival of his fifth jr. operator, Ex-WL1AOD, now WNL6YW, is a DX specialist and is now taking over his 20-beam atop the house—something he has been wanting to do for years—instead of on a role in the backyard. Traffic: WBDL1H, PHR 45, VJR 26, (ISWY) 8, HKF, 4.

Dakota Division

South Dakota — SCM, J. W. Sikorski, WBBNM — SEC: GCP, PAM: UVL, RM: LOB, YQR and ZW have been SCM. ZIB has been elected vice president. ZQR operates more on 11-meter River territory and visits clubs and individuals frequently. ZW (who is building a modulator after all these years) will work with the 11-meter regular schedules on 17 meters with GQH and says it works well for short-haul. (SWX) W is assigned to foreign duty and ex-SX5N, just back from Korea, says severe drought continues. (SWX) VQX, former operator of Viking II and UC-125 at home, is conducting ham classes at HCAF. HVB and GQG have graduated from the Amateur Radio Emergency Service with Class IBO with an error of only 0.9 meters per year. GQH made Class II. LRM has organized the South Detroit City ham club, now has 20 members. DVR of GQH, formerly of Sioux Falls, announces the arrival of his fifth jr. operator, Ex-WL1AOD, now WNL6YW, is a DX specialist and is now taking over his 20-beam atop the house—something he has been wanting to do for years—instead of on a role in the backyard. Traffic: WBDL1H, PHR 45, VJR 26, (ISWY) 8, HKF 4.

Delta Division

Arkansas — SCM, Fred Ward, W5LUX — Act 146 of the Arkansas Legislature provides for license tags for Arkansas hams. The cost will be two dollars above your regular license fee. A rule promulgated by the ARAC is to Mr. W. L. Woodward, Director, Motor Vehicle Division, State Capitol, Little Rock. WUB made WAS from Mountain Home. A new c.w. operator at KJVR is getting on the air. A new operator at K5WRA and OKU is leaving for his home in West Monroe, La. WUB is running 70 watts to a BC-250. PHV has a new NC-143 receiver. U2T has new Viking rig. PTD says a new club is being organized at El Dorado. QH, Manager of RN5, says they need c.w. men from TVI. WVB is a new ARAC license. A new call on 10, W5B is on 340 kHz on 3 meters.

Mississippi — SCM, Norman B. O'Banion, W5JHS — This will be the last report sent in by JHS. Your new SCM is Dr. A. Richard Co., N8C. It has been a pleasure serving the hams in Mississippi. You have picked a very able band of workers, and it is our sincere hope that you and your successors will do the same. The ARAC continues to be an active organization, although the weather conditions have not been great. The ARAC mobile committee for 1953 includes BLD, ESR, EQR, FZX, GZB, IDW, MOT, MFP, NNP, ONY, VLR, W5B, and WNB. A new at KJVI is a very active WZL...

(Continued on page 78)
$10,000.00 IN PRIZES

ENTER RAYTHEON'S TRANSISTOR APPLICATION CONTEST!

Here's the chance-of-a-lifetime to win a big cash prize while gaining valuable "know-how" on the latest electronic development — transistors. Raytheon is offering 17 cash prizes to the seventeen contestants who produce the most ingenious applications of the Raytheon CK722 Junction TRANSISTOR.

Here's all you have to do! Simply build equipment that uses one or more Raytheon CK722 Transistors which you have purchased from your local Raytheon Tube Distributor. Then send a photograph of the unit you have built, a completed official entry blank and a 500 word minimum, 1000 word maximum constructional article on the equipment to Raytheon, P. O. Box 6, Newton 58, Mass. All entries will be carefully judged and prizes will be awarded on the basis of ingenuity of application. Duplicate equipment to be judged on basis of descriptive material. Decision of the judges is final and all entries and their ideas become the exclusive property of Raytheon.

Here's how to enter! Go to your nearest Raytheon Special Purpose Tube Distributor. Get your official entry blank which must accompany each entry and which contains complete contest rules or get the official entry blank by writing directly to Raytheon, P. O. Box 6, Newton 58, Mass. Enter today — the contest closes on Midnight August 31, 1953.

PRIZES
1st ........ $5000.00
2nd ........ 2000.00
3rd ........ 1000.00
4th ........ 500.00
5th ........ 300.00
6th to 17th 100.00
BIGGEST AMATEUR NEWS IN YEARS!

SIMPLIFIED ANTENNA MATCHING

NEW Johnson MATCH BOX

A fully engineered antenna coupling system

Performs all transmission line matching and switching functions required in medium powered amateur stations. Bandswitching and completely self-contained, the "Matchbox" will load an almost infinite variety of antennas from 3.5 to 30.0 mcs. Matches balanced antennas from 25 to 1200 ohms resistance. Successfully loads unbalanced, or single wire antennas of approximately 25 to 3000 ohms resistance. Tunes out large amounts of reactance.

Though designed as a companion unit to the Viking I and II, the "Matchbox" can be used with any 250 watt transmitter. Nominal input impedance is 52 ohms—power rating 250 watts. A change-over relay switches the antenna from receiver to transmitter, grounding the receiver antenna terminals in the "transmit" position. This same relay also mutes the receiver during transmission. Receiver performance improved by matching antenna input to receiver input impedance.

Supplied as a completely assembled and tested unit. Easy to use, front panel controls. No internal adjustments required to change bands. Fully shielded maroon and gray cabinet matches the Viking II. Dimensions 9½" wide, 10½" deep, 7" high, weight approximately 6 pounds.

$49.85
Cat. No. 250-23
Amateur Net

Standing Wave Ratio Bridge
Provides accurate measurements of standing wave ratio permitting adjustment of the "Matchbox" for minimum SWR and maximum harmonic rejection. Insures the most effective use of a low pass filter providing the ultimate in TVI suppression.

Impedance is 52 ohms, can be changed to 70 ohms or any other desired value. Shielded construction, 2½" dia. x 4½" overall length. Equipped with SO-239 connectors and polarized meter jacks. Cat. No. 250-24
Amateur Net $9.75

E. F. JOHNSON COMPANY

CAPACITORS, INDUCTORS, SOCKETS, INSULATORS, PLUGS, JACKS, DIALS, AND PILOT LIGHTS

210 SECOND AVENUE SOUTHWEST • WASECA, MINNESOTA

79
listed, of which 35 are mobile and 23 with c.d. vehicle
movement. the 12 mobiles and 36 gasoline engines have
4.73 c. d. control. DQN and BTA have improved ARC/c. d.
signals with new antennas. The Levittown Radio Club
operates a unique, c. d.-controlled radio on a 5.3 meter
wave. Other c. d. radio clubs in the area are expanding
their operations with new equipment and antennas.

DUP, Bronx E. and liaison officer for c. d. city-wide, rep-
ports that 5 new c. d. radio clubs have been organized in
the city. The Bronx E. and liaison officer has decided to
attend State approval training. IXV, Brookhaven Township
E. states that all emergency operations are currently
powered by a single 600-watt generator and 3 new 100-
watt generators are on order. BRK, Blue Island, a
crew of 3 people is organizing a new c. d. radio club
in the township.

T/F, Meacham, and KQZ, Yorktown, are expanding their
operations with new equipment. T/F, Meacham, is ex-
pecting to add a 10-watt transmitter to his station in the
next few weeks. KQZ, Yorktown, is planning to install a
new 10-watt transmitter in the near future.

NW. Bayonne, a member of the New Jersey-Radio Club,
has added a new 15-watt transmitter to his station. His
new transmitter is capable of operating on 40 meters.
NW. Bayonne, is also planning to install a new 20-meter
transmitter in the near future.

ES, Eastern Shore, has added a new 50-watt transmitter
to his station. His new transmitter is capable of operating
on 80 meters.

In conclusion, the c. d. radio clubs in the area are ex-
panding their operations with new equipment and antennas.
They are also expanding their number of members and net-
work of radios. The future looks bright for c. d. radio
in the area.

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midwest division

iowa — SCM, William G. Davis, W5PP — it is with
regret that SCM, William G. Davis, W5PP, has
passed away. SCM, William G. Davis, W5PP, was
one of the old-timers. EHH reports that he has
received his MARS appointment. QVA reports that
BDR was elected president of the Central Iowa
Amateur Radio Club. Other officers are BDZ, vice-
president; NYP, secretary, and chief cook. FDA is getting the Indians out of his

kansas — SCM, Earl N. Johnston, W5HCV — SEC:
PAIL, RM; EXKL, PAM; FNS, My sincere thanks to all
you Kansas amateurs and your friends for your help in
putting the last bits together. We have a strong
legion of volunteers who have contributed to the

in conclusion, the Radio Club has planned a series of
activities to help keep the quality of the Iowa ham high. OM now is on a
and is enjoying it.

omaha — SCM, H. E. Kohn, NE4Q — SEC: RWC, W5DQ; and DAE participated.

Concert, Y2F is running 700 watts and the rig is into the 20-watt

missouri — SCM, Clarence L. Arundale, W8JG —
SMB, PAEJ, and QXO, the Tri-State Radio Society
has selected the following officers: FKJ, pres.; LEX, vice-
pres.; Betty Davis, asst. BUL, treasurer; LEA, asst. in charge of
field engineer with Philco so he is leaving Missouri. PJF
reports 144 MHz. Window is open at one window and XFR is being

for the 40-meter band. K2BCK is working on new RTTY
gig. OBO reports from NYE and QZJ show a total of 30 violations logged
in March. NCZ is expected to have a new generator in
the near future. OBO needs to apply for OP appointment.
The inciting activity on the bands demands more rigid observation. These interested,
plesant.. DJF, W6F, and SCM are interested in the

for OBO appointment. The inciting activity on the bands
demands more rigid observation. These interested,
plesant.

for OBO appointment. The inciting activity on the bands
demands more rigid observation. These interested,
plesant.
The MALLORY PLASCAP*
Can Put New Pep In Your Old Receiver!

An average communications receiver has more than 25 paper tubular capacitors in its circuit. As a result, the chance of one or more of these capacitors becoming sub-standard and reducing the over-all performance of the set is quite likely—especially if the equipment is several years old.

As a matter of fact, there are probably many communications receivers in daily amateur service which, unknown to their owners, have gradually lost new-set pep as a result of leaking, inefficient and aged paper by-pass and coupling capacitors.

Unfortunately, sub-standard or inferior paper capacitors are not always apparent as a well-defined fault in the set's operation. A gradual reduction in gain in I.F. stages over a period of time, an occasional unexplained indication of R.F. or I.F. instability, audio distortion, or sluggish and erratic signal level meter operation may be the only outward signs that important by-pass or coupling capacitors are beginning to show their age.

When these symptoms begin to appear, it is time for drastic action. To delay, invariably means serious trouble with time off the air while repairs are made.

If there is any doubt at all about a paper capacitor in your equipment, the safest thing to do is replace it with a new Mallory Plascap plastic paper tubular capacitor, for the Plascap has exactly the kind of electrical characteristics you can depend upon. Separately molded plastic cases, pre-impregnated cartridges, special Mallotrol† impregnating oil, and moisture resistant Mallocene† plastic seal assures you of uniformly high insulation resistance (IR) and stable operation over the long life of the capacitor.

The Plascap is exactly the kind of capacitor you can depend on to put your equipment back in good operating condition. Ask to see it at your Mallory Distributor. In the meantime don’t forget those other fine Mallory parts carried by your Distributor. They include volume controls, rheostats, pads, wire-wound potentiometers, dry electrolytic capacitors, dry disc rectifiers, rotary, push button and lever action switches, vibrators and vibrator power supplies.

†Trade Mark

P. R. MALLORY & CO. Inc.
INDIANAPOLIS 6	INDIANA
their traffic activity so they can receive proper credit to apply on the new Trafiller Club certificates being issued by Midwest Clique, New AEC members: W6KMW and W5MRQ. Traffic: (Mar.) W6PWT 1185, QYO 689, JX5 517, BVL 455, GAR 123, K8WBD 125, W8RIS 100, ZL9 64, CCE 15, JSR 129, BRI 29, HUT 36, KIR 24, OUD 22, GQK 15, GZG 10, QMF 10, C1A 6, TGG 2. (Feb.) W6JBS 181.

NEBRASKA — SCM, Floyd B. Campbell, W8CRH assisted SCM, Thomas B. Boydston, W7FX, SEC: JDJ, RM: BMT. WM6MIA has added a VFO and modified his rig. KWQ is mobile on an 807 in the final, KWQ is OBS for the Combined Net on 2812 kc. Also a member of the Nebraska 76-Meter Phone Net, RDN has received his TEN Certificate and is also a member of the Nebraska C.W. Net, QSC, and CAN. KX8D is trying out a new antenna. LPQ is his rig, LKQ is now mobile with his Elmac and is using a Morrow converter. GPX is now located at Cheyenne, WY. NEF has a 65-foot tower for his 10-meter beam and a 40- and 75-meter antennas. CB9 has retired his 820-R for an NC-175. He worked RYQ on phone for the first time. Thanks to MJR for the first YLRL report on traffic. Your SCM sure would like inquiries from fellows interested in such ARRL appointments as OBS, OBS, OBS, etc., The SCM visited the annual meeting.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Roger C. Amundsen, W8HYF, SEC: IKF, RM: KYQ, PAM: FOB, CN801, C6P 1180, C286 60, 4408 kc, SJO makes G4F again! The CN and GPN had a fine dinner at the Waver in Cheshire on March 27th. KYQ did the hard work on arrangements and the gang really enjoyed the affair. We hope to make it an annual one. RBF has been visiting Texas, leaving HQ batching it. HH3EO and his bride visited LIG, MMZ, and MQW. D3PM is in new RQ for area mapping, with OWL, FRL, and HYP his alternates and JW, PCZ, and RP1 their alternates. NPCF is busy with QD, net "Yolanda." CUH has a new job, W7W in LQ 146.7 kc. OWL is visiting Texas, too. He now is hunting DX on 2 meters also. NQR works his e.w. mobile style. 2VMX/1 has a new rig. A1KAS new modulator on 7. Mel, ZL, invites all USNR personnel to join the Sunday morning net at 1900 kc. AOS sends his voluminous and very welcome annual report. RYV is planning a scouting expedition and really has a swell time with a swell bunch of fellows.

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EASTERN MASSACHUSETTS — SCM, Frank L. Bacon, Jr., W1CLA, new appointee; VYJ, East Bridgewater, AWA, UX7, and SCS as OBS; JNY and VHH as OOs; UX7 as OBS; RNW as OBS. Appointment endorsed: Kw, of Westwood, SH, new appointee; SKN Medford, FEC Middleboro, MBQ Vineyard Haven as ECs; WI and PU as OBS; QJG as OBS; SS as EC for Lincroc, OBS and OBS; HAI as OBS, OBS, and SCS as OBS. WDY as EC for Sharon, OBS, OBS, and OBS. We wish to extend our sympathy to SS on the death of his wife. UI is going to visit FDDY in France. SS's conditions of parole are very bad. OPK is now secretary of M.I.T. Radio Society, MX. DMS has 300 watts with an 813 in home rig. W4UH says the Ten-Ace Net is on. W5LAL at 1st coast, W8BB worked OBHNY and ZC4AXP and heard ZS5K and ZL1AH in the 100-Meter DX Test. WJH has now got Co6s Super 6e coupler and Elman moble, TIQ and WJH. The South Shore Club had CTW give a talk. Region 5 committee meeting was held with NJN, KUC, TQP, KTG, DDFS, OTK, B1, and R.M. present. WN1WFP, now in Framingham, is on 3742 kc. every morning. TOQ has 400 watts into 814 on s.s.b. The Quimnapowitt Radio Asn. had a talk by PJU on National Radio Asn. radio. Faby Amateur Radio Asn. held a meeting at NWO's QTH. The following took part in ARRRL's Frequency Measuring Test in February: BB, BGW, B8R, QDI, QX, WH and TCH. WAG, Taunton EC, would like some help from the hams in that city. He has W1M and DDB with him, but has no power. TQJ has 2240 and 4040 A.W. The TC Radio Club recently held a dinner and dance. AWA is working on a new antenna for 6 meters and is Net 4 on Central. W9HBA, 10: TSK Chelsea, OQJ Neponset. WN1WMO and WH have passed their Technician Class exams. Virgina King, V6, is now a Radio Club. The Cape Cod Radio Club recently held an auction. FEC, Middleboro EC, has a net on every Sunday morning with JXF, KLS, LDE, and VED. PFL is Radio Officer. Winthrop e.d. did had NJ0, Q5D, M9Q, CMW, BDU, HFI, LVA, TTH, TQD, on 80. WN1WFP, now has an HFS receiver for 6 meters to check in with Revere. Frank Dodge is W9K, LAZ attended LBC, in N. NED, for Net 5 on 7 meters. YDB is a new ham in New Bedford. WGN tried 75-meter phone but liked 10-meter phone and 40- and 80-meter cw. WFM, New Bedford C.D. Headquarters, has rig on 10 and 75 meters. NJN, State Radio Officer of Mass., attended a meeting in New Bedford. AVY was Net Control at WKM during a drill on 7-meter phone and had the following reporting in: AGW, UID, M9H, FXY, WG, LAZ, WGN, WD, SS, CTZ, EWL, NSF, APN, MFS and mobile BMQ. The Hallucinators from the Eastern Mass. Radio Club, had a message center at Jordan Marsh Company store in Boston. W2ZG was used. Those helping were KKE, SZQ, URT, AT, HFE, TY, TTY, UWN, IKR, KB8, H0I, UKH, SPL, UPZ, BGW, and MWX. B8F, AOD, OR8, MBQ, and A8K took part in Radiological Team drill with BL at Region 5. DDFS, Somerville, heard on a good signal. GOO has a new team for 70 meters. YC, Sudbury EC, has a Viking 1. TVP applied for OQ Class IV appointment. VYJ and WSN are heard on 10 meters. Traffic: (Mar.) WRM and BWM were on SS 450, MX 250, EMG 150, TY 125, UE 92, SMG 76, UX7, 75, JM 60, DMS 51. AVY 36, UPZ 25, BY 21, W114, RSE 13, SCS 8, UTH 8, HWE 6, BNW 3, GUS 3, TNK 2. (Feb.) WBU 132, MX 50, (Dec.) WIXY 60.

WESTERN MASSACHUSETTS — SCM, Roger G. Capen, WJ8J, W8HL, REC, KUIR, RYV, PAR, TAY, TAY, W8BM, WMN meets at 7 p.m. Mon., through Fri., and WMN8 at 8 p.m. Mon., Wed., and Fri., 3050 kc. TV has built a 40-meter crystal converter for his BC-610 with good results. Congratulations to WN1YDP, the XYL of MND, who is the section’s new S.L. licence. UY1 keeps akeas on WN8S and MI? YCG is dropped the "N" from his call and is active on 80-meter e.c. YCG also has his General Class and is on 80 and 40 meters from Amherst College. BVD now is experimenting with a gating modulator. CQG reports new second harmonic, input and output variable, changes bands often, MUN, RJI, ULE, QQQ, QQI, YCG, YJ8I, MND, and RKQ took part in the RSGB, and is in that order. UY1 is a new member of the section from W2. KIWA/V/A1WAV now is on the air from the Springfield Armory with TCM, MNG, WDR, and W9V, operating into the MARS nets during the lunch hour. Other MARS stations in Springfield are WH2G and QYJ. AVJ has a new, to him, HRO-5TA1 and is looking forward to the next CD Party to give it a workout. QWJ has an s.s.b. crystal lattice filter under construction and has finished a receiver using a Signal Silver filter, EHH has a new 6-meter mobile in operation using a 2E36. Appointments as OBS, OBS, OBS, OBS, OBS, and OBS are available for all interested ARRL members in the section. Are you taking advantage of the increased operating enjoyment this offer? Drop me a card for full information and application forms. Also, if your community does not have an EC now is the time to recommend one or volunteer yourself. Traffic: W1BYR 154, TV 121, GPH 97, YDG 93, TAY 35, HBC 15, MNG 14, JYH 13, RLI 8, UTV 6, MIV 3, B7V 1, MND 1.

(Continued on page 89)
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NEW HAMPSHIRE — SCM, Carroll A. Carrier, WICEM—SEC, RAI, NUN, RM, ORW, PAM, UNY, GRV, and Key Club has elected the following new officers: QH, pres.; OMZ, vice-pres.; RYT, secy.; QH, treasurer; TZF, asst. mgr. The Club will hold its next meeting at 7 p.m. on 6, Sun., UAB is in the Army in Texas and through the kindness of QH has been able to talk to his folks in Nashua. VAZ has a new rig on 80 and 15 meters. New appointments this month: WHM as ORS, TWF as ORS, UJL as ORS, VQG as ORS. What about getting your application in for an appointment? What is really needed is more ORS appointments. Now that there are so many newcomers on phone, why not send in some suggestions to YVM, our Ask Column. Mar. for February? Not as interesting and contain many good suggestions. CVK has bugs on 80 through 2 meters as well as 85 meters. Phone the editor. TRWY, 2GA, 2BR, 52, 69, 70, 72, CDX 19, JWJ 15, UNV 7, PR 4, UJL 3.

RHODE ISLAND — SCM, Goodell, WZBD, SEC; MJL; BM, RM, RTV, PAM: BPT, RTN meets Ryot through Fri., at 7 p.m. EST on 5440 kc. KNE, who has been away at school, has rejoined KIV, R, L. C.D. Net meets Sun. at 10 a.m. on 2993 kc. Sorry to report that OIA, who has ably guided the destinies of R.I.C.D., has had to resign because of the serious illness of his mother. dBH has assumed his duties at Net Control and QMC has taken over as RO for Middletown. Both jobs will be capsably handled! RIA's report election results about 10:30 p.m., HIL, vice-pres.: AGL, rear., cre.; VUC, asst., secy.; KRE, rear; and ex-QST in charge of publicity, with TQW, LKZ, and OGT named as directors. A glance at each of their operating skeds indicates that all of the above may be reached almost every evening on 2 or 10 meters and most of them operate on all bands. U1G does not recommend BCR as an air guide for mobile equipment. While following BCR's over-the-air directions to BCR's antenna farm — so we are to say — a few thousand in excess of what is present by BCR, and a passing good samaritan all had to be pulled from the jungle into which BCR guided him. TRAFFIC: WIBTY 26, BUN 14, OXU 14, BV1 9, BVU 7, KNE 2.

VERMONT — SCM, Raymond N. Flood, WFFS—SEC; NLO, RLO, OAK, AET, RM, PM, PAN; AXN. NLO has taken over SEC duties as JEN is QRL. AXN has a new Viking II. The Tri-County ARC elected new officers as follows: RWP, pres.; NHI, vice-pres.; LKN, secy.; TXN, treas., and DAQ, asst. mgr. CGX has new NC-1850 receiver. The Middlebury Amateur Radio Club has received its Charter from ARRL. The Caledonia ARC will sponsor the Vermont ARRL Convention this year which will be held some time in August. Watch QST for details and date. The 2nd International Field Day and Family Picnic will be held Sun., June 26th, at Bayley, Malelita, Bay, miles north of Burlington, co-sponsored by the Montreal ARC and BARC. Officers of BARC are TQZ, pres.; TZM, vice-pres.; NLO, secy.; and SEL, treas. The BARC has organized a QTH, "QTH" is the call sign of a mobile vehicle. TRAFFIC: WIRNA 237, OAK 95, NDB 45, AVP 34, FFS 29, T 26, AXN 20, TAN 14, EJU 9, TXY 1.

NORTHERN DIVISION

ALASKA — SCM, Glen Jefferson, KL7NT — KL7ATN, at Ladd Field (Fairbanks), advises that he is available with a "phone watch" for traffic in the Ladd Field-Fairbanks area. He has a schedule on all bands. HBQ has a bill before the legislature license-plate bill passed Territorial House and Senate and at this writing awaits final action by the Governor. The bill will authorize call-letter plates for those amateurs who have mobile equipment installed in their automobiles. The All-Alaska Hamfest for 1963, sponsored by the Anchorage Club, has been set for Aug. 8th and 9th, and preliminary plans suggest that it will be held at Paxton Lodge. Formal announcement will be forthcoming. INDIANA — SCM, Joe Kozak, KB7WJU — Cour d'Alene: A nice letter was received from KOG, who moved from Grangeville the latter part of February. OAV reports schedules on Jefferson Station, PARM, and OEN Nels. His XYL, OOV, has applied for OBO appointment. New officers of the Jefferson, Clarksburg Amateur Radio Club are OOW, pres.; IDV, first vice-pres.; OOV, secy., treas.; and POZ, reporting secy. Craigmont: RRS writes he is on 3.5 and 2 meters now, having cracked his 3648 crystal, with his old Novice frequency lock — 3725 kc. Boise: The Ten Meter Net is having hidden transmitter hunts frequency, NVO is OBO and in operation. As opening for Phone Activities Manager, so let's have some suggestions. Traffic: W7NH 198, MKS 18, FIS 19. MONTANA — SCM, Edward O. Reven, AK7JG — The Glacier Hamfest will be held July 18th and 19th at Two Medicine and the Big Springs hamfest at Big Springs, July 9th. Aug, 8th and 9th. The Club plans to open a new station, having cracked his 3648 crystal, with its old Novice frequency lock — 3725 kc. Boise: The Ten Meter Net is having hidden transmitter hunts frequency. NVO is OBO and in operation. As opening for Phone Activities Manager, so let's have some suggestions. Traffic: W7NH 198, MKS 18, FIS 19. MONTANA — SCM, Edward O. Reven, AK7JG — The Glacier Hamfest will be held July 18th and 19th at Two Medicine and the Big Springs hamfest at Big Springs, July 9th. Aug, 8th and 9th. The Club plans to open a new station, having cracked his 3648 crystal, with its old Novice frequency lock — 3725 kc. Boise: The Ten Meter Net is having hidden transmitter hunts frequency. NVO is OBO and in operation. As opening for Phone Activities Manager, so let's have some suggestions. Traffic: W7NH 198, MKS 18, FIS 19.
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recently moved to Great Falls; attended his first club meeting there. MBM, who has spent two years in the South Pacific, also attended. NGX has his transmitters rewound and is back on the air; SPK is now Official Observer and plans to monitor mostly in the phone bands. W7NSJ, W7RBB, and W7RBI visited SEW and WNTVA at McClellan and W7RBB and W7RBI bought a W7HIL from SEW and plan to work 'phone when they make their General Class license. SBTV7W, now in Miles City, has received W7TXB as his new call. New calls are W7HTH and W7KDH. Lothrin, W7TGG and XYL, W7TGH, and W7WSY, Brady, CT still needs attendance on MSN. Traffic: (Mar.) W7CP 18, OPM 10, BNU 4, (Feb.) W7CT RI.

OREGON — SCM, John M. Carroll, W7BUS—Oregon apparently will get ham license plates this year or as soon as details are ironed out. Fine cooperation from the State has made it possible with no hitch. PHA advises activity on OEN, O5N, and CTN. The Rogue Valley Club had its Annual Covered Dish Dinner at Astoria, with hams from Grants Pass and Klamath Falls attending. Norman Vance has been succeeded by EBR as secretary of the RVC. PX Club, HIJ innoce, and ACY formed a civic defense organization in Astoria. The Show Net has a good bulletin for information on PX6. VFO and the Pacific Area Net News is a fine reference for net operation and traffic-handling. For information, write FIX. The Pacific Area Trailing Net shows increased activity. Traffic: W7CP 107, PX5 in AJN 49, PXN 32, PRA 23, HIJ 10.

WASHINGTON — SCM, Laurence M. Seznan, W7CQY — SEC: BTY, RM: FIX: PAM: PGY; PYD had a bonfire in his rig when some insulation broke down. FQG has been appointed EC for Spokane County, OGU and BCA installed new towers at FFD in Walla Walla and AIC in Freeburg. PAM and MGG are going to school at WSC. JFF, who works at KJQ, had a severe shock and was hospitalized. BRB, chairman of the Spokane TV committee, OZZ passed away, OOV, OOW, and FOZ, from Lewiston, were visitors in Spokane. PXA has ceased on 10 meters.

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PACIFIC DIVISION

HAWAII — SCM, John R. Sanders, KB8RU— The HARC is mailing every KBO a return postcard form for registering intent to attend the August meeting at Honolulu. This is going to be a big deal! Don't miss it! The Juneau Club is holding a 7-Mc. Phonc QSO Contest. The Hill Club is continuing its annual training classes. ARRL is backing a move to revive the Territorial Radio Roundup. QB has returned to Oahu from a couple of years with the USAP. ABA is returning to W-Land, DK will spend a year training at WWV. For Pacific Area: YVZL and 5QDF are now sole operators at KG6FA, 9L1H and K66Q are now returned to the States, 8PL for the month: KG6CF, K6AAJ, K6AGH, and K6AFL Traffic: Mar.) KG6AAJ 402, K6AFL 927, K6AGH 620, KG6CHC 122, (Feb.) KG6AAJ 2270, K6AGH 623.

NEVADA — SCM, Ray T. Warner, W7JU— SEC: HJ, EC5, ROA, LG3, NWL, OXZ, and 23. W7JU, W7QO, JRU, RSY is starting a new antenna farm at his new QTH in Las Vegas. OXX now is mobile with an Elmac in his new station wagon. LIG is Justice of Peace and Fire Chief in Overton. WNT7GQ is a new Novice in Boulder City. JU is attempting to give West Coast stations on 144 Mc. A Nevada QSO with a 322 transmitter and 24-element Yagi, in Las Vegas, is showing interest in 144-Mc. activities.

W7NTH is the latest Novice in Gabbe, giving NWL some

(Continued on page 26)
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company. KQA has had another Jr. operator added to his brood.

SANTA CLARA VALLEY—SCM, Roy L. Cousin, W6LZL—Clubs are swinging into high gear preparing for the coming Field Day in June. Committees are being formed and the sites are being planned according to the rules to be used. MMG reports in with a slack month of operating but manages to keep his sked with JAN active. UKM now is having trouble with 40 meters, QD5 is still in the hunt in those well P.M.T. reports, and his accuracy is amazing. IU1 reports in with very little activity but is keeping active on emergency net. AFT reports that he received a call from the S.O.S. of PANW and liked it very much. WMM finds that working with a living is interfering with his radio so retires after a D.M.T. in order. NTO is happy to report the arrival of a new YL Jr. operator, named Joy Ann. YHM sends in a traffic report that clearly shows some effort and time wasted, and the XVL is feeling the OS so as not to halt the steady flow of traffic. ORF still is handling traffic but has gone into hibernation with his eight work. BMT is out of the hospital after an operation and we hope getting well fast. INFEC held two meetings this month, both business, but discussed a means of interesting more bands to attend the meet. Field Day plans were made. The MBRC held its meeting at the Naval School, where Prof. Cooper spoke on antennas. The SCCAA had another meeting and EDJ, who speaks for his sisters, Bob is from Pacific Tel. and Tel. Co. Traffic: W6Y1H 1001, OFJ 49, AIT 9, NTQ 4.

BEEST—WAX—SCM, P. H. F. C., WAXL, W6ZJ—Aest. SCM:
Guy Black, 6LRL, and Harry T. Cameron, OHRV. SEC: WGM, RKME: IPW, JOH, East Bay still needs a PAM. Any suggestions? The AREC now has a total of 60 members. We can use a lot more than this. WGM has plenty of application blanks, so how about it? There will be a real bonfire of a c.d. drill on June 10, and the western states, JZ now is c.d. communications organizer for Albany. Listeners to QVRA's nightly show on ANBC wouldn't be afraid to hear anything—even anything.

s.s.s.s. The Mt. Diablo ARC now has a monthly newspaper, the Carrier, with HIR as editor. The Northern California DX Club's DX er reports that their club members are contest-buggy, and are not sending in enough news. Give the editor of your club paper a break. He works hard and probably needs the news, but be sure you need his help. Keep him happy and enjoy a good club paper.

The Valley Mobile Reeks are now in the DP Drive-in on the first Sun. of every month. HMQ is back from being a KG6. LGW is training Novices in Alamo. The American Legion Amateur Radio Net has set out a new list of disasters where amateur radio furnished the only means of communication. The Skyriders have had another election: ANK, pres.; ELP, vice-pres.; ELP, secret.

The Skyriders sound like a club where the XYLs have a good time, so if yours is down on ham clubs try bringing her to one this month. Among those who have been building the lastly are JOP, ASN, BSY, YSX, GIZ, CQG, TI, UBM, and RL. We are sorry to report that RDA is very ill indeed. PWR was heard on 26 d., 224. RA7 has recovered from a bout with the microbes. EBY hid the transmitter on the Saro's second HT hunt of the year. UHM and JZ are economically recommending a fish on the 220-meter. Write to K6HJ at Fillmore for details. The v.h.f. gang is sharpening its Lance for the FHFS HT Hunt at the Rose Point Ranch. It is the 5th of the month and the Club meets the 2nd Fri., in City Hall, Solano Avenue, Albany. Everyone is welcome. The Club's new secretary is QSM, new YV1 chairmen; JK, new 2-meter, new 2-meter mobile. If your Field Day chairman does not have a set of the revised rules for the CCR Field Day Award, write to K6VJ, 670 10th, Alameda, CA 5.

SAN FRANCISCO—WGM, R. E. Czolikow, W6ATO—July 7-5561. SEC: NL, PL, 5-6545, Eureka Area; RC: SLX. Congratulations again are in order for QX2. His results in the ARRL Frequency Measuring Test were excellent, the official results showing his readings had an average accuracy of better than 54 cycles per minute—an accuracy suitable for appointment as a Class I Observer. He also has received an ARRL Public Service certificate for his work in the Arkansas-Tennessee tornadoes. SLX reports that a side-tube went out the transmitter a few days ago, 10-hour period, and that CWV handled its traffic, while FYF handled traffic for the Weather Bureau and the Northwestern Pacific Railroad, for which he received a letter of appreciation from the R.R. BZK and FQS handled the other end of the circuit. As mentioned in last month's report, the Eureka Area group is getting ready for the very disastrous floods of January. Those in the San Francisco section to whom great credit is due are RMI, SLX, FYF, WUL, JFR, SSL, HZ6, JFR, CHP, and HBJ. In the Sacramento Valley section: GOS, JVU, KTF, ITF, QF, VZ, OHM, KQl, SFR, and REE/9. In the Oregon section the LZU, REF, and K6P. H. Coquillette did a fine job of Net Control each night. LRU and others whose calls are unknown also contributed to a good job well done. BZK is the new Operator.

The Humboldt Amateur Radio Club meets the 2nd and 4th Fri. in the YMCA room, Municipal Auditorium, entrance on St., Eureka. Martin Area: 

(Continued on page 92)
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KNZ, Tamalpais Club EC: ZUB. Hank Alvernaz advises that the Tamalpais Radio Club will work operator shifts around the clock on Field Day, BZK and FQS assisted in the Eureka flood emergency, with BSK handling traffic for the Weather Bureau, Southwest Airways, NAM, and P.T.A.T. Guests at the last meeting were W1HJ, and WQI, as well as a father-son combination, WNEFBE and W6MWF. The Marin Radio Club had an interesting talk by John Heconovitch on 2-meter construction, with a sample of his well-known 2-meter transmitters on exhibit. The Marin Radio Club meets the 2nd Fri., in the American Legion Hall. The Tamalpais Radio Club meets the 1st Fri., at 7 Loma Ave., Tiburon—the home of W6LCA. (San Francisco Area: EC: HVS, PIH and GYO, both XYLs, are General Class licensees. RBQ is beaming with pride over the licensing of his son as W6LCA.) All are invited to check into "The 29ers Net," meeting Thurs. at 8 P.M., on 20,000 kc. PYK is Net Control. GQA is in OC. Classes III and IV, Mobiles are invited to make the regular 1st and 3rd Sun. morning breakfast meetings of the Bay Area Mobiles, usually held at Perkins Fine Foods, 1700 Baker St., Redwood City. The SFRC meets the 4th Fri., at 7 Lakeshore Plaza, opposite 34th Ave., and the SARA meets the 2nd Fri., at 1023 Van Ness Ave., Red Cross Bldg. Santa Rosa Area: EC: LOU. The SARA meets the 1st Wed. in the Board of Supervisors room, Court House, Santa Rosa. Traffic: W6YQY 221, PIH 9, PIH 9, BIP 8, ATO 7.

SACRAMENTO VALLEY—SCM, Harold L. Lucero, W6JDN—ARR has 4807 in the final: he is 80 for Mt. Shasta, Calif. ZQA on 40-meter ‘phone, FHR has new 75-meter antenna, FNU’s beam is still on the ground. NQA is about ready to leave the Norris ranks. FQ is entering 40-meter ‘phone and is using the T272 antenna. IRA is on 144 MHz, and has installed TVI filter on his rig, has some new countries, and has received QPSK, QSY, and QSB appointments. ILY is on 40-meter ‘phone, DDC is giving 40-meter ‘phone a try, NFX receives a fine report on his frequency Measuring Test. FJ is back in the running after a long illness. CPU is a traveling man for the S.P.R.R. and doesn’t get very often. FYK has moved to the Sacramento Valley section. CIS has been on the road with very little time for ham radio. The Tall Pine Net is back in the running and will convene at 0030 Sunday mornings. The Mt. Shasta Club is making great plans for the Mission Trail Round-up June 27-28. McCloud reports three new Novices. KY-BQQ is a new ham in Chico. JBY has moved to his house and has a special radio shack over the garage. The SROC held a successful auction, ROAFF is a new ham in Redding. Let’s all read QST for April, page 59, and another article starting on page 74, then get on the ball, gang. We want to build up the Sacramento Valley section, but need the help of all, so let’s hear from everyone next month. Traffic: W6JDN 28, ILY 8, OBR 3.

SAN JOAQUIN VALLEY—Acting SCM, Edward L. Martin, W6GJW—As most of you know by now our SCM, FYM, has moved to Wilmette, Ill., near Chicago, and is employed by the Motorola Corp. He has appointed me Acting SCM and I hope I can live up to the confidence he has in me. Howard made a five-day trip to Turlock and the TARC enjoyed seeing him again at the March 31st meeting. He said he likes his new work but thinks the West in October is better than in W6-Land. He is active on 7 Ms. and 14-Mc, ‘phone and c.w., as W6FYM. SCM reports increase in activity on SBJV in spite of poor condition. QRO achieved very good results in the February F.M. T. IAS now is a member of MARS. MSU announces the Teenager’s Net on Sun., 1 P.M., 3500 kc. UWV and RRN are active in C&AP work and would welcome interest from local hams. QER is a new president of TARC, replacing FLP, who had to resign because of new work assignment. The Fresno gang is working hard on the coming hamfest. That’s it for this month, gang. Send me those reports. Traffic: W6EXL 01, G1W 12, OBA 4.

ROANOKE DIVISION

NORTH CAROLINA—SCM, J. C. Graden, W4DLX—Reports were very thin this month so this column is likewise. AKC had to resort to 40-meter ‘phone to get the annual DOG traffic out of his system. Joe also made BPL again this month. Congratulations, RRH has been the WCNS on TCPN. Tues. and Thurs. nights, Brad, ex-FY, now is K4FM, and checks in on NCM, MWW, Roanoke Division Director. has appointed the following as tech directors: AKC, DLX, and ZG. The 15Him gang has been giving the SCM some traffic reports; keep it up, gang, and let’s have more of them. ROA-Roaring River Activity 727, RRH 123, ANU 19, TMV 14, DXG 6, DLX 5, CVQ 4, G4B 2, WDJ 2, FZJ 3.

SOUTH CAROLINA—SCM, T. Hunter Wood, W4ANK—NTD is the Rock Hill EC and reports that plans for emergency ham prep are being prepared and that they are working with the civil defense office. The Florence Club has organized a permanent TVI committee that is (Continued on page 94)
TELEVISION interference may be due to short wave broadcasting stations, amateur radio transmitting stations, diathermy equipment, X-ray equipment, automotive ignition noises or similar sources. The basic problem of eliminating this interference is that of rejection of the signals received from these sources. Interference to television receiver reception caused by transmissions from an amateur station can be caused by harmonics or by shock excitation from the transmitter. The shock from the transmitter fundamental can be cured at the television receiver with a Bud HF-600 high pass filter. Harmonics can be greatly reduced or eliminated at the transmitter by use of a Bud LF-601 low pass filter.

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Harmonics can be greatly reduced or eliminated at the transmitter by the use of a BUD LF-601 low pass filter, which has the following characteristics:
1. Minimum attenuation of 85 decibels on all frequencies above 54 megacycles and a minimum of 93 decibels above 70 megacycles.
2. Maximum rejection is adjustable from 60 to 90 megacycles. This tunable feature provides two slots at least 100 decibels down on any 2 TV channels.
3. The cut-off frequency is 42 megacycles.
4. The unit will easily handle a full kilowatt modulated on a reasonably flat line.
5. The insertion loss is less than one DB.
6. Since the design of this filter provides an adjustable feature, the unit can be used with either 52 ohm or 72 ohm coax.
7. Each inductance is in an individually shielded compartment.
8. All capacitors used are variable.

Size 12" x 2 1/4" x 2 1/4"  
Bud LF-601  Amateur Net — $13.95

BUD HF-600 HIGH PASS FILTER

The HF-600 high pass filter is designed to have a cut off frequency at 42 megacycles, thus this filter rejects signals from 0 to 42 megacycles. It is within this range that the majority of signals causing interference would be received. Since there is no attenuation above 42 megacycles, picture strength or quality is not affected. This unit is easily installed on the T.V. set.

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approved by the PCC and is working satisfactorily. TSU is building a 75-meter mobile which is to go to W2VIB/4; a student at the College of Charleston, W1ZBR is a new ham in North Charleston. T7N is the Emergency Coordinator for Orangeburg and is licensed in 500-watt vq. XQB has a Viking on the air from Clover. Official Phone Stations and Official Relay Stations are appointed upon application to the SCM. These permits entail an agreement, to operate according to approved practices. Every ARRL member in South Carolina is now holding one of these permits, should the application blanks from the SCM. The Anderson Club planned to have the Deputy Director of Civil Defense for South Carolina as its guest speaker for Mar. 27th. Traffic: W4ANK 138, TSU 17, EDQ 14.

**VIRGINIA — SCM, H. Edgar Littauer, W4FF — BV finished the HPI, with the help of the Washington Chapter of Sojourners, Maj. Gen. Ed Lynch, USAF, known to us as EMJ, gave a good account of ham radio and its value to the country in terms of military, educational, and social aspects, a medium of good will between persons of all nationalities. PWX informs us he will be moving to Norfolk and has the job of proxy of the Washington Mobile Club to BOP. Harrisonburg is organizing a Votice club sponsored by OYW, VRO now is in Landover Hills, Md., NHEW, HCN sports a Viking II. It will push the other through a true match automatic tuning device under construction. KFC now has returned to the after 6 weeks on special assignment in N.Y.C.-weeks background. Vio pouting the contest hours at his home rig, however, FY and NITZ operated on a drift band, detecting HQM in the DX Contest. FY s.t W7RF while the latter teamed up with ERK on special location at Los Angeles. The Franklin Radio Club was cut in front by a large margin over PYRC, the latter’s effort to date over a period of years still wasn’t sufficient to name the Pennsylvania Division. Reesboro, Director MWII’s conference of Aset, Directors and SCMs at Danville was attended by AKN, NYLV, 2D, DLX, BPI, KX, DX, and PF. HP who introduced MWII to ham radio a decade ago, was on hand to admit his progress in the role of top man in the Division. Records still are soaring in the section. This time 15 stations submitted traffic reports and topped a previous high of 35,0C11/9, ex-NUU, QS80ed over a salad bowl on two recent luncheon engagements, accompanied by PF, Traffic. (July 1.) W7HP, SHJ 301, JOT 143, KRR 127, LK 119, T7C 87, UWS 83, GR 77, JAL 75, KX 60, FY 88, ELV 55, MWIII 52, SAD 51, DLX 48, JUI 87, UWS 52, MWIII 52, KSW 20, AKN 18, KMC 18, OW1 18, PWX 17, B7J 17, JZG 15, V12 14, LW 12, RCS 11, SWA 9, SPE 8, VUY 8, KBS 8, W7HMS 7, LG 6, KFC 4, CGP 4, LG 6, HCN 2, JUJ 2, (Feb.) W4JL 6.

**WEST VIRGINIA — SCM, John T. Steele, WSMCP, RTO has been appointed Civil Defense Officer to assist L. C. Zickalof as future RACES work within the section. YPF has fully rebuilt and again is active on the air, the 60meter bands, with the prominent DX stations reported. W7P and W7G are now in full swing, and a prominent DX station is heard on 75 meters. Congratulations to the Tri-State Amateur Radio Assn. of Huntington on becoming an ARRL affiliated club. The 6th Club picnic reports TVI trouble. W. Va. Phone Net is now out almost all hours of the day. Traffic: W8LSU 400, ETF 42, HXG 21, GPE 16, F15 10, EVD 6, W6L 0, PGL 5, HZ 5, AEN 4, DPF 4.

**ROCKY MOUNTAIN DIVISION**

**COLORADO — SCM, Karl Broegeen, WSCDX — SEC: AE. We wish to welcome AE. We wish to welcome AE as a member of the new Colorado SEC. Hank took over from K4JG, who did a wonderful job for us. COP won the transmitter burn out, but the EI Radio Club, CMOR, W5IT, ROU, CG, HX, and K5T are active on 2 meters. CMOR has moved to the limelight from Denver. He has built a new shack and has plans to let the family live in what he doesn’t need for his equipment. OWP reports a new ham in club in Brush, with W5AE as president and COO, having a band of 6146 TVI-proof exeter with a constant running VFO finished and can really work break-in with it. A new call is N9P. He is moving from Arapahoe County to Green Bay. AZT gave a nice talk at the last Denver Radio Club meeting in how to sneak DX. IO is the Denver Radio Officer and has been visiting the hospital with a heart attack, IC, Our Director, made a flying trip to Washington, D.C., and had quite a time getting acquainted with the same old faces. He then flew to Minneapolis to meet Mr. Deardorff, BWJ was his pilot from Minnesota to Denver. Don’t forget the Rocky Mountain Convention at Estes Park and Sat. See you there. Traffic: W5BKF 766, W5Q 407, A4D 18, WOP 4, W5TAK — SCM, Floyd A. Hinesworth, W3TUM — (DEN, Ogden EC, has appointed Mr. M. as his assistant, and added the formation of a new c.d. net on 25.6 Mc. with the following QNS: S17, NAV, NIA, C14, and N22; net times Mon., Wed., and Fri. at 0300 MDT. (BRAS 177)

(Continued on page 99)
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WHEREVER WHEELS TURN OR PROPELLERS SPIN
rebuiding and experimenting with series gate modulation. NXG is working on a new shack and power supply, SP advises of a joint meeting of the Salt Lake City and Ogden Clubs in April to meet our new Rocky Mountain Station Director, Claude Maer, Jr., sic. The Ogden Club has a new Octan generator and HC-545 receiver and is preparing for each establishment of a new station to be located in the center of SLC. TVL is using all his spare time repairing the "one-eyed monsters." DAD again is in Salt Lake City. CD is going FB in the Salt Lake City area with his 2500 meter mobile net and the auxiliary police boys carrying most of the load. FJS is working on new a.s.b.o.c. rig. NOE has moved to Salina and is giving SP strong competition. CED has moved to Idaho. Traffic: W7UTM 192.

WYOMING — SCM: L. L. Daily, W7JDB—Mr. Daily, W7JDB, has resigned as SCM in view of transfer to Denver, Colo. On his recommendation Marion Neary, W7KJFV, has been asked to serve as SCM until the 1947 members complete nomination and election of an SCM under the League Rules for SCM elections that appeared in April QST. Notice soliciting nominating petitions appears elsewhere in this issue.

SOUTHEASTERN DIVISION

ALABAMA — SCM: Dr. Arthur W. Woods, W4QJW—KIX continues to pursue his traffic hobby with remarkable efficiency. The result being felt on AENB, SUP, QAC, and AENB, and KIX have been reporting into RNS. MVM presented the first QO report this writer has seen in his many years as SCM. An even more comprehensive report will be welcomed. MVM is now getting a high fever about s.a.b. OAO has enlarged his net activities to include MARH, NQR in the chorus and PPK in the orchestra helped with a recent presentation of Verdi’s Requiem. RLG has qualified for ORS. TVM is affiliated with AENB and QIN, and still is not satisfied with the rebuilding he did on his rebuilt VFO. UBI still keeps an eye on the top of the traffic score, answering AENB, TLJ, DON, RN5, RN4, VR, and TCPPN. Weekly code classes are under way at UBI, also more de-TVUing has been accomplished. At UJJ now is MARS affiliate. WN4YPC started and officiates at the Novice Net on 3775 kc., the old AENB frequency, and information about crystals can be obtained from your SCM. All Novices and ex-Novices are invited, urged, and expected to QNI. The Huntsville Club now meets at Hutt's stone Arsenal. The Huntsville Novice Net meets Tues. at 7:30 on 3735 kc. TXL and RQS now meet AENB regularly. Traffic: W4UPRA 201, KIX 92, QBO 76, UJJ 75, PRR 231, OAO 12, TV1 11, MVY 7.

EASTERN FLORIDA — SCM: John W. Hollister, Jr., W4FWZ—WNYVOX advises that the Novice Net meet on 3727 kc. each Sun. at 2:00 p.m.; WN4YCS is NCS. The Florida Phone Traffic Net handled 517 in March. All on 144 Mc., advise us for new listing, please. WS has retired as NCS for Emergency Phone Net and HUY has taken over. Daytona: W4IN reports two o.d. drills with good results. F1, Meet and SBV reports he and FDD, CPG, and TVU mobilized for reported storm nearby for good practice run. Gainesville: The Gator Club officers at University are ULL, OXW, FPV, ML, and SXV Jacksonvile: The net set up downtown on Armed Forces Day to relay to overseas relatives. EUE was in charge. KKE reports an HRO-50, QO-45, all QO-45, and the SAOM relay the rumor that the Atlanta Hamfest will be held Aug. 30th. Key West: Cold station: LACO is getting a facelifting by WTVUO and others. EC KOH reports AYB activity is good, and BCZ (the OM of KOB) is polishing rocks for all emergency frequencies and their j.o. operator now is WN4ZIG. Sheriff: KIX on s.a.b. on 75 meters. EID will be s.a.b. AT got 325-2. (TVI won over his half gallon.) BHE uses 325-2. SWI is AEC for mobiles and WN4YUQ is talking up emergency net for Novices. Lakeland: AVQ will direct the club’s theory course. SVB, MLY, VIE, and UDB will demonstrate amateur radio at Florida Southern. Miami: WYR has dropped the "N." IECX is on s.a.b. IKE, and MVR set up Dade Emergency Net on 28 Mc. MVR is EC for Dade. The Miami Net hamlet’s hidden transmitter hunt used "Dakar" walkie-talkie is a MVR. YRRA makes BPL again. UJX is using Lettine 35f. Orlando: TVQG got NC-125 from W4ACI WGC reports a Novice in Port Richmond: KJ and UJS worked in Pinellas o.d. drill. Cleveland: F4UJ makes BPL again. Traffic: W4PUU 534, FRN 298, DRS 280, PZT 204, WS 125, TVUQ 26, DDW 35, TPR 51, EF 33, FWZ 31, RWM 29, SUK 29, AXT 8, TIX 3, UYF 5, WGR 9, TG 4, IM 3, IBW 2.

WESTERN FLORIDA — SCM: Edward J. Collins, WM4MS—SEC: PLE, QK has VHF-182 and SCR-532 for meter rig. DAO is going great, going on 75 meters. RZV is Net Control of the Dagwood Net. UBS is in charge. K4UW transferred. KZ7SB was a visitor to the section. SHZ is a clean up. SKVV now is in charge of KAPR. PZT is increasing power. KWM and POF have new telegraph gpoles. NHI has added new antennas to mast—TV antennas are in the works. PLE is nearly ready with the big rig. REX is in charge of 110VAC in the car. UWX now is QRMMing Edgin Village. ROM is active in new car but not on the air. SSB and MS are looking at s.a.b. SUQ has left the market for mobile rig. UNE operates 25 hours per day. PQW is starting TV camera. AXP is finding out things.

(Continued on page 20)
THE COMPACT VERSATILE ST-203-A is again available—because
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Designed primarily for mobile operation, the ST-203-A can be used
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Attractively styled in silver-gray hammertone finish with gray plastic
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Culver City,

Los Angeles County, California

about the 7-Mc. band. VCB is enjoying 21-Mc.; 'phone. FHQ keeps old 7-Mc. c.w. skeds on 'phone. ODO is QRL comer. QRM sends 80 per cent of his time on 6.5 Mc. Traffic: WAGQM 4.

GEORGIA — SCM, James P. Born, jr., W4ZD — The following certificates have been endorsed: As OBS, MIZO and NB; as OHS, HYW, KSZ, KGP, KFL, MTS, BOC, 1X8, 2X8, 2XZ, as OBS, MZO, NB, 2X8, and FNA as OBS, NMZ, IMK, KJ, and HDB; as OBS, FBH, and JD. DL is doing a swell job as OD. Congratulations to the Atlanta Telephone. Phone Net on the PB job they did in furnishing communications and handling traffic for the Naval Air Station and Dobins Air Force Base when a plane crashed near Riddle, Fla. A letter of appreciation was received from the Commanding Officer of the Naval Air Station. The Camp Gordon Radio Club and the Augusta Radio Club will hold a joint hamfest on July 28th at Little River Casino in Augusta. AAY is chairman of the hamfest committee. The Kennedalello Amateur Radio Club's hamfest will be held May 3rst at Little River, Garnet, S.C. Viking II will be given to some lucky attendant. LNG was guest speaker at the Augusta Radio Club's April meeting and gave an FB lecture and demonstration on the design and construction of amateur audio equipment. KSZ has returned to the air after an absence of two years and is conducting a code class for hams in the Columbus Area. W44ZDL is a new ham in Atlanta. WKL has a new 28 Mc. over 14 Mc. beam complete with 60-foot tower. YUMI is rebuilding PBH to work the 100 K traffic watch tos. MIZO has a new 3.85-Mc. antenna. Traffic: W4USA 19, K4VAR 161, WA4ACH 120, ZD 43, MA 36, OPE 18, UMM 12, MTS 5, OPE 6.

WEST INDIES — SCM, William Werner, KP4DJ — Station: ITZ, GP, 5R, RD, AZ, ND, EA, FW, PJ, and ZK renewed ARSC membership. CH has a long-wire antenna. And National has been set on 75 meters. DJ is working 40-meter phone with new half-wave antenna. RC has new Harvey-Wells transmitter. FZ changed to end-fed antenna. RN has de luxe 20-meter beam. UB built 829 final 829 oscillator amplifier transmitter for NZ. ZK has an M-5000 transmitter and a 10-kw. station on 3925 kc. uses Elmac transmitter. TP bought 100-B from RD. AL resumed activity after several years' break. JM has an HZO-00, a Viking I, and 250-f. antenna. RP is building broad-band exciter. SK put up 135-ft. Windom antenna. New officers of PRARC are ADS, pres.; GF, vice-pres.; RA, secy.; BV, treas.; CN, YG, DJ, RD, and RD, directors. DC has been appointed to civil defense committee. FW has been requested to act as amateur liaison to civil defense. ZZZC is v. a.m. of weekly band. BA is repairing JV's TB850; OB now has BC-410 on all bands. PJ finished assembling Viking II. DN has returned from RD and is now working with local groups. RO, at Ramsey AFB, received ARS Class license. RK received WPR-50 certificate. KD made ten 160-meter contacts during the DX Contest. RL was the only representative of the States in the February F.M.T. Traffic: KP4DJ 4, KD 2.

CANAL ZONE — SCM, Nelson W. Magner, KZ5M/V4QIBS — Effective April 15th, the KZ5M/V4QIBS were changed: 21,325 kc. was monitored daily at 1215 EST; 28,900 kc. will continue to be monitored daily at 1700 EST. WZ with a four-element and KD was taken about the three-element beams on 21 Mc. are working lots of DX. DJ has ordered an s.a.b. call. E44, four elements, switches on 14- and 28-Mc. phone bands. KZ5M, through SSB, 1350 to 2000, Sun. 1300 to 2000. RT became the owner of NM's 10-meter handie and LM, consented to installing her Elmac in the family car. ML thanks the St. Petersburg, Fla., gang for their daily contacts with FL and JD while he was in Florida during the serious illness of their father. Traffic: (Mar.) KZ5AA 759, WA 94, ML 66, DG 31, FL 28, NM 38, NN 39, RA 10, RM 5, (Feb.) KZ5AA 695, WA 55, ML 49, FL 52, NN 17, RM 4.

SOUTHWESTERN DIVISION

LOS ANGELES — SCM, Howard C. Bellman, W5YXJ — Aest. SCM: Bill Coo, 005WQ, PAM; QW, RLU, FMG (LSN), JGP, and JQB. Acting SBC: YVJ, 5PWX/6 wants his OBS appointment transferred from Louisiana, LLS, from Nashville, is in town and needs a WSG; crack ICN. American Legion Net, is OBS. UTE is OJ. Another OBS is LGP. KGEA opened OBS privileges. HPF applied for TD appointment. P6N of Bishop is a brand-new OBS of renewed OBS appointment. LSN report shows 24 sessions, 22 station check-ins, traffic total 375 for February; total 368 for March; 263 check-ins, total 279 messages. CDR received Section Net certificates. There are 25 OBS appointments in our section position nomination. KGEA elected the SCM this trip: KQW, ICG, W1K, UTE, LGE, S3R, KTH, NZI, and RZGB/3. WJE converted his BC-348 to 110 volts. These three qualify for Class I OQ: CIX, CK, CBO, CJF, YYJ, KGEA, W6YSK, VG, and GKZ. Class II qualifiers: DCD and YYY. Honor roll mentioned to entrants who are E5K, ENK, KA, and LEE. Sure would like to have some more (Continued on page 100)
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<td>&quot;Civic Patrol&quot; Receiver (30-50 mc)</td>
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<tr>
<td>R-46</td>
<td>Matching Speaker for Hallicrafters Receivers SX-62, SX-71, SX-73, S-76</td>
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Oo, HIP is a Santa Fe railroad man and operates from the caboose. Wow! B3 and DAD is leaving the U. S. S. America. Superbe to be a civilian and wants club information. QWJ is busy in c/d. FM3 took over Mt. Lee and JFQ and AEQ will rejoin antenna form. A new voice at the AM radio contest. W5ZV at the H.H. is looking forward to new TV station. Did I report that KFI has a new grid dip oscillator like that in Merced? WSH in Glendale and new Collins 32V-3. RBW reports on the UCLA Radio Club: The transmitter is on TV and on the air. The 30-meter beam blew down but now is up atop a 60-foot tower on the Bldg. Code and theory classes are conducted for those desiring Novice tickets. MNJU is on 2 meters with 90 watts. RBW is going to W2-Land to make cross-country schedules. EBK wants OBS and OQ appointments renewed. YBF reports on a farewell party for W5OUG. HIP is in Oregon. Traffle: (Mar.) W5KUU 2092, NTN 241, YGK 211, YLG 106, CMN 149, JQO 147, QR 148, KBG 139, ELZ 118, PJP 119, DPL 108, URG 96, MAZ 69, KLG 68, BLY 63, KDLA 35, W5GFF 256, HED 16, CK 12, ZSR 12, COZ 11, CBG 10, HIP 9, NJU 7, NCA 5, YJV 5, DTY 4. (Dec.) W5GB 99, JAG 69.

ARIZONA - SCM, Albert Steinbrecher, W7LVR - Asst. SCM's: Kenneth P. Cole, W7QJH; Dr. John A. Stewart, 7SW; SEC: OIF, RM; Manager: W5QON; Arizona Net: Tue. and Thurs., 7 P.M., 3895 kc. Arizona W.G: Net: Mon., Wed., Fri., 8 P.M., 3815 kc. Phoenix Net: Tue., Thurs., 7 P.M., 29 Mc. Tucson-6 Net: Mon., 7 P.M., 3900 kc. Tucson-6 Net: Mon., 7 P.M., 3900 kc. Phoenix had another successful Don's Shrek into the Superstition Mountains in quest for the Lost Dutchman's Gold Mine. Fixed and mobile communication was established by the following: JYH, KOY, LMS, MAN, OIF, OTQ, OYK, PFC, QZ2, and RJ3. We regret to announce our loss to radio of one of our very active net members, PFC, who was killed in this Aircraft, in a crash near Phoenix, and MDK, who died of heart trouble. KOY, our PAM, requests that all names of those who can conveniently do so, monitor 3885 kc, daily at 8 A.M. - 12 Noon and at 4 P.M. for the purpose of dispatching traffic during these hours rather than at regular net times when QRM and QRN are at their maximum. Again, your SCM requests that appointees please send in station activity reports. Traffle: W5ROY 215, PLM 89, LVR 34, QFQ 27, PKU 10.

SAN DIEGO - SCM, Edgar M. Cameron, Jr., W6FHJ - Asst. SCM: Thomas H. Shelley, W6JTT; Manager: F6AM; Richard E. Huddleston, 6DLN, SCR: KR, Asst. SECs: WYA, FOP, EC, DEY, RMY, MUE, PAM, and F6IM. FJH awarded 2PM and a PAM certificate at the San Diego AREC picnic held at Felix Park in Escondido. F6H would like to have an RM and MUE in Orange County, as well as in the El Centro region. OQ will soon visit the ARRL-organized code practice drills. T2B now is overseas. SR informs us that the San Diego Mobiles have elected ZD as president, and BWW as secretary-treasurer. The mobile gang will convene every Sun. at 1130 and will hold a breakfast on the last Sun. of each month at 0800. AREC worked the Coast Guard on speed-boat races. HII sparks Chula Vista c/d. KSI is c/d. work-horse for the county. FOP is AEC for 75 meters and WYA for 10 meters. Local R. T. UDU, pitched in with an FB turnout of the gang from all over the section to work out the horrors of T2B. ZJO gave top accounts of his personal experience with TVL Twelve Novices at IAC, high school radio club, are working hard on General Class theory. QBM advanced from Technician to General Class. The Escondido Radio Club and Physics Class went on a field trip to the telephone company's "cool" microwave installation on Mount Palomar under the guidance of DQD, who is local telephone company engineer. MUE is struggling for a bit of sleep between c/d. traffic net work. EC DEY reports plenty of activity up in Orange County on 2 meters, and Q5L is working on 420-Mc. gear. SAK now is General Class. An FB job is being done by Q5Q, ICN, and OZQ as TVI committee of the Orange County Amateur Radio Assn. Traffle: W6LAB 3007, YDK 447, MUE 24, FCT 6, OHV 4.
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states. W2M is building a new VFO and de-PTVing his transmitter. W2H is building a new receiver. The Ablfman Automatics are to be completed by the end of the month, the new addition to the office facilities. The new transmitter will be operational by the end of the month.

Oklahoma — SCM, Jesse M., Langford, W3GVY — SEC: AGM, EM: NQJ, PAM: SFR and ROZ. The Energy Pageant at Lawton was held in cold and cloudy weather; the traffic total down considerably, but some excellent planning had been done and the gang could handle any reasonable amount of traffic. Thanks to R55, CAY, and the other groups and individuals that worked through Saturday night and into Sunday in order that the traffic would be kept moving. WAH, he might have kept moving, was using a pair of 313s. WNSZAF is a new Novice in Edmond and PYW has a new 415 rig. TK1 has a new V85000-D and is working all bands. N6DYC is working a new 222, and has a new 2-meter converter and transmitter, and also is trying to get the TVI out of the new VFO. The Holdenville Club has its plans for Field Day ready, with a new 2-meter beacon and traffic net. Another 2-meter traffic net has been formed between Hobart, Lonewolf, Carter, Sayre, and Mayfield. A mobile club has been organized in Oklahoma City. PET has a new mobile and is working on an 80-40-meter CW rig for emergencies. The Oklahoma Ham meets and arranges for a tower top every week, GVS is recovering slowly from his illness. The Blackwell gang has a trailer house complete with 5-kw generator and 300- watt transmitter ready for use in emergencies or for civil defense. HXC and HFW are working with the local authorities regarding civil defense, HFW now using a VHF link. Traffic: WSGK Z, SWL 100, ROZ 60, MKR 81, SQS 71, QVQ 60, TEL 60, PMJ 51, MQJ 37, KX 38, QVQ 44, TFP 22, VFW 10, FRL 10, ERI 10, AFR 10, HFW 10, YCV 10, HFW 10, Padre Island Mar. 27-28 to handle traffic for the 100-mile walkathon up Padre Island from Port Isabel to Bob Hall Pier at Corpus. JHW, YPB, MVY, RLO, ONQ, and OOG helped relay or clear traffic to other towns. Mobiles were operated by JFO, GRT, PMT, QJF, and HMG on the upper part of the island. Fifty-five messages were originated and 15 were received and delivered. The Corpus gang included EY, GJF, LMU, PMT, QEM, GQA, VCM, WPC, WRC, WRC, and YOL. At a recent meeting the HARK elected SDA, pres.; VVF, vice-pres.; EER, treas.; VHR, secy. VHF now is on 75 meters with an arc. Zone 2 of STEN had its annual picnic at Conroe Air Port April 12th. JYM and EEX found the hidden transmitter. Some of us got together and organized the Deepwater Net, a mobile net for the Padre Island area. PAD, formerly in Texas, which meets on 3885 kc, from 7:15 a.m. to 9 a.m. and 4:30 p.m. to 6 p.m. FQG is Net Control and LJJ is Alternate. All mobile stations, please leave 395 kc open for mobile use. The Port Arthur Radio Club has a new publication, The Monitor, FCD and BUZ, both DX men, are handling traffic. BUZ is communications officer in the TSBRC. FCD has 32 counties. WNSWWR worked KH6 on 3.5 Mc, with 21 watts, 500 ma; APX added 85 W and 4.5 to his 80-meter DX. VOM has a new rig. WRE is working on an antenna coupled. WPL has a new 40-meter rig on 40 meters. UHF is operating on a new modified rig, the antenna is 40-meter phone, is going up to put a 40-meter doubler and is rebuilding his antenna coupler. ZAT found a 4.7 meter line, and was using it at high last arrived. Traffic: K5KPG 1617, W5MN 1533, QAA 74, DAZ 40, ABQ 15, NIT 6.

New Mexico — Acting SCM, Dick Mattson, W6BIW —— sent a file No. 186 was passed by both boards and signed by the Governor, making call-letter license plates for amateurs in New Mexico available to all who wish to pay the $13.00 above regular license fees. Filing fees will be issued sometime after July 1st. The following have gone portable/mobile with new Elmac transmitters: WPA, KSH, and PFW. RBY and his crew from the XYL’s exam for ham ticket. AKR reports he has spent many hours helping Novice. BWA, Net Control for New Mexico 7-meter Emergency Phone Net, is back on the air after a few weeks’ absence while he was putting the new 6-meter transmitter. The Mesilla Valley Radio Club at its first meeting in March elected the following officers: SAZ, pres.; VJL, vice-pres.; UMO, secy-treas. At its next meeting in March the members heard an interesting talk and saw films on Guided Missile Photog.
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For Rhombic Antenna Termination, and other applications...

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SONAR MODEL SRT-120 TRANSMITTER
For mobile and fixed location operation. Has band-switch for 80, 75, 40, 20, 15, and 10 or 11 meters, plus spare position for any future band. Has provision for two crystals or external VFO head. Final amplifier employs the new Amperex 9903/5894A tube. Power input is 120 watts on CW, and 100 watts on phone. All circuits metered. Powers rf, metered. Power supply dc at 350 ma; and 6.3 volts at 6 A. Complete with Tubes $198.50 External Head $19.50 SRT-120P same as SRT-120 but with built in push-to-talk relay and self-contained power supply for use with 110-125 v or 50-60 cycle transformer $979.50 Also available in Kit Form: 120 Kit—$158.50 120P Kit—$198.50

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Six Band Amateur Converter
A compact converter covering 10, 11, 15, 20, 40, and 75 meter bands. Also covers 6 mc (49 meter) and 15 mc (19 meter) short wave broadcast bands. Uses C606 low noise rf stage, with panel controlled antenna trimmer, 6AT6 triode mixer, 6C4 modified Clapp oscillator, and 6H6 IF stage. Complete with Tubes $52.50

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Type 7107 Constant Voltage Power Supply
The Solia CVE Transformer delivers filament and plate voltages regulated to within ±3% with line voltage variations from 110 to 120 volts. Regulated filament windings provide 6.3 volts at 4 amps, and 5 volts at 3 amps. Another winding provides 6.3 volts at 8 amps, unregulated. High voltage winding furnishes 380 volts at 250 ma. Weight of transformer, 19 lbs. Dimensions: 7½" high x 4 ½" x 4 ½". Supplied with Capacitors. SPECIAL $13.95

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Provides constant 115-volt output with an input variation of from 95 to 130 volts. Stabilization is held within 1%. Rating is 30 va, 60 cycles.

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These Brush Model BA-206 Headphones, designed around the exclusive BIMORPH® crystal-dielectric element, are your best choice for high fidelity and smooth frequency response. By their nature they draw negligible power and only require modest driving voltages. Hence, these headphones are ideal for monitoring applications...may be used in either high or low impedance circuits and are extremely well suited for multiple installations. They are of rugged, shock-proof construction...light-weight yet powerful. Advanced design gives your ears a smooth, comfortable air-tight fit for excellent bass response. Here is the ultimate in headphone quality at a fraction of the price you'd expect.

Brush crystal products are leaders in their fields because for many years Brush has specialized in research, development and applications of piezo-electric crystal materials. Write for bulletin. Brush Electronics Company, Department VV-6, 3405 Perkins Avenue, Cleveland 14, Ohio.

into the Alberta 'phone net. Let's see how well we can cover our province, gang. The net meets Mon., Wed., and Fri. at 1830 on 3765 kc. All stations are welcome. Traffic: VEFTA 88, WC 52, OD 15, MJ 14.

BRITISH COLUMBIA — SCM, Peter McIntyre, VE7TTJ — Mobile interest seems to be coming into full swing, with DH, CX, ALW, and JT, trying to get into their respective jollies. JT suffered a fairly serious industrial accident last month and now is operating with a body cast and one arm in a cast. AF1 is operating from Clinton. The Victoria Club had a very successful transmitter hunt, as did the VARC, with others to follow for the d.t. snoppers. You soon will hear from the BCARA with a program for TVI and your participation will be in good stead for future operations. By the time this is in print the editor of the Amachee, HI, should be getting ready to move down the center aisle. Formerly a mobile club in Vancouver is in the making so the boys can profit from each other's experience in this form of operation. Those holding appointments are asked to inform the SCM of their activity and send in their certificates for renewal when necessary. Any comments, etc., will find me at 98 W. 20th Ave., Vancouver 9. The BC ARRO Network has an average of over sixty check-in stations daily on 3753 kc. at 1730 PST. These cover the Province. Roll call is finished in 10 minutes with traffic following.

Three sectional NCSs call this roll, one each for the Western, Eastern, and Island sections. GC, as Net Manager, doubles-checks these NCSs and carries the Net after they are through. The Net is in session for one hour with all stations welcome to check in. The meet was well represented the better. Why not join the ARES Net? It is a Net with a purpose! Traffic: VE7QG 88, DH 20, JT 20, AC 7, AO 4.

MANITOBA — SCM, Leonard E. Cuff, VE7ALC — XO has been trying out vertical long-wave antennas with the help of a hydrogen balloon. HG has left us for EBD-land, where he has been transferred by his firm. OC has taken a position with the Canadian General Electric Co., after having completed engineering studies at the U. of Manitoba. HL is using TBS-50 now on railroad/mobile. Our heartiest congratulations to CE on his promotion to the position of Deputy Chief of Police of the City of Winnipeg. JO is operating mobile on 75- and 20-meter 'phone using super modulation. JE is active again on 75-meter 'phone after a long layoff. JA transmits Official Bulletins at noon on Tues., Thurs., and Sun., on 75-meter 'phone. How about sending along news of your activities, gang, so that it may be put in this column. Traffic: VE4MLE 72, AB 15, BR 11, BN 6, RG 3, A note is asked to inform SCM of any new mobiles and GI and LU at the school station. These drills are providing good practice for those taking part and those checking in for relays. Ex-6NN now is 5NN at Regina as Radio Inspector. BU, TE, Aq, and CB provided hockey score service between Rosetown and Moosequin, using 7QC for relay when conditions were good. Ex-5I and JI, now 3DL, and 3DL, wish to be remembered to the gang. The SARL now is affiliated with ARRJ and received the Charter in January. Are you a member? If not, join SARL and AARRJ, if not, 51 will look after your applications. PD is visiting in B. C. and the old PADDLEMAN is 75 meters after a long absence and will be new OES. UQ is leaving Regina for a position with the Department of Mineral Resources at P. A. LU, who is back from the Wars, will be VE6HR 36, GI 27, TE 22, DR 17, ES 11, GO 9, FJ 5, CU 3, QL 3, DD 2, FG 2, LE 2, RE 5, WH 2, PQ 1.

K26 AFL and GI0 have been reported O5Oing harmoniously on 75 'phone.

Gifted concert pianist LeRoy Ansphack, W8BD (ex-W33D3), appearing as soloist with the Topexk Symphony Orchestra, found W8NCV playing first French horn and that W6HS had tuned the piano.

Owners of Elmac A-54 and A-5511 mobile transmitters may obtain mimeographed pamphlets of instructions for easiest conversion to bands not included in the original design (such as 7 or 21 M.C.) by writing the manufacturers.
WINNERS BOTH! *See Foot Note

CONGRATULATIONS, OLE TIMER!

I REALLY CAN'T TAKE ALL THE CREDIT. GOOD EQUIPMENT FROM WALTER ASHE DID THE TRICK.

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ELMAC Model A-54 Wired for 10, 11, 20, 40 and 75 meters. Net $143.00
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ELMAC New Mobile Receiver, Model PMR-6-A, Dual conversion, 10 tubes, BFO, noise limiter, covers all amateur bands, 10 through 160 meters plus BC band. Measures only 4½" H. x 6" W. x 8½" deep. Net $134.50


NATIONAL HRO-60T, Less speaker. Shpg. wt. 90 lbs. Net $483.50


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Mobile Antennas

(Approximate values for 10- and 20-meter operation are 2.21 microhenrys for $L_1$, 0.85 microhenry for $L_2$, and 36 µfd. for $C_1$. The photograph, appearing on page 11, shows a production version of the network in which $L_2$ and $L_3$ are made variable.

The antenna can be three-banded by the addition of another network as shown in Fig. 6. In this case the frequencies $F_1, F_2$ and $F_3$ are in increasing order. $L_3/C_1$ is series resonant at $F_3$, as is also $L_4/C_2$. $L_5/C_3$ is series resonant at $F_2$. The network $L_1L_5/C_1$ is the same as the network shown in Fig. 5B, and is tuned to $F_2$ and $F_3$ (previously designated $F_1$ and $F_2$) as described above. $L_3$ is electrically shorted at $F_2$ and $F_3$ by the series circuits connected at $A$ and $B$. $L_2$ is of a value which will resonate the entire system at $F_1$.

It should be observed that these network techniques may be used for fixed antenna installations, both vertical and horizontal, and for various band combinations.

Results

The antenna measurement program and the coupling circuit design resulting therefrom has made possible a transmitting equipment with "built-in" antenna coupling circuitry which requires no electrical adjustment within the 10-, 11-, 15-, 20-, 40- and 75-meter bands.

In addition, the antenna program permitted further experimentation and evaluation of multiband antenna networks which had been under development for some time. This work has proved the practicality of these networks.

The combination of a bandswitched, gang-tuned transmitter and automatic multiband antenna networks has resulted in exceptionally good flexibility and convenience — to the extent that bandchanging can usually be accomplished more quickly with the transmitter than the receiver.

Acknowledgments

The developments described in this paper were greatly facilitated by the cooperation and assistance of Fred Hager, W5DRG, and Manley Youngberg, who contributed in large part to the over-all project.
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Unbelievable! But a fortunate purchase by
Lafayette makes available a top-brand hearing
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The Johnson Viking II transmitter kit incor-
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MOBILE CONVERTER
MC-55 Net .............................................. $69.50
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should blow. A receiving-type r.f. choke connected across the low-impedance output will provide a protective path to ground and keep the plate voltage off the coax line should the blocking condenser fail.

4) Audio Equipment

The rules of construction set forth for power supplies will serve equally well for most speech amplifiers and modulators. An important additional precaution that should be taken is that the microphone stand and enclosure should always be connected to the microphone-cable shield which, in turn, should be grounded to the chassis. At least one ham has met death by failing to do this.

5) Auxiliary Equipment

Particular attention should be paid to the use of pick-up links for monitors and scopes. Too often such links are made in haywire fashion from any piece of wire that happens to be handy. Use well-insulated wire and ground one side of the link.

In conclusion it should be reiterated that no voltage, including those in the lower hundreds, can be considered free from danger. With a good contact, tests have proved that the maximum that a person can take and still have the power to release his grip is 40 volts a.c. Handle every circuit with caution and remember that the lowly 115 volts has more electrocutions to its credit than any other. None of the measures recommended above involves any considerable amount of complication or expense. It’s just a matter of taking the time to make sure that they are complied with.

Electronic Voltmeter

(Continued from page 38)

Evaluating Capacitors

Filter capacitors used in low-voltage power supplies are usually of the electrolytic type. Some leakage in this type of capacitor may be tolerated; the general level of resistance in typical samples is shown in Table I. Coupling and by-pass capacitors are also listed in the table. The readings shown do not represent limits or standards, but are recorded as a guide for use in the evaluation of capacitors in equipment being serviced. When electrolytic capacitors are tested, the positive probe from the ohmmeter should always be connected to the positive terminal of the capacitor. Polarity of paper and mica capacitors does not matter.

Resistance measurements on capacitors having a value below 1 microfarad can be obtained quickly on the 1-megohm scale. Because capacitors having higher values require a longer charging time to arrive at a leakage equilibrium

(Continued on page 118)
GET ON THE 40 and 15 METER PHONE BANDS NOW!

Fellows, we are the first with the latest gear as it is released from the factory. We accept low down payments — name your own terms. We finance our own paper — there's no red tape. We offer the most personalized service anywhere. We buy more equipment — we sell more equipment.

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The WRL GLOBE SCOUT is the latest triumph of the WRL engineering staff. It is a beautiful, compact XMTX, completely self-contained, including power supply — 31/2" X 101/2" X 81/2". Contains new 6L6 and tubes in final; covers 160M thru 10M. Metering provided for final grid and final plate circuits. Complete kit includes all parts, chassis, panel, power supply, cabinet, tubes, meter and one set of coils. Can be used for mobile work with suitable power supply. (Auxiliary socket provided.) An ideal XMTX for the novice or the experienced ham.

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point, it saves time to bring the capacitor up to
a partially charged condition quickly on a lower
scale. If the capacitor is left on the lower scale
too long, the needle will move backward to
equilibrium when the ohm switch is swung to the
final reading scale. Too short a charging time on
the lower scale will produce a rise on the final
scale.

The position at which equilibrium may finally
occur can be approximated by making several
attempts, discharging the capacitor before each
attempt. With a 1000-microfarad capacitor,
however, even this procedure is lengthy; the
100,000-ohm $R$ scale is used, therefore, to obtain
an equilibrium leakage reading. When leakage of
unused electrolytic capacitors is being measured,
it is good practice to operate the capacitor near
the rated voltage before testing in order to
"form" the dielectric film.

Resistance of good mica capacitors will be
considerably above 1000 megohms. These capaci-
tors can be evaluated, as can other high-
resistance devices, by the use of an external
high-voltage source and the d.c. scale of the
electronic voltmeter. Fig. 4 shows both the test
set-up and the formula for the determination of
results.

In Table I, the "charging time" is listed as an
estimation of the capacitance rating. The input
resistance for the 1-megohm $R$ scale on the meter
used for these data was 11 megohms. Meters
having different input resistances would give
other charging times for the same capacitor, but
all electronic voltmeters having an 11-megohm
base could be used for the capacitor evaluation
as given in the table. "Charging time" is de-
pendent upon the capacitance of the unit being
tested and the resistance of the circuit through
which the voltage is applied.

Receiver and Transmitter Circuits

In the basic circuit diagrams, all capacitors
marked $C_r$ are those in which negligible leakage
(greater than 1000 megohms of resistance) is
required. Voltage points marked $E_x$ are those
where important variations in circuit behavior
can be identified. Fig. 5 shows fundamental
Class A audio amplifiers. Where current is
indicated as (I), the value is obtained from the
$E$ and $R$ relationship.

Points for measurement of Class B amplifiers
are shown in Fig. 6, and some of the tricks used
to examine the transformers and load conditions
are listed.

Class A r.f. amplifiers are generally found in
the input and i.f. stages in receivers. Fig. 7
illustrates these circuits and Figs. 8 and 9 show
the remaining basic receiver circuits, the mixer
or converter stage and the beat-frequency oscil-
lator.

Transmitter Components

One device frequently utilized in both receivers
and transmitters is the voltage regulator, Fig. 10.
Gas-tube regulators are easily built and serviced.

(Continued on page 114)
Marvelous Minifon!

new pocket-size wire recorder!
The world’s smallest complete recorder, requiring no outside power source, the sensational MINIFON is precision-built like a fine imported camera. It measures only $1\frac{3}{8} \times 4\frac{3}{4} \times 6\frac{3}{8}$". It weighs only 2 lbs. 7 oz.

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Ideal for on-the-spot interviews, field trips, conferences etc. Hundreds already in use by broadcast stations, doctors, lawyers, executives, scientists, insurance and private investigators, police departments. Continuous recording up to 2½ hours!

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MINIFON may be easily concealed to serve as a private memory for small details which might be decided verbally and which might later be in question. Among available accessories are a fine crystal microphone cleverly concealed in a wrist watch housing and a telephone recording attachment.

versatile, economical to operate!
MINIFON records . . . plays back . . . rewinds . . . erases — immediately! Recordings may be stored or wire may be re-recorded. Operates on standard 1½ volt "A" battery, standard 30 volt "B" battery and 7 Mallory RM-4Z mercury batteries. Mercury batteries are good for 24 hours continuous recording, A and B batteries are good for shelf life. MINIFON will record continuously for as long as 2½ hours!

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Complete with batteries, crystal microphone, stethoscopic earphones and 1-hour spool of wire. Terms if desired. Order No. 34-290

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COLLINS 75A-3 AMATEUR RECEIVER

with Built-in MECHANICAL FILTER

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<table>
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<th>Item</th>
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<td>75A-3 receiver</td>
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<tr>
<td>75A-2 receiver</td>
<td>$420.00</td>
</tr>
<tr>
<td>Matching speaker</td>
<td>$20.00</td>
</tr>
<tr>
<td>32V3 transmitter</td>
<td>$775.00</td>
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<tr>
<td>KW-1 transmitter</td>
<td>$3,650.00</td>
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<td>70E8A-VFO</td>
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MECHANICAL FILTERS

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<tr>
<td>F-455B-31 3.1 KC plug in</td>
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<td>F-455B-08 800 cycle plug in</td>
<td>$75.00</td>
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<tr>
<td>F-455A-31 3.1 KC solder terminals</td>
<td>$75.00</td>
</tr>
<tr>
<td>F-455A-08 800 cycle solder terminals</td>
<td>$75.00</td>
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and with only two components, a resistor and a VR tube, constant output voltage can be maintained with a range of load currents from 5 to 40 milliamperes.

The first stage in many transmitters is a crystal oscillator. One of the various circuits used for this stage is shown in Fig. 11. In addition to the regular readings of $E$ and $R$, a periodic check is made of the d.c. voltage at $E_r$ to give an account of the behavior of the oscillator. If the voltage at $E_r$ gradually drops, check the tube and possibly clean the crystal.

Class C amplifiers and multipliers (Figs. 12 and 13) do most of the heavy-duty r.f. work in transmitters. Rigid control of the final-amplifier plate current requires a regular meter in the circuit at all times, and it is just as important to have a permanent meter in series with the grid. No. 1 return to indicate the proper drive. Preceding stages in the transmitter usually operate at conservative power levels, and spot-checking is adequate for normal operation. A milliammeter with a switching arrangement may be used to obtain plate and grid current readings while the various stages are tuned up.

When Class C stages are being serviced, the electronic voltmeter is handy for checking leakage in coupling and by-pass capacitors, and for locating leakage paths of the type that break down or are only when high voltage is applied. It is also used for maintaining a record of plate and screen voltages, grid-driving voltages, and resistor values. When a.c. or d.c. voltages are checked in the presence of strong r.f. fields, such as are encountered near operating transmitters, misleading readings may be obtained unless the instrument is well shielded. Not all vacuum-tube voltmeters exhibit this reaction; a metal case is helpful in minimizing the effect. When the reaction does occur, however, there is an appreciable meter reading when the probe tip is merely placed in the vicinity of the transmitter. If the reading persists when the shielded probe cable is disconnected, a need for filtering of the v.t.v.m. a.c. cord and possibly additional shielding of the instrument is indicated.

**Workbench Activities**

Electronic voltmeters, besides being important in development and servicing operations, are flexible and handy meters to have within reach at all times on the workbench. Getting a reliable check on a capacitor, resistor, battery, transformer, choke, or switch in a hurry when an odd job calls for an immediate answer saves time, effort, and peace of mind.

**Strays**

Germanium, the metal used for transistors, is nearly worth its weight in gold. It now sells for $350 a pound or about 65 per cent of the price of gold. Present methods recover only one pound of the metal in the sludge from the production of 2,500,000 pounds of zinc ore. — The Okmiate News
GONSET AMATEUR EQUIPMENT

3016 "COMMANDER" TRANSMITTER
Fig. A. Multi-band transmitter covering 1.7 Mc to 30 mc. Complete. Power requirements: 240 volts DC and 200 watts input. 30 volts AG or DC at 13 amperes. 30 watts input. Use only on CW. Provision for all bands as well as broadcast band. Requires 6 volts AG or DC at 3.5 amperes. 250 volts DC at 30 ma. Gray cabinet. 7½ x 14½ x 9½ ins. Wt. 6½ lbs. 977550. NET. $134.50

New VFO. Specifically designed for use with the Commander above. Arranged for convenient external mounting. Covers 10, 15, 20, 40, 80, and 110 meters. Size: 5½ x 5½ x 3½ ins. Shpg. wt. 1 lb. 977574. NET. $29.95

New! Fig. B. "Super Six" Converter. Covers 10, 15, 20, 40, and 75 meter bands. High stability and sensitivity. Gray case, 3½ x 5½ x 3½ ins. Shpg. wt. 1 lb. 977582. NET. $52.50

ELMAC PORTABLE UNITS

New! Model PMR-6-A Receiver. 10-tube dual-conversion unit. Covers 10, 15, 20, 40, 70, 80, and 160 meter bands as well as the broadcast band. Requires 6 volts AG or DC at 3.5 amperes and 250 volts DC at 30 ma. Gray cabinet. 4 x 9½ x 8½ ins. Wt. 6½ lbs. 977500. NET. $134.50

Model A-54 Transmitter. 50 watt unit for 80, 75, 40 and 110-10 meters. Temperature compensated VFO. Requires 6 volts at 4.5 amperes and 650 volts DC (max.) at 25 ma. Gray cabinet. 7½ x 7½ x 12½ ins. 17 lbs. 977180. NET. $139.00

Model A54H. Similar to above, but for use with crystal or high impedance dynamic microphone. 977181. NET. $149.00

New! MORROW 5BR 5-BAND CONVERTER

High gain superheterodyne tuner for use with auto radio for the reception of 10, 15, 20, 40, and 75 meters. Features RF amplifiers and mixers to improve image rejection ratio. Calibration accuracy, better than 1%. 1525 kc output. Has 1 microvolt sensitivity on all bands. 3 gang tuning condenser with tuning ratio of 20:1. Powered by receiver—requires 6 volts and 100 volts DC at 16 ma. Size: 4 x 9½ x 8½ ins. 5 lbs. 977516. NET. $74.95

MASTER MOBILE ANTENNAS AND MOUNTS

Fig. A. All-band Antenna. Rugged and versatile antenna for operation on all Amateur bands from 10 through 80 meters. Heavily chrome-plated for beauty and durability. Center-loaded for maximum efficiency. Supplied complete with coil for 20, 40 or 75 meters. Operates on 10 meters by shorting out coil. Easily installed—all fins on any mount with 3/4" SAE female threads. Highest quality workmanship and materials. Coils are easily interchangeable. Overall length, 8', 10'. Less mount. Shpg. wt. 3 lbs. 92F300. With 20 meter coil. B 92F301. With 40 meter coil. 92F302. With 75 meter coil. NET EACH. $8.58

Fig. B. Whip Antenna. Finest stainless steel whips for maximum flexibility and strength. 3/8" threaded studs fit all mounts. Shipping weight, 3 lbs. 92F305. Model 100-905. 99". NET. $5.10 92F307. Model 100-906. 96". NET. $5.15

Model 118 Coaxial Kit. Converts all bodv mounts above to coax input. Provides an excellent match for 1/2 ohm coax line without the need for supplement matching. Shpg. wt. 1 lb. 92F320. NET. $98c

MASTER MOBILE MOUNTS

Sturdy mobile mounts for all types of installations. Available for body or bumper mounting with straight or double tapered springs. All are tapped for 3/8" antenna or extension studs. Swivel base types are excellent for cowl mounting. With hardware, Wt., 3 lbs. 92F322. Fig. C. Model 132XC. Heavy duty body mount with coax fitting for whip antennas. Has adjustable split ball swivel. Built-in coax connector. NET. $7.65

92F316. Fig. D. Model 140X. As above but with extra heavy duty spring. NET. $7.50

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*Spiral bound, 4" x 6"......30¢
USA Proper, 5¢ elsewhere

If you prefer more detailed station records, the ARRL Log Book with ruled 8½ x 11 sheets (also spiral bound to lie flat when open), will make record-keeping a pleasure. Useful also for portable or mobile as well as fixed station operation!............50¢
USA Proper, 6¢ elsewhere

These are available in loose-leaf form (punched for 3-ring binders), 100 sheets.............75¢

Available at Your Dealer

The
American Radio Relay League, Inc.
WEST HARTFORD 7, CONNECTICUT

Single-Package Mobile
(Continued from page 87)
tenna and mixer grid-coil tuning cores for maximum output. Next, rotate the gang so that it is at minimum capacitance and set the signal source to approximately 30.2 Mc. Adjust the tubular trimmers C39 and C37 for maximum output. This procedure should be repeated a second time for best results. Alternatively, a signal may be used at about 28 Mc. and both tuning cores and trimmers adjusted for maximum output at this frequency. Since the range is small, the tracking error is not likely to be excessive. Adjust the tuning core of the converter plate coil, L8, for maximum output when receiving a weak signal.

It may be convenient to use a small 250-volt power supply in place of the auto-receiver supply when checking the unit on the bench, since a 6-volt storage battery for the auto receiver may not be readily available. The switching relay will not operate when a 63-volt a.c. supply is used. However, the supply lead may alternately be connected to converter or transmitter, depending on which is being tested.

Transmitter Adjustment
We may now tune up the transmitter. First, connect a low-range d.c. voltmeter or milliammeter between the doubler grid test point (Pin 5, J4) and ground. (The negative meter terminal is connected to the test point.) Adjust the tuning core of the oscillator tank coil, L9, for maximum voltage indication. Move the negative terminal of the meter to the test point corresponding to the grid circuit of the 6AQ5 (Pin 6, J4). Adjust the tuning core of the doubler tank coil, L9, for maximum output. Disconnect the plate and screen voltages of the 6AQ5. Couple a sensitive resonance indicator to the final-amplifier tank coil. A good indicator can be made by connecting a 1N34 crystal in series with the coupling loop and a d.c. milliammeter with a 1-ma. scale. Using the resonance indicator, adjust the 75-mufd. tank tuning capacitor, C12, for resonance. Readjust L9 for maximum output; adjust the compression neutralization trimmer, C6, for minimum output. Again, readjust L9, and also the tank tuning capacitor, for maximum output, and the neutralizing trimmer for minimum or zero. The final amplifier is now neutralized.

Reconnect plate and screen supplies and connect a 56-inch length of wire to the antenna output terminal, J9. Connect a 100-ma. meter across test points C and D. Adjust the 75-mufd. tank capacitor, C12, for minimum current and then adjust the antenna tuning capacitor, C13, until the plate current increases to about 35 to 40 ma. Continue alternately adjusting C13 for minimum current and C14 for the desired input power until the plate-current dip as the tank capacitor is adjusted becomes small. The transmitter is approximately in adjustment. As a matter of interest, the actual power output of the unit was measured when using approximately a 240-volt
TERMINAL LEADS IN MOBILE EQUIPMENT
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Everything for the Car and Home Base!

MODERN MOBILE MIKES
by ELECTRO-VOICE

All feature high speech intelligibility, 16 Watt output, press-to-talk switch for operating relay, and handy mounting bracket.

208—Low cost, 8, 6, 4, 2 watt output, noise-canceling type. 9.70
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207—Three 8-Ohm output, with Differential feature. 20.28
600—One of the best, Dynamic choice of high or low impedance. 22.22
602—Like 600-D, but with Differential feature. 26.46

TECRAFT
Crystal Controlled TCF-1M CONVERTER

Low noise, 1 microvolt gives 20 db quieting, high sensitivity, 0.1 microvolt provides a signal 6 dB over noise level. The unit offers protection for major power sources. Supply power of 150 to 250 volts required.

CV=115 Volts AC 42.50
CV-10—11 & 11 Meters 37.50

FOR THE SHACK

Hallcrafters HT-20 transmitter, 100 watts, all wave band. Continuous coverage from 1.7 Mc. to 30 Mc, with full band switching. Choice of 10 crystals, Less microphone and crystals. 449.50

COMMUNICATIONS RECEIVERS

NATIONAL SW-125 49.50
NATIONAL NC-125 149.50
NATIONAL NC-1830 365.00
NATIONAL HRO-Sixty 485.50
HALLCRAFTERS-R-149 119.50
HALLCRAFTERS-S-40B 99.50
HALLCRAFTERS-S-50A 99.50
HALLCRAFTERS-S-71 224.50
HALLCRAFTERS-S-81 48.50
HALLCRAFTERS-S-91 99.50
HAMMURAUD-HO-1400 264.50

ELMAC A-54 TRANSMITTER

A-54 is an excellent mobile or fixed station transmitter. Only 7% x 7/4 x 1 1/2", will tuck away anywhere by an extra 90 watts output. Handswitching provides 10, 11, 20, 40, 70 and 80 meters. VFO-Xtal selective switch provides. A-54—Carbon microphone input 139.00
A-54—Dynamic or Crystal input 169.00
PSA-500—115 VAC power supply 39.50

GONSET "COMMANDER"

Powerful mobile 35-50 watt transmitter
up to 1.7 to 54 Mc.
Not a kit. With mic. 250.00

GONSET VFO for Commander 29.50

New SONAR
SONAR-120 Multi-Band XMTX

A compact TVI-suppress 10, 11, 15, 20, 40, 70 and 80 meter all-purpose transmitter measuring only 8x2x5/8, packing 100 watts phone on 12 meters, 75 watts on broadcast. Suitable for mobile or fixed station with selection of power supply options.

SRT-120—With tubes, less power supply 199.50
SRT-120—With tubes, full power supply 279.50
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SRT-120-P—the SRT-120 and PS-501 in single handsome cabinet. 279.50
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All other SONAR products in stock.

ELMAC PMR-6-A

6-Band Receiver
Elmac has designed this receiver to be the finest possible in its class with regard to cost, dual conversion, ten tuned circuits, six bands covering the amateur bands from 10 meters to broadcast, band less than 1 microvolt to produce 3/4 watts audio output, effective noise filter, and many, many other features.
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HARVEY-VELLS

VFO now available for your BANDMASTER Transmitter. High and low Clap type 6AG7 voltage regulated oscillator for all bands—10, 11, 15, 20, 40, and 75 meters. May also be used with other transmitters. 75.25

ROBERT DOLLAR
Model 222

New TWO METER quality mobile transmitter. With tubes, less crystal, mike and power supply. 225.00
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FOR HOME BASE: KRECO ANTENNAS

Features low angle of radiation; low standing wave ratio; solid brass for high weather resistance, all antennas threaded to fit brass pipe, rigidized 3/4" pipe available anywhere in lengths up to 21 feet, mounts as easily as a TV mast; absolutely no compromise with quality; no dang ling feedline, cable enclosed in pipe mast.

CO-AX Antenna for RG-11 or 59/U Cable
CO-2 meters 14.95
CO-2 meters 150-170 Mc 19.95
CO-6 meters 19.95
CO-10 meters 29.50

Antennas cut for middle of band unless otherwise specified for the dope and quotations on beams, multi-element vertical or horizontal polarized hi-fi arrays.

TERMINAL RADIO CORP.

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supply. The power was measured in a noninductive resistor using a thermo-milliammeter. With normal loading, the power output was approximately 4.5 watts.

Before installation, it may be wise to check the modulation and to listen to the signal on a communications receiver. If things are normal the modulation should be quite linear and the quality good.

The photographs show two small mounting brackets near the front of the chassis. These brackets provide a simple means of fastening the chassis beneath the dash. A single screw on the rear of the chassis provides means for rear support.

When tuning up in the car, a small field-strength meter, consisting of a 1N34 crystal in series with a tuned circuit and a microammeter, will be very valuable.

A good noise limiter is, of course, an essential addition to the receiver as with any mobile or fixed-station installation operating in this frequency range.

This little rig has given very gratifying results and it is hoped that others will find similar satisfaction with it.

The best DX so far is a W4 at about 1000 miles, but just wait till the band gets hot again!

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TVI Complaints

(Continued from page 51)

his TV set. A TV set operating satisfactorily in your own house with the transmitter is very, very good evidence. Additional evidence may be displayed in most cases by temporarily installing a high-pass filter in the complainant's antenna lead-in at the TV set terminals. If this reduces the interference any at all, it is a good indication that if it were properly installed as close to the TV tuner input as possible (inside the set), all of the interference might disappear. From this point, the complainant must assume the lead and have his serviceman (preferably one working under the dealer who sold the TV set) install the filter as you suggest. Once the test is made with your filter, you should remove it for your next demonstration. Inform the complainant that the dealer has sold him a TV set without all the necessary parts. Tell him it is a job for his dealer and/or manufacturer to correct. Encourage him to demand satisfaction from his dealer.

3) From this point on, you can gain a little more of the complainant's confidence by setting a deadline beyond which you intend to operate at will. Give him a reasonable time to have something done and agree in the meantime to put your transmitter on the air for tests. Make sure you begin your operations at will on the date you have

(Continued on page 120)
STEINBERGS LOOK
IMMEDIATE DELIVERY
Single Sideband Exciter SS-75

Check these specifications and you'll see why the SS-75 is now the one piece of equipment that places all the advantages of single sideband at your finger tips:

★ Built-in stable VFO's, with voltage regulation.
★ Carrier injection to receiver antenna terminals...tune in SSSC signals the same as AM, no other gadgets necessary.
★ Illuminated VFO tuning dial provides 31 inches of bandspread 3800-4000 KC in 4 bands, with 5 to 1 gear reduction.
★ Built-in voice control and receiver disabling circuit. Also provides for break-in CW operation.
★ Specially designed crystal filter network for maximum stability and reliability.
★ Carrier injection to transmitter available for working single sideband WITH CARRIER, for tune-up adjustments, or CW.
★ 10 watts output, with additional 807 socket for up to 100 watt operation with external power supply.
★ Handsome grey crinkle cabinet, chrome trimmed, 20" x 12" x 12". Complete with 12 tubes, including one 807, operating manual.......................................................$245.00

Frequency conversion mixer for 40-20 meters, rack mtg. 3¼" x 19" less power supply..........................75.00

WRIGHT T-R SWITCH
For break-in operation on CW, AM, or SSSC. Use one antenna for transmitting and receiving. It's instantaneous! No moving parts, no power needed to operate. Coax fitting for connections to feeder and receiver. Will handle 1 Kw. With 75 meter plug-in coil...$9.95
Extra coils $1.75 per band

TUBE SOCKETS
For 4-prong tubes 866, 809, 811, 100th etc. Heavy phosphor bronze side wiping contacts, metal shell, white porcelain base. Regular list $1.50, while they last...........45¢

Triple 8 mfd. 450 V. electrolytic upright condenser, separate negatives, all leads insulated from can. Nationally known mfr. Reg. dealer net $2.58......ONLY 59¢
10 for $5.00

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

Minimum order $2.00.
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ELMAC-A54 Under-dash Mobile Xmtr.

VFO or Crystal control. Direct-reading VFO on all bands–75, 40, 20, 10. Plate modulation. Completely band-switching tone or CW. 50 Watts max. input. Power required: 300-500 V.D.C. at 250 ma., 6.3 V AC or DC at 4.5A. Uses 3-6AG5, 6AR5, 6C4, 12AU7, 2666G, 807 (Included). Only 7⅝" x 7½" x 12"; 14½ lbs.
For carbon mike input....................................................$139.00
For Dynamic or crystal mike............................149.00
Power Supply, 110 Volt AC........................................39.50
ELECTRO-VOICE 210 Mobile Carbon Mike...........17.10
ELECTRO-VOICE 600D Mobile Dynamic Mike.........23.10

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

Triple 8 mfd. 500 working volt D.C., all-filled condenser, common negative, solder terminals, hermetically sealed. 5" x 3¼" x 7¼"........................$1.95

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

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set. Under no conditions should you let him scare you off the air and, under no conditions should you enter additional arguments with him. Keep the rig on the air and keep suggesting he take it up with his dealer and/or manufacturer.

4) As soon as you know the facts about your TV set or other TV sets having no trouble from your transmitter, you should notify the FCC office of your findings. You should follow up with the results of the tests you have made with the high-pass filter. Give name and address of complainant, make and model of TV set involved, and as much other factual information as possible in each individual case. This is necessary because the complainant will usually check with FCC before he challenges his dealer.

You are wasting your time and that of the complainant if you agree to assume the responsibility of forcing the dealer or manufacturer's representative to get on the job. Remember, no one can get this done as quickly as the dealer's customer.

After you have convinced a few of your neighbors and a satisfactory solution has been reached for them, they will begin spreading the word and it will not be necessary for you to go through all the details with all the remaining complainants. The atmosphere will clear rapidly and peace will break out all over again. You will have done much more for all concerned by this procedure than you could have done by fixing, free of charge, every TV set in your community.

Beware again of assuming any responsibility to "make the dealer or manufacturer's representative do anything." The actions herein recommended will cause their customers to do a much better job of this than you can do. You cannot "make" the dealer or manufacturer's representative do anything anyway. The recommended procedure works! You cannot escape the responsibility and obligation of proclaiming and demonstrating the truth.

How's DX?

(Continued from page 68)

gang of which he was a member. ------ W2TXB reports the Rochester DX Association membership enthusiastic participants in this year's DX contest. W2PBA was top club man with 84,000 hard-earned points in the c.w. section. W2TXB heard FR7ZA for a would-be new one that got away but C6AAB puts AI's WACE effort in the bag. ------- There are 62,224 DX stations listed in WTRD's Summer, 1963, Call Book. Anybody worked 'em all? ------ KL7ZG (W0VSN) erected a 4-wavelength Yagi to help his 700-watt keep a longstanding schedule with G3RSGN on 14 M. ------ DXCC members W9S LI NN and GDI are engineers for b/c station WGN in Chietaro. ------ V83BY (ex-Y520GP) has been hamming in the Yukon for some twenty years. He has two rigs winding up with 4D3Z and 829B finals respectively.

After recording DXCC memberships for VR2CG and YN4CB, W1WPO established that DXCC certificates have now been awarded to amateurs in 101 countries. DXCC is now DXCC!
June—Now for that Skywire
See UNCLE DAVE—He has the Makings

Collins 32V-3 Transmitter
$775

VFO Controlled. Bandswitching. Gangedtuned. Covers 80, 40, 20, 15, 11 and 10 meters; 150 watts CW; 120 watts phone; entire RF section enclosed in metal shield. (In Stock)

COLLINS 75A-3 RECEIVER
With Mechanical Filter and Speaker
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ELDICO TR-75-TV TRANSMITTER KIT

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10 and 20
Complete Stock of ROTATING EQUIPMENT
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Whips and Mounts

NATIONAL HRO SIXTY
$483.50
Matching Speaker $14.95

Here's the latest and the greatest of the famous National HRO series! Features dual-conversion plus 12 permeability-tuned IF circuits!

NC 183-D (Less Speaker) ....................... $369.50
NC 125 (Less Speaker) ....................... $149.50
SW 54 (Complete) ....................... $49.95

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Kit, complete with tubes—$279.50
less crystal, key and mike
(In Stock)
Wired and Tested ....................... $334.50

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24-Hour Electric "Ham" Clock with GATT Indicator $11.95
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SONAR SRT 120 TRANSMITTER
All bands 120 watts CW, 100 watts phone.
Sleeves in six bands—TVI suppressed, 18 tubes.

Sonar MR-3
Sonar SR-9
Sonar MB-26

Loss Power Supply $198.50

SONAR MR-3
SONAR SR-9
SONAR MB-26

(Complete Mobile Box Receiver)

$89.95
$72.45
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Type 105-B Micrometer Frequency Meter. Measures center frequency, any number nearby transmitters, CW, AM, FM, 0.1 to 175 MC. Meets FCC mobile specs. Weights 13 lbs. Price $220.00.


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Mfg. Division, Bradenton, Florida
Please send more dope on the 105-B and 205.

Name
Address
City . State

YL News & Views
(Continued from page 58)

100 per cent. Stations who do not receive her QSLs within a reasonable length of time after QSOs should write to Lucia and she will be happy to oblige with other cards. When not on duty as a radio operator at Beiraeradio (aeronautical station), she QSLs daily with American stations from 1900 to 2400 GCT on 20 w.e.f. and from 0300 to 0130 on 40 w.e.f.

On July 3rd women of the famed Ninety-Nine Club will take off from Lawson, Missouri, in their Seventh Annual Women’s Transcontinental Air Race. For the first time last year, amateurs aided the flyers throughout the race period. Again this year under the coordination of Viola Gumpman, W2JEX, amateurs (YIAs and QSOs) at key points along the flight route will assist. See QST, Sept. and Oct., 1952, pp. 45 and 40 respectively, for information on last year’s activities.

The W8 YLRL District Chairman, Inga Hoffman, W8ROY, is one of only a handful of YIAs in North Dakota. Inga would like to see more girls get their licenses not only in her state but also in the entire tenth calling area. She holds BCC, WAS, MM, and Public Service Certificates.

Field Day Rules
(Continued from page 40)

station in Class A, B or C. Cross-band contacts are not allowed. Contacts by mobile stations may be made in motion or from any location(s). A station may be worked more than once only if the additional contacts are made on different bands.

9. Field Day Message: Field Day Message is one originated by a Class A, B or C station and addressed to the SEC or SCM (see address in QST, p. 6) stating the number of operators, the field location, and the number of AEC members at the Field Day station. Only one Field Day Message may be originated.

10. Scoring: Points: Each valid contact counts 1 point.
Credit for handling messages may be obtained only as follows: 25 points for originating one Field Day message to SEC or SCM. In addition, each Field Day Message received for relay will score 1 point when received by radio and 1 point when sent onward by radio. Any FD message can be handled (originated or relayed) only once for credit. There will be a deduction of 10 points for omission of handling data or for defects in form. Copies of all messages originated and relayed must accompany Field Day reports.

Multipliers:
Power: Output-stage plate input under 30 watts: 3. Output-stage plate input over 30 and under 100 watts: 2. Output-stage plate input over 100 and under 1000 watts: 1.

Independence-of-Mains: All radio equipment independent of commercial power sources: 3. All radio equipment not independent of commercial power: 1.

Battery Power (applies to Class B and C only): 1.5. The battery capacity or size shall in all cases be adequate to permit one hour’s continuous operation of the station. Charging batteries from commercial mains while batteries are connected to transmitter or receiver voids the “independence-of-mains” and “battery power” multipliers.

Multipliers do not apply to Class D and E entries.

Final Score: The final score equals the total “points” multiplied by the “power multiplier” multiplied by the “independence-of-mains” multiplier (multiplied by the “battery power” multiplier, if applicable). Where different multipliers apply during the Field Day period, points are multiplied by the multiplier in effect at the time the points were earned.

(Continued on page 184)
Mobile Antennas
For All Regular and Civil Defense Use

Car-top, Whip, Center-Loaded, Marine, Zone and Sector Control Center... a complete line of Mobile Antennas to meet every need.

PREMAX PRODUCTS
DIVISION CHISHOLM-RYDER CO., INC.
5302 HIGHLAND AVE., NIAGARA FALLS, N. Y.

Special 75, 40, 20, 11, 10, 6 and 2-meter Mo-
Kobilies for Civil Defense and Amateur insta-
lations.

Ground Plane Antenna used in Civil Defense Zone and Sector Installations.

At the left, one-hole-mounting car-top, and at the right emergency suction-clamp car-top antenna for 100 to 250 mc.

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COMMUNICATIONS and
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PHILCO TECHREP DIVISION
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...to men who are qualified by experience or training in the design, maintenance and instruction of Communications, Radar and Sonar Equipment.

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...are more than "sales talk" at Philco. Demands for our electronics installation and service work throughout the entire world have been coming to us with increasing regularity since 1941. This is YOUR best assurance of a future with us.

PLUS — OF COURSE
...the fact that in Civilian Radio and Television, PHILCO has led the Industry for 20 years.

COMPENSATION IS TOPS!
Salary, bonus, subsistence up to $6,500 stateside and $7,500 foreign; PLUS, hospitalization, group insurance, profit sharing, retirement benefits, merit and faithful service salary increases and paid vacations.

TRAINING PROVIDED
Philco provides all necessary refresher courses and new courses, where required on new equipment, to assure your qualifications before assignment. Pay while training.

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$7,000
Per Year, Or
BETTER
11. Club Aggregate-Mobile Scores: Entries under Class C may be combined to form a "Club Aggregate-Mobile Score. The club name must be noted on the individual report, and the club secretary must submit a claimed aggregate score. Credits to the extent supported by the reports submitted to ARRL will be allowed. Only bona fide members of the club, residing in the club territory, may contribute to the aggregate-mobile club listing.

12. Reporting: Mail reports or enter logs on or before July 15th. Reports must show bands used, dates and contact times, calls of stations worked, signal reports received and sent, and ARRL sections or locations of stations worked. Reports must also show power inputs and sources of power, number of transmitters in simultaneous operation, location of station, number of persons participating, and score computations.

Sample Score
Assume a station operating in Class B with independent power and less than 30 watts input. If 27 valid contacts are made, 1 MD message originated, and 2 FD messages relayed, the score would be computed as follows:

\[ 27 + 25 + 4 + 56 \times 3 \times (\text{power below 30 watts}) \times 3 \times (\text{independent power}) = \text{claimed score of 501. If the station were using battery power, the claimed score would be } 1.5 \times 501 = 756 \text{ points.} \]

V.H.F. QSO Party

(Continued from page 69)

... to pass FCC amateur exams

LEARN CODE and Theory

$6.95 up

EASY,

FAST HOME STUDY!

PASS COMMERCIAL and AMATEUR CODE EXAMS, AMATEUR THEORY EXAMS, FOR YOUR FCC LICENSES!

4 AMECO Courses Available:
No. 1 — NOVICE CODE COURSE. You get and keep 10 recordings (alphabet through 8 W.P.M.). Includes typical FCC type wide variations. Free instruction book on learning how to send and receive code the simplest, fastest way; plus charts to check your receiving accuracy; plus an album, all for the low price of only $7.95

No. 2 — SENIOR CODE COURSE. You get and keep everythin given in the Novice Course except that you get 22 recordings (alphabet through 18 W.P.M.), plus typical FCC type wide variation. Free instruction book, plus a code book for General Class and 2nd class commercial telegraph licenses. All this for only $12.95

No. 3 — COMPLETE RADIO THEORY COURSE. A complete, streamlined home study course in radio covering the Novice, Technician, conditional and general classes — all under one cover — with nearly two hundred typical FCC questions and problems for license exam. No technical background required. Sold at all leading dealers anywhere. FREE! FREE! COMPLETE course for only $6.95

No. 4 — NEW ADVANCED COURSE. Prepares Novice operators for the amateur general class and second class commercial license tests. Contains 12 recordings (12 through 18 W.P.M.) PLUS the complete code book PLUS pistol type code examinations for general and commercial testing ALL for only $6.95

Dealer Inquiries Invited!
FREE LITERATURE AVAILABLE

SOLD AT ALL LEADING DEALERS EVERYWHERE OR WRITE DIRECT TO DEPT. 99

AMERICAN ELECTRONICS CO.
1203 Bryant Ave., New York 59, N.Y.
with the new Gonset "TWIN-SIX" 2 METER BEAM

Now... the "TWIN SIX"... a rugged, quickly assembled dual Yagi array which provides well over 10 dB gain and front-to-back ratio throughout the two meter band. (Refer to a matched, resonant half-wave dipole.)

The Twin-Six is designed for use with 32 ohm line; extremely low standing wave ratio and electrical symmetry being assured by the use of special balun and matching networks. A spacing of approximately 3/4 wavelength between bays has been fixed optimum from the standpoint of gain and reduction of spurious lobes when oriented for vertical polarization. This same spacing also provides optimum gain when horizontal polarization is utilized.

This array is largely preassembled and is designed for use with typical TV antenna rotors. STANDARD MODEL 1550 attaches to your rotating mast section. (up to 1/4" O.D.) for horizontal polarization, or to a 5 foot cross-bay "T" section (not supplied) for vertical polarization. DE LUXE MODEL 1550-V includes brazed, tubular steel "T" assembly. (5 foot boom and mast section) for vertical polarization.

Both models are complete with existing bays, boom and mast shield junction box ready to attach to 32 ohm coax. Instructions are furnished describing simple modification to permit use of GONSET 450 ohm open wire line, when desired. Where runs exceed 100 feet.

MODEL 1550, STANDARD TWIN SIX. (For horizontal or vertical use) includes: (1) Model 1558, (2) Model 1559's. Amateur net. 29.50

MODEL 1550-V, DE LUXE VERTICAL TWIN SIX. Includes: (1) Model 1557, (1) Model 1558, (2) Model 1559's. Amateur net. 34.50

Model 1558 Matching busses for (2) Model 1559's... net 7.50
Model 1557, Single, 8-element Yagi... net 11.00
Model 1557, Brass, tubular steel assembly... net 5.00

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A completely self-contained 2 meter station in a single, highly compact unit. Power supply is arranged for both 6V, DC and 110V, AC operation to provide utmost flexibility and the ability to adequately handle casual or emergency communications. Receiver is a broad band superhet, transmitter is crystal controlled for maximum stability. Self-contained speaker and audio channel that may be utilized as an excellent emergency PA system. Covers 2 meter band and adjacent CAP frequencies. The top unit in the field for amateur or Civil Defense applications.

AMATEUR NET. 199.50

GONSET CO. 801 SOUTH MAIN STREET BURBANK, CALIFORNIA

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SPECIFICATIONS MIL-T-27 & ANE-19 AND COMMERCIAL TYPES

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Self-contained and A.C. operated with electronically regulated supply, 1 megohm to 2 million megohms.

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Incremental Inductance Bridge
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NO. 1170
D.C. Supply
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Null Detector and Vacuum Tube Voltmeter

NO. 1010
COMPARISON BRIDGE
Self-contained and A.C. operated. For rapid and accurate test of Resistors, Condensers and Inductors.

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Null Detector Amplifier
NO. 1040
A.C.—V.T. Voltmeter
NO. 1250 Decade Condenser
NO. 1410
Harmonic Distortion Meter and... Decade Inductors

SND FOR COMPLETE CATALOG DESCRIBING ALL FREED INSTRUMENTS AND TRANSFORMERS

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1703 WEIRFIELD ST., BROOKLYN (RIDGEWOOD) 27, N. Y.
XTALS FOR ALL PURPOSES!

LOW FREQUENCIES

<table>
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<tr>
<th>Type</th>
<th>Description</th>
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<tr>
<td>BC-100</td>
<td>2 banana plugs</td>
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| FT-43-14/36 | 14/36 micro-
| | sp. | 1.25 each |

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<td>314</td>
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<tr>
<td>354</td>
<td>685 785 885 985</td>
<td>1.25 each</td>
</tr>
</tbody>
</table>

Special Purchase: FM RADIO CHASSIS

- 88-105 MC, complete with 6 tubes, built-in antenna and speaker, product of Famous Radio and TV Manufacturer whose name we promise not to mention... $16.95
- Maroon plastic cabinet for above $5.95

TWO-STATION Intercom System

- Contains Master and Control Storage, 20 feet of 3 wire cable, 115 V. operation A.C. or D.C. Extra wire, 50c per ft. $17.95

NOTICE TO ALL HAMS

TRADE-IN your used communications gear on new Hillaclifiers, National, RF, Hammond, Sonar, Elmac, Contest, etc., equipment. Write for FREE ESTIMATE attention "Pick" - W3PQQ.

FREE QUOTATIONS

On h.f. equipments you request. All famous brands of amplifiers, tuners, converters, etc. Pick-up, speakers, etc. Just tell us how much you want to spend and we'll recommend the best matched system your budget will allow.

2) Name-of-section exchanges must be acknowledged by both operators before either may claim contact point(s). A one-way exchange, confirmed, does not count; there is no fractional breakdown of the 1-, 2-, or 3-point units.
3) Fixed-, portable- or mobile-station operation under one call, from one location only, is permitted.
4) A "contestant" is a single operator working without the help of any other person. Results may be presented with names of all participating persons for listing, but only single-operator scores will be considered for certificates.
5) Scoring: 1 point for completed two-way section exchanges on 50 or 144 Mc.; 2 points for such exchanges on 220 or 420 Mc.; 3 points for such exchanges on the higher v.h.f. bands. The sum of these you will note is determined by the number of different ARRL sections worked per band; i.e., those with which at least one point has been earned.
6) A contact per band may be counted for each station worked. Example: W9PK (Ill.) works W9UJW (Wis.) on 50, 144 and 220 Mc., for complete exchanges. This gives W9PK 4 points (1 + 1 + 2) and also 2 section-multiplier credits. (If W9PK contacts more Wisconsin stations on these bands they do not add to his section multiplier but they do pay off in additional exchange points.)
7) Each section multiplier requires completed exchanges with at least one station. The same station can provide another multiplier point only when contacted on a new v.h.f. band.

One certificate award, endorsed as appropriate, will be made to recognize the over-all section winner, the Novice winner, and the Technician winner in each ARRL section. Awards will be limited to one per entrant per section, as earned. It will be necessary for each Technician licensee to indicate his call of license in order to qualify for the Technician award. Award Committee decisions will be final.

All reports must be postmarked no later than June 22, 1955, to be entered for awards. Send copies of this article for the correct form, or a message to Headquarters will bring a typographically blanked for your contest report.

World Above 50 Mc.

How Many States?

For some months now there's been no major change in our states-worked listings. Not much new DX is worked in the colder months, but the big season is getting under way as this issue goes to press. To be of real interest and value, the 50- and 144-Mc., states-worked boxes must be accurate and up to date. How about checking up on your listing right now? If it complete and correct? If not, let's have the latest information on the stations you've worked on 50 Mc., and the states, call areas and best DX worked on 144.

Obviously, we can't list everyone, and with the possibilities varying somewhat with geographical location, the same method for determining whether a call will be listed cannot be applied to all call areas. What we try to do is to list the outstanding and more active men in each area. If you have a spectacular record on 6 or 2, or both, send it in. And if your listing is outdated, better bring it up to date, or your space may be taken over by someone who is up to date.

Note that there are quite a few 47s in the 50-Mc. box. Some of these undoubtedly will catch that elusive Number 48 this summer. We remind them that there is a special hand-lettered serial-numbered 50-Mc. WAS certificate waiting for them. If you knock off the last one this year, send us your 48 50-Mc. QSLs for examination and your certificate will be on the way. It's a rarely won and highly prized award.
slender design
elegant response
new low cost

The New TURNER ADA 95D
DYNAMIC MICROPHONE

Here's the microphone that amateur operators everywhere have been waiting for... a slim, modern dynamic priced within your budget! Maximum sensitivity to voice is achieved through Alnico V magnets and moving coils. Frequency response, 70 to 10,000 cps; output level, -58 db; standard 5/8"-27 coupler swings microphone in 60° arc; satin chrome finish; 20 ft. removable cable set; choice of 50, 200, 500 ohms or high impedance. Switch models also available. Write for complete information.

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Microphones by TURNER

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Export: Ad. Aurora, Inc., 89 Broad Street, New York 4

CRYSTAL CONTROLLED
CONVERTERS
For
2, 6, 10-11, 15 or 20 Meters

MODEL
RC-1B
$45.00

Complete, with power supply, crystal and tubes!

Converter for any one band, complete with built-in power supply, crystal, tubes, output cable and input fitting for 52, 75, or 300 ohm line, $45. Now available at leading distributors. Specify band and input impedance when ordering.

Crystal Converter for Collins 75A2 $65.00
For further information, write Dept. Q-4
SUMMIT ELECTRONICS LABORATORIES, INC.
393 No. Pearl Street Albany, New York

QUADRAPOLE
2 MTR ANTENNA

Designed by W&NGA — $7.95

- 2 MQ-P ——— $7.95
- 4E2 ——— $8.75
- 4E2 2 MTR-4 ELEMENT YAGI
- 8 E2 ——— $20.50
- 8 E2 2 MTR—TWO 4 EL. YAGI
- PD 3 E 10 ——— $24.95
- 3 E 10 3 EL. 10 MTR/T-MATCH
- 3 E 10 F $42.40
- 3 E 10 T $41.80
- 3 E 15T $59.00
- 3 E 15T 3 EL. 15 MTR/T-MATCH
- 2 E 20T $47.95
- 2 E 20T 2 EL. 20 MTR/T-MATCH
- 6 E 10-20T $98.95
- 6 E 10-20T 3 EL. 10 MTR/3 EL. 20 MTR STACKED/2 T-MATCHES

Write Dept. Q-6 for Catalogue
MULTI-BAND OPERATION

SIDEBAND
8 TIMES THE VOICE POWER
HARMONIC TVI VIRTUALLY ELIMINATED

MULTIPHASE EXCITER MODEL 10A (upper left). Approx. 10 watts peak output 160 to 20 meters, somewhat less on 10-15 meters. Will drive beam power retrofits to more than 1 kW input from 20 to 160 meters. SWITCHABLE SSB, with or without carrier, double sideband AM, PM, break-in CW, VOICE OPERATED BREAK-IN and receiver disabling. It's ALL BUILT-IN to this truly versatile exciter. Built-in power supply also furnishes blocking bias for linear amplifier and voltage for optional VFO. With internal slate and coils for one band, wired and tested $199.50. Complete kit $112.50. Extra coil sets for $3.45 per band.

NOVICES — ATTENTION
Plug your 40 or 80 meter slats into the MULTIPHASE EXCITER for break-in CW operation. Later it's an excellent fone exciter, for use with your General Class ticket. No expensive high-level modulator required.

SIDE BAND SLICER
MODEL A RECEIVER ADAPTER (upper right). Improves any receiver, SWITCHABLE upper and lower sideband reception of SSB, AM, PM and CW. Cuts interference and heterodyne in half. Eliminates distortion caused by selective fading. Works into any receiver having 450-500 EC IF. Built-in power supply. Use a Model A Slicer — notice the "holes" in even our most crowded bands and hear signals you have never heard before. Wired and tested $74.90. Complete kit $49.50.

PS-1 Plug-in preselected 40th phase shift network and socket available separately for use with GR Signal Slicer and SSB Jr. $7.95 postpaid.

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Central Electronics, Inc.
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For Selectivity
Never Before Achieved In a Communications Receiver

Dr. Qvak

The Collins 75A-3
With Mechanical Filter

Dr. Qvak (Willard Wilson — W3DQ) also has Collins transmitters, National, Hallicrafters, Johnson, Elmac, etc. all for prompt delivery, and on the easiest of terms. Write today.

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408 Delaware Ave., Wilmington, Delaware
Est. 1920
Willard S. Wilson, President
Member OOTC — VWOA — QCWA

U. S. N. R.

Louisiana Radio Clubs

The Central Louisiana Radio Club meets at the Naval Reserve Training Center, Alexandria, La., (K5NAG) on the first and third Wednesdays of each month. The club membership includes 10 licensed amateurs. Some of the activities sponsored by the club are hidden-transmitter hunts and assistance in eliminating local TVI. The president of the club is Charles R. Kammock, RM1, USNR, stationkeeper of the Naval Reserve Training Center at Alexandria.

The Greater New Orleans Amateur Radio Club meets on the first Friday and third Sunday of each month at the Naval Reserve Training Center, New Orleans, La. (K5NAW). Organized in November, 1962, the club has been instrumental in the formation of a TVI committee consisting of local electronics dealers, technicians, and club members. The club conducts code and theory classes three nights a week at Loyola University. Over 25 persons are at present enrolled in these classes. Naval Reservist club members: W5S ECI:X SPL SPZ and TZV.

Emergency

The Naval Reserve Training Center, Dallas, Texas, (K5NRD) mobile radio station receives frequent requests to provide communications during emergencies. Recently the station furnished communications for a local railroad during a three-day ice storm and materially assisted in keeping the railroad operating.

Message Service

The Naval Reserve Training Center, Laurel, Miss., (K5NAK), assisted by local amateurs and W9FCF at Wausau, Wis., recently teamed up to provide a daily message service via amateur radio. Laurel high school students, visiting Wausau as part of a student exchange program, were able to exchange messages with home. Operators at K5NAK were W5s ECT EUS OAE and NRU. W5ECT assisted in some schedules from his home station. W9FCF operated from the Wausau Valley Radio Club quarters part of the time. The same service will be provided when the Wausau students visit Laurel.

Reservist QSO Parties

A group of amateurs on active duty with the Naval Reserve Electronics program conducts daily and weekly QSO parties. One group operates Monday through Friday at 7 p.m. EST on 3515 kc. The other group operates once a week at 10 p.m. EST on 7110 kc. Among the actives are: W1s BWR JBS NK/4 SGQ, W3s GUF/4 TDH, W4s CE/2 LW RPI SSN, W5s HNW KJA NEL PLQ SPZ, K6s DL and DY. Active duty Reservists are invited to join these parties.
You will benefit from high wages, a modern, air-conditioned plant, paid vacations and holidays, group insurance and a good chance for advancement.

Housing immediately available in the beautiful suburban and county areas that surround the Bendix Radio plant.

NOTE THE NEW FEATURES OF THE

DOW CO-AX RELAY

FOR 52 OR 72 OHM LINE
Type 'N' or UHF Conn.
Capacity 1000 watts

FEATURES:

1. AC types entirely free of hum and are guaranteed equally as silent as DC.
2. Causes negligible change in SWR up to 100 MG.
3. Now available with type 'N' or UHF connectors.
4. Magnet coils entirely shielded.
5. Special type receiver connector automatically grounds receiver contact inside of connector during transmit and protects receiver from RF (Optional).
6. External SPDT switch (Optional).
7. Tongue pressure on contacts both AC and DC energized or de-energized, sufficient for all types of mobile service.
8. Overall length 4½", width 3".

AC types (all voltages), Amateur net .......................$10.50
DC types (all voltages), Amateur net ..................... 9.50
Add $1.00 for SPDT switch
Add $1.00 for special type receiver connector.

See your distributor, but if he has not yet stocked Dow co-ax relays order direct from factory. Send check, money order, or will ship COD. Prices are net. FOB Warren, Minn. Dealer inquiries invited. Literature on request.

THE DOW-KEY CO., INC.
WARREN, MINNESOTA

MORE SIGNALS PER DOLLAR
From Money Invested in an Antenna

STEEL TOWERS
For Rotary Beams, FM, TV

ATTRACTIVE—NO GUY WIRES!

- 4-Post Construction for Greater Strength!
- Galvanized Steel—Will Last A Lifetime
- SAFE—Ladder to Top Platform
- COMPLETE—Ready to Assemble
- Easy to Erect or Move
- Withstands Heaviest Winds

Pay Only ½ Down!
12 EASY MONTHLY PAYMENTS
Freight Charges May be Included in Financing

VESTO CO., Inc.
20th and Clay
North Kansas City, Mo.
MARS Refile Procedure

Standardized procedure used on MARS frequencies as prescribed by the military is somewhat different than the procedure used by amateurs. In order to permit greater flexibility and at the same time reduce confusion the Chiefs, MARS, have worked out a standard conversion process whereby MARS stations may refile amateur traffic via MARS and vice versa.

Personal messages (third-party traffic) suitable for transmission via amateur circuits are originated in ARRL form. If a MARS station transmits the message via MARS, he places thereon a MARS refile heading. If the message requires relay, the relaying station will handle as military traffic if sent on a MARS circuit or will delete the refile heading entirely and transmit as an amateur message if sent on an amateur circuit. Examples follow:

Amateur to MARS

Received via Amateur
NR6 WOPDS CK9 SOUTH BEND IND 2130 MAY 5 TO JOHN ADAMS AA
324 FERNDALE AVE AA
ATLANTA GA B T
YOUR LETTER RECEIVED X WILL EXPECT YOU JUNE THIRD BT ART AR
Refiled via MARS
4404A DE WAR NR18
NM 0613ZS
FM WAR WASH DC
GRNC BT
NR6 WOPDS CK9 SOUTH BEND IND 2130 MAY 5 TO JOHN ADAMS
324 FERNDALE AVE
ATLANTA GA BT
YOUR LETTER RECEIVED X WILL EXPECT YOU JUNE THIRD BT ART AR

MARS to Amateur

Third-party messages originating at overseas MARS stations will be reoriginated as amateur messages by the U. S. MARS station introducing them into the amateur bands. Third-party messages originating at U. S. MARS stations will be refiled as amateur messages when necessary to make delivery. In such cases conversion to amateur form will be made by the MARS station introducing the message into the amateur bands.

Received via MARS
WAR DE AJSAB NR21
NM 001223Z
FM AJSAB FRENCH MOROCCO
TO MRS JOHN DOE
132 SPRING DRIVE
KANSAS CITY KANSAS
GR10 BT
PACKAGE AND LETTER RECEIVED PD LETTER FOLLOWS PD SGD JACK BT

(Continued on page 158)

GET INTO ELECTRONICS

You can enter this crowded, interesting field. Defense expansion, new developments demand trained specialists. Study all phases radio & electronics theory and practice TV, FM; broadcasting; servicing; aviation, marine, police radio. 18-month course. Graduates in demand by major companies, H. S. or equivalent required. Begin Jan., March, June, Sept. Campus life. Write for Catalog.

VALPARAISO TECHNICAL INSTITUTE
Dept. TN
Valparaiso, Ind.
MOBILE RADIO'S

THE MORROW 5BR HAS NO EQUAL!  Compare these features:

FOR OPERATING EASE—5 BANDS on 5 easy to read, accurately calibrated slide rule scales; 3.5-4.0 Mc, 7.0-7.3 Mc, 14.0-14.35 Mc, 21.0-21.45 Mc, and 28.0-28.7 Mc.  TEMPERATURE COMPENSATED CLAPP OSCILLATOR assures low drift performance.  Each Osc. coil is slug-tuned for calibration accuracy.  Car generator voltage fluctuations will not affect stability.  SINGLE POINT TUNING with high image rejection, negligible birdies or BC break-thru.  BETTER THAN 1/2 MICROVOLT SENSITIVITY by using Polystyrene coil forms. Zero-temp ceramic trimmers on all Ant., Osc. and Mixer circuits.  AVC on preselector, NO BLOCKING ON STRONG SIGNALS.  IF Amp with 4 tuned circuits.  1525 Kc output.  A VERY EFFECTIVE NOISE LIMITER.


SBR with built-in Noise Limiter, $74.95.  SBR/LN less Noise Limiter, $69.95 (Amateur Net)

SEE OR WRITE YOUR DEALER ABOUT A MORROW CONVERTER . . . TODAY!

Q-H (QUICK HEADING)

5 ELEMENT NON-ROTATING BEAM

"THE BACK YARD RHOMBIC"

10M—15M—20M KITS

CALAMAR

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EASY TO LEARN CODE

It is easy and pleasant to learn or increase speed the modern way— with an INSTRUCTOGRAPH Code Teacher. Excellent for the beginner or advanced student. A quick, practical and dependable method. Available tapes from beginner's alphabet to typical messages on all subjects. Served range 5 to 40 WPM. Always ready, no QRK, beats having someone send to you.

ENDORSED BY THOUSANDS!
The Instructograph Code Teacher literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have "acquired the code" with the Instructograph System. Write today for full particulars and convenient rental plans.

INSTRUCTOGRAPH COMPANY

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TOWERS by TRYLON

Amateur radio types • Guyed towers for FM-TV antennas • Vertical radiators • Microwave towers • Commercial communication towers • Transmission line supports, etc.

Completely fabricated by the most modern methods by 20-year tower specialists, Trylon towers offer top value for any installation—commercial or amateur. Special design and construction features assure maximum dependability.

WINDE® TURBINE COMPANY

WEST CHESTER, PA
BUY OF A LIFETIME!
TRYED AND PROVEN THE WORLD OVER

LETTEINE MODEL 240
TRANSMITTER WITH MOBILE CONNECTIONS AND A.C. POWER SUPPLY

This outstanding transmitter has been acclaimed a great performer throughout the world. It is excellent for fixed station, portable or mobile operation. Even if you have a transmitter of your own you can't afford to miss this wonderful buy, direct from our factory, ready to operate.

The 240 is a 70 to 50 watt Phone-CW rig for 160 to 10 meters, complete with (8 x 14 x 11) cabinet, self contained A.C. power supply, MOBILE connections, meter, tubes, crystal and coils for 40 meters. Tuner, A.C. rect., 807 final, 6A6 crystal, mike amp., 6N7 phase inverter, 2 6L6's mod., 304G rect, Weight 40 lbs. P.1.V. 1 1/2 months insurance included. 90-day guarantee. Price $79.95.

$25 deposit with order—balance C.O.D.
80, 20, 10 meter coils $2.91 per set. 160 meter coils $3.60.
Also for CAP, Broadcast, MARS, Maritime, State Guard, Novice.

LETTEINE RADIO MFG. CO.
62 Berkeley Street
Valley Stream, N. Y.

FEED-BACK

In reference to W60XR's article on the 14-Mc. ground-plane antenna in the March issue, Lt. John J. Dougherty, USN, W2LHB/6, points out that sloping of the ground-plane radials in the manner shown raises the feed-point impedance. Therefore, the design referenced in the footnotes on page 39 cannot be followed in this instance.

Before you wire up a portable rig according to the description of the Detroit c.d. portables that appeared in QST for February, 1953, here are two corrections on the wiring diagram, Fig. 1, page 17. Pins 3 and 6 on the audio-modulator tube are interchanged. Pin 6 is the control grid, Pin 3 the screen. The transformers, T1 and T2, are also interchanged. Using the numbers shown on the diagram, T2 is the mike transformer.

THE "ULTIMATE" C.W. RECEIVER

A scheme for reducing by three the number of tubes in the 37-ko. i.f. channel of the "Ultimate C.W. Receiver" (QST, Sept., 1952) has been reported by one of the authors, W5FKQ. Instead of using two tuned circuits in stage, four are used (in all but the last stage, where two are still used). In the original design the transformer gain was deliberately reduced by mounting the coils at opposite ends of the shield cans, but the revision mounts the two coils as close as practicable in all seven cans. The first, third and fifth i.f. tubes are replaced by link coupling former grid and plate windings. This link coupling is obtained by tapping the six coils involved at 30 turns up from the "cold" ends and inserting an 0.003-µf. coupling condenser. Gain and coupling can be controlled by changing the size of this condenser. Readers are reminded again that the 37-ko. circuit tune with 0.001 µfd., not 0.01 as shown.

RADIO COURSES
- Radio Operating
- Radio Servicing
- Radio Engineering
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Service to hams • "YOUR FRIENDLY SUPPLIER" by hams. Nationally accepted brands of parts, tubes and equipment. Trade-ins and time payments. Write W1BFT.
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We Carry a Complete Line of Amateur Equipment including: National • Hallicrafters • E. F. Johnson Co. • Bud • Barker & Williamson, etc.
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ATTENTION
MOBILE HAMS
Complete mobile package — nothing else to buy. Outstanding mobile signals use MOTOROLA equipment — backed by years of communication equipment experience — world's largest producer of 2-way mobile equipment.

A mobile transmitter 1325 Master Mobile with a double feature FM or AM at flip of the switch, the MOTOROLA FMT-30-DMU (27-30 MC) ... $130.00
or 18-ARS receiver with special noise limiter for use with any converter having 1440-3000 K.C. ....... $60.00
100/96" Master Mobile P-327-E Fire wall Whip Antenna .... $5.25 loud speaker .... $7.50

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

NOTE: This Receiver and Transmitter is equipment which has been returned from the field, modified and rebuilt for Amateur Service.
Above units subject to State and Federal Excise Tax where it applies.

For further information write to
MOTOROLA C. & E. INC.
Amateur Sales Dept. GST—June
1327 W. Washington Blvd. Chicago 7, Illinois
Attention: Harry Harrison, WJILX, Tel. Taylor 9-2200 Ext. 161
2 EL 20 M. BEAM $24.95

This great value includes the following:
1—12 foot boom, 1" aluminum tubing
2—12 foot center elements, 1" aluminum tubing
4—12 foot end inserts, 7/8" aluminum tubing
1—T match, with polystyrene tubing
1—Mounting casting

All hardware, fittings and castings

OTHER GOTHAM QUALITY BEAMS:
6 Meter 3-element beam, T match . . . $14.95
10 Meter 2-element beam, T match . . . $12.95
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10 Meter 4-element beam, T match . . . $24.95
15 Meter 2-element beam, T match . . . $22.95
15 Meter 3-element beam, T match . . . $29.95
20 Meter 3-element beam, T match . . . $37.95

All beams assemble quickly, are adjustable over entire band, and stack easily.

FAMOUS GOTHAM SHIELDED CABINET: We guarantee to suppress your TVI with our shielded cabinet. All steel, 20 pounds, for rigs up to 13" x 24" x 16", Full instructions included. Price $12.95

HOW TO ORDER: We ship express on approval. Send $1.00, try beam or cabinet 10 days, and remit balance if satisfied. If not, return at our expense, and we refund $1.00.

GOTHAM HOBBY
107 E. 126 Street
New York 35, N. Y.

Tech Topics
(Continued from page 45)

Substituting in the equation for the far field, $F$ now becomes

$$F = K \sqrt{\frac{P}{R_e}} \frac{G}{2}$$

A good approximation of the radiation resistance when $G$ is small is $R_e \approx 20G^2$, where $G$ is expressed in radians, rather than in electrical degrees. The far-field expression for $F$ becomes

$$F = K \sqrt{\frac{P}{20G^2}} \frac{G}{2}$$

The far-field equations for the half-wave dipole, and for the electric dipole for the condition of the square loop placed in a plane normal to, and passing through, the mid-point of a half-wave dipole become

$$F_{\text{dip}} = K \sqrt{\frac{P}{R_e}} \frac{G}{2}$$

$$F_{\text{dip}} = K \sqrt{\frac{P}{20G^2}} \frac{G}{2}$$

It can be seen that if the power is kept constant, there is only a small reduction in the far field of the electric dipole as compared to the half-wave.

Since it has been shown that the power radiated from the magnetic dipole is equal to that of the electric dipole, the magnetic dipole should perform nearly so good as the half-wave dipole so far as far field are concerned.

The conclusion is that the radiating efficiency of a small magnetic loop is nearly that of a half-wave dipole under the assumption that the same power can be fed to both. This fact, again, indicates that it is paramount to keep coupling-circuit losses at a minimum.

This limited discussion assumes the ideal and does not include polarization or the associated reflection problems. -- Robi. F. Lewis, W3EBS

Strays

What General Electric claims to be the "quietest room in the world for its size" will be ready for use in 1954 for noise-testing transformers. It is 56 by 66 by 49 feet in dimension and its walls of special composite construction are four and one-half feet thick. Full electrical shielding is included. It is estimated by GE that the room will be large enough to test any transformer being built today or anticipated within the next decade.

AN/APR-4 COMPONENTS WANTED

In any condition. Also top prices for: ARC-1, ARC-3, APR-1, APR-3A, etc.; TS-34 and other "TS" and standard Lab Test equipment; especially for the MICROWAVE REGION; ART-13, BC-348, BC-391, LAE, LAF, LAG, and other quality Supply equipment; also quantity Spares, tubes, plugs and cable.

ENGINEERING ASSOCIATES

434 Patterson Road
Dayton 9, Ohio
MORE WATTS PER DOLLAR

WITH

LYSCO

MODEL 600-S

TVI SUPPRESSED

PHONE/CW TRANSMITTER

LARGE VFO DIAL

FULLY CALIBRATED

The LYSO Model 600-S, designed for 160, 80, 40, 20, 15, 10 meter operation, is a 35 watt, TVI Suppressed, clamp tube modulated, VFO/crystal, phone and CW transmitter, with the final working straight thru on all bands. The oscillator is a series tuned "Colpitts" circuit. The Clamp tube modulator used in the 401 Clampmaster is built in. The large dial gives ample spread on all bands and is illuminated for easy readability. This is the Novice’s dream — ample wattage for good contacts and later for driving any powered final.

<table>
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<tr>
<th>MODELS</th>
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$189.95 NET

Here is the answer to getting the soup up where it belongs — in the antenna. The Model 50 will load any long wire, 50 ft. or longer. 75 Watts max. pwr., 5 position switch for coarse tuning and condenser for fine tuning, neon indicator, compact 4" x 3/4" x 5". Ideal for Model 600-S or any low powered rig.

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With both gold border and lettering, and with black enamel background, it is available in either pin (with safety clip) or screw-back button type. In addition, there are special colors for Communications Department appointees.

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THE EMBLEM CUT: A mounted printing electrolyte, 3/4" high, for use by members on amateur printed matter, letterheads, cards, etc.

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AT ANY PRICE... you couldn’t ask for more in a MOBILE TRANSMITTER!

40 WATT BABCOCK MOBILE D-X MITTER
6 Band-Band Switching
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— 2 Crystal Frequencies per Band
— Instantaneous antenna change-over with LS-1 or LS-2 Units in 8 ft. whip

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Features:
Finest Components available
68K5 oscillator
6146 final amplifier
Complete Motorizing, including
Watts output into 52 ohm antenna load
Small Size—5" hl., 8" w., 7" d.
Readily adaptable to mobile or home use
ABSOLUTELY GUARANTEED

Write for Free Literature and name of your nearest dealer.

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BROAD BAND MULTI IMPEDANCE TRANSMITTING ANTENNA

Described "QST" May 1953 issue. Good match with any type feed line. Broadband with 52 or 72 ohm coax, 300 or 600 ohm lines. Replaces any dipole. Lightweight, low loss construction, phosphor bronze wire, brass hardware, low loss spreader, unsurpassed results even with low power. Tested several years.

See your dealer or order direct
20 M. Kit $33.70 • 40 M. Kit $31.40
80 M. Kit $38.35 all band

ANTENNA MFG. CO.
ANDOVER, CONN.

Correspondence

(Continued from page 40)

have set was now an odd-looking black mass. The only recogniz
able part on this end of the chassis was the melted envel
lope of the J-V rectifier.
To give you a clearer idea of the over-all circuit, I should
tell you that several other small units were being operated from
the receiver power supply. In QST articles it had been recom
mended that each of these units should be powered from
the receiver supply. I have so far completed only the follow
ing units—all of which were running at the time: R-85er, con
verter, break-in unit, xtal calibrator, Q5-er, n.f.m. adapter, limiter-filter, Select-0-ject, Monitor. To say the least I am rather perturbed and most annoyed with QST, as followed your instructions explicitly. Being an unprejudiced and open-minded individual, I think it only just that the ARRL replace my prized receiver.
In case you, too, are mystified as to just what might have happened, I am shipping to you express collect the remains of my trusty inhaler.
I know you will give this your fullest attention and con
sideration.

— R. A. Ninkleheffer, K0W6W

[Corvorn’s Note: Mr. Ninkleheffer’s receiver, upon arrival at Hq., was inadvertently mistaken for one of floor sweepings and tossed into the incinerator before the trouble could be diagnosed.]

NOVICE GEAR

4831 Wentworth Blvd.
Indianapolis, Ind.

Editor, QST:

I just wanted to tell you that when I started studying for my
Novice ticket I built the one-tube receiver described in
How to Become a Radio Amateur. When I obtained my ticket I
went on the air with the one-tube transmitter described in
the same book. I used this combination for the entire
three months that I had my Novice license and worked DX up to 500 miles using a quarter-wave 60-meter antenna,
about 15 feet off the ground. In my opinion this combination of
transmitter and receiver is the best that any Novice
could start out on.
I also want to mention that when I visited ARRL Head
quarters a few weeks ago I was treated very well, taken on
a tour of the Headquarters building and WIAW. This kind of
treatment makes me realize that my $4.00 has not been
wasted. I think that any amateur that is in the area
should drop in at Headquarters and see the work that is being done.
Thanks a lot . . .

— Allen Landrath, W6STW

FAMILY HOBBY

421 Rodger Young Village
Los Angeles 27, Calif.

Editor, QST:

I’m hopping mad. I finished reading the letter in QST
from Thomas Tountas, W7NGB, about his ham-hating
wife. I don’t think he should stop; he’d better educate her
on the family enjoyment of having a rig. We have three
girls, all of them being brought up on radio. It’s a lot better
to have hubby out in his shack gabling with some guy than
to have him in a bar gabling with some blonde. She (Mrs.
Tountas) had better be glad her hubby is a ham. She
doesn’t know when she’s well off.
Our little rig is a source of fun and enjoyment to all of us
and I’m just as happy as he is when he gets some DX or
something. Mrs. Tountas had better count her blessings
and share her hubby’s hobby.

— Mrs. J. L. Sartain, XYL of W655MR

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by Harold E. Ennes — Staff Engineer, WIRE
2nd edition. Complete daily operating routine — inside and out
side the studio. Valuable tips for veteran operators, indispensable
for new operators. Solves the operating problems of studio and
transmitter personnel. Only $5.40
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AN EDUCATIONAL CATALOG OF TV KITS
An educational TV kit in easy stages. Pay as you win—only $10 for starting package. W1. Learn while building a sound 10" to 21" screen TV Set with latest features. Ideal for fringe areas, adaptable to VHF. Easy—no tools or technical knowledge required. Free Catalog describes a great TRANSVISION TV Kit.

Write today to Educational Dept. — TRANSVISION, INC., Dept. QST, NEW ROCHELLE, N. Y.
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No Mermaids
nor Sea Monsters!

- Old maps are quaint but ARRL does not compete with Herr Blaeu... we leave that market to the antique shops. Our World Map is strictly 1951, not the 16th century.
- No active ham can afford to be without one of these popular and useful adjuncts to good operating. Here is why the ARRL World Map is such a favorite because:

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

267 Countries are clearly outlined

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

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Ham wanted by large Northern, New Jersey electronic distributor to work as radio parts counterman. Large ham business. Excellent opportunity for right man. Inquiries held in strictest confidence.

Box 130, QST

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Over 20 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 R.

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... or trade that Collins, Johnson, Hallicrafters or National piece of radio gear be sure to get our prices. Our service cannot be beat. Remember the name—

ADIRONDACK RADIO SUPPLY
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Ward J. Hinkle, W2FEG, Owner

Remember also—Our telephone number is 73
Our P. O. Box number is 88

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

137
PLATE OR GRID CONNECTORS

High-quality grid and plate connectors of both the insulated ceramic (meeting JAN-10 specifications) and the non-insulated spring clip types for use on tubes having contacts of $\frac{1}{4}$", $\frac{3}{8}$" and $\frac{5}{8}$" diameters. All lugs are designed to provide strong mechanical connection. Write for drawings and prices.
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(5) Closing date for HAMD-Ads is the 25th of the second month preceding publication date.

(6) A special rate of 76¢ per word will be applied to advertisers when judgment, is obviously non-commercial in nature and is paid for by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used, and for sale by an individual or apparatus offered for exchange or for sale by the owner himself, under such conditions, is subject to the American Radio Relay League the 76¢ rate. An advertiser is entitled to appear in any quantity. If, however, an individual, is commercial and all advertising by him taken into the rate. Provisions of paragraphs (1), (2), and (5), apply to all advertising in this column, regardless of which rate may apply.

(7) If copy is not easily avoided, it is requested that address and address be printed plainly.

(8) It may be impossible to use more than 100 words in any one issue or more than one ad in one issue.

(9) If more than one advertisement is to be included in the classified column, each advertisement must be placed for which it is intended. The integrity of the advertised product or service is advertised.

(10) Please note: The cut and paste text of this document contains sections that are not clearly visible in the image. The text is not complete and may require further attention to ensure accuracy.
AMATEUR Paradise vacation spot, Long Cove, Mass. For sale: 150 watt CW transmitter in 39" enclosed rack; 20 ft. MCL OC-101, $125.00. Also 80, 40, 20, 15, 10 meter, $200.00 for set. Pay by check. 3133 Rhode Island Ave., Providence, R. I.

FOR SALE: Collins 37V2 receiver, 15000 to 5000 kc, $50.00. Mark R. Sartori, 6821 Wolf Road, Galesburg, Ill.


FOR SALE: Collins 37V2 transmitter, 10, 15, and 20 meter beam antennas, tubing, etc. Perforated Aluminum sheet for shielding. Radiation's, 1720 North Court St., Ohio, Oregon 25. $250.00.

FOR SALE: 45 watt AM/SSB power amplifier. $150.00. 25 watt voice modulator, $100.00. Good condition. 1500 W. Gallo St., Cleveland, Ohio.

FOR SALE: 14C2B amplifier, $75.00. 40 meter, 100 watts, $50.00. 80 meter, 100 watts, $45.00. 160 meter, 100 watts, $30.00. 10 meter, 100 watts, $25.00. 10 meter, 50 watts, $20.00. 150-1400 kc, $15.00. If interested call 1-221-1234.

FOR SALE: Collins 37V2 transceiver, $750.00. Complete 60 meter band, $475.00. Complete 20 meter band, $350.00. Complete 10 meter band, $250.00. 1500 W. Gallo St., Cleveland, Ohio.

FOR SALE: 45 watt voice modulator. $50.00. Collins 37V2 transmitter, $250.00. 40 meter, 100 watts, $50.00. 80 meter, 100 watts, $45.00. 160 meter, 100 watts, $30.00. 10 meter, 100 watts, $25.00. 10 meter, 50 watts, $20.00. 150-1400 kc, $15.00. If interested call 1-221-1234.

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BC459, $12.00; BC506, new, $20.00; BC711, new, $10.00; BC512, new, revamped for 10 meters, $45.00; BC514, used, $45.00; BC228A, modulator for same, $15.00; Bendix 1AT2, used, $45.00; MP28A modulator for same, $25.00.

Grid Dipper, battery for AC or battery, complete with separate AC supply, size 3x6-3½, Workshop beam, $7.00. Ferguson, WA3B, J.56 Brookside, Pittsburgh 34, Penna.

WANTED: Recently commercially made transmitter, multi-band low-medium power, preferably phasor, Rd. Rose, WNHC, 426 Oxford Road, Waynewood, Penna.

SELL: Harvey-Wells, TBB9P, phone transmitter plus AFS-50 power supply. In good condition, $150.00. Mr. Hannah, 228 W. 19th St., Los Angeles, Calif.

FOR sale: Melsoner VX signal shifter, with FMX modulator, $300.00. Henry Besle, 609-336 Roberth Road, Racine, Iowa.


FIRE extinguishers. Underwriters approved, for shock, $9.95 prepaid. Thompson, WA3GQ, 735 Silver Soring, Silver Spring, Maryland. Free folder.

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**LET A HINT STRAIGHTOUT A Kink!**

Confused over something? Let the ARRL "Hints & Kinks" give you a helping hand and save you grief and time. You'd be surprised at the shortcuts and tips listed in this book.

As its cover says, it is a symposium of 222 practical ideas for the workshop and station, plus war-surplus conversion section.

The American Radio Relay League
West Hartford 7, Conn.

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$1.00

U. S. A. Proper — Elsewhere, $1.25
The No. 90651
GRID DIP METER

The No. 90651 MILLEN GRID DIP METER is compact and completely self-contained. The AC power supply is of the "transformer" type. The drum dial has seven calibrated uniform length scales from 1.5 MC to 300 MC plus an arbitrary scale for use with the 4 additional inductors available to extend the range to 220 kc. Internal terminal strip permits battery operation for antenna measurement.

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MFG. CO., INC.
MAIN OFFICE AND FACTORY
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The new JK G-9 is a medium priced, high precision, 100 kc frequency standard crystal available for use with or without oven, depending on tolerances desired. Supplied for operation at series resonance or into specified load capacities. Hermetically sealed, evacuated glass holder provides thermal insulation, protection against contamination. Consult us on specific applications.

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THE JAMES KNIGHTS COMPANY
SANDWICH, ILLINOIS
HI' YA PODNUH!

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ARRL
NATIONAL
CONVENTION
JULY 10-11-12

HOUSTON — Deep in the Heart of Texas

Exhibits by national manufacturers and armed forces. See Fifth Call Area QSL Bureau in operation. Special sessions for VHF gang, DX-ers, teen-agers, ladies and others.

Registration $13.50 per person. Pre-registrations close midnight, June 18. Special pre-convention dinner party, informal, July 9th, $2.00 per person extra.

See May QST for full details

Lots of Contests and Many Nationally Known Speaker on the Program

ARRL 7th NATIONAL CONVENTION
JULY 10-11-12, 1953—SHAMROCK HOTEL, HOUSTON, TEXAS
PRE-REGISTRATION BLANK
MAIL TO P.O. Box 10173, Garden Oaks Station, Houston 18, Texas

Registration fee — $13.50 per person — Pre-convention dinner party, $2.00 per person
Make checks and money orders payable to Houston Amateur Radio Club, Inc. Enclosed find money order/check for $................to cover........pre-registrations and........tickets for pre-convention dinner party, July 9.
NAME..............................CALL..............................
NAME..............................CALL..............................
NAME..............................CALL..............................
(Check Group or Groups Below Indicating Main Interests)
..................Hidden transmitter-mobile;.......DX Meeting;........Traffic handling;........Novice meeting;........Technical talks;........Teen-age group;........VHF-UHF;........SSB-Teletype;........Emergency;........Other

SEND ONLY CHECK OR MONEY ORDER, PLEASE   ●   NOT RESPONSIBLE FOR CASH
Presenting A GREAT NEW RECEIVER—
A WORLD-BEATER IN VALUE!

For both novices and experienced amateurs, here's a receiver that tops them all for value! Compare these features:
(1) Calibrated bandspread for 80, 40, 20, and 10 meter bands (large 6" indirectly-lighted lucite scales), (2) Advanced A.C. superhet circuit uses 8 high gain miniature tubes plus rectifier, (3) covers 540 kcs. to 40 mcs. in 4 bands, (4) tuned R.F. stage, (5) two I.F. stages, (6) 2 high-fidelity audio stages with phono input and 2-position tone control, (7) built-in speaker, (8) antenna trimmer, (9) separate high frequency oscillator (10) R.F. gain control, (11) series valve noise limiter, (12) delayed A.V.C. (13) headphone jack, (14) send-receive switch.

And all this for only $119.95

IN THE LATEST EDITION OF THE RADIO HANDBOOK, 14 transmitting type tubes are featured in the HF and VHF transmitter circuits. Thirteen out of fourteen of these tubes are beam power types!

Why beam power? Because, beam power tubes... an original RCA development... enable you to build a transmitter using only one high power stage—the "final."

You don't have to use high-level stages as drivers or frequency multipliers. TVI problems are greatly simplified. Result: A lower cost, modern TVI-free rig.

Do it better—with RCA beam power tubes. Your RCA Tube Distributor carries a complete line.