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AMATEUR RADIO

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The American Radio Relay League, Inc., is a non-commercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

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

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisites. Correspondence should be addressed to the Secretary.

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Address all general correspondence to the executive headquarters at West Hartford, Connecticut.
THROUGH the efforts of A.R.R.L., amateur radio now has the privilege of engaging in general mobile operation on the frequencies from 56 to 60 megacycles and above 110 megacycles, and without the necessity for filing any special notifications before engaging in this work. Heretofore our only mobile authorization has been for use on aircraft but now we have the right to make ultra-high-frequency installations on automobiles, trailers, cruisers and canoes and use them while in motion; we may build pack sets and talk while climbing mountains (if our wind is good enough to spare breath for speech)—and anything else our fertile imagination conjures up.

What marvelous possibilities for sport and experiment are now opened to us! The mind leaps to many an intriguing opportunity. The portability and inexpensiveness of ultra-high-frequency apparatus make it possible for every amateur to have a set on his car and we suspect that every amateur with a car will want to do just this. The right to engage in automobile operation will teach us many interesting things about the performance of ultra-high frequencies, and as we roll along cross-country we can be in touch with the gang in every town and city. Give your fancy rein for a moment and imagine that you are driving, to Chicago, say, for the first time. Approaching an unfamiliar town, you pick up the mike and send out a CQ. Immediately a local amateur answers you and you have all the dope. He invites you to drop by and see him but you don’t know how to get there. Describing your location to him, he tells you where to turn and brings you right up to his house, where he is standing on the curb to greet you! Or imagine that you have a rig in the rowboat. The YF can now tell you that it is time to stop fishing and come home for chow. That may not be so good, but every good receiver should have a cut-out switch in it anyway.

The details on the new regulations are elsewhere in this issue. Bear in mind that in such mobile operation you must have your original operator license with you and either the original or a photostat copy of your station license. Also note that, although it is not necessary to notify the radio inspector of such operation, it is necessary on every transmission to state the call area in which you are operating (the same as for portable operation) and to note in the log your approximate location.

In some localities we may come in conflict with local laws, so far as automobile operation is concerned, where communities have adopted regulations intended to prevent the improper interception of police radio reports. Amongst others, New Jersey, New York, Indiana, Illinois and Michigan and the cities of Cincinnati, Dayton, Kansas City, Los Angeles, Louisville and Syracuse have local laws the general intent of which is to prohibit the installation of short-wave receivers in automobiles without a permit from the proper authority, and similar ordinances have been proposed and possibly enacted in Miami, San Diego and Spokane. Some of the regulations apply only to receiving installations capable of receiving signals on the frequencies allocated for police use but others of them apply to any receiving installation, and the local authorities may be tempted to consider that they apply even to Federally-licensed two-way stations. The League has long been studying the progress of these regulations. The validity of the limitations imposed by them is regarded by competent legal authority as an open question and it is impossible at this time to establish any categorical standards for the general guidance of amateurs. The subject is still under study, even including the possibility of promoting national legislation to supersede these local ordinances in some uniform and satisfactory manner, and A.R.R.L. is doing its best to unsmear the situation. Meanwhile amateurs in these localities should ascertain what local restrictions may be binding upon them, and they are requested to report on all state laws and city ordinances to A.R.R.L. headquarters, sending copy for study when possible, and reporting any difficulty in obtaining permits.

And now a note of warning: The amateur mobile privilege, like every other amateur right, is available only to amateurs and for amateur purposes. The opening of this new facility may attract non-amateurs into endeavoring to qualify as amateurs simply to be able to employ this privilege for utilitarian communication. Naturally the League opposes this, and it calls upon amateurs everywhere to discourage those who have no “heart interest” in amateur radio from attempting to qualify simply in the desire to make use of our privileges. Amateur radio is a hobby; its distinguishing characteristic is a personal and non-commercial interest in communicating. Our frequencies may be used only for
amateur work and mobile ultra-high-frequency communication may not be engaged in as an adjunct to any business enterprise nor for any strictly utilitarian purpose. The right is confined to those who have an interest in the technique of communicating. For example, amateurs have the right to employ mobile 56-mc. equipment on their boats but we do not want our band converted into a marine band for those who merely legally qualify as amateurs—there are plenty of marine frequencies available for them. Let us make it clear right from the start that this is strictly an amateur privilege.

K. B. W.

**WHFZ (W10XDA) Goes North**

THE Schooner Morrissey, under command of Captain Bob Bartlett, sailed for northern waters again on June 14th. Hundreds of amateurs will have fond recollections of 14-mc. phone and c.w. contacts with the Morrissey on her 1933 trip, at that time under Canadian registration and known to the gang familiarly as VOQH.

Robert B. Moe (Bob) of W2UN is again in full charge of radio communications from WHFZ. He completely rebuilt the equipment (from QST dope) and, in fact, was so busy with the installation that final information is being sent us from Newfoundland; we hope to present details in subsequent issues. This season two calls have been assigned, one regular ship license and one special experimental license.

Power supply is obtained from a rotary converter from the ship’s batteries (120 v.d.c. to 115 v.a.c.). The tube line-up consists of 47 oscillator, 46 doubler, 841 r.f. amplifier and 203-A modulated amplifier. Push-pull 45-driven and '10 Class-B modulator follow the 2-stage 37 speech amplifier. Test schedules with the Columbia Broadcasting System have been arranged, and some re-broadcasts may be attempted.

WHFZ is the regular ship call assigned for work in 17-, 24- and 36-meter bands. W10XDA is the call for 8655 kc., 12,862 kc. and 17,310 kc. Permission has also been granted for use of 6425, 23,100 and 27,100 kcs., and these will be used as soon as the crystal blanks are finished up.

Bob Moe writes, “The League certainly made a wonderful success of our communication work last year, and we are counting on it this year. "The trip itinerary is as follows: Brooklyn, N. Y.; Brigus, Nfld. (Captain Bartlett’s mother’s home); Turnavik, Labrador; Cape York, Greenland, where we shall inspect the Peary monument built by Captain Bartlett in 1932; Grantland; Ftismerland; Baffinland, Fury and Hecla Straits and, if possible, through the Straits, where passage by ship has been impossible heretofore. Then the return will be through Foxe Basin, Foxe Channel, Hudson Straits, down the Labrador coast and home again.”

**Midwest Division Convention**

August 31st—September 1st—Lincoln, Nebr.

CONVENTIONS may come and go, but the Midwest Division Convention is always a leader and it is expected that this year's official divisional convention will outdo previous ones. The Cornhusker Amateur Radio Association is sponsoring the event, and they will have the support of both the University of Nebraska and the Wesleyan University, which insures some good talks. Convention headquarters for Friday, August 31st, will be in room 206, Mechanical Engineering Building, University of Nebraska, and those arriving Saturday, Sept. 1st, register at Wesleyan University. Information will also be available at the Y. M. C. A., where an attendant will be ready to assist.

Come prepared to be initiated into the R.O.W.H. There is a good possibility of seeing and hearing Lieut.-Comdr. Schnell, W9UZ, and Lieut. John L. Reinartz, W1QP, of Arctic fame. Harbert D. Kimberly, Convention Chairman, 1222 Nelson St., Lincoln, Nebr., will give you further information if you write him.

**Strays**

To W2AOE goes the distinction of pulling off the first 5-meter QRR. While out in his transceiver-equipped car late one foggy night, he ran out of gas—with the nearest filling station about a mile away, as might be expected. By good fortune W2DX happened to be on the air; a hurried call got him, and in a few minutes the precious fluid arrived along with DX in his chariot!
New Equipment for the 56-Mc. Station
Complete Details of a Practical Stabilized Transmitter and Non-Radiating Receiver
By Ross A. Hull* and George Grammer**

If there is any one reason for the present extraordinary popularity of 56-mc. amateur communication it is, without doubt, the utter simplicity of the equipment required. When twenty or thirty dollars worth of equipment will allow one to exploit the facilities of the 56-mc. band, the temptation to do so is exceedingly great. Had QST not been fit to design, describe and recommend 56-mc. equipment of the utmost simplicity during the last few years, the probability is that ultra-high-frequency working would have continued to interest only advanced amateurs and laboratory workers. It is evident, then, that we owe a great deal to the simple modulated-oscillator transmitter and the simple super-regenerative 56-mc. receiver. Without such apparatus, the enormous value of our 5-meter band might have remained unknown.

The picture to-day, however, is changing rapidly. So great has the popularity of the 56-mc. band become, and so dense its population in some centers, that the frequency-modulated transmitter and radiating receiver can no longer be considered ideal in all cases. The time has come when amateurs in congested areas must turn their attention to stabilized transmitters and non-radiating receivers. Details of such apparatus have been presented on several occasions in QST during the last few years but its complexity would seem to have scared off most amateurs and manufacturers of amateur equipment.

The apparatus to be described is by no means as simple as much of the early 56-mc. gear. It is, however, a great deal simpler in construction and adjustment and infinitely more effective than any of the other “stabilized” equipment which has come to our notice.

THE TRANSMITTER

Many amateurs have the erroneous opinion that all one needs to get freedom from frequency modulation in a 56-mc. transmitter is an oscillator tube feeding a modulated amplifier. Indeed, we know of one commercial manufacturer who was trapped by faith in the merits of an oscillator-amplifier into the expensive discovery that its frequency modulation could be substantially as severe as that of the modulated oscillator. The present transmitter gains its stability through the use of an electron-coupled oscillator-tripler or doubler as the driver tube and a well-shielded screen-grid tube (with very low grid-to-plate capacity) as the amplifier. The stability of the transmitter is of such a high order that its voice signals are still intelligible even when received with an oscillating autodyne receiver.

The complete transmitting outfit actually consists of three parts: the 56-mc. transmitter, the modulator, and the power supply. The last two pieces of apparatus will be described in the following sections; for the moment we will confine ourselves to the radio-frequency unit, photographs of which are given in Figs. 1, 3 and 4. The circuit diagram appears in Fig. 2.

Two Type 58 tubes are used in the transmitter,

ILLUSTRATING ONE POSSIBLE SET-UP FOR THE NEW 56-MC. EQUIPMENT OPERATED AS A FIXED GROUND STATION

one as the electron-coupled oscillator and the second as the 56-mc. amplifier. The latter tube is modulated.

A front view of the transmitter is given in Fig. 1. The physical layout, it will be observed, almost exactly follows the circuit diagram. The metal chassis is made of aluminum and measures 13 by 4 inches, with 3/4-inch vertical sides.

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FIG. 1—A SIMPLIFIED HIGH-STABILITY 56-MC. TRANSMITTER

Type 58 receiving tubes show their splendid capabilities as transmitters in this rig. An unusually high order of stability under modulation is attained by the circuit design and layout.

The aluminum should be scratched rather deeply on the bending lines, on both sides of the sheet. It is then easy to bend over the sides along the scratch marks. After the socket holes have been cut out (a circle cutter is helpful for this job) the aluminum can be given a pleasing satin finish by immersing it in a lye solution (one can of lye to about a gallon of water) for a short time and then washing it in water.

The tuning condensers are Cardwell Trim-Airs, mounted on brackets supplied for the purpose. The oscillator tuning condenser $C_4$ is provided with mounting brackets at both ends so that this condenser will be quite solidly mounted. The double mounting helps to prevent frequency changes arising as the result of vibration. For the same reason the oscillator coil $L_6$, which is just behind $C_4$, is wound on a form instead of “on air” as are the other coils.

The oscillator plate-coupling coil $L_4$ is mounted on two feed-through stand-off insulators at the rear edge of the chassis behind $C_3$. This coil is placed so that its axis coincides with that of $L_3$, and is about $\frac{1}{4}$-inch away from it. Its connections run down through the insulators to the under side of the chassis.

The rear view of the transmitter, Fig. 3, will be helpful should there be any doubt about the way in which the parts on top of the chassis are placed and wired.

By-pass condensers, resistors and r.f. chokes are placed underneath the chassis, as shown in the bottom view, Fig. 4. In this photograph the right-hand tube socket is for the oscillator tube. Both sockets have their filament terminals lowermost. A connection from the oscillator-socket cathode prong runs through a hole in the chassis to the tap on $L_5$ indicated in Fig. 2. The suppressor and screen-grid prongs on this socket are connected together. Condenser $C_{10}$, just above the oscillator socket in Fig. 4, has one terminal connected to the screen-grid prong and the other grounded to a lug under the nut holding the upper socket screw in place. Resistor $R_1$ is to the right of the oscillator socket and $R_2$ to the left. The lower terminal of $R_2$ is soldered to a piece of bus-bar which in turn is fastened to a midget stand-off insulator acting as the positive plate-supply terminal for the

FIG. 2—CIRCUIT DIAGRAM OF THE OSCILLATOR-AMPLIFIER TRANSMITTER

Ground symbols indicate connections to the metal chassis.

- $C_1$-50-µfd, midget variable condenser (Cardwell Trim-Air Type RT-50).
- $C_2$-30-µfd, midget variable condenser (Cardwell Trim-Air Type XT-30).
- $C_3$-25-µfd, midget variable condenser (Cardwell Trim-Air Type RT-25).
- $C_4$-140-µfd, midget variable condenser (Cardwell Trim-Air Type RT-140).
- $C_5$-to $C_{10}$ inc.-250-µfd, midget mica condensers (Aerovac Type 1467).
- $C_{11}$-100-µfd, mica condenser (Dobier Type 3 with lugs).
- $R_1$-50,000-ohm, 1-watt resistor (I.R.C.).
- $R_2$-25,000-ohm, 1-watt resistor (I.R.C.).
- $R_3$-50,000-ohm, 20-watt resistor (Ohmite).
- $R_4$-50,000-ohm, 2-watt resistor (I.R.C.).
- $R_5$-25,000-ohm, 1-watt resistor (I.R.C.).
- RFC, RFCs—Sectional-wound short-wave chokes (National Type 100).
- $L_1$-2 turns No. 12 enameled wire, coil diameter $\frac{5}{8}$ inch.
- $L_2$-4 turns No. 12 enameled wire, coil diameter $\frac{5}{8}$ inch, length $\frac{3}{4}$ inch.
- $L_3$-3½ turns No. 12 enameled wire, coil diameter $\frac{5}{8}$ inch, length $\frac{3}{4}$ inch.
- $L_4$-3 turns No. 12 enameled wire, coil diameter $\frac{5}{8}$ inch.
- $L_5$-5½ turns No. 12 enameled wire, on 1-inch diameter (National) coil form, length $\frac{7}{8}$ inch; tapped 1½ turns from ground end.

The following additional components will be required:

2 6-prong Securite tube sockets (National).
2 tube shields (Hammarlund Type TS-50).
2 feed-through stand-off insulators (Birnbach Type 458).
2 Small porcelain stand-off insulators (Birnbach Type 866).
2 midget porcelain stand-off insulators.
4 feet of 5-wire shielded cable.
5 mounting brackets for Trim-Air condensers (Cardwell).
1 5-prong plug or old tube base.

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oscillator. The oscillator plate r.f. choke RFC₂ also is soldered to this insulator, its other terminal goes to the left-hand feed-through insulator (just above where the cable comes through the chassis). The other feed-through insulator is connected to the plate prong on the oscillator socket.

Between R₃ and the amplifier tube socket is R₂, the amplifier grid leak. The grid by-pass condenser C₈ is just above it, one terminal being connected to the resistor and the other to a ground lug. The other two condensers at the top of the photograph are the screen and plate by-pass condensers, C₆ and C₇. One connects to the screen prong on the socket and the other to one end of the amplifier plate choke RFC₁, which is at the left. Beside the choke is the screen dropping resistor R₁. Both RFC₁ and R₁ are soldered to a lug on the left-hand midget porcelain insulator, and also to one of the wires in the 5-wire cable (No. 4). The filament by-pass condenser C₅ connects between one filament prong on the amplifier tube socket and ground. In this stage the suppressor grid is connected directly to ground, not to the screen grid.

As in the remaining apparatus the shield on the cable is connected to the chassis. The terminals at the other end of the cable are soldered in the pins of a 3-prong tube base for connection to a socket on the power supply.

THE MODULATOR

The tube used in the modulator unit is a 2A5 pentode. This tube is capable of delivering the requisite audio power and has high enough power sensitivity to permit operating its grid circuit directly from a single-button microphone without the necessity for an intermediate amplifier. It is operated as a Class-A modulator in order to avoid the power supply complications which would result from the use of Class-B if power supply voltage fluctuations were to be avoided.

The general construction of the modulator is similar to that of the other units in the station. The aluminum chassis, measuring 6 by 3½ inches, with 1½-inch side pieces, is bent in the same way as the bases for the receiver and transmitter. The microphone and output transformers, T₁ and T₂, are mounted on the top, T₁ being the nearer one in the general view, Fig. 5. Fig. 6 is the circuit diagram of the modulator, while Fig. 7 shows the apparatus mounted underneath the chassis.

The small piece of bakelite fitted in one end of the chassis is used to hold the two binding posts to which the microphone battery is connected, the tip jacks into which the microphone cord is plugged, and the microphone on-off switch. This panel is fastened to the chassis by small metal angles, visible in the bottom-view photograph. Care should be taken to see that C₁ is properly connected; the negative terminal should go to ground and the positive to the cathode prong on the tube socket.

The output transformer T₂ is one designed for coupling out of a different type of audio stage than this one. Its characteristics, however, are well adapted to the work in hand if only one side of the primary is used. Be sure, therefore, to connect the positive plate supply terminal (No. 3) to the center tap of the primary winding. One of the other primary terminals should be connected to the plate.
prong on the tube socket, while the remaining one should be left idle. One side of the secondary of $T_2$ should be connected to terminal No. 3, while the other side goes to wire No. 4 in the cable. The other end of the cable terminates in a 5-prong tube base similar to the one used on the transmitter cable. Through connections made in the power-supply unit, the secondary of $T_2$ is put in series with the plate supply lead to the amplifier tube in the r.f. unit, thereby introducing the modulation into the transmitter.

THE POWER SUPPLY

The third unit of the 50-mc. station is the power supply, shown pictorially in Figs. 8 and 10. It is capable of delivering all the filament and plate power required by the transmitter, modulator and receiver. The receiver needs 15 or 20 milliamperes at 200 volts for its plates; the transmitter and modulator together take approximately 70 to 80 milliamperes at 350 to 400 volts. Ordinary broadcast-receiver replacement power-supply parts are designed for just this type of load; such parts are used in the power supply shown. The circuit diagram with the list of components needed is given in Fig. 9. Other makes of apparatus can be substituted for those indicated, provided the electrical values are identical. Since the arrangement of parts is comparatively unimportant, physical differences in components will not matter, although it will be necessary to take them into account in planning the layout.

The front view shows clearly the parts mounted above the chassis. Two of the connection-terminal sockets also are shown, as well as the toggle switch which cuts the transmitter and modulator plate supply on and off. This switch is provided so that the transmitter will not interfere during reception periods should its frequency be close to that of the station being received. A bakelite panel fitted in one end of the chassis holds two closed-circuit jacks to provide a means for measuring the plate currents taken by the transmitting tubes during operation.

The bottom view shows the plate-circuit jacks, the terminal sockets, and the two resistors constituting a voltage divider for the receiver. Be careful that none of the high-voltage connections touches the chassis, and make a thorough check of the wiring before connecting the unit to the power line. A 110-volt cord several feet in length, one end connected to the primary terminals of the power transformer and the other to a 110-volt plug, should be provided. Plugging into a 110-volt socket will therefore turn on the whole station. If desired, a switch may be inserted in the 110-volt cord to turn the set on and off, thus avoiding the necessity for inserting and removing the plug when the station is to be put into or taken out of operation.

If a voltmeter with a range of 0-500 or more is available, it would be well to check the output voltage after the power-supply unit is completed to make certain that the unit is functioning properly. The voltage should be measured between the chassis (negative) and the various high-

![Fig. 6—Modulator Circuit Diagram](image)

Connections to the metal chassis are indicated by ground symbols.

- C1: 10 µfd. dry electrolytic condenser, 50-volt rating (Cornell-Dubilier Type ED-3100).
- R1: 600-ohm 10-watt resistor.
- R2: 500,000-ohm miniature potentiometer (Centralab Type 72-106).
- T1: Microphone transformer, for single-button microphone (Kenyon Type KSMG).
- T2: Output transformer (Kenyon Type KR-79M).

The following additional components will be needed:

1. 6-prong tube socket.
2. Pair phone tip jacks J1.
3. Toggle switch, single-pole single-throw.
4. Binding posts, A, B.
5. 4 feet of 5-wire shielded cable.
6. 5-prong plug or old tube base.
7. Single-button microphone (Shure Bros.).
8. 6-volt dry-cell microphone battery.
voltage socket terminals. It will be quite high without the other units connected (450 to 500 volts on the modulator and transmitter sockets) and should drop to 350 or 400 volts when the station is running normally.

Power transformers of the type specified ordinarily are furnished with two 2.5-volt windings, one having high current-carrying capacity and the other low. Use the "high amp." winding.

**Tuning the Transmitter**

The transmitter just described has been designed in such a manner that the tuning process is reduced to a very simple routine. Indeed, the tuning is much more difficult to describe in words than it is to perform in actual practice. If the equipment has been built exactly according to the specifications, the only problems in tuning will be setting the transmitted frequency within the limits of the amateur band and obtaining the highest possible output power in the antenna.

Before beginning the tuning it is well to review the arrangement of the two jacks in the power-supply unit. J1 is connected in the high-voltage supply lead to the oscillator tube. Hence a milliammeter plugged into J1 will read the plate and screen-grid current of the oscillator tube as well as the few milliamperes taken by the voltage divider R3-R4 of Fig. 2. The jack J2 is in the high-voltage lead to the modulator and hence will show the modulator plate current together with that taken by the screen and plate of the amplifier tube. When it is desirable to read only the load taken by the amplifier tube—as in the preliminary tuning procedure—the modulator tube is removed from its socket.

Having made a careful check of the wiring of the entire installation, the first step is to remove the modulator tube and plug the milliammeter into J1 of the power-supply unit, setting the tuning condensers C2 and C3 at about one-third their maximum capacity setting. Now the power supply may be switched on and, when the tubes have warmed up, the oscillator load current noted. If this reading is of the order of 20 or 25 ma. it may be assumed that the tube is functioning properly. A further check may be made by touching the oscillator grid lead with a pencil, in which case the load current will show a slight deflection if the tube is oscillating. At this stage the milliammeter should be plugged into J2 of the power-supply unit. The reading should be approximately 20 ma. Watching the meter carefully, the oscillator tuning knob should now be rotated slowly in the region around one-half the maximum capacity setting. A point will be reached at which the amplifier plate current makes a sharp rise of a few milliamperes. This will be the setting at which the frequency of the oscillator is one-third that of the tank circuit C3-L3. Now a tuning lamp should be coupled closely to the coil L3, and condenser C2 tuned until the lamp lights with the greatest brilliance. C2 may then be retuned slightly to give the greatest output.

At this stage it will be well to listen on the receiver. The signal from the transmitter will cause a dead area on the receiver tuning dial and the center of this area will correspond roughly with the transmitter frequency. If this setting of the receiver can be compared with the setting at which signals of a known frequency have been received, it will

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**FIG. 7—UNDERNEATH THE MODULATOR CHASSIS**

But few parts are required for this unit, which is essentially an audio power amplifier.

**FIG. 8—THIS COMPACT POWER-SUPPLY UNIT FURNISHES ALL THE FILAMENT AND PLATE POWER REQUIRED BY THE TRANSmitter, MODULATOR AND RECEIVER.**

Inexpensive components of the type intended for broadcast-receiver replacement purposes are used throughout.
be possible to make a fairly accurate check of the frequency at which the transmitter is operating. If no signals are available with which to check the frequency it will be necessary to borrow or purchase a frequency meter with which to measure the frequency. Should either of these tests show that the frequency is outside the amateur band running from 56 mc. to 60 mc., it will be necessary, of course, to retune the oscillator and the other two tuned circuits until the frequency is in the desired place.

It will be found that a second adjustment of the oscillator tuning condenser—almost at the minimum capacity setting—will allow the amplifier tube to operate in normal fashion. With this setting, the oscillator is operating at one-half the amplifier frequency instead of one-third. Though slightly greater output may be obtained in some cases under these conditions, the stability of the transmitter will not be quite as satisfactory.

THE TRANSMITTING ANTENNA

The essential requirement in a 56-mc. antenna is that it consist of a piece of wire suspended vertically as high as possible and well clear of any surrounding trees, wires or buildings. Also, the antenna must be cut exactly to one of the lengths shown in Fig. 11. In the diagram "A" of this figure is shown the simplest type of antenna—a vertical wire some odd multiple of 4 feet long; connected to one end of L1. The antenna system is completed by the transmitter installation itself which serves as a ground. Hence the other "antenna" terminal of the transmitter is connected by a short piece of wire to the metal chassis of the set itself. If in both diagrams may be a low-current flashlamp bulb or a thermo-coupled ammeter having a scale reading of 0.5 or 1 amperc. The actual antenna current obtained will usually be only of the order of 0.1 to 0.2 amperc, but either of these devices will serve to indicate when the antenna current is maximum.

The antenna "A" is suitable when the equipment is so located that the antenna wire can be run directly from the set in almost a vertical line. In cases where the transmitter is located several feet from the window, the arrangement of "B" is to be preferred.

TUNING THE ANTENNA

When the transmitter has been tuned in the manner described, we may connect the antenna system and tune it to the transmitted frequency. The first step is to remove the tuning lamp from its position near the coil L2. Then C2 is retuned until the amplifier load current is a minimum. Now the antenna tuning condenser is rotated slowly until the maximum indication is secured in the ammeter or flashlamp bulb in the antenna circuit. An alternative method is to leave the tuning lamp coupled to the amplifier plate coil and tune the antenna condenser until the tuning lamp becomes dimmest. Then the tuning lamp is removed and

FIG. 10—ALL THE WIRING OF THE POWER-SUPPLY UNIT IS UNDERNEATH THE CHASSIS

This sub-base view shows the voltage-divider resistors, the connection sockets for the receiver, transmitter and modulator, and the metering jacks for measuring transmitter plate currents.
condenser $C_4$ retuned until the amplifier plate current is lowest.

**BUILDING THE RECEIVER**

Receivers used for 56-mc. work are still almost exclusively of the super-regenerative type. The super-regenerative detector not only is remarkably sensitive to weak signals but also possesses the property of discriminating between locally-generated damped oscillations, such as those set up by automobile ignition systems, and continuous-wave signals, amplifying the latter a great many more times than it does the noise. The one disadvantage of this type of set in its simple form is its ability to radiate a strong signal. For this reason the modern 56-mc. super-regenerative receiver should be provided with a radio-frequency amplifier. The r.f. stage brings other benefits as well: it increases the sensitivity of the receiver and, by acting as a buffer between the detector and antenna, improves the stability of the detector by eliminating antenna-resonance effects.

Fig. 12 shows a modern receiver of this type. Fig. 13 is the circuit diagram of the receiver. The r.f. amplifier tube is a Type 58, the detector a 56, and the audio amplifier also a 56. The receiver is designed for headphone reception, although the substitution of a power pentode for the 56 in the audio stage would make it suitable for operating a loud-speaker. The use of headphones is usually preferable, however, when "duplex" operation is to be attempted.

Figs. 12, 14 and 15 show the details of construction quite clearly; a careful study of them should make the building of the receiver a fairly simple task. The metal chassis is a piece of 1/16-inch sheet aluminum bent in the shape of a broad, squat "U". The horizontal part measures 7 by 5 inches; the vertical sides are $1\frac{1}{2}$ inches high.

**FIG. 12—A THREE-TUBE RECEIVER FOR THE 56-MC. BAND**

A tuned radio-frequency amplifying stage is followed by a super-regenerative detector and an audio amplifier.

The chassis is most simply made by first cutting out a flat piece of aluminum measuring 8 by 7 inches, then drawing a line $1\frac{3}{4}$ inches in from each 7-inch side, leaving a center portion 5 by 7 inches.

The plan view shows the layout of parts on top of the chassis. The two tuning condensers, $C_1$ and $C_2$, are centered on the chassis and are mounted with their shafts in line for swinging.

Both $C_1$ and $C_2$ are mounted by means of special brackets fitting the Cardwell condensers; the design of these brackets is such that the condensers are insulated from the chassis—a desirable feature in this case since the detector tuning condenser $C_4$ must not be grounded. This should be kept in mind if a different type of condenser is used.

Between the two tuning condensers is a vertical shield of sheet aluminum, its purpose being to help isolate the r.f. and detector stages and prevent the r.f. tube from oscillating.

The antenna coupling condenser $C_3$ is fastened to the stationary plates of $C_1$. Ordinary trimmers will not do because their minimum capacity is too high. The Hammarlund Equalizer has a range of 3 to 35 µfd., and as ordinarily used is set toward the low-capacity end, with the movable plate well separated from the stator. The extension of the stator plate is bent almost at a right angle so $C_3$ can be mounted on one of the screws holding the stator plates of $C_1$ and still be reached by a screwdriver from above the receiver for adjustment.

The r.f. coil, $L_1$, is mounted vertically at the left of $C_1$. No special mountings are provided; the upper end of the coil is simply soldered to the lug on the stator plates of $C_1$ and the lower end to a soldering lug fastened to the chassis by a short...
Aside from the coupling between the r.f. and detector stages, the arrangement of and method of wiring the parts underneath the chassis is not so critical. Short, direct leads are essential in the r.f. coupling, however. This consists of the radio-frequency choke RFC1 and the adjustable condenser C4. The choke should be mounted as close as possible to the plate prong on the r.f. tube socket, and C4 must be placed so that the leads to it will be short. Both sides of C4 must be insulated from the chassis, and it is also advisable to mount the condenser as far from other metal parts as possible to avoid capacity effects to the chassis. A National Type-WGS stand-off insulator is used for this purpose, mounted near the detector-tube socket. The metal base of the insulator should be removed and a single hole drilled in the chassis so a

machine screw. The rotor plate connection to C1 is made to the same lug. The grid lead for the r.f. tube comes off the same stator-plate lug of C1 to which the upper end of L1 is soldered.

The detector coil is split into two parts, L2 and L3, both wound the same way. Looking at Fig. 14, the left-hand end of the left-hand coil, L3, is soldered to the lug on the stator plates of C3. The outer end of L3, the right-hand coil, connects to the rotor-plate terminal. The inside ends of both coils are connected to opposite terminals of a midget 100-µfd, mica condenser, C9. On each side of C9 the holes are drilled through the chassis so that connections from C9 to the grid and plate prongs on the detector tube socket can pass through. The grid is connected to the stator plates; the plate to the rotor. One end of the grid lead R3 is soldered to the inner end of L2, the other terminal goes to a lug fastened to the chassis beside the detector tube socket.
screw can be run through for mounting the insulator. This method of mounting \( C_4 \) makes the condenser easily accessible for adjustment.

**OPERATING THE RECEIVER**

If the construction of the receiver is duplicated and the coils are carefully made to the specifications given, the 56-mc. band will cover approximately the higher-capacity half of the tuning range. In coupling the tuning condensers together, care should be taken to see that they are "lined up"; that is, that both reach maximum and minimum capacity at the same dial setting.

The power supply described will give the proper voltages for the tube filaments and plates. Other forms of power supply can be used, however. The filaments must be provided 3 amperes at 2.5 volts, the plates 15 to 20 milliamperes at 200 volts. "B" batteries or an eliminator will be satisfactory for the latter, while a small transformer of the proper rating will handle the filaments.

Assuming that the correct voltages are applied and that the headphones are plugged in, both the volume control and the regeneration control should be set at maximum. There should be the usual hissing sound in the phones. Turning the regeneration control toward minimum (that is, increasing the resistance) should cause the intensity of the hiss to decrease; it may finally stop altogether. Now set \( C_4 \) so that the movable plate is just about touching the mica, and set \( C_3 \) so that there is about a sixteenth of an inch between the plates. The antenna should be connected to the movable plate of \( C_3 \).

Now turn the tuning dial, covering particularly the higher-capacity half of the tuning range. If a 56-mc. transmitter within a reasonable distance is working it can readily be recognized by the fact that the super-regenerative hiss disappears when the station is tuned in.

Having tuned in a signal, the coupling between the r.f. and detector stages should be adjusted for maximum signal strength. This is done by adjusting the capacity of \( C_4 \). An insulated screwdriver of the type used by radio service men for "trimming" broadcast receivers should be used for this job. Turn the adjusting screw throughout its range; there should be a rather definite maximum of signal strength at one particular setting. After making an adjustment to \( C_4 \) it is advisable to retune the receiver to make certain that the change in capacity at \( C_4 \) has not changed the detector tuning. When the proper setting for \( C_4 \) has been found, a similar adjustment should be made to \( C_3 \) to get the optimum antenna coupling. \( C_3 \) also acts to some extent as a trimmer for lining up the r.f. stage with the detector.

The most suitable antenna for the receiver will depend upon the conditions under which it must operate. If the location is high and a short wire will be well above surrounding metal objects such as the frames of steel buildings, a very modest antenna will suffice. For instance, an 8-foot vertical wire located on the second floor of a suburban home will work quite well. It is advisable to make a short antenna of this sort some multiple of 8 feet in length because such an antenna will be approximately resonant in the 56-mc. band and consequently will give greater signal strength than an untuned wire. In other localities the best antenna usually will be the one which is placed at the highest possible point; it should be vertical if it is possible to make it so. Length is not nearly so important as height; a long horizontal antenna is not generally so efficient as a short vertical one. For this reason it is rarely necessary to have a horizontal wire once the antenna reaches the roof; in common terms, the antenna usually is one which is all "lead-in."

**IN CONCLUSION**

It might seem that the gear described here is unnecessarily complicated, in view of the fact that the range over which it is possible to communicate is no greater than is to be expected from the simple and cheap transceiver. Nevertheless, this step in the development of 56-mc. apparatus is wholly logical. When a band of frequencies represents a new and unexplored field of interest only to the experimenter, the simplest of equipment will suffice. But when the rank and file of amateurs take over the territory for routine communication, refinements in apparatus become essential.
Pointers On Noise-Reducing Receiving Antenna Systems
Adapting the "Double-Doublet" To Ham-Band Frequencies
By L. W. Hatry*

Although popularization of so-called "noise-reducing" antenna systems for radio reception has been accompanied by considerable noise, and surrounded by some smoke, most of them differ little from the "lamp-cord" doublet modestly described by W6HM in the Experimenters' Section way back in September 1929 QST. The technic for amateur work is brought up to date in this article by Mr. Hatry, former QST staff member, a gentleman thoroughly experienced in the subject.—EDITOR

O F COURSE, the "noiseless" aerial is mis-named. Passing most of the mis-naming as justifiable colloquialism or language-growth, the correct name still would be "noise-reducing."

The first noise-reducing aerial system consisted of the aerial, defined as the open conductor (the "top") supported practically parallel to the earth, and a shielded vertical or down-lead portion connecting the top to the receiver. This was relatively ineffective, as was its outgrowth, the "completely shielded" aerial. The failure of the plain shielded lead was due to the mismatch of impedances that resulted from attaching a low-impedance line (the shielded lead) to a high-impedance line, the horizontal wire. That neither the lead nor the aerial ever approached a true line in operation is obvious from the fact that nothing was done to eliminate or reduce the various resonant periods (standing waves) occurring in each as the frequency was varied.

The first step in the right direction was toward impedance matching. In other words, the high-voltage top was stepped-down to pass a suitable voltage into the low-voltage shielded lead. The lead was then run direct to the receiver, its standing wave behavior, or free-resonances, being used to act somewhat like a transformer in connection with the antenna coil of the receiver. But really satisfactory performance was not attained until the shielded lead was used as nearly like a true transmission line as possible, and transformers were applied at both ends.

Those unable to get along with impedance-matching philosophy may make more sense of this equally legitimate explanation: A shielded line has high capacity, or, from a reactance viewpoint, few ohms; whereas an aerial has low capacity, and considerably more ohms reactance. When Ohm's Law is stated in the form $E^2/R = W$, inserting a few figures in the formula quickly shows that for the same power the fewer ohms call for fewer volts. This is why I mention the lead-in as a low-voltage circuit to which there must be a step-down from the relatively high-voltage aerial. Likewise, most receivers are designed to work from the aerial direct, having relatively high-voltage (high-impedance) input; hence the shielded lead must be stepped-up to the receiver input by means of a transformer to give a match and full performance.

I speak of the "line" from the aerial circuit to the receiver circuit as a shielded lead because probably the first successful effort at noise reduction was a simple shielded lead-in. However, whether the low-voltage line be a wire surrounded by a metal sheath, or two wires closely paralleled, or a twisted pair—or a combination of these—the result and the basic principles are the same, provided the design is carried out with some skill.

NOISE-REDUCING AERIAL CIRCUITS IN GENERAL

The basic fact utilized in the noise-reducing aerial is that the noise picked up by the aerial, which are radiated from house wiring and elevated a.c. mains, have the typical "local signal" char-

* Hatry & Young, 203 Ann St., Hartford, Conn.
acteristic of reducing strength in the proportion to the square of the distance of removal. Other things equal, noise from a source of 10 feet away is four times worse than noise from a source 20 feet away. Thus the down-lead of any aerial is likely to be many times closer to the source of noises (wiring of the house, for example) than the top; in fact an average top distance may easily be 60 feet when the average lead-in distance is only 1 foot, and the top, therefore, 360 times freer of noise than the down-lead. Hence the idea of shielding the signal wire so that it could not pick up; while noise pick-up by the shield was directly grounded. But the simple shielded lead is little used to-day, and in its place we have the three basic circuits, variations of which serve for most of the noise-reducing broadcast aerials.

Fig. 1 is of the modern shielded lead-in arrangement. Fig. 2 is perhaps the better type of twisted lead-in design and Fig. 3 is simply Fig. 1 with twisted pair replacing the shielded lead-in. I want to step off the line here to stress perhaps an obvious point of noiseless aerial installation which seems to have been ignored completely by manufacturers' instruction sheets, prior articles and most aerial putter-uppers. Following which, gentlemen, we will pass on to the short-wave exhibit.

A basic item in textbook aerial theory is the presumption that the horizontal part is largely inefficient in pick up. In fact, it requires that the radio waves behave indecorously in order to leave any energy in the horizontal wire. We all know that practice departs widely from the basic presumption, simply because radio waves are undignified enough to satisfy the rest of the theory. Nevertheless, the vertical portion of a broadcast-band aerial is very important and does give major results.

Hence, an important detail of aerial design to remember is that if an aerial is connected to earth it has a vertical section. This statement may seem obvious enough to be silly. Yet Fig. 4 shows a frequently used and recommended circuit. What's wrong with the picture? This: The aerial vertical or "down-lead" or "lead-in" section is now the shielding outside the "line." The fact that the transformer is hung in the air, or that the shield protects the inner conductor, has nothing to do with the fact that Fig. 4's aerial system is reasonably bad off as to noise pick-up even though it is a shielded system. The aerial circuit, of which the shield is a very active part, has the same amount of lead-in in the noise region as before. Nevertheless, Fig. 4 will reduce noise to some extent because the potential gradient of the shield, with the ground at its end, is considerably less than the same length of wire with a relatively high-impedance high-potential primary in its path to ground. This is the same as saying that the effectiveness of the lead-in as a noise pick-up is directly related to its effective impedance. When it is high in impedance because of inserted units its electric or magnetic coupling to noise sources is more effective; the same amount of current through more ohms impedance gives higher noise voltage.

Fig. 4 is improved when the effective vertical portion of the aerial is kept out of the noise area, as in Fig. 5, and the shielded line is kept solely to that function and not allowed to mix into the aerial's functions. You have no doubt heard the recommendation of some individuals that the shielded lead be grounded in several places; such complication would not be necessary were the lesson of Figs. 4 and 5 well learned. Likewise, when putting any noiseless aerial system into use keep well in mind that the function of the shielded wire or twisted pair is strictly that of a transmission line, the aerial-ground system being complete in itself and preferably remote from possible sources of noise.

In the circuit of Fig. 2 this advice is not easy to apply. The lead-in of Fig. 2 is a balanced lead designed to pick up nothing, leaving the entire results to accrue from the top of the aerial. Experience has shown that such systems do require longer tops than the ordinary, the "vertical" portion of the aerial contributing too little to the results. Since the lead-in of this system is really dead to pick-up, using the ground at the receiver does no harm except where the receiver is two or three floors from earth. The latter case has a partial vertical portion composed of the piping or radiator system used as "ground"; and it could be improved by a proper vertical portion connected properly on the antenna winding of the aerial top's transformer (Fig. 6).

That results should be widely different with different users of noiseless aerial systems is inevitable, as we have all observed. The error of Fig. 4 is a common one.

**Design Points**

I have spoken of these nets as impedance-matching transformers connected to a transmis-
sion line passing energy from an aerial system to a receiver. Within practical considerations this manner of speech conveys information reasonably close to accurate. Exactly, however, true impedance matching is economically impossible in practice and essentially does not occur. Impedances can be truly and accurately matched at but one frequency and closely matched for a narrow group, graduating to an average poor match throughout a wide range. The purpose of going into this is to help the experimenter go about the making of his own with some judgment.

When broken into by a transformer a grounded aerial worked at a wavelength higher than its fundamental presents to the transformer an increasingly higher impedance as the transformer progresses from ground to the upper end. (I mean a tapped coil as well as a two-winding unit when I say transformer.) That is why Fig. 5 would not be exactly correct for a transformer designed originally to hang, had it showed the transformer wired in close to earth for convenient mounting on a cellar window or under a porch. This effect is clearest to most, perhaps, if they consider the earthed wire as having capacity, all of which capacity is effective toward the ground side. When breakers are so used, the ground ad absurdum at the open end: no capacity of condenser return circuit, infinite impedance and, of course, negligible results. Which simmers down to the fact that the transformer requires least winding when nearest the actual or effective earth (counterpoise, tin-roof, steel building).

No news is the truth that an aerial has a resonant frequency, whether with an added inductance or not. No system with a resonant point is a constant impedance to all frequencies, else it would not respond best to one. Hence, an aerial system is not a constant impedance and therefore cannot, through a transformer which tries to transfer what it gets, present a constant impedance to a line. The line tries hard to be a constant impedance and will therefore introduce losses which are kept at their lowest by means of the almost-matching transformers.

The antenna matching transformer may be located where you will in the aerial circuit (say on the ground) if it is built for that location. The resonant frequency for the aerial system plus the transformer should be at either end or the middle of the band; at either end when a certain group of stations must be received best, at the middle if you desire to be fairest to the band as a whole. However, if you wind a transformer for a 50-foot aerial and best performance at the high-frequency end of the band, you have but to lengthen the aerial on the side away from earth to shift the best point toward the middle or the lower-frequency end.

Since the average shielded lead-in gives an effective impedance of from 20 to 50 ohms and the average twisted pair from 40 to 90 ohms, and since the transformer ratio will be proportioned to regard the aerial side as between 10,000 and 20,000 ohms, a turns ratio of between 33- and 11-to-1 will do for the shielded type, and of between 10- and 22-to-1 for the twisted pair. These ratios tend to emphasize the resonance effect. On the other hand, the resonance effect can be reduced, which is the commercial compromise, by using transformer ratios considerably lower and having the line effectively mismatched over the entire range. The receiver-end transformer (step-up) is a reversal of the antenna-end transformer (step-down) as to connections, design being identical unless the antenna transformer is to be hung near the top of the aerial and well above earth. In the latter case the aerial transformer has a greater step-down ratio from aerial to line than the receiver transformer has step-up from line to receiver. In any case the receiver should have a 100- to 200-muf. condenser connected from aerial post to transformer to simulate the capacity of the antenna (Fig. 7).

TRANPOSED LINE ARRANGEMENTS FOR SHORT-WAVE RECEPTION ARE ILLUSTRATED IN FIGS. 8 AND 9

The resistors, R, of Fig. 8 serve to broaden the resonance of the system.

Of course, no amount of shielding, and no complication of design, will clear out the remotely picked-up noise. These "noiseless" systems work if the noise is not coming from appreciable distance (which, fortunately, is usual for man-made static) and if the aerial system (complete with down-lead, as in Fig. 5) is remote from nearby noise sources either by virtue of height or re-
moval to the back-lot. In keeping the aerial system free of noise it is not sufficient to raise the aerial above a house and then ground effectively "under the house." To do so is to place the noise source in the direct field of the aerial. For such a case, which is that of the business district or any crowded area, a counterpoise must take the place of ground, and no ordinary ground connection should be made.

**SHORT-WAVE NOISE-REDUCING AERIALS**

The main trouble of the short-wave "noiseless" aerial has been the wide range of frequencies to be covered. This we solve in most cases by hanging a system which is either restricted to good performance over a narrow band of frequencies or which complicates overall operation by being tuned. For all-wave use, however, we have had various devices of "noiseless aerials" of which most, whether transposition-block systems or users of the twisted-pair lead-in, gave equally good results over limited frequency ranges and equally bad wide-range results.

The short-wave aerials for the amateur or broadcast listener have a doublet top for effective pick-up. One of the first of these consisted of the set-up shown in Fig. 8. R and R were inserted to spoil the resonant point and bring it to the average level of results off aerial resonance. When the horizontal halves are proportioned properly for a given band (about half wavelength total, quarter-wave per half of top), R and R work chiefly to eliminate resonance effects in the line (if it is not very long) and leave the top relatively selective. The Fig. 8 set-up can be effective and satisfactory over a limited band, such as an amateur band, if given regard for electrical proportions; that is, two quarter-wave sections for the top, reasonably close to a half-wave length for the line (or two or three half-wave lengths), and no resistors in use between the line and the usual small primary winding of the receiver.

Where limited-band use is desirable but dimensions and circumstances preclude a half-wave length, or multiples of it for the line, one of two set-ups should be made; a- Zepp, as in Fig. 9, where the line can be a quarter-wave in length (additional line must be added in half-wave sections); or a tuned-circuit and link to the receiver so that a quarter-wave line in Fig. 8 (or 3/4, or 5/4) can be effectively matched to the receiver (Fig. 10). For broadcast resonance L and C comprise a low-C circuit for the particular band (keep C near to 25 μfd.). L may be tapped for convenience. The link winding to the receiver should have as few turns as satisfactory performance will permit (P to S ratios, say, of 10-to-1 for 1.7 mc., 8-to-1 for 3.5, 6-to-1 for 7, 4-to-1 for 14). In Fig. 10 taps on S are indicated for convenience. Fig. 10 is also applicable to the Zepp of Fig. 9 when the lead-in is at least a half-wave long (or two or three or more half-waves).

From practice I have come to the conclusion that about 30 transpositions per half-wave are sufficient for effective noise reduction. More do not help much and the noise tends to pick up noticeably with fewer.

When the R's are left off Fig. 8 and a transformer of untuned (by manual control) design, but otherwise of the nature of Fig. 10, is connected between the line and the receiver, we have a set-up recommended for all-wave use. When a twisted lead-in replaces the transposition-block line but gives the same connections, we have approximately the same thing. We also have limited performance except over one frequency range (sometimes two) of relatively narrow width. That such aerial systems are an improvement over the ordinary sky-wire from a noise viewpoint is frequently enough true. But also they cut down on results on the broad average, leaving from 50 to 60% of the users dissatisfied.

Yet the simple doublet with twisted lead-in or the transposition line can be satisfactory over a very wide frequency range if one has no objection to additional adjustments. A good homemade set-up for all amateur bands would be Fig. 8 with a line of sufficient length so that the length of half the top plus the line totals a half-wave somewhere in the 160-meter band. A transformer is then set up as in Fig. 11, C₁ and C₂ being about 200 to 250 μfd., each, P being wound as though it were one coil to tune to 1750 kc. but actually split in half. S should have a fifth of the turns of P and be tapped for an 8th and a 10th, and it may be wound on top of P near the center. Operation will be easy. Progressing from 1750 kc. up, C₂ in the center of the coil will be at full capacity until C₁ across has reached minimum and can no longer help, whereupon C₁ is adjusted. As the wave goes further up in frequency and C₁ again reaches minimum, it is time to start the operation over again.

Remember that none of these systems will work as “noiseless” systems if the tops cannot be sufficiently in the clear, up or away, or if the line is allowed to parallel possible noise sources too closely.
A SYSTEM WITH SOME ALL-WAVE PERFORMANCE

Recently designed is an antenna system which has some just cause for the name all-wave. This system is known as the "double-doublet" antenna system. It consists essentially of two doublets mounted in a special manner and with the line tapped onto the doublets off-center to achieve some sort of impedance match for a multiplicity of frequencies. Fig. 12 illustrates the general set-up recommended as standard. From contact with a number of such installations for all-wave use, the writer can testify to the good performance of the system as compared with the usual single-doublet all-wave antenna system.

The effectiveness of the aerial over a wide range of frequencies (approximately 6-to-1) is explained as due to the overlapping resonances of the 29-foot and 16 1/2-foot doublets which result from the set-up of Fig. 12. The longer 29-foot doublet is resonant at about 8 mc. and at its third harmonic of 24 mc. The 16 1/2-foot doublet is resonant at about 14 mc. These resonances combine as shown in Fig. 13 and the aerial behaves accordingly. The performance of a single doublet is similar to that indicated in the curve for the 16 1/2-foot doublet, the peak of the curve varying as to frequency with the dimensions of the top and the transformer used for its line.

The designers stress additional points which contribute to the overall performance of the system. The twisted-pair line is of about 180 ohms impedance. This was chosen as suitable for most all-wave receivers of modern design. It is also a suitable value for the doublets.

The transformer that couples the line to the receiver is static-shielded to eliminate capacity coupling of the line through to the input of the receiver.

The crossing of the two wires that form the aerial top is a phasing necessity. The angle between them seems to be reasonably critical if the intended performance with satisfactory elimination of noise is to be had. The optimum angle can be determined best by trial.

This system is very effective in the elimination of ignition noise on the bands most affected thereby. Since ignition noise seems to travel good distances, this apparent miracle deserves some explanation. The designers suggest that part of the elimination is due to the predominately vertical polarization of ignition-generated waves, the horizontal doublet being inefficient for other than horizontally polarized waves. The writer, however, confesses a predilection and stronger faith in the second explanation of the same men: That the twisted line of the system is effectively isolated from the receiver (except electro-magnetically) by the static-shield of the line-to-receiver transformer. This prevents the line from

(Continued on page 74)
Behind the Scenes With Next Year’s Model

The Tale of a New Receiver’s Evolution

By J. N. A. Hawkins, W6AAR*

The recent trend toward all-wave broadcast receivers has aroused much interest among amateurs and others, and many have expressed an interest in how the new developments happened to see the light of day. The principles of design are considered quite mysterious and deeply scientific; so we conducted an investigation among the engineering staffs of receiver manufacturers in order to get the story behind the development of a new model.

Herewith we present the highlights in the development of a typical receiver, “The Dual-Ratio Knee-Action Triple-Hemispheric Multi-Tube Many-Wave Looperdyne.”

* * *

President tells Chief Engineer that sales are dropping off on current model so a new one is necessary. As the Chief Draftsman is on his vacation, the Chief Engineer gloomily reflects that he will have to use a new man and have to do all his own calculating. Sends to Purchasing Agent a requisition for a copy of the Handbook and a 10-inch slide rule.

President sends memo that compactness and portability are the watchwords. Chief Engineer outlines three-tube design to draftsman, with radical new chassis design and spherical bakelite cabinet. Special dies purchased at cost of $1,972.34. Sales Manager points out that he forgot the loud speaker. Dies scrapped. Memo from President: Short-wave reception is the coming thing, and compact sets are on the way out. Chief Engineer makes requisition for subscription to QST, another Handbook and a 16-inch slide rule. Lays out new chassis and designs tuning condensers and coils for 3-to-1 frequency ratio in each band. Draftsman can’t read his writing, so provides only a 3-to-1 gear reduction in the tuning dial. Bad intercoupling between various tuning ranges causes continuous dead spots; coil and switching assembly redesigned and shielded. Draftsman points out that new coil assembly won’t fit on chassis. Chief Engineer eliminates power transformer and sends memo to President pointing out advantages of new 25Z5 transformerless power supply and full a.c.-d.c. operation. Memo from President points out that 25Z5 rectifier is out, as there are 6,920 type 80 rectifiers still in stock room and must be used up. Chief Engineer lays out new chassis 4 inches wider.

Memo from Sales Manager that RCA is planning new Class-C audio amplifier. Chief Engineer scamps audio channel for Class-C type. RCA designer scamps his layout of Class-C audio amplifier and plans new Class-D-Prime audio amplifier, after hearing that Philco plans to use it. Philco designer scamps Class-D Prime because it takes 10 watts of driver power to get 7 watts of output to the speaker, and adopts new Majestic “Cold Control.”

Cabinets for the new model arrive from Furniture Manufacturer. Chief Engineer suddenly remembers he forgot to notify Furniture Manufacturer that 4 inches were added to the width of the chassis. Chief Engineer eliminates one i.f. stage, the tuned r.f. stage ahead of the first detector, 8 mikes of filter condenser and washes out the audio transformers in favor of resistance coupling. By mounting 16 resistors and 5 by-pass condensers in the half-inch gap between the three-gang condenser and the chassis he manages to squeeze the new layout into the new cabinet. Service Manager points out that power transformer, three-gang condenser and the filter condensers must be removed to test or replace the 16 resistors or the 5 by-pass condensers. Chief Engineer buys his silence with ease of “Old Crow” and a promise to adopt Crosley Shelvador on future models.

President returns from I.R.E. Convention and announces that High Fidelity is the watchword—sensitivity and selectivity must be compromised to obtain it. Design is altered to suit. Class-C audio channel is scamped for a pair of 845’s in Class-A.

Shop error makes i.f. shield can five inches in diameter instead of two-and-a-half. In exchange for past favors in covering up his errors, Chief Engineer writes long memo to President pointing out that large shield can raises Q in i.f. transformers and increases gain so that one i.f. stage can be eliminated. President skips involved calculations about large shield cans, tells Shop to eliminate one i.f. stage and add a beat-frequency oscillator for help in finding short-wave stations; also to add an inter-station noise suppressor, as

* 2850 19th Ave., San Francisco, Calif
Majestic is reported to have one in their new model. Chief Engineer and Shop Superintendent go into conference and decide that the beat oscillator and the noise suppressor had better be mounted inside of the five-inch i.f. can, and say nothing more about it.

Power transformers arrive from manufacturer with terminals on the side instead of the bottom. After long correspondence with Transformer Manufacturer, Chief Engineer decides to keep mum about it and just mount the transformer underneath the chassis in place of the three-gang condenser, which he mounts on a bracket hung from the loud speaker. Power pack delivers only 200 volts. Transformer Manufacturer points out that Chief Engineer’s specifications called for a 400-volt secondary instead of an 800-volt secondary center-tapped, which would be necessary to get 400 volts of output with a full-wave rectifier. After three sleepless nights trying to get the experimental model to operate on the 200 volts supplied by the new power transformer, the Chief Engineer gets the Office Boy (who is a ham in his spare time) to draw him a bridge rectifier circuit.

Sends long memo to President suggesting use of two 25Z5’s as bridge rectifier. President is somewhat hazy on the Chief Engineer’s involved vector diagrams and, as he has also forgotten about the 6,920 type 80 rectifiers still in stock, he OK’s the change and tells the Chief Engineer to make it a long-wave receiver for the export business, which is picking up. Chief Engineer sadly adds another set of r.f. and oscillator coils to cover the range from 400 to 150 kc. and thus is forced to change the intermediate frequency from 260 kc. to 465 kc. Receives memo from Purchasing Agent asking why in hex he changed the intermediate frequency the day after a shipment of five thousand 260-kr. i.f. transformers arrived from the Coil Manufacturer.

First production models show extreme instability and go into oscillation on the least provocation. Since the Foreman of the Sheet Metal Shop does not speak English, the Chief Engineer waves his arms around to show the shape of the new shielding baffles that he wants to put between the i.f. and the first-detector tubes. Misunderstanding him, the Foreman turns out a startling new triple-deck chassis, and orders $3150 worth of dies to make it. The Chief Engineer has a drawing made of the new idea and sends it up to the President, pointing out that his new development will probably triple the sensitivity of the set due to the improved shielding.

High pressure Salesman sells the Purchasing Agent a new type of loud speaker. All is well until it is found that the chassis is 3/4 of an inch too high to allow the speaker and chassis to inhabit the same cabinet at the same time. Chief Engineer saws the bottom out of the cabinet and mounts the chassis 3/4 of an inch lower. The holes in the front of the cabinet for the tuning, volume and switch controls being now out of line with the control shafts, Chief Engineer finds it necessary to mount the chassis upside down in the cabinet. Sends memo to the President pointing out that new chassis position and bottomless cabinet allow the set to be adjusted and lined up without taking the chassis out of the cabinet. President sends back memo asking how the i.f. tube and the second-detector tube are removed without removing both the chassis and speaker from the cabinet? C. E. makes front of cabinet removable in order to get at tubes.

Assistant Sales Manager writes letter from field to President asking why dealer delivery promised two months ago is not yet being made, and pointing out bitterly that delivery of new lines by three competitors in his territory has already curtailed future orders by 50%. President sends mandatory order to Production Manager to put out new models without further delay and instructs Sales Manager to lower retail price by $5 and cut dealer discounts in order to compensate for competition. Sales Manager resignedly junks $6100 worth of printed literature in connection with big dealer display program on new model in order to feature new price and so informs President. President figures rapidly that 34% more units must now be sold to make up total investment on the new model, but since this represents an increase of only 120% over their net production of last year does not feel too discouraged and prepares to leave on fishing trip to Canada just as Service Manager discovers that last two changes made in assembly by Engineering Department were unreported to him, with result that all servicing literature and instructions must be recalled and new material issued.
A Medium-Powered 'Phone-C.W. Transmitter With Pentode Power Tubes

30-Watt 'Phone—100-Watt C.W.—Three R.F. Stages—Three Or More Bands

By C. A. Harvey, W1RF* and R. M. Purinton, W1HTM**

The design of an amateur transmitter capable of delivering 100 watts to the antenna, with crystal control and other features to guarantee the best type of signal, was a complicated task a few years ago. To-day, developments in circuits and new transmitting tubes for amateur use reduce the problem to a comparatively simple one.

The transmitter to be described was built for use principally in the 3500-, 7000- and 14,000-ke. amateur bands with either 'phone or c.w. operation optional. The addition of suitable coils extends the range of the transmitter to the 28-megacycle band, while additional coils and a second crystal make possible operation at 1700 kc. The choice of circuits brought quick selection of the Tri-tet oscillator in the Universal Exciter system already described in several forms in QST.1 Two of the new 50-watt r.f. pentodes2 for the final amplifier fulfill the power requirements, operate with excitation efficiency unattainable in triode tubes, do not require neutralization and also make available suppressor-grid modulation for 'phone with a carrier power of 30 watts and 120 watts on peaks.

Prior to construction of the Universal Exciter unit, the final 100-watt amplifier was completed and tests made to determine excitation requirements. Usually, the excitation power required for a triode amplifier stage is approximately 10% of the plate input power to the excited amplifier tube. However, the power required for excitation of the r.f. pentode type tube is only some 2% of the plate input power and therefore not more than 3.5 watts are needed. The final amplifier with the two tubes operating push-pull was connected to the 59 Tri-tet oscillator with link coupling between the amplifier grid and oscillator plate coils. With the crystal oscillator operated at 3500 kc. the amplifier delivered over 100 watts at 7000 kc. using the 40-meter harmonic from the crystal oscillator for excitation. After considerable debate over the merits of this ultra-simple excitation system for two bands versus the flexible Universal Exciter for all-band operation, the latter arrangement was adopted. The amateur operating on one or two bands and not requiring quick changes to others will find the 59 Tri-tet operating "straight" or at a crystal frequency one-half the transmitted frequency ample for the excitation of one or two of the 50-watt r.f. pentode tubes.

The Universal Exciter unit is standard in circuit1 with interchangeable coils and a choice of crystal control or electron coupling in the oscillator. Two type 59 tubes are used, one as the oscillator and the second as the doubler-amplifier. The final amplifier circuit is a push-pull arrangement with parallel choke feed to each plate to eliminate the third or middle connection to the plug-in type plate coil.

The modulator uses two Type 45 tubes in push-pull with a single 56 preceding them as a microphone amplifier stage. A good single-button microphone gives ample voltage swing at the secondary of the output transformer. A double-button microphone of low sensitivity makes necessary an additional 56 speech stage, resistance coupled. Tests of both types showed sufficient voltage output with the volume level control well below maximum.

Two power supplies are used with the trans-

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* 18 Orchard Road, Brookline, Mass.
** 63 Lake Avenue, Newton Center, Mass.
1 QST, October, 1933.

Panel View of the Three-Stage Transmitter

It is rated at 100-watt output for c.w., 30-watt for 'phone with suppressor-grid modulation of its push-pull pentode final stage.

August, 1934
mitter. One 300-volt unit furnishes current to the 59 oscillator plate and screen, the 59 doubler-buffer screen and to the speech amplifier. The other power supply, a standard unit using three 83 tubes in a bridge system, furnishes 1000 volts to the final pentode amplifier plates, 300 volts to their screens and 500 volts to the 59 doubler plate. Fig. 1, showing the transmitter circuit, indicates the approximate maximum current values at these voltages.

Closed circuit jacks are included in the plate supply leads and in the C-minus lead to the final amplifier grid. Meter readings are taken by plugging one meter at a time, or several meters permanently, into these jacks. It is advisable to use a meter in the final amplifier plate circuit continuously during operation and to check the final amplifier grid current whenever any of the exciter adjustments are changed.

The constructional details which follow cover the rack units pictured, although the circuit elements lend themselves just as readily to breadboard mounting if such construction is preferred. The final amplifier tubes, in a horizontal position, should be arranged with the plane of the filament vertical (plate on edge); or they may be mounted vertically. Shielding is not absolutely necessary with the arrangement shown. R.f. leads should be short and direct.

TOP VIEW SHOWING THE PUSH-PULL FINAL STAGE USING A PAIR OF 50-WATT SCREEN-GRID PENTODES

The tuned-grid input circuit is at the left, output tank at the right

FIG. 1—THE TRANSMITTER R.F. CIRCUIT

L1, L2, L3, L4 and L5—See coil table.
C1—365-µfd. (Cardwell 407 B or equivalent).
C2—C5—150-µfd. (Cardwell 405 B or equivalent).
C6—Split-stator condenser, 130-µfd. each section (Cardwell 406 BS or equivalent).
C7—Split-stator transmitting type, 70-µfd. each section (Cardwell 413 BS or equivalent).
RFC1—2.5-mh. r.f. chokes (Hammarlund or National Type 101).
RFC2—Transmitting type r.f. choke (Hammarlund or National or equivalent).
Sw1—Two-gang two-position switch.
Sw2—Single-pole single-throw switch.
Sw3—Single-gang two-position switch.
C9—0.002-µfd.; C10—100-µfd.; C11—250-µfd.
C12—800-µfd. (All molded mica type condensers rated at 1000 volts).
R1—50,000-ohm; R2—40,000-ohm; R3—300-ohm, all 1-watt; R4—50-ohm c.t.; R5—20-ohm c.t.
J—Closed circuit jacks.
CONSTRUCTION

The mechanical assembly of parts in the exciter unit and final amplifier may follow the design shown or may be changed to suit requirements of the individual builder. The amateur who has a Tri-tet assembly may wish to construct only the amplifier. Then again, the high-power station requiring a more efficient driver for the final stage may use the final unit with modifications in mechanical layout to suit the main transmitter. The amateur who is interested only in the amplifier stage can pass over the construction and tuning data covering the Tri-tet exciter assembly.

The coil sockets in the exciter unit should be placed near the tuning condensers with the two 59 tubes between them as shown in the photograph. The two plug caps shown accommodate the cabled leads from the power supply. The switch between is for opening the cathode-to-ground connection of the 59 doubler-buffer tube for keying in this circuit. The binding post terminals at the left in the rear view of the exciter stage are terminals for the link coupling coil at position L2 and connect to similar terminals on the final amplifier mounted directly above. The crystal plugs into the rear, at the right, as shown in the photograph.

A top view of the final amplifier assembly shows the arrangement of parts and tubes. The layout is unusually simple but, nevertheless, effective. The grid coil is adjacent to the split-stator grid tuning condenser. As may be noted, the tube sockets (which should be Hammarlund or similar because of the arrangement of prong holes) are mounted on brackets attached to the grid tuning condenser frame. The tube plate caps are mounted in fuse clips connected directly to the stator terminals of the plate tuning condenser. The plate coil form plugs into jacks which are a part of the stand-off insulators visible below the coil form. No antenna connections are shown, since any of the conventional arrangements may be used.

TUNING ADJUSTMENTS

In general, the tuning procedure for this transmitter is like that used with all master-oscillator power-amplifier systems. However, certain new features are present, such as suppressor-grid modulation and the low value of excitation demanded by pentode final amplifier. These warrant complete tuning instructions although the adjustment of the transmitter is simple.

Assume, first, that the transmitter is to be used for c.w. on the 7000-kc. band. Reference to the coil table indicates that the oscillator may be used with crystal control or electron coupling at 3500 kc. with coil B1 at position L1, coil A1 at position L2, coil C3 at position L3, coil C5 at position L4 and coil C8 at position L6. With this arrange-ment the oscillator operates at 3500 kc., doubling into the grid circuit of the 59 amplifier tube which passes this frequency along to the grids of the pentode power amplifiers delivering power at 7000 kc. to the antenna. If crystal control is used, SW1 will be in the “Crystal” position and SW2 will be in the closed position connecting coil A1 (at position L3) into the circuit. SW3 will be connected to the grounded tap, placing zero potential on the power pentode suppressor grids.

With power connected and with the 1000-volt power supply cut to about 600 volts, C1 may be set with the plates approximately 25% meshed. Condenser C2 should next be tuned to make the plate current to the 59 oscillator minimum. Next adjust C3 to make the 59 amplifier plate current reach its minimum value. Following this adjustment, adjust condenser C4 to make the power pentode tubes have the highest possible grid current. Next adjust C5 to make the pentode tubes have the minimum value of plate current. Before connecting the antenna and making excitation adjustments to the final stage, connect a milliammeter in the grid circuit of the final stage and adjust C4 to the position which provides maximum current in the power pentode grid circuit. Finally, the tuning adjustments described, with the exception of any further adjustment to C4, must be repeated. Careful adjustment of each circuit is required for efficient operation.

Following the adjustment of the transmitter, the antenna load may be coupled. For testing it should be a dummy load, which may consist of a coil that will tune to the output frequency with a condenser capacity of approximately 250 μfd., in series with a standard 100-watt 110-volt lamp. Couple the load to the output plate-tank coil and go over the tuning adjustments once more. The 59 oscillator plate current should be about 15 ma., the 59 amplifier a plate current between 30 and 40 ma., the output stage grid current from 15 to 20 ma., and the output stage plate current, with proper load, approximately 160 ma.

So far nothing has been said about the adjust-
ment of screen current to the power pentode tubes. This is relatively unimportant in the 59 oscillator and amplifier but it is an accurate indicator of proper excitation in the RK-20 stage. At 300 volts screen voltage and with 45 volts considerably higher than the crystal frequency.

'PHONE OPERATION

The circuit of the modulator unit used with the transmitter is shown in Fig. 2. It is a conventional arrangement with 45's push-pull in the output stage. The push-pull stage was selected in place of a single tube to insure adequate modulating voltage across the load resistor without any possibility of distortion. A number of other tube combinations offer possibilities. For instance, a single 47 or 2A5 working into a choke with the audio output voltage applied across a 7500-ohm resistor should work well as the modulator with a single stage using a 56 tube to drive it.

For 'phone operation, $S_{w3}$ should be connected to the modulator output terminal. A meter should be placed in the suppressor circuit at the jack marked $J$ in Fig. 2. With the transmitter operating and with modulation the meter should barely show current on speech modulation peaks. The meter deflection should never be greater than 1 ma.

When $S_{w3}$ is connected to the modulator position, a negative bias of 45 volts is applied to the suppressor grids. This negative bias

negative “C” bias on this stage, the screen-grid current should be approximately 30 ma, for each tube or 60 ma. for the two. If the screen current is higher than this value, excitation should be reduced until the current is normal. At full output of 100 watts, a control-grid direct current of 15 to 18 ma. indicates ample excitation. If the control-grid current is higher than it should be, the excitation to the final stage can be reduced by lowering the plate voltage on the 59 amplifier tube.

Adjustment of the transmitter for other amateur bands should be carried out in the same manner. Reference to the circuit diagram and to the coil table shows that $S_{w3}$ should be open for output frequencies in the 1750-ko, or 3500-ko. amateur bands. The oscillator output coupling for either of these bands is the radio-frequency choke alone, and no tuning adjustments are made to condenser $C_1$.

If $S_{w3}$ is placed in the electron-coupled position, condenser $C_1$ becomes the frequency adjusting element of the transmitter and is highly important, whereas its function with Tri-tet crystal control is to control oscillator excitation, tuning circuit $L_1$ $C_1$ to a frequency

![FIG. 2—THE MODULATION CIRCUIT](image)

**TABLE I—COIL WINDING DATA**

<table>
<thead>
<tr>
<th>Coil Diameter</th>
<th>Turns Top*</th>
<th>Link Coil Turns</th>
<th>Size Wire</th>
<th>Turn Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>$A_1$</td>
<td>1½ inch</td>
<td>28</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>$A_2$</td>
<td>1½ inch</td>
<td>63</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>$A_3$</td>
<td>1½ inch</td>
<td>70</td>
<td>-</td>
<td>6*</td>
</tr>
<tr>
<td>$A_4$</td>
<td>3½ inch</td>
<td>68</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>$B_1$</td>
<td>1½ inch</td>
<td>15</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>$B_2$</td>
<td>1½ inch</td>
<td>42</td>
<td>-</td>
<td>5*</td>
</tr>
<tr>
<td>$B_3$</td>
<td>3½ inch</td>
<td>38</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>$C_1$</td>
<td>1½ inch</td>
<td>15</td>
<td>2½</td>
<td>22 d.c.</td>
</tr>
<tr>
<td>$C_2$</td>
<td>1½ inch</td>
<td>23</td>
<td>4½</td>
<td>22 d.c.</td>
</tr>
<tr>
<td>$C_3$</td>
<td>3½ inch</td>
<td>21</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>$D_1$</td>
<td>3½ inch</td>
<td>13</td>
<td>2½</td>
<td>22 d.c.</td>
</tr>
<tr>
<td>$D_2$</td>
<td>3½ inch</td>
<td>3</td>
<td>2½</td>
<td>22 d.c.</td>
</tr>
<tr>
<td>$D_3$</td>
<td>3½ inch</td>
<td>12</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>$E_1$</td>
<td>3½ inch</td>
<td>3</td>
<td>-</td>
<td>18*</td>
</tr>
<tr>
<td>$E_2$</td>
<td>3½ inch</td>
<td>5</td>
<td>-</td>
<td>12 enam.</td>
</tr>
</tbody>
</table>

* Turns from ground end of coil.

**TABLE II—COIL COMBINATIONS**

<table>
<thead>
<tr>
<th>Frequency Band</th>
<th>Tri-Tet Exciter</th>
<th>R.F. Pentode Amplifier</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$L_1$</td>
<td>$L_2$</td>
</tr>
<tr>
<td>1750 - kc.</td>
<td>$A_4$</td>
<td>$A_6$</td>
</tr>
<tr>
<td>3500 - kc.</td>
<td>$B_1$ $C_1$</td>
<td>$B_4$</td>
</tr>
<tr>
<td>7000 - kc.</td>
<td>$B_1$ $C_1$</td>
<td>$C_5$</td>
</tr>
<tr>
<td>14,000-kc.</td>
<td>$B_1$ $D_1$</td>
<td>$D_6$</td>
</tr>
<tr>
<td>28,000-kc.</td>
<td>$B_1$ $D_1$</td>
<td>$E_6$</td>
</tr>
</tbody>
</table>
will cause the plate current in the final stage to fall to approximately 60%. It should not vary appreciably from this value (approximately 100 ma.) with modulation.

Thorough tests of the transmitter have been made with a dummy load, and on the air on the 14,000-kc. band. On e.w. transmission, as well as "phone, it produces all that might be expected of the circuit and tube combination. With no initial neutralization to adjust, and with consequent freedom from interaction, the transmitter is easy to manipulate and produces a clear carrier. With this rig, "phone transmission at 20 meters has proved to be as productive of DX as with the more complicated 100-watt, Class-B modulated transmitter which it replaced. And the new circuits, and the tubes to go with them, do make the job easier.

Operating Notes

OPERATION on 56 mc. (or work in any amateur band, for that matter) is positively illegal, unless one possesses proper amateur station and operator license authorization from the United States government. In spite of mail-order catalogs and certain magazines, signals are still covered by the appropriate law. Under the Communications Act of 1934 there is the possibility of a fine not exceeding $10,000 or imprisonment not to exceed two years, or both, on conviction of operation without an amateur operator license! Also we note a number of cases in recent Decisions of the Federal Radio Commission where individuals have been barred from examination for operator privileges because of such unlawful operation. In addition, at least one amateur's station and operator licenses have been suspended for one year for permitting operation by a man unlicensed and unauthorized.

AUTOMATIC REPEATING for DX relays as suggested in July QST, involving the pick-up and retransmission of signals, brings up the problem of making proper identification of stations "at the end of each transmission and at least once in every 15 minutes," as required under Rule 384. To comply with the rules it is necessary only to devise ways where each station "rebroadcasting" in a chain take over the control at the end of each transmission and identify itself.

It is forbidden to sign a false call. Each station in a chain must be identified by its own call signal—and by no other.

The Commission, asked to suggest satisfactory procedure indicates that, if the originating station in a chain signs its call, followed by QRX AS (telegraph), or by voice transmits, THIS IS AMATEUR STATION ..., AT ..., TRANSMITTING TO ............ STAND BY FOR IDENTIFICATION OF THE RE-

LAYING STATION YOU ARE NOW RECEIVING, this followed by a gong or musical note, and this procedure inserted at the end of transmissions (at least once each 15 minutes), and if each other operator in the chain thereupon gives his own station call signal by key or microphone, that will fully meet the government's requirements.

(Continued on page 70)

Rocky Mountain Division Convention
August 25th-26th—Rocky Ford, Colo.

On to Rocky Ford, Colo., for the convention to be held under the auspices of the Rocky Ford Amateur Radio Association. Those of you who attended last year's convention at Colorado Springs will remember those luscious melons brought over by the Rocky Ford gang. Well, the convention will be held right in the heart of the melon-growing country, and they will be just ripe when we are there. Of course, there is being planned good talks and entertainment for the delegates. The headquarters will be at the Elks' Club, and the best news is the registration fee at $2.25, which covers lunch and the banquet on Saturday and a lunch the following day. The Colorado Springs gang will also stage an initiation in the R.O.W.H. Remember last year? Make A. H. Haase happy by writing him that you will be there. The address is just Rocky Ford, Colo.

Strays

Lt. Henry B. Harris, 26, research pilot of the M.I.T. meteorological group and well-known to amateur radio for his 56-mc. work on test flights last spring, was instantly killed at the Elmira, N. Y., airport at 7:45 a.m. on June 15th. The rear wheel of a glider-towing automobile in which he was a passenger collapsed, causing the car to overturn. The driver of the car suffered shoulder-blade and rib fractures, but his condition was not dangerous.

The automobile, a large touring car with top down, had towed the glider to the end of the field and the sailplane had taken off. As the brakes were applied, the car skidded on the wet grass. When the driver attempted to turn the automobile the rear wheel collapsed. The car over-turned, throwing the driver clear but pinning Harris underneath. He died of a broken neck. Mrs. Frances Harris, mother of the young pilot, was a witness of the disaster.

It was an ironic freak of fate that Lt. Harris, who was one of the best instrument flyers in the country with many hours of experience in "blind" flying and holder of several altitude and cross-country records, should have met his death as the result of so simple an accident as the breaking of a wheel on an old automobile. The New England 56-mc. gang, in particular, admired and respected him; their activities are saddened by his loss.
What the League Is Doing

League Activities, Washington Notes, Board Actions—For Your Information

As all of us know, the A.R.R.L. Board of Directors at its annual meeting made requests of the Federal Radio Commission for changes in certain amateur regulations, so as to secure new privileges for us or relax some of the handicaps on our work. The secretary presented these matters at Washington and we are now happy to say that on June 22d the Commission enacted them. Read on!

Ultra-High Frequencies

For a long time we have wanted the right to roam in the ultra-high-frequency field and, in addition to exploring 30 and 60 mc., find out what 120 and 240 and 480 mc. were like. Effective June 22d, we were given the non-exclusive right to operate at will on any frequency above 110 mc. (any wavelength below 2.727 meters). The new regulation reads as follows:

Rule 374a. The licensee of an amateur station may, subject to change upon further order, operate amateur stations on any frequency above 110,000 kilocycles, without separate licenses therefore, provided:

1. That such operation in every respect complies with the Commission’s rules governing the operation of amateur stations in the amateur service.

2. That records are maintained of all transmissions in accordance with the provisions of Rule 380.

The Commission also opened these same frequencies to the licensees of special and general experimental stations, experimental broadcasting stations and experimental visual broadcasting stations, for work pertaining to fundamental research. We may operate mobile stations there as well as fixed ones. Now for some really ultra h.f. experimenting! QST will endeavor to present some dope. Any contributions?

Mobile Operation

Heretofore we have not been permitted mobile operation except 5-meter work on aircraft. The League requested for amateurs the right to engage in general mobile work on the frequencies above 56 mc. and, as a result, amateur portable-mobile stations are now authorized on those frequencies, including the new region above 110 mc. A portable-mobile station is one so constructed that it may conveniently be moved from one mobile unit to another for communication, and that is, in fact, so moved about from time to time and ordinarily used while in motion. That language exactly covers a ham installation. F.R.C. Rule 386 has been amended to read as follows:

Rule 386. Licenses for mobile stations and portable-mobile stations will not be granted to amateurs for operation on frequencies below 56,000 kilocycles. However, the licensee of a fixed amateur station may operate portable amateur stations (Rule 192) in accordance with the provisions of Rules 384, 386 and 387; and also portable and portable-mobile amateur stations (Rules 192 and 102a) on authorized amateur frequencies above 56,000 kilocycles in accordance with Rules 384 and 386, but without regard to Rule 387.

Portable operation is not affected by this change and remains possible on the lower frequencies as well. But note that last clause, “but without regard to Rule 387.” It is not necessary to notify the radio inspector when engaging in this mobile operation, and it is no longer necessary to notify him when engaging in portable operation on frequencies above 56 mc. This will be big news for the 5-meter gang, for it eliminates a big nuisance.

Portable and Mobile Procedure

Mobile stations must indicate the call area in which they are operating, the same as portable stations. The Commission provided for this by amending Rule 384 and at the same time made a minor change to specify that the call-area indication must be given each time the call is signed. The new wording:

Rule 384. An operator of an amateur station shall transmit its assigned call at least once during each fifteen minutes of operation and at the end of each transmission. In addition, an operator of an amateur portable or portable-mobile radiotelegraph station shall transmit immediately after the call of the station, the break sign (BT) followed by the number of the amateur call area in which the portable or portable-mobile amateur station is then operating, as for example:

Example 1. Portable or portable-mobile amateur station operating in the third amateur call area calls a fixed amateur station:

W1ABC W1ABC W1ABC DE W2DEF BT3 W2DEF BT3 W2DEF BT3 AR

Example 2. Fixed amateur station answers the portable or portable-mobile amateur station:

W2DEF W2DEF W2DEF DE W1ABC W1ABC W1ABC K

Example 3. Portable or portable-mobile amateur station calls a portable or portable-mobile amateur station:

W3GHI W3GHI W3GHI DE W4JKL BT4 W4JKL BT4 W4JKL BT4 AR

If telephony is used, the call sign of the station shall be followed by an announcement of the amateur call area in which the portable or portable-mobile station is operating.

To eliminate the necessity for notifying the inspector of mobile or portable operation above 56 mc., minor changes were made in Rule 387:

Rule 387. Advance notice of all locations in which portable amateur stations will be operated shall be given by the licensee to the Inspector in Charge of the district in which the station is to be operated. Such notice shall be made by letter or other means prior to any operation contemplated and shall state the call sign, name of licensee, the date of proposed operation and the approximate locations, as by
city, town, or county. An amateur station operating under this rule shall not be operated during any period exceeding thirty days without giving further notice to the Inspector in Charge of the radio district in which the station will be operated. This rule does not apply to the operation of portable or portable-mobile amateur stations on frequencies above 100 kilocycles authorized to be used by amateur stations. (See Rule 388.)

How's all that, gang? New u.h.f., mobile on our cars, boats and roller skates, and notices to the inspector only for portable operation below 30 mc.1

Simplified Log-Keeping

For a long time we have been growing at the necessity for having two boys and a bookkeeper to be able to keep a station log in legal form, and we have tangled with some radio inspectors who wanted you fellows to make a separate entry every time you switched over to transmitting during a QSO. The League requested the Commission to simplify and clarify its requirements. This the Commission has kindly done, by completely rewriting Rule 386 to read as follows:

Rule 386. Each licensee of an amateur station shall keep an accurate log of station operation to be made available upon request by authorized Government representatives, as follows:

a. The date and time of each transmission. (The date need only be entered once for each day's operation. The expression "time of each transmission" means the time of making a call and need not be repeated during the sequence of communication which immediately follows; however, an entry shall be made in the log when "signing off" so as to show the period during which communication was carried on.)

b. The name of the person manipulating the transmitting key of a radiotelegraph transmitter or the name of the person operating a transmitter of any other type (type A-3 or A-4 emission) with statement as to type of emission. (The name need only be entered once in the log provided the log contains a statement to the effect that all transmissions were made by the person named except where otherwise stated. The name of any other person who operates the station shall be entered in the proper space for his transmissions.)

c. Call letters of the station called. (This entry need not be repeated for calls made to the same station during any sequence of communications provided the time of "signing off" is given.)

d. The input power to the oscillator, or to the final amplifier stage, where an oscillator-amplifier transmitter is employed. (This need be entered only once provided the input power is not changed.)

e. The frequency band used. (This information need be entered only once in the log for all transmissions until there is a change in frequency to another amateur band.)

f. The location of a portable or portable-mobile station at the time of each transmission. (This need be entered only once, provided the location of the station is not changed. However, suitable entry shall be made in the log upon changing location, showing the type of vehicle or mobile unit in which the station is operated, and the approximate geographical location of the station at the time of operation.)

g. The means traffic handled. (If record communications are handled in regular message form, a copy of each message sent and received shall be entered in the log or retained on file for at least one year.)

This about explains itself. The date, name of operator, power, frequency band, type of emission and location of a portable or mobile station need be entered only once until there is a change. There need be only one entry for each QSO, but it must state the time of making the first call and the time of signing off, thus showing the period during which communication was carried on. New features are the requirement to maintain copies of messages handled for one year (any kind of copy will do) and to stipulate the type of emission. Easiest way of accomplishing this latter is to use the term A-1 for c.w., A-2 for i.c.w., A-3 for 'phone, and A-4 for television or facsimile if any. Fire the bookkeepers, fellows; we have a common-sense viewpoint on log-keeping now.

More Class-A Examinations

In the west there have been many long stretches where no examinations were held by the inspectors. Take the case of Butte, Montana, for example. An amateur there wanting the Class-A privilege would have to appear in person before the inspector at Seattle or Portland or Minneapolis or Beaver—all terrific distances. Yet to many of these cities the inspector has to come twice a year to inspect commercial stations. The League requested the Commission to hold Class-A examinations in these cities under these circumstances. The Commission sharpened its pencil, figured that it would take only a little additional traveling expense to do it, and agreed. Jacksonville, Florida, was in the center of the one bad stretch in the east, and we got that included too. F.R.C. added a new paragraph to their Rule 30a, as follows:

Examinations for commercial and Class A amateur privileges will be conducted not more than twice per year in the following cities, which are not to be construed as examining cities under the rules which apply for Class B and C amateur privileges:

- Albuquerque, New Mexico
- Billings, Montana
- Bismarck, North Dakota
- Boise, Idaho
- Butte, Montana
- Jacksonville, Florida
- Little Rock, Arkansas
- Phoenix, Arizona
- Salt Lake City, Utah
- Spokane, Washington

There will be no Class-B examinations at these cities—ordinary amateur privileges are still available under Class-C by mail. 'Phone fellows in these regions who are eligible for Class-A and want to take a whack at it should communicate with the radio inspector for the district in which lies the city of their choice (see listing in Handbook or License Manual) to learn when the exams will be held.

"N" Prefix for N.C.R.

At its annual meeting the Board approved a request of the Navy Department that, under appropriate rules, the F.R.C. permit the Navy Department to let the N.C.R. fellows use the prefix "N." June 29th the Commission acted on this, the last of our Board matters to come before it, and just a day before it itself went out of existence. It adopted this new rule:

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August, 1934
384a. In the case of an amateur licensee whose station is licensed to a regularly commissioned or enlisted member of the United States Naval Reserve, the Commandant of the naval district in which such reservist resides may authorize in his discretion the use of the call letter prefix "N," or "K," assigned in lieu of the prefix "W," or "E," assigned in the license issued by the Commission, provided that such "N" prefix shall be used only when operating in the frequency bands 1715-5000 kilocycles and 2800-4000 kilocycles in accordance with instructions to be issued by the Navy Department.

So there you are, N.C.R. But please note that this is no blanket authorization and that members of N.C.R. do not have the right to start using the prefix of their own volition. It is to be governed by Navy Department regulations. That permission they may give, withold or cancel in each individual case. We understand that the right to use the prefix will be extended as a “plum” to those who attend drills and make a good record, witheld from those who do not serve loyally, canceled for unsatisfactory performance or infringement of rules. The Navy Department will issue rules for its use. Amongst other things, these rules will prohibit its use in foreign correspondence; it is to be used only when communicating with other “N,” “W” and “K” stations.

Speed

During his term as director, Barney Fuld of the Hudson Division has been in the habit of returning to New York immediately after the Board meeting, getting on the air at a crack ‘phone station, and telling his gang all about the meeting that very night. But for DX performance the records belong to Ralph Gibbons of the Northwestern Division. Three-quarters of an hour after this year’s meeting was over, Gib was in the air enroute west. Arriving in Seattle the following evening, he was telling the Northwestern bunch about the meeting in person within 24 hours of its conclusion, and on successive nights spoke to the fellows in Seattle, Tacoma and Spokane to give them the story of what the Board had done. That’s action, you’ll agree!

The New Law

The famous Radio Act of 1927 is no more. Ditto the Federal Radio Commission! On June 9th the Congress passed new legislation, known as the Communications Act of 1934, which on July 1st replaces the F.R.C. with a new Federal Communications Commission of seven members. The new F.C.C. will be in charge of wire telephony and telegraphy as well as radio. It is authorized to divide itself into not more than three divisions to handle specific activities, each division having at least three commissioners as members and being in charge of a director, appointed by the Commission, with each division in full control of its matters except that petitions for review may be filed with the full commission. Except for a few new provisions, generally minor in character and generally relating to broadcasting, the law substantially renews the Radio Act of 1927. The new commission takes over the personnel, funds and records of the old F.R.C. and all the regulations of the latter continue in force until further notice. That is to say, the radio part of the law is almost exactly the same as before and there is no change in any amateur regulation. The League kept in close touch with this legislation as it progressed and is assured that nothing in the new law adversely affects amateur radio.

Madrid Ratification

The International Telecommunication Convention of Madrid, 1932, and the General Radio Regulations annexed thereto, have now been formally ratified by the United States Government and became effective on June 12, 1934, superseding the International Radiotelegraph Convention and General Regulations of Washington, 1927. The text of the Madrid convention and regulations may be purchased from the Superintendent of Documents, Government Printing Office, Washington, at 30c per copy.

This treaty applies only to communication with foreign countries that make similar ratifications. The list of foreign countries with whom the treaty was in effect on June 16th is as follows: Australia, Belgium and colonies, Bulgaria, Canada, Czechoslovakia, Denmark, Egypt, Finland, Iceland, British India, Italy and colonies, Japan, Morocco (excepting the Spanish zone), the Netherlands and colonies, and Vatican City State. With other countries the treaty does not apply at this writing.

“Special Arrangements”

Great Britain and British India have informed the United States that they are unable to enter into an arrangement permitting amateurs to handle international third-party messages. That is nothing new, for the amateurs of those countries have always been forbidden by their licenses from handling any messages, even locally. The government of Peru, however, has accepted the proposal which our government put forward in our behalf, and a miniature treaty will be arranged soon. The existing arrangement with Canada has now been extended indefinitely, by an exchange of diplomatic notes which our government undertook at the request of the League. There is no change from the arrangement which has been in effect since 1929 but to refresh your memory we summarize it here; Canadian and United States amateurs may interchange the following kinds of third-party traffic:

1) Messages that would not normally be sent by any existing means of electrical communication, and on which no tolls must be charged.
2) Messages from other radio stations in isolated points not connected by any regular means of electrical commun...
sation; such messages to be handed to the local office of the
telegraph company by the amateur receiving station for
transmission to final destination, e.g., messages from ex-
peditions in remote points such as the Arctic, etc.
2) Messages handled by amateur stations in cases of
emergency, e.g., floods, etc., where the regular electrical
communication systems become interrupted; such messages
to be handed to the nearest point on the established com-
mercial telegraph system remaining in operation.

A.R.R.L. on the Air

Every Tuesday night at 9 o'clock Central Standard Time,
commencing June 12th and running thirteen weeks, the
National Broadcasting Company presents "The QST Program" over WEA.F and associated sta-
tions of the Red Network. Each program dramatizes some outstanding accomplishment of the
radio amateur. In addition to being well done and
immensely interesting, they are the swellest kind of
publicity for ham radio. They are all based on actual
incidents of the sort with which we all are
familiar, and are written around information supplied by A.R.R.L. Although originally in-
tended to be accompanied by a campaign to inter-
est the public in entering amateur radio, the
League has convinced the proponents of the idea
that this would be unwise and not conducive to
the creation of amateur good-will. The programs
therefore appear simply as a tribute to the skill and
resourcefulness of the amateur, with no "campaign" at all.
This is a "sustaining" program, not a paid or
"sponsored" one. The number of stations broad-
casting it varies from week to week, depending
upon the time the stations have sold for com-
cercial purposes. A typical line-up embraces WEA.F,
New York; WTIC, Hartford; WCHS, Portland, Me.; WFBR, Baltimore; WFI, Philadelphia;
W7AM, Cleveland; WWJ, Detroit; KYW, Chi-
icago; WWNC, Asheville, N. C.; WSOG, Char-
lotte, N. C.; WIS, Columbus, S. C.; WJAX,
Jacksonville; WJOD, Miami; WFLA, Tampa. If
your local station belongs to the N.B.C. Red
Network and isn't broadcasting these programs
devoted to amateur radio, it is likely they would
do so in response to popular request if they do not
have the time sold locally. The programs bring
amateur work to just that favorable public notice
that we always have wished for. Listen to them
and see if you don't think they are hot stuff.

Examinations

In the past, F.R.C. rules have provided that the
Examinations code examination for a
Class-C amateur applicant must be administered by a person possessing a
license from the F.R.C. as a radiotelegraph
operator of certain specified grades. The rule gave
no recognition to government radiotelegraph
operators, who do not need to possess licenses
from the Commission. In our territories and
possessions and in many remote parts of this
country there are skilful radiotelegraph opera-
tors in the service of the various branches of the
government, and generally they are in localities
where it is difficult to gain contact with a licensed
operator. Realizing that a change in the require-
ments would be of immense help to many ama-
teurs, particularly in Alaska, the League took up
the question with F.R.C. and on June 5th secured
a modification of the rule, which now permits
code examinations by government operators:

407. An applicant for Class-C amateur operator's privi-
leges must have his application signed in the presence of a
person authorized to administer oaths, by (1) a licensed
radiotelegraph operator other than an amateur operator
possessing only the Class C privileges or former temporary
amateur class license, or (2) by a person who can show
evidence of employment as a radiotelegraph operator in the
Government service of the United States. In either case the
radiotelegraph code examiner shall attest to the applicant's
ability to send and receive messages in plain language in the
continental Morse code (5 characters to the word) at a speed
of not less than 10 words per minute. The code certification
may be omitted if the applicant can show proof of code
ability in accordance with the preceding rule.

Examination Changes

Applicants preparing to take the amateur examination
should note that their study of the radio law should now
be in terms of the Communications Act of 1934,
rather than the Radio Act of 1927 and in terms of
F.C.C. rather than F.R.C., and that the applying
international treaty is now the Madrid Conven-
tion of 1932 rather than the Washington Conven-
tion of 1927.

Strays

If you can't remember the address of your QSL
manager, a lot of trouble in looking it up can be
avoided by putting it on the back of the envelope
which you send him for mailing cards. When a
batch of cards arrives simply turn over the en-
velope, get the address and mail another one
back.

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W5ASG

Referring to the note at the bottom of page 55,
May QST, if the substitution suggested is made
in the d.c. set, it will be necessary to insert a
blocking condenser between the "cold" end of the
ticker and ground to avoid shorting the bias
battery on the buffer stage.

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The RCA tube manual described on page 46 of
QST for January, 1934, although priced at
twenty-five cents, will be supplied free to
individual amateurs writing for copies. A tube
chart for wall mounting, Form 1275, also is
available. Requests should be addressed to RCA
Radiotron Co., Harrison, N. J. A booklet describ-
ing amateur transmitting types can be obtained
without cost from the RCA-DeForest Amateur
Radio Division, 201 North Front Street, Camden,
N. J.
A Four-Band Transportable 'Phone and C.W. Transmitter

Power and Stability in an A.C.-Operated 25-Pound Unit That Goes Places

By Frank M. Davis, W9FVM*

E
ey amateur has at some time dreamed of an ideal portable station that he can carry with him wherever he goes. The current popularity of portable 56-mc. apparatus testifies to this urge to get something working away from the home station. However, in many sections of the country 56-mc. stations are scarce and it is necessary to turn to the lower frequency bands if any portable work is to be done.

The writer has had dreams of such an ideal transmitter for some time, and several months ago it was decided to see if something couldn't be done about it. The resulting portable transmitter described herein is the result of design and construction done in spare time in senior engineering college work over a period of several months. While it is not represented that this is the ultimate ideal in portable transmitters, it does satisfy the requirements listed below in a very satisfactory manner.

For the type of work planned it was decided that the transmitter and receiver should be separate units. This decision was furthered by the fact that a good compact portable receiver was already available. Hence the transmitter only was considered in the design.

The requirements are easier to write down than to satisfy. The transmitter must have enough power output to do consistent work. It must be actually portable, by hand. It must work efficiently on the four lower frequency bands, 1.75, 3.5, 7, and 14 mc. It must be completely self-contained. It must put out a signal of good quality, preferably with crystal control. The tubes used should be inexpensive and obtainable at any radio store in order that no spares need be carried. It must be neat and rugged in construction.

Descriptions of many portable transmitters have been published in these pages, but few of them have made any attempt to give satisfactory 'phone transmission. So another requirement is set down. This transmitter must be capable of complete modulation of the full power output with good quality on any band within its range where 'phone is permitted. The description and photographs indicate the design, and show how well these requirements are met.

THE CIRCUIT

The design of the radio frequency part was not difficult. Experience indicated that r.f. power output of ten to fifteen watts would do very good work. One 46 tube as an r.f. amplifier gives this output easily, and is cheap and easily obtainable for replacement. Since operation on four bands is required, the Tri-tet crystal oscillator is the obvious choice. While good practice ordinarily dictates the use of at least one buffer stage between the oscillator and the modulated amplifier, with the Tri-tet oscillator the buffer action is supplied without resort to a separate buffer stage, an advantageous feature for portable work where the circuit must be pruned down to essentials.

Since it was planned to run the 46 at about 15 to 20 watts input, 8 to 10 watts of audio power would be necessary for complete modulation. The 58 as a Class-B modulator is the logical tube to furnish this amount of power, as it requires only moderate voltage and takes smaller space than any other tube or tubes giving the same output. This is important in keeping the size

* 1010 No. Sixth St., Monett, Mo.
down. Another 53 with elements connected for Class-A operation serves as the speech amplifier and driver. Any sensitive single-button microphone will drive the modulator to full output. The microphone battery, two flashlight cells, is contained in the set.

Two complete power supplies are used, with sufficient filter to eliminate all audible hum on the carrier. The power supply for the radio-frequency tubes uses a 375-volt transformer, T1; 82 rectifier, a small 20-henry choke and two 8-μfd. electrolytic condensers. The audio-frequency power supply uses a 335-volt transformer, T2; 80 rectifier, 30-henry choke, and a dual 8-μfd. electrolytic condenser. This transformer also carries the filaments of all tubes except the 82. Both power transformers are small and light.

MECHANICAL ARRANGEMENT

The transmitter was designed to fit in a small metal carrying case measuring 5 by 10 by 16 inches. The front panel measures about 10 by 16 inches, and there is a sub-panel, 6 by 15 inches, running along the rear, 4 inches from the bottom. It is supported by homemade sheet-metal brackets. All parts are mounted on the panel or sub-panel, and the set is designed to be removed from the carrying case during operation, to facilitate ventilation and cooling.

Attention was given in the design to the distribution of weight in order that the transformers and other heavy parts would not be grouped at one end to make the set end-heavy and hard to carry. As a result of this attention, the center of gravity of the set in the case lies directly below the carrying handle.

The radio frequency part of the circuit is mounted on the left 6 inches of the front panel, making it occupy a space about 5 by 10 by 6 inches, the layout having been tried and found satisfactory in a previous model. The knob at the lower left on the cathode condenser (excitation control), and the knob to its right controls the oscillator plate condenser. The key plugs into jacks at the bottom of the panel. The 59 oscillator tube mounts horizontally against the front panel just below the condensers, and the coils plug into jacks mounted on small standoffs on the under side of the sub-panel behind the tuning condensers. Between the coils is the mounting for two crystals. The coils may be plugged in from below, and the crystals from behind without moving the transmitter from its normal operating position.

The 46 r.f. amplifier, with its associated apparatus, is located above the sub-panel. The upper

FIG. 1—THE CIRCUIT, COMPLETE WITH MODULATION AND POWER SUPPLIES

L1—for 160-meter crystal: 38 t. No. 22 d.c.c. 13½ inch dia. for 80-meter crystal: 16 t. No. 14 d.c.c.
L2—160 meters: 30 t. No. 22 d.c.c., with 100-μfd. fixed condenser.
80 meters: 29 t. No. 18 d.c.c.
40 meters: 12 t. No. 18 d.c.c.
20 meters: 5 t. No. 18 d.c.c.
L3—160 meters: 70 t. No. 22 d.c.c. wire, center tapped.
80 meters: 44 t. No. 18 d.c.c. wire, center tapped.
40 meters: 19 t. No. 14 d.c.c. wire, center tapped.
20 meters: 8 t. No. 14 d.c.c. wire, center tapped.
L4—Antenna coil: 22 t. No. 18 d.c.c. Variable coupling between L3

All the above coils are self-supporting and are 1½-inch diameter. The excitation tap on L3 is about ½ down the coil from the plate end.

C1, C2—100-μfd. midget (Hammarlund or similar).
C3 and C4—100-μfd. (National SE-100 or similar).
C5—25-μfd. midget neutralizing condenser.
C6—0.006-μfd. mica (Sangamo or similar).
C7—0.001-μfd. mica (Sangamo or similar).
C8—250-μfd. mica (Sangamo or similar).
C9—25-volt 10-μfd. electrolytic (Aerovox or similar).
C10—8-μfd. 500-volt electrolytic condensers (Sprague or similar).
R1—50,000-ohm 1-watt.
R2—4,000-ohm 1-watt.
R3—10,000-ohm 10-watt.
R4—5,000-ohm 10-watt.
R5—250,000-ohm 1/4-watt.
R6—1,000-ohm 1/4-watt.
R7—25,000-ohm 20-watt.
T1 and T2—See text.
T3—Single-button microphone transformer.
T4—Class-B input (Collins 754X or similar).
T5—Class-B output (Collins 740Z or similar).
M1—0-150 d.c. milliammeter.
M2—0-100 d.c. milliammeter.
Ch1 and Ch2—Small replacement-type filter chokes to carry 80 to 100 ma.
Sw1 and Sw2—S.p.s.t. toggle switches.
Sw3—D.p.s.t. toggle switch.
Sw4—Milliammeter switch, d.p.d.t.

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left-hand knob controls the antenna tuning condenser, and the knob to its right is on the amplifier tank condenser. Directly behind the antenna condenser is the tank coil in its vertical plug-in mounting with the pivoted antenna coil at the top. The tube is located behind the tank condenser. The neutralizing condenser, with the knob convenient at the left end of the set, is mounted under the antenna condenser. The antenna connections are brought through "Micromite" standoff insulators mounted through the panel from behind. The panel is tapped for the mounting screws so that there are no screw heads on the front of the panel. Three terminals are provided so that either series or parallel condenser connection may be used. One antenna coil serves for all bands. Extra tank coils may be used as loading coils, and additional capacity, in the form of small 100-µfd. fixed condensers, are carried along to help out the antenna condenser when necessary.

The center part of the transmitter comprises the two power supplies. This takes a space about 4 inches along the length of the front panel. The a.f. power transformer is mounted above the sub-panel, with its dual filter condenser behind it and its filter choke above it. The r.f. power transformer is mounted below the sub-panel with the Class-A 53 cathode resistor and by-pass condenser behind it. The power transformers are fastened both to the front panel and to the sub-panel to improve the rigidity.

The remaining space, 6 inches or so, at the right of the set is occupied by rectifier tubes, audio tubes, meters, microphone battery, microphone and Class-B transformers, switches, and part of the power supply filter for the r.f. tubes. On the front panel the left-hand meter is a 0–150 d.c. milliammeter which may be connected in either the 59 or 46 plate circuit by means of the d.p.d.t. switch immediately below it. The meter at the right is a 0–100 d.c. milliammeter permanently connected in the plate supply to the modulator. Just below it is a red-jewel pilot light. At the bottom are three toggle switches. The center one is the main switch, the left-hand one controls the r.f. power supply, and the right-hand one is a d.p.s.t. switch controlling the a.f. power supply and the microphone battery simultaneously. The microphone plugs into tip jacks at the right end of the panel. At the top center of the panel is a handle for lifting the transmitter in and out of its case.

In the rear view the tubes, from left to right, are: 53 driver, 53 Class-B modulator, 80 rectifier and 82 rectifier. Next comes the dual-8 electrolytic condenser, and to its right the 46 tube and the amplifier tank coil. The microphone battery is at the top of the panel, above the audio tubes, and the audio transformers below the sub-panel. The a.c. line cord plugs into a receptacle just behind the first 53 tube.

This description supplements the pictures to give a general idea of the construction. Because of the compactness and the manner in which the parts are mounted closely together it is impossible for any photograph to show all the details.

The coils are first wound on cardboard tubing of the proper size, doped with Duco cement and then removed from the form. The self-supporting coil is then stuck with more cement on a ½-inch bakelite strip carrying a G.R.-type plug on each end. Where a third plug is required, a hole is drilled in the strip and tapped for 6–32 thread. The plug is then screwed in and the part projecting through on the other side cut off flush with the strip. When the plug is unscrewed, a soldering lug put on it, and then reinserted, the thickness of the lug prevents the screw from shorting to the coil. These coils are small, light, rugged, and easy to handle. Nine coils, giving crystal-controlled operation on four bands, are normally carried. Coils for using the 59 as an electron-coupled oscillator are also available, and are sometimes used.

IN ACTION

This little transmitter has been in operation now for about three months. It gives about 12 watts output on 40, 80, and 160 meters, and this may be 100% modulated for ‘phone work on the two latter bands. Its output on 20 meters is less, about 4 or 5 watts, but is still enough to do surprising work on both ‘phone and c.w. The quality on ‘phone depends, of course, on the type of microphone, a Universal Model W having been used successfully. The frequency characteristic taken from microphone transformer to antenna terminals shows the response to be 4 db down at 200 cycles on the lower limit, and flat to 9500 cycles (the upper limit of the test audio oscillator). A simple low-pass filter, a sort of tone control, has since been installed to reduce the unnecessary high frequency response.

The transmitter works like it should and does all that can be expected of a transmitter of its power. No loss of efficiency or output seems to
result from the compact assembly. Because of the plug-in coils and the meters permanently in the circuit, only a few seconds are required to change bands.

The transmitter is neutralized in a rather novel manner. Because of the compact construction, there are many chances for feedback and oscillation in the amplifier stage. Since only perfect neutralization will prevent this oscillation, the amplifier is neutralized until it doesn’t oscillate. The method is the simplest possible. When the key is up the oscillator tube is “dead,” but the amplifier still has its plate voltage. If it is oscillating its plate current will be higher than the six- or eight-milliampere static current. The neutralizing condenser is then varied with the key up until the amplifier plate current drops to minimum and does not change as the tank condenser is rotated. The antenna should be disconnected during this process. This point of neutralization is as definite and sharp as that obtained by use of a grid milliammeter or vacuum-tube voltmeter. With careful construction and placement of the tap the neutralization need not be changed on any band.

The static plate current of the modulator (both plates) is from 35 to 40 milliamperes, depending on the line voltage. Complete modulation of the carrier is indicated by a modulator plate current of 55 to 60 milliamperes.

Since the key is in the crystal oscillator circuit, the transmitter is completely dead when the key is up. Thus it lends itself readily to the popular “push to talk” phone communication system.

When the transmitter is in its carrying case it has two crystals and nine coils (giving operation in four bands), and the key—all contained inside the case. The microphone, line cord, 60 feet of small flexible antenna wire, a small screwdriver and a pair of pliers are carried in the lid. Of course it has some weight; but what amateur would object to carrying 25 pounds in the interest of his hobby? The transmitter alone weighs exactly 19 pounds, and the carrying case and accessories account for the other six pounds.

In conclusion, it should be said that if it were possible to pick the component parts very carefully, such a portable transmitter could be made even more compact without reduction of efficiency. In this instance, however, parts on hand were used when possible and the transmitter was made large enough to accommodate them.

Amateur Radio at World’s Fair

SINCE the first 150,000 visitors greeted the renovated A Century of Progress on its opening day last May, a steady stream of sightseers have poured over the grounds investigating the myriad wonders of the Fair. A goodly proportion of them have come in visual or aural contact with amateur radio, either at the Radio Amateur Exhibit on the second floor of the Travel and Transport building, or at the special transmitting exhibit installed in the Hall of Science Court.

Those amateurs visiting the Radio Amateur Exhibit are being permitted to operate the 750-watt 7030-kec. transmitter signing W9USA, provided they have their operator tickets with them. It is absolutely necessary to have your license with you if you plan to operate this station when you visit the Fair.

In addition to the manufacturer’s display visitors to the exhibit are regaled by several special stunts. Most striking of these is the visitor’s souvenir radiogram relay. An old spark transmitter, concealing a modern v.t. oscillator, is located in a booth giving it the appearance of a separate room. Messages are filed at this station, transmitted to the tune of the thumping spark to a receiver located in the “modern” shack, across the room, where they are transcribed on a special souvenir radiogram form and given to the sender as a memento of the Fair.

Work on the remainder of the original project was proceeding apace at the time of writing, the end of June, and by the time this is read all of the originally scheduled transmitters and exhibit stunts will probably be actively functioning. But don’t forget to bring that operator’s ticket with you when you go to the Fair; you’ll need it if you want the sensation of having your fist sign W9USA!

—C.B.D.
SOMETIMES we all forget, although usually not for very long, that there are two sexes comprising this world of ours. And through the ages, the masculine has been prone to usurp to itself all authority and all consideration. It took a good many years for women to achieve recognition in the world of affairs, woman's suffrage, and other of their triumphs. But they persevered, and eventually succeeded.

So far, we've managed to keep amateur radio essentially masculine. Oh, there have been a few YL's—perhaps a hundred and fifty or so up to last year. But we've swarmed all over the top of the heap in a plentiful majority.

Now it looks as though all that's going to be changed. The YL's and YF's are going to invade QST. In fact, they've already done so. Orders came down from the boss the other day to start a new department in the old mag, one for ladies alone (I mean, only for ladies—don't get me wrong). Shed one bitter tear, gang, for the good ol' days when you could use a kw. spark to shear the hair off your chest without violating any of the conventions. But only one—that's all the time we can spare. We must to work.

Perhaps it's not so bad, after all. As Ed McKinney, W5CJS, says, maybe we ought to get some articles in QST "for the women who are liable to be led into matrimony by a ham—and also to encourage more YL operators, whether they be prospective ham brides or not. Such a procedure would accomplish two things: a YL would find out ahead of time what being a ham's wife means and make her choice accordingly—and those women for whom it is too late would be shown how to reconcile themselves to their fate."

Well, here goes. Let's turn the meeting over to the ladies, now, and see what they have to say.

* * *

The YF Has Her Say

By Mrs. Wayland M. Groves, W5DUR

IT ALL started several years ago on a northbound interurban ... but we will pass that by. The next thing I knew I was reading letters with foreign postmarks, relating to personal visits to the shacks of KAIHR, VS1AB, VS7AP, and others. Within a year I found myself registered at a divisional convention, where I met those beings I had heard referred to as "hams." Among them was a jolly little man from Hartford named Herbert, a boy aged thirteen, and a wife (OW, YF, XYL, they say) who had just passed her operator's examination. Why so much attention to the OW who has her ticket, I wondered? She looks every bit the equal in intelligence to those hams with ears warped from wearing the cans.

The next thing I learned was that there are two kinds of licenses: one changes you from a YL to an OW, the other from a BCL to a ham. Of these two, the latter is the harder to obtain. It took two months of dah dit dah dit's (you must not say dot dash, because that is all ruled out, now) for me. When the oscillator was completed and a couple of days spent with it, I expected it to go where most oscillators go that are built for the YF. Truly, I was tired of it after that couple of days, but the OM persisted in dragging it out daily. It got to be as regular as bacon and eggs. After a month of this, we made plans to attend A Century of Progress exposition (which amounted to four days at the World-Wide ham convention and a couple of trips to W9USA at the Travel and Transport building). 'Twas a good trip, at that. A smile broke across my face as we were ready to leave, thinking that I would get to leave dear little oscillator at home. But, to my disappointment, oscillator was loaded on. When I protested, the OM said, "You're at the halfway point. You gotta practice every day now or you'll forget the code you have already learned."

"I'd rather use 'phone anyway," I replied.

The OM retorted, "Do you want to be a sissy?"

I can read every sign along the highway from Texas to Chicago in my sleep, because I had to say them all in dit dah's as we drove along (the OM said it helped to keep them on your mind). You know you are getting good when you can whistle a Burma shave sign as you go by at 50 per.

At Chicago we met all the idols of hamdom I had heard the OM speak of so many times. First, that outstanding personality Hiram Percy Maxim, Fred Schnell, John L. Reinartz, and numerous others.

After getting home, with considerable more code practice to my credit, I turned on the receiver. By all that is holy in ham radio, I was able to copy several CQ's de their calls and a few
words! This was getting interesting. I didn’t mind code practice any more. I could see I was getting better daily. At last the OM pronounced my speed 12 w.p.m. Now for the theory. Well, anyone who has crammed for school exams can get enough of that theory down in a couple of weeks so that she won’t have to worry. Fact is, I took great pains with my diagrams, etc., and made a higher grade than my OM. Hi!

A trip to Dallas, and the R.I. tuned up the oscillator. I was a bit scared, but when the oscillator got started I knew I could copy that 10 per, and I did on the first trial. Needless to say, the OM was very proud.

After several days of anxious waiting the Class B ticket arrived, and while the OM was at work I turned on the receiver. There was W5CMW CQ’ing. I threw a few switches, made a couple of haywire connections, and gave him a call. Right back he came! I got the call—but say, I thought it was this guy Joe Chaplin who won the world’s code speed contest. I guess CMW wasn’t there. After requesting a QRS, however, I did very well, and after the QSO I knew that I had been born again into a new world.

Day after day rolled by, and I wondered what could have been wrong with the F.R.C.—not sending me a own call! At last the letter from Washington arrived, and with trembling hands I opened it, realizing that I had a new name, that henceforth I was to be known as W5DUR.

My advice to the OW is to get yourself a ham ticket, and then you can understand why it is sometimes necessary to be late to meals, why wire has to be all over the living room floor, and why it never pays to dust a transmitter.

It seems that the attitude of the YF toward amateur radio is evolved from the ratio existing between the amount of money spent on that $82, or that other new gadget invented by so-and-so, and the distances between her new clothes, which soon become as much of a record as his DX. Yes, alas, the OW must suffer. Those hours spent waiting for the OM to come to meals, contrasted with the speed with which he rushes home to keep a sked. And the sympathy that’s deserved by every wife who finds acid on her new rug, and neon tubes in the baby’s mouth.

But, oh YF, there’s only one remedy, and that’s to jump in the water too. You may break a ham of the habit for a little while, but sooner or later he will go back to it. Make it a 50-50 proposition. Make him agree to a few points, like the following:

1. If he plans to locate the set in the living room, reserve at least one corner for the family.
2. When DX parties are thriving, refuse to make sandwiches and coffee after 3 a.m.
3. When you are QSO and haven’t time to prepare dinner, make him take you out to dine.

“One can buy a ham and know precisely what one is getting, but when one takes a ham husband she must go mainly by guess.”

In the August, 1931 issue of QST there was described the inauguration of the Wives and Mothers of Radio Amateurs Club in Dallas, under the chairmanship of Mrs. Frank M. Corlett, wife of the director of the West Gulf Division. Now nearly four years old, the club has been continuously active since its organization. Last February a third anniversary tea was given at the home of Mrs. W. I. Aubott, to which fifty women, including mothers of radio amateurs, were invited. A magnificent birthday cake, bearing aloft two miniature radio towers and a small station building, decorated in the A.R.R.L. colors, yellow and black, was flanked by yellow tapers in black holders. Black bowls of yellow flowers were used.

Elsewhere, to our knowledge, Wives and Mothers Clubs patterned after the original Dallas organization have been established. Members of these clubs are cordially invited to send news of their activities to the editor of QST, for possible inclusion in this department.

That invitation applies equally to all YL’s, XYL’s, and RM’s, whether already licensed, or interested in becoming licensed, or simply anxious to learn how to get along with the species. Get out your long range ammunition—the cloistered preserves of masculine ham radio have now been made public ground, and it’s “Open Season.”

THE WIVES OF RADIO AMATEURS CLUB

Left to right: Mrs. Helmar Bokeland, parliamentarian; Mrs. T. B. Gentry, chairman, visiting committee; Mrs. J. D. Vencop; Mrs. Corlett, club secretary; Mrs. W. I. Aubott, vice-president; Mrs. H. B. Sherry, club director; Mrs. Frank M. Corlett, president; Mrs. G. E. Tippett, registrar; Mrs. W. B. Ellis, treasurer; Mrs. Alfred B. Crabtree, secretary.

August, 1934
Observations on Long-Delay Radio Echoes
An Opportunity for Amateur Coöperation

By J. H. Dellinger*

SPECIAL signals are being transmitted from two European stations for the study of long-delay echoes. The signals and the whole undertaking are adapted to the participation of persons all over the world who have high-frequency receiving sets, no technical training being required.

Long-delay echoes are a most surprising and baffling phenomenon. Mr. J. Hals was listening in Norway, one day in 1927, to telegraphic signals from station PCJJ in Holland on a frequency of about 9600 kc. Some of the signals were followed, after about 3 seconds, by a faint echo or reproduction. Echo signals occurring one-seventh of a second after an emitted signal had been well known, being due to the reception of waves that had travelled all the way around the earth. But the discovery of echoes after a materially greater interval than a seventh of a second immediately raised the puzzling question of where such an echo could come from.

The phenomenon has been verified in a few scattered observations by Dutch, British, and French engineers. Echoes have been heard from 1 to 30 seconds after the emitted signal. Not enough is known, however, to determine what causes the echo signals nor how they are propagated. Two theories have been proposed. One, by Dr. C. Stormer of Norway, considers that there are streams of electrons in space some hundreds of thousands of miles out from the earth’s equator, converging in a vast toroid upon the magnetic poles of the earth, and accounting for the aurora borealis or northern lights. Dr. Stormer supposes that the signals are reflected from these electron streams in space. The other theory, by Dr. B. Van der Pol and Professor E. V. Appleton, considers that these echoes are due to a slowing up and reflection of the waves by a peculiar distribution of ionization in the very high levels of the ionosphere (that portion of the atmosphere, 65 miles and more above the surface of the earth, which is responsible for all long-distance radio transmission).

The British Broadcasting Corporation through its magazine, World-Radio, and with the aid of Professor Appleton, has just inaugurated a world-wide endeavor to learn more about these long-delay echoes. Special emissions are provided from two high-power high-frequency stations to facilitate observations by anyone who cares to listen with a high-frequency receiving set. Listeners in all parts of the world have been enrolled in the endeavor, over 10,000 of them in Great Britain. It seems likely that information of unique value to science will result, and an orderly explanation of the curious phenomenon developed, when definite data are secured on the frequencies and the times of day and season at which these echoes occur, their intensities, the area over which a given echo is heard, their relation to magnetic storms, sunspots, etc.

THE SPECIAL TRANSMISSIONS

The stations transmitting the special signals are GSB, Daventry, England, and HBL, Geneva, Switzerland (the League of Nations station). The GSB signals are transmitted on 9510 kc., with a tone or modulation of 1000 cycles per second, each Sunday, Tuesday, and Thursday, from 3:25 to 3:55 a.m., Eastern Standard Time. The HBL signals are transmitted on 6675 kc., modulated continuous waves, each Sunday, Wednesday and Friday, from 6:00 to 6:30 a.m., E.S.T. Each transmission consists of a five-minute adjusting period (GSB using phonograph music, and HBL using its call letters in code repeated) followed by the letters of the alphabet in code, spaced a minute apart. Thus, for instance, GSB transmits the letter “A” in code at 3:30, and after a minute of silence the letter “B” at 3:31, then the letter “C” at 3:32, etc., finishing with letter “Z” at 3:35. During the one-minute intervals between signals the observers listen for echoes and observe the elapsed time in seconds with a watch having a second hand. It should be noted that the GSB signals are receivable with a receiving set as used for receiving broadcast programs, but the HBL signals are unmodulated c.w. and, therefore, require an oscillating receiving set.

I would be very glad to have any successful reception of long-delay echoes in the United States reported to me, and will relay the information to the British authorities who are coordinating the investigation for the world as a whole. Observers should give the identifying letter of the signal observed, the time to the nearest second at which the direct signal was heard, the time to the nearest second at which the echo was heard, an estimate of the relative intensities of direct signal and echo, a description of the sharpness or apparent shape of the echo, and any pertinent information on interference, fading of signals, etc.

(Continued on page 88)
A STOCK BROKER took to ham radio; but there was a background that provided the reason. In 1922 Paul H. Davis, now 45, senior partner of Paul H. Davis & Co., past-president of the Chicago Stock Exchange, built an untuned “transmitter” using a Kidder medical induction coil excited by a bank of salamonomic cells and transmitted 30 feet to a coherer in a neighbor’s home. In 1909–1910 a small spark set was built at the University of Chicago with Coleman Clark (now champion ping pong player). Then for ten years Paul’s interest in radio was purely academic, but with the advent of broadcasting the usual set-building commenced. In 1925 he was elected vice-president of the C.R.T.A. In 1930 his eldest son, W9ADU, went to the Arctic with MacMillan, and a transmitter was built to keep in touch with him. Now there is a ½-kw. c.e. job on 3.5 and 7, and a 200-watt 1.7-mc. ‘phone at W9GES-W9BT. The current interest is 56 mc. For two years he has represented A Century of Progress in connection with amateur activities. Added to W9ADU there’s a daughter who knows the code, and a 9-year-old son who’s boding for the license exam—even Mrs. Davis likes to sit in when the station’s on the air. Kenilworth boasts at least one 100% radio-minded family!

THOSE who roam the world with key and microphone will feel a sympathetic envy for J. L. A. McLaughlin, just returned from two leisurely years spent circumnavigating the southern girdle of the world. He, too, once visited the remote spots of the earth in spirit, as 2AKP. In mid-1932, having tired of such mundane pursuits as being chief engineer of radio stations and receiver manufacturers (old timers will recall his original one-control neutraldyne and super) or serving as assistant to the art director of the old Roxy theatre, he hied himself westward to ‘Tahiti. There he acquired the nickname “Panther” and the seed of the South Sea nostalgia that now grips him. He shipped with four Brits (hers) in the 65 ft. ketch “Vanora” and roamed the Pacific—Fiji, Pago Pago, Suva, Brunei, Singapore, Pulau Bukum and Swalborg, Mauritius, and then Durban. Now he’s back, but we strongly suspect that Boston, New York, Hartford are just further ports of call for this ham who went to see for himself the places he once worked.

AMONG the claims to fame of Ed Harris of Hugo, Oklahoma, in addition to the dominance of his call, W5TW, over southwestern airways, are his double filament test tube audion, and the fact that he has a copy of every QST ever printed. Now 29, he started in wireless in 1912 with a spark coil and crystal detector. In 1919 when the Navy Department said “Go!” in he went with a 1-kw. rotary spark gap ‘n’ everything. In the autumn of ’20 this gave way to the ubiquitous “5 watter,” followed by a continuous series of displacements until now there is a 100-watt five-stage a.c. job. But if you listen much on 40 meters you’re probably already well aware of that.

BOY SCOUTS and amateur radio constitute a fortunate combination, as has been discovered by national scout executives recently. W. Howard Moffat, W5CWC, has known this for several years. An Eagle scout, mate of the local Sea Scout ship, as well as a radio amateur since 1920 and an ensign in the NCR, he has combined the activities for a number of years past, notably in providing amateur radio communications at summer scout camps in the Choctaw area, down near Meridian, Mississippi. Moffat started the idea in 1925, as portable 5AGM, which was operated for two seasons at Camp Binachi. College interfered for four years; now W5CWC links Binachi and Meridian each year.
Typical Technical Questions Answered


Q. No. 1:
How may the maximum plate voltage swing of a Class-A amplifier be computed?

A. No. 1:
One method of determining this value approximately, is to take the square root of the product of the rated load resistance, and undistorted power output of the tube.

Example:
Type '45 tube.
Plate voltage, 275 volts.
Optimum load resistance, 4600 ohms.
Power output, 2 watts.
Maximum r.m.s. voltage developed across the load = \( \sqrt{4600 \times 2} \approx 06 \) volts r.m.s. The peak value is obtained by multiplying this value by 1.4, which gives 134 volts for the peak swing either side of the operating point (total swing, 268 volts).

Q. No. 2:
Will you please make clear to me how an electron-coupled frequency meter can be used as a monitor when the coil in the meter is wound for only one band? For instance, how is it possible to hear a 7000-ke. signal using a monitor with a 1750-ke. coil?

A. No. 2:
The reason that a 7000-ke. signal may be heard in a monitor tuned to 1750 kc. is that the fourth harmonic of the monitor oscillator heterodynes the 7000-ke. signal to produce the beat note in the plate circuit of the monitor. A 1750-ke. tuned circuit will have appreciable, though small, impedance at the higher frequencies and will, therefore, detect signals at its harmonies if they are of sufficient strength.

Q. No. 3:
I have constructed a push-pull self-exited transmitter, but have encountered considerable trouble in “balancing” it. A neon bulb touched at either end shows considerable more r.f. at one end than at the other. All wiring is perfectly symmetrical, and switching the tubes causes no change in the condition. A single-stator tank condenser is used. What is the cause of this?

A. No. 3:
Unless one side of the tank is near a grounded conductor (such as shielding), if the wiring is perfectly symmetrical, the coil center-tap properly located and the tubes in good condition, it is probable that the circuit is really “balanced” satisfactorily even though the neon lamp test does not indicate that this is true. The reason is that the hand capacity to one side of the single-stator tank condenser may be sufficiently different from that to the other side to cause the neon bulb to give a misleading indication.

Q. No. 4:
Having built the three-tube autodyne receiver described in QST for January 1933, and also in the last two editions of The Radio Amateur’s Handbook (p. 57, 11th edition), I have experienced trouble from the r.f. amplifier which oscillates when the r.f. gain control is turned down. Upon investigation, I find that the screen voltage varies from 50 to 175 volts as the r.f. gain control is varied from minimum to maximum. Why does the screen voltage vary and what causes the instability of the r.f. amplifier?

A. No. 4:
Although we did not run into trouble with oscillation in the original model of this receiver, it is quite possible that variation in screen voltage might be experienced. Such a variation might, in certain instances, cause instability of the amplifier. As the gain control is varied, the grid bias of the r.f. tube is varied, which will cause a change in screen current. This change in current will cause a proportional change in the voltage drop across the series voltage dropping resistor which in turn will cause a variation in screen voltage. This variation might be practically eliminated by securing the screen voltage from the voltage divider. This could be done by substituting two 7000-ohm resistors for the 14,000-ohm resistor \( R_s \) and connecting the screen to the junction of the two 7000-ohm resistors.

Q. No. 5:
May the antenna and feeder lengths be of any convenient dimensions when used with the universal antenna coupler as described in QST for February?

A. No. 5:
It should be possible to put power into an antenna system of any antenna length and feeder length, within reason in respect to the frequency used. However, as the original article definitely states, the radiating properties of an antenna system still depend upon the usual requirements for a good radiator, irrespective of the type of coupling. For best radiating properties, the
antenna proper should be cut and erected as carefully as with other coupling systems. It is only in the feeders, such as those of a Zepp system, that the dimensions are less critical. With the more usual type of coupling, tuned feeders should be cut in approximate lengths of quarterwaves. This, however, becomes unnecessary when using the impedance matching network, and the feeder length may be the most convenient.

Q. No. 6:
When using the universal antenna coupling network, the final amplifier oscillates. What may the trouble be?
A. No. 6: *
It may be that with the network improperly adjusted, capacities are introduced which disturb the neutralization of the amplifier. When the network has been finally adjusted, however, it should appear as a pure resistance across the output tank circuit and should not disturb the neutralization of the amplifier.

--D. H. M.

Visit the Clubs

A GOOD many hundred amateur radio clubs throughout the United States and Canada are affiliated with A.R.R.L. At headquarters we have recorded the addresses of these clubs, their places and times of meeting. Clubs are splendid places to get acquainted with other amateurs and to participate in interesting discussions on amateur radio. Do you want to be put in touch with a club in your vicinity? Would you like to attend a club meeting in another city you are visiting? Address the Communications Manager (enclosing 3¢ stamp, please) for data on Affiliated Clubs in your vicinity.

Saskatchewan Hamfest Well Attended

IN THE U. S. we outnumber Canadian hams by more than thirty to one. When as many as 75 VE's attend a hamfest at Moose Jaw, Saskatchewan, it means something. From the four corners of the province they came, on June 7th, to the Moose Jaw Amateur Radio Club Hamfest, to make the affair one of the most rousing ever held in that region.

Varied entertainment was provided throughout the day, the routine skillfully organized by Allan Saunders, president of the club, J. Heddle Sinclair, secretary-treasurer, and an entertainment committee comprising Fred Ward, Austin Capper, and Tom Holby. The morning hours were given over to registration and a general get-together, in which much of the pent-up steam of many hamfestless months was released. Luncheon put a period to this phase of the proceedings.

At two o'clock in the afternoon several groups went their respective ways, some to the Nataatorium, some to the Wild Animal Park. Later the members gathered in a body to visit the National Light and Power Company's plant, and, still later, inspect the transmitting studio and remote control equipment of OHAB. At this point we must not forget the exhibit of amateur gear in the C.P.R. dining hall, where more than 100 pieces of apparatus, receivers, monitors, freq-meters, from 1-tube DX'ers to multi-stage jobs, were displayed by the proud owners.

The evening schedule was a heavy one. W. R. Pottle, chief radio inspector for Saskatchewan, traced the development of radio. W. Skaife, of Regina, VE4EL and SCM for Saskatchewan, talked on traffic. J. C. Stephen, local Department of Marine radio inspector, told of amateur aid to radio science. Harold D. Tee, Marine Department inspector for Saskatoon, boosted his home area.

Following the royal toast, proposed by W. R. Pottle, Heddle Sinclair gave "To the Visitors"; the reply came from Ed Swain of Regina. William Rogers proposed a toast to the c.w. men; not to be outdone, E. J. Mehlhoff toasted the 'phone men. Edward Holmes eventually concluded with a tribute to those who had passed on, "To Silent Keys."

The Moose Jaw gang feel justly proud of their success. After all, they say they had a real depression in Saskatchewan. And the fact that this affair was the biggest one ever certainly proves something or other, they feel.

--C. B. D.

Strays

From a newspaper clipping sent in by W. G. Blaha of Cleveland, we learn that different sounds made in laughing indicate varying degrees of mirth. The syllable "hi" (pronounced "high"), for instance, shows a dislike of laughter and a desire to avoid it. Must be some truth in it, for most of the "hi hi" performances heard on the 'phone bands give the casual listener just that impression.

August, 1934
Stabilized 56-Mc. Transmitters

In a recent program of experimental work on 56-mc. transmitters carried out by QST’s Technical Staff, considerable work was done in the attempt to obtain a high degree of stability with a single transmitting tube. The circuits showing greatest promise followed closely those described by J. C. W. Drabble and R. A. Yeo in The Wireless Engineer & Experimental Wireless for December, 1933. In general the arrangements consisted of an electron-coupled oscillator with the suppressor grid operated at ground r.f. potential and supplied with the modulating voltage. The input circuit of the oscillator was operated either at output frequency (in which case the tube was neutralized) or at one-half or one-third the output frequency. The complete freedom from frequency modulation suggested by the authors above-mentioned was not attained. Nevertheless, the circuits showed a considerable improvement over the ordinary modulated oscillator and doubtless hold some promise for the future. They present a splendid field for experiment.

The input circuit of the transmitter may be either the Colpitts of Fig. 1 or the Hartley of Fig. 2. Both appear to be effective. The remaining circuit features and constants represent an approach to normal practice, and need no further mention. The use of a suppressor at “ground” r.f. potential and the screen above ground would seem to be desirable in order to avoid having any cathode current common both to the input and output circuits of the transmitter—as is the case in the normal electron-coupled circuit of to-day. The tubes used with some success included the Types 58, 59, RK20.

—R. A. H.

An Ingenious Bug

A home-made bug which eliminates the machine shop, mechanical engineers, cranes, etc., which are usually required in the making of even the simplest home-made bug, is being used here at W6AVQ; and although it has a rather strange and startling appearance, it works quite decently and can be made in any well-equipped kitchen or bathroom with very little struggle.

Briefly, the idea is to use a straight key set up on its right side with a couple of angles for the main part of the animal, and screw the vibrating spring onto the end of the arm. Thus in one sweep the tough question of bearings, main arm and one of the springs is disposed of.

Fig. 3 gives all the necessary details. The universal clips used for weights are easily adjustable for various speeds. They are the type our Hartleys used to bristle with when Hull got on the job. The angles are from the 5 & 10. The light spring carrying the dot contact is a prong contact from a Benjamin spring socket. Almost any light spring would do here. The vibrator spring is a one-inch piece of half-inch corest stay, with one-quarter inch bent at a right angle (it must be bent slowly as it is brittle) and drilled or punched at the unbent end for the back adjustment screw on the key. It is clamped under the locknut on this screw. The screw is lock-nutted to the bent end of the vibrator spring; a hole should be punched and the vibrating arm fastened securely. The rubber band balances the tension of spring near the dash contact so that the arm comes back to a middle position after a flock of dots. A light spring under the adjusting screw at the back of the key would look less queer, undoubtedly. The two sets of contacts should, of course, be connected in parallel.

It was necessary to solder over each of the contacts on the dash end, making a solder to solder

QST for
contact, as the high resistance of whatever Signal uses in his contacts made the dashes sound different from the dots (which have a low resistance path) in my monitor. A piece of cork glued to the under side of the regular knob makes the dot knob.

The adjustments of the thing call for much cut-and-try. The rubber band, the dash spring and the set screw at the back of the key are adjusted for about one-eighth-inch swing on the dot side and one-sixteenth on the dash side, with enough tension on each spring to bring the bar back firmly to the middle position. With the bar all the way over in the dot position, the contacts should touch with a slight tension on the spring carrying the dot contact. This makes a heavy dot. But the adjustments of home-made bugs have been explained many times; there is nothing different about this bug except the use of the straight key, which really makes the home-made bug a simple matter any ham can build. No more glass arms.

--Frank Sullivan, W6AVQ

Magnets for the Velocity Microphone

Where to get permanent magnets for home-made velocity microphones? Here is one answer, supplied by Paul R. Smith, W8FHB, Bradner, Ohio:

“A recent issue of QST gave data concerning the construction and operation of a ham-built velocity microphone of the permanent magnet type. This was the very thing I had been looking for, but upon inquiring my stock of parts I found nothing that would be of any value. One day, quite by accident, I found a substitute which is easy to construct and at the same time very rugged. It is the last word in simplicity since there is no machining of parts.

“The drawing of Fig. 4 shows the construction of a microphone using a permanent magnet of a special type—a drag-magnet taken from a watt-hour meter. Magnets of this type should be easily obtained by hams who are on good terms with a power company. The spacing between the poles is originally about one-eighth inch, which is not wide enough for the ribbon. Therefore the poles must be separated far enough to admit a 3⁄4-inch bakelite strip to which the ribbon is fastened by the washer-nut combinations at each end. The mechanical tension of the magnet is ample to hold the strip permanently in position.

“An improvement can be made by drilling the strip full of holes to allow free passage of air past the ribbon. These should be as large and as close together as possible without endangering the mechanical strength of the strip. A tinfoil ribbon is in use at W8FHB. It can be made quite accurately if a little time and patience are used in shaping it.

“No means of checking the quality is available here except the usual ham method of hooking it up and listening. However, on various musical tones, all appear to register equally well. The mike-to-grid transformer described in a former QST is used in this rig.”

A similar use for another type of watt-hour meter magnet was suggested independently by E. R. Patchen, of Lakeville, Conn. A sketch of a magnet of this type is shown in Fig. 5. These measure approximately 2 3⁄4 inches by 2 inches, and the bar is about 3⁄4-inch thick. The gap is too small to accommodate a ribbon of ordinary construction and must be widened to 3⁄4-inch by cutting off a small portion of the vertical arm. This may be done with carborundum wheel.

In making the microphone a number of the magnets are stacked to take care of the ribbon length used. They may be clamped together in any convenient fashion. It is necessary to check

FIG. 3—A BUG KEY MADE FROM AN ORDINARY HAND KEY

FIG. 4—SIMPLE VELOCITY MICROPHONE USING A DRAG-MAGNET FROM A WATT-HOUR METER

The ribbon, not shown, is suspended between the machine screws at the ends of the bakelite strip.
the polarities, since the magnets are furnished in pairs for each watt-hour meter and the individual magnets of each pair are oppositely polarized. Mr. Patchen states that most power companies have plenty of these magnets on hand, since they are frequently removed from meters brought in for checking and recalibration.

**Portable Feeders**

Fig. 6 indicates a convenient type of feeder for portable 50-mc. work suggested by H. P. Chandler, W3AKE, Springfield, Pa. The feeders—W3AKE uses No. 18 rubber-covered wire—are sewed into a piece of heavy composition cloth or canvas of the type used for roadster tops so that the spacing between the wires is two inches. This requires a three-inch wide piece of cloth, allowing a half-inch lap at each edge for stitching. The feeders may be any length desired depending upon the type of tuning employed. Those used by W3AKE are five feet long, and couple into a Picard-type antenna. Odd multiples of four feet would be satisfactory for Zepp feeders if series tuning is to be used.

The advantages of this arrangement are obvious. The wires are kept uniformly spaced providing heavy canvas is used, require no insulating spacers, and do not twist in a breeze. If the wire is flexible the whole feeder system can be rolled up in a few seconds when it's time to move to a new location.

_A “Marconi-Zepp”_

Another method of operating an antenna on the next lower frequency band than its fundamental as a half-wave Hertz is suggested by George Underwood, W1GPE, of North Providence, R. I., in the letter below. The efficiency of the radiator should be as good, if not better, than with those arrangements which call upon Zepp feeders to do part of the radiating. With W1GPE's system the feeders continue to act as such—they do not radiate. Here is the story:

**Fig. 7—Grounding the Far End of a Zepp Antenna Permits Working It as a Quarter-Wave Marconi with End Feed**

With this arrangement, used for operating an antenna on a lower frequency than its fundamental as a half-wave Hertz, the feeders do not radiate.

"For the past six months I have been experimenting with all sorts of antennas including one system I have used experimentally, but which I have not seen published. I'd call it a 'Marconi-Zepp.' The diagram is given in Fig. 7.

"With this system a Zepp designed for 80 can be used on 160, or one designed for 40 could be used on 80, etc. It has another desirable feature in that it can be tuned exactly, both feeders and flat-top. Possibly the best feature I found was that one could still use feeders with a Marconi antenna, and thus do away with feed-back difficulties usually accompanying radiating feeder systems when used on 'phone. Also neutralization remains FB, while it is often disturbed somewhat by a radiating feeder. Plenty of fellows with small backyards can use it to advantage, since the flat-top is only a quarter-wave affair.

"Accurate tuning of the flat-top is a little ticklish, and calls for a bit more care than with an ordinary Zepp. First, the system should be tuned at the transmitter end with condenser C1..."
set about midway. Observe the current in each feeder. If they balance everything is OK. If not, the flat-top will call for some tuning, which is done with $C_1$. $C_1$ should be fairly high in capacity to assure wide tolerance. About 350 microfarads is used here. Increasing or decreasing the capacity of $C_1$ will move the current loop on the feeders around, and when it is in the center of the coupling coil—where it should be—the feeder currents will balance, and cancellation will result.

"This antenna worked very well on 80 meters (the antenna being designed for 40) although I must add that I never have had the luck in DX with a Marconi that I’ve had with a half-wave strung up in the sky."

The idea can be carried a bit further by making the length of the antenna between the end of the feeder and the connection to $C_1$ equal to a half-wave for the next higher frequency band and installing a switch at $C_1$ so that the condenser and ground connection can be cut off when the antenna is to operate as a half-wave Zep. The length of lead between $C_1$ and ground can be anything convenient provided the total length of the system is not more than three-eighths of a wavelength, since the series condenser will shorten the electrical length.

Plugs and Jacks for Automatic Feeder Switching

Fig. 8 shows a set of diagrams for plug-in tank and antenna coils for a transmitter. The idea is to have automatic choice of series or parallel tuning as coils are changed. In building an amplifier for the Five-Band Exciter I wanted to make band changing in the amplifier as simple as that in the exciter, hence the brainstorm.

"A" shows the connections to jacks 1, 2, 3 and 4; jacks 5, 6 and 7 are connected to the tank circuit and are always connected to plugs 5, 6 and 7 respectively.

The arrangement in "B" is for series tuning using a single condenser. "D" shows the connections for series tuning using a condenser in each feeder. "C" gives the wiring for parallel tuning.

The unused plugs can be omitted from the coils, but it would be advisable to drill all holes on each form so that plugs and connections can be changed should a change in feeder length make necessary a different method of tuning.

The expense of using this method instead of the usual arrangement with five jacks and plugs, is very small—only two extra jacks are required, together with one extra plug on the coils for those bands on which parallel tuning is used.

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Charles H. Robinson, W1GHS

Next Year's Model

(Continued from page 40)

As President is boarding train, telegram is handed him from Vice-President in attendance at RMA Convention, where it has been decided that in interests of stabilization of the industry no new home models be introduced during balance of year, but instead that vigorous campaign be launched to popularize automobile radio.

President goes fishing. Chief Engineer goes nuts.

Strays

We hear that at the South Bend ham-fest John Reinartz, W1QF, won a prize which he offered at once to swap with the winner of the next one drawn. And the next thing pulled out of the hat was "How to Become a Radio Amateur"! Good work, John—all you need now is a License Manual!

Several requests have been received for separate copies of the frontispiece in May QST of Hiram P. Maxim. To supply this want we have had a supply printed on excellent coated paper with a special ink. When thoroughly dry these were shipped to New York and run through a pebbling machine. The final portrait is very effective and will be sent postpaid to any person desiring a copy. A charge of 10 cents (no stamps) is made to cover packing and mailing.

Copies of May QST are becoming increasingly scarce. Anyone desiring another copy of the Anniversary Number of QST may have same by addressing the Circulation Department and enclosing 25 cents.
W2GOX, North Arlington, N. J.

They always come back"—even if a fellow's been out of the game a matter of decades instead of years. Back in 1908 John E. Preston built his first ham station. The next year found him a commercial operator, a profession which he followed until 1914, when he dropped out of radio—for good, it seemed. But after twenty years of quiescence, the bug got in its fine work again, and now we find him back on the air as the owner of W2GOX, put into operation in February of this year. And from the looks of the photograph, no time has been wasted in getting together equipment of the most modern design.

The transmitter at the right in the photograph is a Collins 300-A, operated with inputs up to 600 watts. It uses a pair of 203-A's in the output stage. On the operating desk, at the left, is a National AGSX receiver, relay-rack mounted with power supply, loud-speaker and extra-coil panels. To its left is a Postal Booster, which adds two more stages of pre-selection to the receiver. A heterodyne frequency meter and control-switch are set into the opposite ends of the table below the operating surface.

In the short time that W2GOX has been on the air 45 countries have been worked, and WAC has been made four times over. The station works exclusively on 14 mc., using a 66-foot copper-tubing center-fed antenna. Steel cable run through the tubing keeps the radiator safely up in the air between two 60-foot poles. A nightly schedule with K6IDK has been maintained for some time, W2GOX's signals usually being reported R8. Similar reports are regularly received from Europe and New Zealand.

W1DNF, Taunton, Mass.

The number of amateurs that started out in the game with the classic pair of 45's in push-pull must be legion. W1DNF, owned by Joseph T. Plonka of Taunton, Mass., first went on the air with such an outfit, but has long since graduated to a rig considerably more complicated and effective.

The frame-mounted transmitter at the left in the photograph is a "phone-c.w. set working on 14, 7 and 3.5 mc. It uses a 47 crystal oscillator, a buffer doubler stage with a 46, a 10 second buffer doubler, and a Western Electric 242-A final amplifier. Two plate supplies are used, one handling the first three tubes on the transmitter, the second the final amplifier. A power-pack supplies bias for the last stage. Inputs up to 300 watts are used on c.w.

The modulator is the unit at the left on the operating table. Two speech-amplifier stages using 56's follow the Universal double-button microphone; the third speech stage has a pair of 45's in push-pull which in turn drive the Class-B modulator, a pair of 10's. The modulator operates at 750 volts, and gives sufficient audio power to modulate an input of 120 watts on the Class-C stage.
The receiver is an FBX-A. W1DNF also has a 56-mc. outfit using the popular 37-37-38 superregenerative receiver circuit and a pair of 71-A's for the transmitter. This equipment, however, does not appear in the photograph.

W6HOG, Glendale, Calif.

Another old-timer is Frank W. Allen, now W6HOG, but originally 9DCF, which call was issued to him in 1920. Allen has been active in either amateur or commercial radio during the intervening years, holding various calls during that time. W6HOG is maintained chiefly for experimental work and rag chewing.

The transmitter, at the left in the photograph, is a crystal job starting out with a 47 oscillator, followed by a 10 doubler, 203-A buffer, and a final amplifier using an 852. The final stage can be operated on either 7 or 14 mc., using the 203-A as a doubler for work on the latter band. The several crystals used are kept at constant temperature in a crystal oven. Keying is done in the primary of the power transformer of the final stage, a method which is effective in preventing clicks in a broadcast receiver in the same building, despite the fact that inputs up to 400 watts are used.

The receiver, which occupies the center of interest on the operating table, is a Hammarlund Comet Pro. To its right is an electron-coupled frequency-meter-monitor, arranged with a switch which transfers the phones to the monitor at the same instant the transmitter is turned on, thus giving continuous monitoring of the transmitted signal. A three-tube regenerative receiver also is used in conjunction with the Pro, both being used with a doubler receiving antenna.

VE3EU, Toronto, Ontario

VE3EU, the station of Charles E. Mullaney, 626 Pape Ave., Toronto, Ont., is shown in the two accompanying photographs, one of which is a view of the operating table and the other of the transmitter.

The transmitter, which is housed in an angle-iron frame, consists of a 47 crystal oscillator, 10 buffer, and a 211-D final amplifier, the latter being run at 125 watts input. C.w. work is carried on chiefly in the 7000-ke. band, using a 66-foot current-fed Hertz antenna. Considerable phone work is done on 1750-ke., for which band a 133-foot Zepp antenna is used. The speech equipment includes a double-button microphone, a transformer-coupled amplifier using a 27 and 47, and a modulator consisting of two 211-E's in parallel, Class A.

A National FB-7 superhet is used for receiving. Next to it on the table is a combined frequency meter-monitor, using a 24-A electron-coupled oscillator and a 56 detector. A home-made power supply for the receiver is behind this unit.

Several countries in North and South America have been worked on 7-mc. c.w.

Correction

In Fig. 1, the circuit diagram of the two-tube receiver given on page 11, June QST. be 2000 ohms; the 75-ohm center-tapped resistor is R8. R9 and R10 in Fig. 1, page 41 of the June issue, should each be 25 megohms instead of .25 megohm. Fig. 1 is the diagram of the a.c. operated head amplifier.
The Amateur Regulations of the World

The most significant occurrence in international amateur radio during the past year has been the increase in the privileges enjoyed by the amateurs of so many nations, particularly in Europe. Where a year ago only a relatively small percentage of the treaty bands were actually available to amateur occupancy in many of these countries, at the time of writing the majority of the major nations of the earth now permit the use by their amateurs of practically the entire territory reserved for them by the Madrid treaty.

To emphasize this point, and to make generally available information of value to every internationally-minded amateur, this department will this month be devoted to a summary of the existing amateur regulations in fourteen representative nations. In addition to the specific details it contains concerning individual countries, this report can be regarded as representing an accurate cross-section of governmental opinion concerning amateur radio throughout the world.

First, Belgium. Until the first of this year amateur radio in Belgium was practically without official recognition, as a result of a drastic change in the amateur licensing situation following upon the restrictive recommendations of The Hague C.C.I.R. meeting in 1929. To-day, the following bands are generally permitted: 3518–3553, 7035–7264, 14,070–14,328, 28,140–29, 850, 56, 280 and above. Telephony is permitted on all bands. Special authorization for operation on 1750 kc. can be obtained. Operator licenses only are required; there is an adequate examination; the fee for a combined operator-station license is 75 francs for 10 watts, 150 fr. for 50 watts. The hours of working are restricted as follows: Week days, 0000–1100, 1400–1600, 2300–2400, local time. Sundays, 0000–1100, 2300–2400. Pure d.c. is required; no frequency modulation with 'phone. Automatic sending, but no automatic reception, is permitted. No relaying of messages is tolerated, whether of a private or scientific nature. There are 370 active stations.

In Czechoslovakia the bands are 3500–3600, 7000–7300, 14,000–14,400, and 28,000–30,000 kc. The 1750-ke. band is unqualifiedly denied. The fee for the operator's license is 200–Kč. Station licenses are free. A maximum input of 50 watts is specified. No third-party traffic is permitted. There are 105 licensed transmitters, according to the C.A.V.

In Germany all of the higher frequency bands are available to treaty limits; the 3500-ke. band extends only to 3600 kc., and 1715 kc. is denied. No amateur telephony is permitted. The combined operator-station license is issued by the German Reichspost, after examination of the applicant by the D.A.S.D., the fee being RM 2.00 per month. Maximum input is 50 watts; pure d.c. supply. Tone modulation is permitted by the government, but banned by the D.A.S.D. No third-party traffic is permitted. Latest available reports indicate that there are about 300 licensed stations.

In Great Britain, general operation is permitted on 1730–1085, 7025–7275, and 14,030–14,370 kc. R.S.G.B. stations can operate from 3520 to 3730 kc. On special application, the bands 28,050–29,950 and 56,070–59,930 are available. The 3500-ke. region is available for daily use only in the months from October to May; during the remaining four months operation is restricted to the period 1500 G.T. Saturdays to 2400 G.T. Sundays. Operators must pass
an examination; the fee is 5/-.

Power is unlimited, within treaty limits, upon individual authorization; the normal license is for 10 watts, fee £1 per annum plus 10/- initial registration. Increases of power irrespective of amount cost an extra £1 per year, plus 10/- for initial registration. R.S.G.B. recommends applicants for increased power; approximately 40% of its 750 licensed members are licensed to use more than 10 watts. A year’s experience is ordinarily required before increase; the increase is then to 50 watts. Pure d.c. must be used. No third-party traffic is permitted.

The Irish Free State permits general operation in the 1750-, 7000-, and 14,000-kc. treaty bands; operation in the remaining bands is permissible upon special application. Telephony is permitted in all bands. The operator’s license fee is 5/-, the station license fee £3 for the first year, £1 thereafter. The maximum power is 10 watts, although special permission may be obtained for higher power. No third-party traffic is permitted.

Italy is the one major power which does not now permit amateur radio. It is interesting from the political standpoint, in that this intolerant attitude seems to derive from the Fascist government, while in Germany the Nazis have been notably liberal toward amateur radio, the attitudes in both countries being in direct contrast to that exhibited by previous regimes. There is some hope that the situation in Italy, too, will be liberalized some time in the future. Meanwhile, one or two “pirates” continue active, without apparent molestation.

The Mexican government permits all the treaty bands, as in the U.S. Emissions must be a.w.; the maximum power is 1 kw. There are no fees. Third-party traffic is at present limited to contacts with expeditions; this provision will, it is expected, be liberalized shortly. There are over 150 licensed transmitters.

In New Zealand, beginners start out on the 1.75- and 3.5-mc. bands, graduating after six months to the higher frequency bands upon special permission from the authorities. Telegraphy is permitted on all bands except 7 and 14 mc. Outputs of 100 watts can be used. The operator’s license fee is 5/-, station license fee £1/10. There are 775 licensed transmitters. Those who have analyzed these regulations thus far will have noted that here, as in America, the treaty provision for sharing the two low frequency bands does not result in restricting their use by amateurs, as is almost universally the case in Europe.

In Norway, all bands are permitted except the 1750-kc. band, with the reservation of buffer territory at each end of the bands as follows: 3.5 mc., 40 kc.; 7 mc., 50 kc.; 14 mc., 60 kc.; 28 mc., 100 kc.; 56 mc., 200 kc. Telephony is permitted on all bands. D.c. plate supply, 50 watts maximum input (interpreted as 20 watts in the antenna). The operator’s and station license is combined, the fee being 30 kr. per annum; licenses are issued those who successfully pass an examination conducted by the N.R.R.L. Third-party traffic is limited to “totally unimportant greetings.” The N.R.R.L. claims 76 licensed members.

In Poland, buffer widths are provided on all bands, as follows: 1715–1800, 3535–3565, 7050–7245, 14,000–14,310, 28,160–29,830, and 56,300–59,680 kc. License examinations are conducted by the P.Z.K.; the operator’s license fee is 5 zloty annually, as is the station license fee. The maximum power input is 50 watts. Poland is the one European country in which third-party traffic is permitted, a recent grant and one for which the P.Z.K. deserves great commendation. There are more than 200 licensed stations.

Portuguese regulations are very liberal, for Europe, all bands being permitted without restriction. Three hundred watts input is permitted, but no telephony. The licenses are granted in connection with the R.E.P., the fee for a station license being 25800 for the examination, and 10800 thereafter monthly. There are 153 licensed stations, according to the R.E.P.

South Africa also permits all the Madrid bands to be used by her amateurs, with no restrictions, telephony being allowed on all bands. The operator’s examination consists of a code test; the fee is 5/-. No station license fee is required. The S.A.R.R.L. assists the government in passing upon applicants. The maximum power input is 50 watts. Message traffic is limited to S.A.R.R.L. business traffic transmitted by member-stations; no general third-party traffic is permitted. Of the League’s membership, 157 are licensed.

The Spanish amateur bands are as follows: 1735–1985, 3520–3730, 7000–7300, 14,000–14,400, 28,000–30,000, 56,000 kc. and higher. Special authorization is required for operation in the 1.75- and 3.5-mc. bands, but this is merely a formality designed to inform the government as to the number of amateurs desiring to use these bands. Spain was one of the few countries which opposed the “shared” classification of these bands at the Madrid Conference. Some ‘phone is used in the 7-mc. band, but most of this operation is on 3.5 and 14 mc. Combined operator and station licenses are issued, upon separate examinations, the fees being 20 Pesetas initially and 2 Pts. per watt per year. The power maximum is 50 watts, but there are exceptions. Pure d.c. and stable telephony. Third-party traffic is prohibited. Further liberalization of the general amateur regulations is expected by the U.R.E. There are 307 licensed members.

In Switzerland, a special license is required for 1.75 mc. The other bands are as in the treaty, with the exception of the 3.5-mc. band, which extends from 3500 to 3700. Telephony is permitted in all bands. The operator’s license fee is

(Continued on page 80)
THE COMMUNICATIONS DEPARTMENT

F. E. Handy, Communications Manager
E. L. Battey, Assistant Communications Manager

The season for long DX days on 14 mc., for vacations, and portable-mobile work is at its peak. Rebuilding plans take some sets off the air; u.h.f. fun puts new transmitters in operation at home and afield.

Effective October 1, 1934, an International 28-mc. Contest, to be in progress for one year, concluding at midnight September 30, 1935, is open to all hams under the sponsorship of the R.S.G.B. In addition to an R.S.G.B. International Trophy and certificates to the leading ten stations wherever they prove to be, the A.R.R.L. will make an award to the highest United States or Canadian operator-experimenter. This will be inscribed for 28-MC. ACHIEVEMENT, OCTOBER 1, 1934—SEPTEMBER 30, 1935.

The League's award will be a bronze charm, engraved as above, and with the call of the winner. One point will be scored for each completed 100 miles of contact. Decision between W/VE competitors will be based on weighted credits: (1) The number of weekly reports to A.R.R.L. on 28-mc. work, 25%; (2) description of equipment, and development work reported on same, 25%; (3) the number of points scored (monthly contacts with the same stations will be permitted to count), 50%. W/VE entries must be received at A.R.R.L. on or before October 15, 1936. Full rules will appear next month. The 28-mc. band has been "hot" with dozens of DX contacts reported during each month, starting with March this year. Get new 28-mc. sets built. Fix the 14-mc. tanks to work on 28 mc. Start testing equipment now. Report your results each week to A.R.R.L., and submit and log to both A.R.R.L. and R.S.G.B. at the end of the contest to be eligible for all awards.

'Phone Work With India

W9HQH, Chicago, with 50 watts input on 14-mc. 'phone, worked VU2CP, Calcutta, India, at 12:55 p.m. C.S.T., June 3rd. W9HQH advises that VU2CP has a p.d.c. note on 14,150 kc. and wishes to contact as many W and VE 'phones as possible. W9ELA Minneapolis, Minn., also worked this VU on June 9th at 8:08 p.m. Central Time.

COMING MEETINGS

Third Annual Hamfest of the WIMU Radio Association, August 4th, 5th and 6th, will be held at Jenny Lake in Teton National Park, Wyoming. WIMU includes Wyoming, Idaho, Montana and Utah, but all hams are invited. For complete details write or QSO W7BNU, WTAEC, W6GWJ, W6BBW, W6JES, W7AMA or W6ES.

Central Illinois Radio Club Hamfest, August 5th, announced in July QST to be held at Municipal Park, Bloomington, III., will be held at the Maplewood Country Club, that city, instead.

Northern Illinois State Hamfest, August 12th, auspices Ogle County Radio Traffic Association, to be held at Pines State Park, Oregon, III. Registration 25¢. Bring 5- and 10-meter portables. Coffee and ice cream furnished; bring basket lunch. And don't forget the YLs and XYLs! Good program promised.

Starved Rock Radio Club Hamfest, August 19th. Starved Rock State Park, Spring Valley, III. Registration, 50¢, includes eats, prizes and entertainment.

Third Annual Hamfest Island Radio Club, Bar Harbor, Maine, August 25th and 26th, Saturday and Sunday. Program will include sporting events, prize competition, code contests, and a big fed Sunday, as well as visits to local shack points of interest, etc.

A Ham's "If"

(With apologies to Kipling)

By PHIL MCCUM, W1CRP

If you can keep your sked when all about you
Are losing theirs and blaming it on you,
If you can trust your wave when all men doubt you,
But make allowance for their doubting too;
If you can send and not be tired by sending,
Or asked to QRS, don't deal in speed,
And you leave him with a message QSP'd:
If you can handle traffic and keep it on the go,
If you can work DX and not make that your aim,
And treat those two co-workers just the same;
If you can bear to hear the truth you've spoken
Twisted by lads who know not all the rules.
Or watch the parts you gave your collar for, broken
And stoop and build them up with worn-out tools:
If you can keep your two-tea running
And show a two-O-four who is the boss,
Or lose and still keep things a humming
And never dit a dah about your loss;
If you can forer your kay and tubes and meter
To save their turn long after they are gone,
And so hold on when they begin to peter,
But keep the will which says to them, "Hold on!"
If you can pound the brass and keep your virtue,
Or talk with phone, nor lose the common touch:
If neither speed nor lads can hurt you,
If all hams count with you, but none too much;
If you can fill each operating minute
With sixty seconds worth of distance run,
Yours is the air and everything that's in it,
And what is more—you'll be a ham, my son!

* A.R.R.L. Route Manager, 61 Madeline St., Portland, Me.
A New System of Signal Reports

At present, to get a complete report on our signals, we must resort to a mixture of plain language questions, QSA, R, and T reports, and international abbreviations. It is believed that a system which would give all this information quickly and concisely would be readily adopted by amateurs. The "T" system is a step in the right direction, but it attempts to combine into a single scale such widely different characteristics as those of frequency, modulation, and tone. Some time ago "The Keywagger" printed an explanation of the "Frame" reports used by some commercial stations. This has been taken as a basis and has been condensed and modified somewhat to make it more applicable to amateur use.

There are four principal characteristics of signals that we are interested in. First, those of frequency variation, such as swamping, chirping, etc. Second, those of signal strength. Third, those of variations in amplitude. Fourth, those of modulation, or tone. In the system proposed here each of these characteristics is designated by a scale running from 1 (least desirable signal) up to 9 (perfect signal). In the order given, the scales are designated "A", "B", "C", "D", "R", "A", "D", and "M". While these exact definitions can be given, the following is an example of an amplitude, or "A" scale:

1. Fading completely out, impossible to copy. 2. Fading difficult to copy. 3. Fading badly, difficult to copy. 4. Fading badly, but copyable. 5. Moderate fading. 6. Some fading. 7. Slight fading at times. 8. Slight traces of fading. 9. Absolutely no fading.

As a further example, our modulation, or "M" scale might run something like this:


The system would be used as follows:

A station desiring a report would send "FRAM?". The report might come back something like this: "FRAM 8578." And that tells the whole story. Why not give it a try? Yours for "FRAM 9999.

—L. D. C. Redgrave, WAINA.

Making Signals Effective

Nothing is more aggravating or wasteful of time than to listen to 75 or more QCs before a fellow signals his call.

Few hams realize that more than 50% of their listeners pass them up due to such procedure. Habitual long QC-ers get poor results for the time spent! Let us all put in our calls every three or four QCs and make our stations more effective!

Another throm in the side is the improper use of dit-dah-dit at the opening of all comebacks. The procedure is entirely out of order when followed by "poe rpt mag" or the equivalent. Use the "D" only when all the transmission is ok. In other cases use the time in stating clearly and concisely just what portions require fills.

One of the best many hams overlook is the correct use of Q signal. Use the proper Q signal—just use them properly. Look up each signal as used as long as this is necessary to familiarize yourself with the meanings, and you will become known as a good operator. "QSL NR 1" does not refer to " needy cards for the shack"—it requests acknowledgment of message number one. Look it up and remember it!

—Kenneth Isbell, W6BOQ-WEMAR.

Echoes of the Sweepstakes

W9BFY votes for "most consistent signals": \textit{W7ZK} (14 mc), \textit{W4CA} (7 mc), \textit{W9BN} (3.5 mc). W9DGS got a great kick out of being W9UM's 65th Sec-

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The approximately thirty stations comprising the \textit{Naval Reserve national network} are all authorized to use 4045 and 3475 kcs. This "net" operates regularly except in the summer season. The most recent drill on June 7th on 4045 kcs was an outstanding example of smooth, sassy, correct, precision operating with proper NCR procedure. The control stations in this net are identified as follows: NDA, Boston, Mass.; NDR, Portland, Me.; NDF, Rochester, N. Y.; NDE, Philadelphia, Pa.; NDC, Richmond, Va.; NDN, Norfolk, Va.; NDJ, Atlantic, N. J.; NEE, Charlotte, N. C.; NDJL, Orlando, Fla.; NDU, Jacksonville, Fla.; NDQ, Pensacola, Fla.; NDZ, Dallas, Tex.; NDS, Chicago, III.; NDP, Kansas City, Mo.; NFE, Cincinnati, O.; NDV, Los Angeles, Cal.; NDT, San Diego, Cal.; NDJH, San Francisco, Cal.; NDO, Salt Lake City, Utah; NDS, Seattle, Wash.; NDI, Portland, Ore.; NIG, Honolulu, T. H.; NDD, Balboa, C. Z.; NDF, Cristobal C. Z.; NBC, San Juan, P. R.; NEJ, Mayaguez, P. R.; NED, Washington, D. C.; NDN, Washington, D. C.

August, 1934
Third Naval District: Effective July 10, 1934, a point to point traffic net has been authorized for all stations in this district to encourage and facilitate inter-sectional message handling using NCR procedure between unit stations. There are five Sections represented in the District. The net will function each Tuesday, all NCR amateurs using their regular Section frequencies in the 3600-kc. end of the band. Unit stations work with the Section Guard 7:00 to 7:30 p.m. EST. Then while unit stations are silent, the guard stations in the several sections and the District Control Station, NDF or NDB, all exchange messages for the next 50 minutes, each Section being allotted 10 minutes for work with each other Section. After 8:30 p.m. EST the Section Guard clears the traffic exchanged to unit stations, thus enabling all NCR hams in the District to send messages to each other. This supplements but does not take the place of the Friday drills.

Requests for information on the Naval Communications Reserve should be addressed to Lt.-Comdr. Wm. J. Lee, Office of Chief of Naval Operations, Navy Department, Washington, D. C.

Briefs

WSCLP has found that an Agfa "Snapfolio," distributed by dealers in Agfa films, makes a convenient carrying case for the new amateur license. He says these "Snapfolios" are furnished free by most dealers.

What Is Good Operating?

R. H. Cunningham, VK3ML*

One continuously reads in radio magazines throughout the world of operating—wise and otherwise. Good operating is an art. As with any art, there is always a foundation to start with; once this foundation is laid, we have a definite basis to work from. Such articles as I have before seen have been more in the way of suggesting eures or remedies for bad operating or hint at better practices. The rock-bottom, so to speak, has been missed.

I venture to offer what I consider to be the main essential of good operating, and that is a good fist. I maintain that good operating, whatever the procedure may be, is governed by this one factor. Volumes of hints and advice are useless to any man who has neglected his sending.

A good fist is developed by paying careful attention to the formation of the characters composing each letter. It requires a mechanical rhythm—hence, one that will instinctively tell whether the timing is perfect or not. This comes with practice, and by self-examination. Examine your sending. See whether there is room for one dot between the characters forming a letter. Note if three dots could be inserted between each letter; also whether you leave room for five dots between each word at any speed. As in drill exercises, one’s sending habits are formed by practice. After a period it is no longer necessary to time the movements so carefully. One unconsciously develops rhythm in sending.

A good fist is coincident with good operating practices. One does not go without the other.

Personally, I think that teaching and practising Morse on a buzzer or audio oscillator is a poor method compared to a sounder. A sounder possesses the advantage of indicating the start and finish of a character and, consequently, shows up the formation more distinctly. This instrument can be used to monitor one’s sending on the air, too.

Many of us would feel very self-conscious about our sending if "our best friends" were to tell us what it was like. However, there is no reason why one should feel this way. We are all apt to develop peculiar little habits in the formation of letters and unless "put wise" will go on practising them forever. I suggest that plans for better operating be supplanted by cries for better sending.

1. To pattern one’s sending by a really proficient operator, or to emulate tape transmissions as a standard of perfection, will also help.

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*1 Dalney St., Malvern S. E. 4, Victoria, Australia.
Washita Valley Flood

About 2:30 a.m., April 4, 1934, the Washita River went on a rampage, sweeping away everything in its path. Seventeen persons lost their lives. Property damage ran into the millions. Communication was cut off from Hammon, the county seat, and from the surrounding area.

Word reached the writers, 6WACI and WS5BBH, via broadcast station KA5A, Elk City, Oklahoma (28 miles south of the flooded district), that the entire town of Hammon was washed away. We immediately set up a portable battery-powered transmitter, and started for the stricken area.

Arriving at Hammon, we found that nine miles below the town people were in trees, on drifts and on house tops awaiting help. We went at once to the scene. We attempted communication from a hurried set-up, but did not meet with much success due to the poor antenna facilities. Nightfall found us on the river banks helping with the rescue work. Several boats were capsized, putting the crew in trees. Among those unfortunate enough to be capsized was WSATO, Granite, Okla., whom we found roosting in a tree.

By 5:00 a.m., April 5th, most of the rescue work was completed. We returned to Hammon and got the rig working on the 1.7-mc. band. We were located in the American Legion Hall. We advised relief workers that our radio equipment could be used to communicate by radio with the Federal Representative. We handled emergency traffic for relief headquarters, calls for relief workers, information relative to food and clothing needed, etc. Altogether we handled 150 messages the first day. Things having quieted down by night, we shut down to make up some of the 42 hours of lost sleep.

At 4:00 a.m., April 6th, we were back on the job. We made an attempt to contact amateurs, since KA5A would not be on until 8:30. W5CFN, W5GBH, W5PBH, and WS5LZ reported that they were standing by for traffic. WS5KNN at Leedy, in the flooded area, got on the air about 8:30 a.m. and handled considerable emergency traffic.

On the afternoon of the 6th, the power and telephone lines had been repaired, so we dismantled and returned for home.

—6WACI and WS5BBH

WORLD'S FAIR RADIO AMATEUR EXHIBIT

Visitors to the Radio Amateur Exhibit booth at the World's Fair go home with a rather novel memoir of their visit—the "Sousien Radiogram." At an old-time Spark station the visitor may file a message; this message is sent by radio (oscillator without antenna) to the "modern ham shack" at the other end of the room. Here it is received, typewritten on a special "Sousien Radio" blank, and presented to the visitor. He reaches the "modern shack." The reverse side of the blank contains a brief story of amateur radio.

The WS9USA transmitter at the Court of the Hall of Science is getting out very well, as is the transmitter at the Exhibit. Every operator who comes to the Exhibit to operate receives a card certifying that he operated WS9USA. But please remember: before any operator is permitted to work the station, he must present his operator's license. It is not permitted to operate WS9USA without his operator's license. Bring your license when you visit WS9USA.

Briefs

"Some operators have the habit of trying to use a bug at speeds much faster than they are capable of with the oscillatory bug. But all radio operators know the habit is a bad one. It may impress a beginner or two, but is a pain in the neck to every descent operator. It is spoiling many a good fast. —W9DX"

The San Isabel Radio Club, Pueblo, Colo., announces:
"For traffic or through Pueblo, Colorado call 'QQ Pueblo' between 8:30 and 9:30 p.m. M.S.T. Monday on 3.5 mc., Wednesday on 7 mc., Friday on 3.5 mc."

Regarding Mr. K. G. Morrison's article on Radioophone Traffic Handling (see page 51, June 34 QST):

The commercial radioophone net referred to is owned by Libby, McNeill and Libby, Bristol Bay, Alaska. Six salmon cannery stations in a radius of 50 miles work the control station at Libbyville, and also connect with a score of 5-watt installations on canoe boats and tally scows. The stations: Libbyville, KIAM; Nushagak, KNO; Ekuk, KMG; Ereglik, KMF; Koggiung, KVV; Lockanuk, KML. All transmitters are crystal-controlled on 2184 kc., and KIAM distributes traffic (arriving via Washington-Alaska Army net long wave c.w.) to the other stations by radioophone, since the other net stations have no other means of communication.

The Birmingham (Ala.) Amateur Radio Club will attempt to gather information on the progress of the National Balloon Race starting at Birmingham, July 28th. A continuous watch will be maintained by Birmingham stations on 14, 7 and 3.5 mc. for reception of reports. All amateurs are requested to be on the lookout and report to any Birmingham station.

W1AMG reports that W2AV, Brooklyn, N. Y., schedules the Schooner Morrisey daily. Any communications for the Morrisey may be thus routed.

W1BAC and W1ACD are located for the summer at the Lonesome Lake Appalachian Mountain Club Hut in the White Mountains, New Hampshire, as hutmaster and assistant. 3.5-mc. c.w. will be used daily and tests will be conducted with 56-mc. hams on the surrounding mountains. They are anxious to receive reports and to communicate with 56-mc. hams on Sundays.

The Federation of Radio Clubs, Southern California, will conduct 25-mc. tests each Saturday and Sunday during August. Reports will be appreciated.

Famous Saying, by WIAQ, New England Division Convention, 1934: "After all, it's only a hobby!" (This is recommended for use after being bitten by mosquitoes on field day excursions, after arguments with BCLs, after blowing tubes, after counting 105 CQs in a row, after a "CUL" QSO, etc.)

From W9BLK-FUP: "I was QSO via telephone with W9ABM the other day, and he told me that a ham in Tennessee gave him a report on his signals of '500 cycle p.d.c.' Quite a report!"

On Adjusting Bug Keys

W9GY, J. H. Flats, comments as follows on this subject: "Have discussed keying adjustment with several ex-commercial operators, and the universal sentiment was that bugs should not be adjusted to dot at 50% of the closed circuit current. That 'dot' is perfect for wire lines, but not for radio QRM and QRN. Many commercial operators still use 30 per cent 'dot' per 'tone' QRM with good op., but let me lighten the dots to 'machine type' and repeats are required. You can send as fast and more readable with a 'skewy' bug than with a 50% adjustment." General information on the proper adjustment of bugs appeared in QST for February, page 18.

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CQ "TFC"

A familiar call to all 3500-3900 kc. operators is CQ TVC. It is an excellent call to use when one wants traffic to deliver or relay. Many new hams have misinterpreted this call, believing it is an indication a station has traffic to move. The correct indications are quite the contrary. When you hear a CQ TVC it is an expression of the operator's desire to help you, and take your traffic. CQ TVC is a good general call to use whenever you wish to handle traffic in general operation. It moves traffic on and off trunk lines, and makes many profitable contacts possible between scheduled periods.

The Use of "ORS" After a Call

One also hears more and more use of "ORS" after calls that take traffic. The "ORS" added after a "nine" is the mark of a reliable operator. It helps other amateurs to know an experienced man is on the air, and ready to help in relaying traffic or making deliveries if they will but give him a call. "ORS" are known widely for their good signals, fine operating, courtesy, and general efficiency and readiness for any communicating job. "ORS" sent after a sign-off is hammy and filled with fratal spirit, in addition to its establishing "identity." It aids general traffic movement, too. If you have traffic, try to give it to a station that signs "ORS." A postal will bring any League member information on becoming an Official Relay Station appointee.

NEW MEMBERS—A-1 OPERATOR CLUB

C.W.: WAIJ ATV MBO BBC BVR DUK ERM FRM SB W2BAS BG BJX VE ZC W6CIL CVL (XZ) DFX DFK DXG HC W4ALK JR MI W6AJF ALZ ANU AQ AVF BRH BQZ MN W6AJP BLIP BPM CRP DKN EGS ELU EXH LM PQ (CV) W7SAN BMF DUE KO W8BWI, BWY CAT CVS DHU DUC DWB EPC EYU GBY GLX GRZ IOR JAK JES (Paul) JTT OB SS UW YA (NOR) W8AJO BBS CSI EKY GJQ HGJ HSN HUTU HUM IFZ IGL IJY KRT M2D PDE TA VELEP 3J IFK B43G44 Foreign: DU7A EISB GSQY J6NX NYLAB (Van & Mac) OK1AW VE5HZGL L4IT A4 AO

'PHONE: W8BUY NK W8AP KIR W6CPD VE3J1

This is a supplement to the complete roster of A-1 Operators which appeared in May QST, page 83. Complete details on the A.R.R.L. A-1 Operator Club will be found on page 84, July QST, under the heading "What is an A-1 Operator?" Every active amateur should strive to "rate" membership in this group of recognized "A-1" operators.

Briefs

W2GWE, Woodmere, L. I., reports what he believes to be the first W2-RA QSO—KA1CM and W2GWE were in contact at 7:25 a.m. Easterly Time, on March 12th, on 7 mc. On April 3rd, at 4:44 p.m. E.T., W2GWE worked FE3AOG, reported to be in French Sudan, French Equatorial Africa.

Radio amateurs of Fort William and Port Arthur, Ontario, and surrounding territory held the first get-together ever staged in that part of Ontario. The meeting place was the Y.M.C.A., Fort William, the date was April 17th. Following a big feed at which about 25 hungry hams did their stuff (and that's a lot of hams in that neck of the woods), P. J. O'Shea, VE2FW, took the chair to handle the organizing of a Radio Amateurs' Association. He was unanimously chosen president. Several interesting talks, a "grab bag," and almost limitless rag chewing made the affair enjoyable for all. Every licensed amateur and would-be amateur who could not be present at this first meeting of the new Association but who would be interested in further details, is invited to write Bruce Grant, Secretary-Treasurer, care of P. J. O'Shea, 227 N. Norah Street, Ft. William, Ontario.

On January 27th a Mrs. Charles Fredrick of Los Angeles filed a message at W6DTH asking if amateurs could assist in locating her brother, whom she had not heard from for twenty years. The only address available was "U. S. Signal Corps Service, somewhere in U. S. or possessions." The message was relayed to W6CLH for release on the 3.9- and 14-mc. 'phone bands. W6DTH and W6ECC also sent it forward on 3.5-mc. c.w. with the request that it be relayed to the various Signal Corps Posts. On February 4th an elderly lady from California filed a message by Mrs. Fredricks from her brother, who had been located at Governors Island, New York — and it was an "amateur radio message" that located him! FB.

With due apologies to the "great fraternity of newspaper reporters" we quote the following item found in a local paper by W1CTI. The item deals with Federal agents locating an unlicensed radio transmitting station. The "headlines" read, "Unlicensed Radio Cleverly Concealed," and the reporter goes on to relate: "A short-wave set with a 1000 watt transmitter, the apparatus was grounded on the bathtub and used the electric light line as a aerial. Although the walls of the house are thin, no tenants ever had suspected the presence of a radio. Its instruments were well muffled and no receiving sets in the house had noticed interference. Its range was estimated at 10,000 miles. So cunningly was the radio apparatus hidden that a maid employed to clean the apartment had never noticed it." . . . MIM

W6QIX and W6DOZ were recently working each other on their respective one thousand QSOs. To make the occasion more memorable they chewed the rag for over an hour in Fig Latin! Try that on your bug — or better yet, "on your milk!"

HAM BROADCAST FROM WMT

The Cedar Valley (Iowa) Radio Club presents an amateur program over WMT, Waterloo, every Tuesday evening from 9:45 to 10:00 p.m. C.S.T. Hams within the range of WMT should listen in on these broadcasts, which are reputed to be very interesting.

Route Manager Hal Falk, W8PP, says, "Good traffic originates is the problem of individual stations. If only worthwhile messages leave the station, traffic lanes of the state will not be cluttered and operators will not be burdened to the extent of monotony or disgust." And history shows traffic will move more effectively when discrimination in origination, gained by advising the public, and personal care in making up messages if followed.

ELECTION NOTICES

To all A.R.R.L. Members residing in the Sections listed below:

(The list gives the Sections, closing date for receipt of nominating petitions for section Manager, the name of the incumbent and the date of expiration of his term of office.) This notice supersedes previous notices.

In cases where no valid nominating petitions have been received from A.R.R.L. members residing in the different Sections in response to our previous notices, the closing dates for receipt of nominating petitions are set ahead to the dates given here-with. In the absence of nominating petitions from Members of a Section, the incumbent continues to hold his official position for another term, as long as the State officers shall file their petition of registration within thirty days after the date of the Annual Convention. Nominating petitions must be in Hartford on or before noon of the dates specified.

Due to resignations in the Santa Clara, Valley and Los Angeles Sections nomination petitions are hereby solicited for the office of Section Communications Manager in those Sections and the closing date for receipt of nominations is June 14, 1934. Petitions are hereby specified as soon, June 14, 1934.

Section Closing Date Present SCM Present Term of Office Ends

Kalamazoo Jul. 16, 1934 O. J. Spetter Jul. 28, 1934

Southern Texas Apr. 15, 1934 J. G. Smith Apr. 15, 1934

Nebraska Jun. 16, 1934 R. L. Eldridge Jun. 15, 1934

South Central Apr. 15, 1934 W. T. Thrasher Apr. 15, 1934

Saginaw Clara Aug. 13, 1934 Bruce Stone Oct. 14, 1934

Mississippi Aug. 15, 1934 Wm. G. Bedker Aug. 15, 1934

Ohio Aug. 15, 1934 W. N. Young Aug. 15, 1934

Eastern Florida Aug. 15, 1934 R. L. Allmon Aug. 15, 1934

Alaska Aug. 15, 1934 Richard J. Fox Feb. 16, 1934


58 QST for
MARYLAND-DELAWARE-DISTRICT OF COLUMBIA—SCM, E. L. Hudson, W3BAK—W3CXL, KCQ, RCA, W3BWT. Chief RM. ASO spends week ends at his cottage on the Chesapeake. BAK (Roland) is still taking SW receiver to Scout camp Rodney on the Chesapeake; he’s camp bugler. CDG worked a K6, OZ-EHWW has 60 in final. EKJ handled message to Gov. Hawaii. BR3 and DYO are rebuilding. DKM is laid up with wave legs. DZE made 33 contacts in portable condition. CQJ works 39-mc. ‘phone all day. DQ attended Pittsburgh Convention.

Traffic: W3CXL 4339 BWT 517 NBD 328 ASO 77 CIZ 09 BAK 52 CDG-OZ-EHWW 6 EKJ 31 DRE 4.


Traffic: W3BEF 48 DNU 3 APY 114 EDFP 17 NF 41 AEJ 7 ARV 88 ZI 103 GL 2 BYR 5 AVJ 6 DST 4.

WESTERN NEW YORK—SCM, Don Farrell, WB83P—KMS has a 53 perking on 2.1 meters. JTT is high traffic man. KNC is new O.R.S. JQE has several schedules. FYP is taking vacation. Jamestown Club members plan another treasure hunt. BQJ wants O.B.S. AEK reports by radio. GMY will spend two weeks with Fleet Reserve. ERZ works Vks. EBR visited Malone gang. GZP was married short time ago. KKR has pair of DXU. DHU uses portable lamp on Lake George. CO has new PBX. EUY had 121 foreign contacts during month. LGR reports fine time by Utica gang on Field Day. June 9th and 10th. S.T.T.A. had nine QSO party. A.O.K. won, working 103 stations in 22 states and 11 foreign countries in one week. IMR received a card and picture from a VX5. AYD was visited by 90FE. GZM uses Tri-teta. LUJ added a buffer and amplifier. MCT reports for first time. LGN is building new rig. BGN has fun on 50 mc. Tri-County Radio Club had fine outing and Field Day on Canandaigua Lake. AQE now has an a.c. line at Sedum, Tom and John at AFM are doing considerable experimental work on cathode ray oscillographs. LKJ is back in the air. IMK is in the hospital. W8GK, W8BLO is looking OW at convention of Central New York Radio Club. New calls: MIB, MCI, MCT, LGN, 4WCC is operating at Penn Yan. F.L.T.S. had a fine time on their outing at DME’s camp on Oswego Lake. The Fort Schuyler Club is active. DSS had trouble with Tri-teta.

Traffic: W8JT7 617 DSS 591 KMC 240 JQE 139 FYF 67 ON 42 BQJ-AEK 40 GPT 36 GPS 30 DBX 22 GMY-ERZ 29 EBR 17 DHU-JT6 16 FMY 15 CO 13 FY 8 IDI-PYQ 6 LGR 5 GWT 4 IMR 3 AXE 2 AYD-GZM-LUJ 1.

WESTERN PENNSYLVANIA—SCM, C. H. Grossarth, W8CUG—KWA attended convention. GUP is rebuilding with RK20. JZZ received O.R.S. C.Q.A. has been teaching beginners. Easton, Pa. GJM is the only station in the area. Fine entertainment at Convention, FY is poking out on 1,75-mc. ‘phone. GSV says Bao changed QRA again! Out of a dozen trees FKU had to pick one that would blow down to put his Zepp on! KSG says CDG is on 1,75-mc. ‘phone. KTP has new antenna. KQJ has 94A final. HWE was reported one of three most consistent Ws in Australia. FZQ is going to Pt. Meade for training for C.C.C. job as radio operator. AYV worked hard as Secretary of Convention Committee. Designated as RM. GUP is appointed R.M. in HGG’s place.

Traffic: W8KWA 123 GUP 204 KD 82 JZZ 43 AXD 31 CQA 17 CKO 13 PX 5 GSV 11 KFU 7 HMJ 5 KEG 2 KQ1 1 KRG 4 GBC 5 CQG 12.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA—SCM, Jack Wagner-seller, W3GS—3OK only makes BPL. 8LR1 is QRL, stone cruiser. 3DXY is making trip to 9UBA. 3D1E is communicating from Eastern lodge. GM3R considers trout fishing to radio. 3EYIM is e.o. on 7 and 14 mc. 3DZW has two ops: Ex-YL now has a ticket. COZ and EGA report for first time. 3EBV has two new members in his net. SAKB installed new 60’s. 8LTZ, op. at 8LTZ, is a new member. A.D.E. schedules daily. 3CJ reports for 3XT. 3MCQ was QRQ Landowski Club Hamfest. 3EPJ is building Tri-tet. 3GS is DX-ing on 14 mc. Over two hundred attended FB Hamfest of Logan.

Traffic: W8DXY 3 EOP 69 OK 734 EIM 10 CB 50 DMP 16 DWZ 70 COZ 10 EZ 210 EAV 31 AEB 202 ADE 3 FCD 64 CL 359 TX 6 AQW 1 MC 178 GS 21. W8HLM 20 AS 8V 66 GUS 15 FLA 207.
CENTRAL DIVISION

ILINOIS—SCM, F. J. Hinds, W9WR—RM 9 AND 9ERU. ABA, EMD, DTM, POO, CSB and GG are QTH. QTH is 19th phone. MILWAUKEE shows new local phones. AD is trying 1.7-m. 'phone. NU and IEP too well. This might mean the turbid. Free Soil, Mich., for a test. BPU and CFV are installing 52s. FO would like to hear from any ham who contacted GUCFM during June. DGT found a job. New rig at PN now working well. Medved is now on the air with HF periweld acu. ACU, HUX and OBD were out on portable field day with the YLs. LW's input is 800 watts on 7 mc. and 450 on 14 mc. IZP worked a "G," IWR worked his first VE. EQOX heard ZL1CM on 2.6-m. 'phone. NN is V-8ing to Mexico. California. Crystal troubles at PIO. RDU is building c.e. rig. BYZ says 28 mc. has no dead spots like 56 mc. OA, GZK and OKZ built 56-mc. rigs after seeing a demonstration at Rock Island Hamfest. KEH visited World's Fair. Antenna trouble at RCQ. KIT picks up to 712 kc NDB has success with a-COM system. RXV is nice in E. St. Louis. OYV says, 'Till they hit me again. See you in the next report. 'COM works 6.3 and 14 mc. DLO gets out on 7 mc. Receiver trouble at OVS and OZJ. OXO is c.e. on 3792 kc. BRX is now O.R.S. FQM left for U.S. Naval Academy. HQUI wants the QRM for 60 and 56 km. OYV says a 33-foot antenna under the parlor rug pokes out as well as the outdoor antenna. HI, USA has been heard in many foreign countries. OKX worked South America on 3.5 mc. KJF has B.C.L. trouble. RLP and EAI are rushing the same YL.

Traffic: W9HFC 595 DOO 500 IHP 393 ILH 384 EBJ 328 MIN 189 LW 155 AD 141 MDL 85 CKE 74 CGV 59 USA 36 DJG 35 KEH 34 MLH 33 DBO-NN 39 HQH-IEP 32 APN 31 DGT 15 MAJ-PEQ 15 CUGH-DOO-FQM 14 NIU 13 FO 11 ICN 10 AVB-LEV-LOJ 8 FYV-GKX-IZP 7 EMN-POW-AIU 6 RCQ 5 AND 4 KIT-POO-ROU 3 NDB-ONY 2 BPU-BWZ-1 R.

INDIANA—SCM, A. L. Braun, W9TE—6QF. Chief RM, AXH has given up c.w. MQQ is home for summer. DJU has three all-wave receivers. DET is now O.R.S. HTP like the 830. HUNO blew rectifier tubes. CKG works 14, 7, 3.5 and 1.7 mc. RJG is new at West Lafayette. BRK has found a job at MAC. Chief is R.M. Indiana. GQP has a 45 Hartley. JST moved to Springfield. Ross, N.M. HUV is giving 28 mc. a try. BU4, 38th Div. Aviation, will op. on 4210 kc. with 1 kw. rig from Aug. 4 to 7. FVI has new QRA at Speedway City. GFS is lining up on the 60 meter band. Miami. RTP has c.e. rig. MQQ works plenty DX. TE has new tri-tot. OKX has visions of a phone.

Traffic: W9AXH 8 MQV 1 DJU-DET 15 HTP 22 HUP 11 CKG 7 PQL-RIG 2 HPQ 10 FQ 4 GQP 2 TE 2.

KENTUCKY—SCM, Carl L. Pflummer, W9OXJ—2TT wins first prize of pair '66a. FGK takes second prize of A.R.R.L. membership, and BWJ gets bottle of Crab Orchard! HBQ is new O.R.S. AUI has new baby girl. BAX is installing new equipment. DXN and EDV attend meeting of A.R. After keeping schedules continuously for six years, OX is temporarily off air. FQG is specializing in paper products (?) RBN finds DX gap on Ohio river camp. JYQ gets relief as snowkeeper during hot months. FZV is considering 'phone. New mast helps HCQ's sign. NEP is on 7 mc. EYW is on diet preparing for Ky. ham picnic. ERH is leaving for Fort Knox. DXN is busy loading the transcommunicator. OMV-DGN-NMQ visit World's Fair. IPQ is coming back on air. Ole Man River has ELL afoot. OFE reached Cambridge, Mass., and is looking for Ky. gang from 1BR. MEET THE ENTIRE KY. GANG at THE KY. HAM PICNIC. 16th LOUISVILLE ON SOUTHERN TORPEDOES with two bucks to HBQ, Sec'y before Aug. 15th. Price $2.50 after Aug. 15th.


MICHIAGN—RM, Kenneth F. Conroy, W8YNR. Much portable work is being done by RM. Would appreciate a note from everyone knowing the whereabouts of radio hams enlisted in G.C.C. in Mich. Plans for a state wide G.C.C. net are underway. Free D.A.R. Bulletin to all who want to receive it. B.P.O.E. of NINES: AAM working with FSP, CSI and HSQ on islepemarking forest-fire helped to save a lot of timber. PDE is rebuilding for Munising job. CWQ prepares for forest-fire help. 9CEU awaits a call. EQQ votes EQG on daily. LKJ reports bad news on new UPS for JCN. RHM joins a.A.R.S. OXL summers at Forest Lake. LUU reports FBC starting for L.P., but best heard of from LIP, St. Paul! NEE, LHW and BBP chucked rag at Sook speak when BHP's boat docked there. CWD handled message to Postmaster General when U.S. Mail service was out for Isle Royale. CZE hooks lots of foxes. OXV uses '47a P.P. '46s. ADY is in P.C.U.'s "Romeo Maintenance." MICHIAGAN EIGHTS: DVC leads state. FTW BPIs on deliveries. QV to CPA teams of beer drinkers had great contest. FAV had the smallest capacity. (22 schuppenfarad.) GUCG's A.R.R.S. lineup puts HL 1st alternate and QT 2nd alternate N.S.C. ROX is trying to get the necessary equipment to work with DVC's west-out west. EQX and ARR need new O.R.S. FQF and CVF are latest O.P.S. 1OR reports CPH working in Chicago. LAL is starting Navy net. IGS schedules 1MK and 7QI. BMG using "Glockleboom's Guaranteed Hair-restorer" shows up with 6QF. DED, on 28 mc., hopes to win BIU's prize crystal. JKQ reports MBP new. QGB reports EQG oping on yacht. GHP moved to 14 mc. The YTV have gone portable nets since listening to JQ's talk at D.A.R. All's well at Stony Point, HNB, GRN and BTK hooked 22GQ for W.A.C. 1KO built receiver for S.W.L. HA finds better sig with 100 watts input. ICUM is c.e. on 3559 kc.

IEX sends first report. MV is scheduling Camp, IFBP, CTD got married! Congrats. IMX's new phone song: "Oof The Heising, Baby." GWA schedules TG at Camp Muskogen. Congrats to KPL—new Jr. opr. Best story: HFU was invited to IKZ's to listen to new s.s. receiver. IKZ is 1.7 mc. man. HUF assumed receiver was on 1.7 mc. and was amazed to hear 69's and 79's rolling in on speaker at high noon! IKZ was trying out 14 mc. too!!!

Traffic: W8DVC 427 QT 374 FTW 208 GUC 175 HMK-HMT 7 TX 194 FQG 4E4EI 88 IOR 54 LAL 4 CPY 51 IPX 29 IQS 30 BKP 25 KJO 17 GSP 18 GQB 16 GHP 15 AJH 14 ARR-DNM 12 DYH 11 HRB-JYP 10 GRN-IKO 9 BYG-IA-ICM 8 IQF 7 ITD-SU-5 VDSQ 4 DCO-FX 2 BTK-IKZ 1 EID 1 KM 1 RMA 1 EM 1 Miam, Miami, RTP has c.e. rig. MQQ works plenty DX. TE has new tri-tot. OKX has visions of a phone.

Traffic: W9AXH 8 MQV 1 DJU-DET 15 HTP 22 HUP 11 CKG 7 PQL-RIG 2 HPQ 10 FQ 4 GQP 2 TE 2.

OHIO—SCM, Harry A. Tummonds, WSBAH—Chief Ohio R.M. SVP. All-Ohio day was big success. HCS won crystal given by SCM. Following placed in order shown: HCS first, 31 contacts, ANU-10, A-Q, 12-HM10, 19, District No. 2; RM WSEEZ. EEE says INX and IBD are rebuilding. UX is policeman at steel mill. Dist. No. 5: BMK is rebuilding for new QM, FVQ, R.GM., is proud owner of W.A.C. LMP is lariat. AMP is lariat and more with ankle. KLP's new QRA: 112 Raving St., E., Liver- pool. KWW worked HC1PZ for 22nd country. AZU graduated from Case. AQ is now O.R.S. Dist. No. 3: JIN sends first report. BJX's new QRA: 124 Mingo St., Circleville. BRQ, R.M., has 500 watts input. Dist. No. 7: R.M. VP: EQB hear lacs on 14 mc. GNG has Class A ticket. Dist. No. 3: Act. R.M. APC: JQG supplies for ORS. 124 NB, 0. AT, LCY will take over HCS schedules while he is rebuilding. Dist. No. 6: EQG has power leak difficulties. HTT is back after 10 months' QRL. JFP schedules IPX and IET. HEY blew 211, '22 new. HWC's new QRA: 1439 Rohr Place, Columbus. MFU got new being done by 22J. KJF very famous in Ohio. GSO, R.M., is going on 7 mc. for sum. GDC is Chief Ohio Phone Activities Mgr.;
worked GBFY on 'phone. Dist. No. 4: UW, R.M., is busy with A.A.R.S. IET handles West Ohio traffic for two trunk lines, Canada to Fla, and N.Y.C. to Calif., Hawaii, KAILUB and Chicago. QSL. OME. WE8's OP put foot in power supply during portable day contest while QSO Camp, PO. Dist. No. 1: BAH spent day with PO on banks of Sandusky River during Field Day. CIO schedule is ready for schedules. BON, R.M., says L.R.C. had FB time on Field Day. DAT has crystal on 3855 kc. BAC, a veteran O.R.S., never misses a report. KKT operates on farm. KZL's new QRA: Cleveland Heights. FVLV's new QRA: South Lorain. DXL is at East Tech. High School, held Anniversary exhibition. Following took part through amateur radio column: LVA, KB, LB, KZK, LXS, LJK, LJG, LYO, LYM, HXK. J. L. Reinertz was guest at Cleveland Free Hamfest sponsored by BAH June 12th. 325 turned out to listen to John L.

Traffic: W6UX 1 ANU 13 BMK 1 FGV 2 AMP 8 KWJ 1 HCS 699 AQ 31 JIN 10 BKE 6 QQV 11 EBG 25 GNG 3 HMH 27 VP 79 LZZ 35 AEW 3 DH 1 LCY 91 EGC 6 DZO 2 CZ 8 JZ 23 MCO 40 GSO 22 UUW 229 IET 116 WE 23 BAH 201 CIO 154 BON 44 EPP 75 DAT 6 BAC 28 KKT 12 FVL 15.

WISCONSIN—Acting SCM. Carl F. Thomas. W9LFP--FSB is out of town for three months. Report to ATO via W9LR. SSB, voice OK. KOP has decided to go back to good. ETM is doing 56-sec. work. KPO is going to radio school in New Orleans. OXP's mast came down in storm. GYL is looking for 16 mc. DX. LFK is trying to make try at DX at 16 mc. GYL has 300 watts into 211. OLT visited IQW. PRL visited ATO with NSM. RSA is building new receiver. BXZ reports for Burlington gang. HTZ and BXZ joined N.C.R. HFL has new transmitter. GHT has new Jr. op. JDP cracked top off '32. Shobogun Radio Amateurs Club is holding picnic July 22 at Columbia Park on Lake Winnebago. ILY will trade a 1.7 mc. X cut crystal for a 3.5 mc. X cut. DNU is rebuilding to RK30. JAN is finishing rack and panel job. OXP is after O.R.S. RCC is now racing ham.

Traffic: W9ATO 233 IQW 109 ETM 75 NSM 54 KPO 34 OXP 27 JCV-GVL 13 LKF 12 HGF 4 PQU 8 PRL 2 RKP 8 OLT 4 HSK 104 JNU 16 DNU 5 OXP 28.

DAKOTA DIVISION

NORTH DAKOTA—SCM. Fred J. Wells, W9VP--OSN and LHS are new O.R.S. PA is new R.M. for West of half states. KEE is R.M. for East half. PGO and JQG are new at N. G. Camp. JAR uses low power. KOP of Minneapolis visited OSN. PDC has a phone on the air. LIJ puts up new sky wire. OEL reports two new calls in his city. HYZ, an old navy OP, and RQK. HJC is QSL stork, vcp is another YL. Ifflows. LBR is putting in ORE. WCN and 2000 are now using 28 kc. KOP has portable rig. BHH is back on air with OBN of Crosby, Minn., at the key as second OP. SCM is putting in class B phone. DYO has new receiver. EIG returns with a Hartley. EOY rebuilt CBM. DGS entered field day with files power portable.

Traffic: W9HJC 47 JVP 37 PDC 22 PGO 20 OEL 15 LIJ 17 OSN 10 KEE 12 FFS 9 PQU 8 HTJ 7 KZL 9 MZS 7 JAR 16 EJ 4 EJ 3 PRU 10 DGS 21.

SOUTH DAKOTA—SCM. Mike G. Strahan, W9FST--W9TV is building a portable. PFI has new shack. AVP married that YL!! OED called on PHP and RSE. BLI has new one kiv rig. LDL is working in Rapid City. Student reports rebuilding new rig. GB is working in Sioux City, Iowa. DIY made two 56 mc. transceivers. DNS has new job. State A.R.R.L. convention at Huron was well attended. Congratulations to the Huron Amatuer Radio Club.

Traffic: W9TV 8 PFI 5.

NORTHERN MINN.—SCM. Robert C. Harsinger, W9LWE—W9OMI visited W9USA. OOO is on 7 mc. DKL, former SCM S. Dak., now in St. Paul, was in accident recently.

Traffic: W9OMI 6 OOO 7 FTF 7 HNS 6 RAG 11 OOU 20 JFB 51.

SOUTHERN MINN.—SCM. F. C. Kramer, W9DRI--W9FCS is working in an oil station. GUX uses e.c. RAU keeps schedules from scout camp. GNN keeps his transmitter locked. DEI has new hi-voltage equipment. PDL moved to summer home. BNN reports prospective ham in Owena. OAK won a 7US fish line belt. DH is building class B phone. RAB is experimenting with the effects of R.F. on the separation of minerals. FND spends his days tagging the QSO's. KDI is called out to squelch the Mps. strike. PJH took a portable into north woods. FYA built a transmitter for 7 mc. EGG is working on new 'phone. FWN has two '90's on 14 mc. BEX operates a portable 'phone in a new pasture.

Traffic: W9FCS 36 GUX 29 RAN 26 BN GNN 24 DE1 24 HCC 17 PDL 17 BNN 5 OAK 5 1H 4 RAB 2 RKG 1.

DELTA DIVISION

ARKANSAS—SCM. Henry E. Vette, W5ABI—BMI made B.P.L. DVR is bothered with feed back. DWD has new 50-watt. DJE will use pair '03A. DFI and DYT spent 3 weeks at Camp Bonanza. DVI and CZQ, co-operators, say their six bit 10's are about shot. ABL is on 7050 kc. BBD built a-super. 9EDK is new O.R.S. SAK sold out to OEO, who is on 1.7 mc. 'phone. 4AJJ applied for 5 cw. DX48 has new crystal. DEI reports batteries have arrived. ABL has 95 mh. on 28. 7HIT. D YX is on 3.5 mc. DXY has new masts. EFJ is new L.R. station. CPV visited Hot Springs hams. ANZ is installing 250-watt. DGL worked in World's Fair. DYL schedules DFI. AHU has made his 8sw call from KDI reporting 14-mc. 'phone. VZ has '46's final. ANR has gas well on his place and uses it to run power supply.

Traffic: W5BMI 510 DVR 43 DWD 42 DJE 41 DTT 38 DVI/CZQ 12 ABL 9 DRY 7 BBD 5 DRY 4.

W9DDB 3.

LOUISIANA—SCM. W. J. Wilkinson, Jr., W5DWW--DKR is new R.M., South La. CQX gives prizes at N.O.R.C. BML applied for A.A.R.S. membership. HR is old 'phone man. CWX is experimenting with 56 mc. AEL is now A.R.R.L. member. AOZ is an N.O. "cop." PW is another police officer in N.O. J.W. is counsel for N.O.R.C. DMP keeps club rig hot. DYR is N.O.R.C. call. DSS is rebuilding for 14-mc. 'phone. ACV is at sea most of time. EDZ is on 7070 kc. NM is cruizing again. MO is helping build gin. IG is Paper Co. worker at Hodge. BQO bought transmitter from ADJ, DUS is homeward bound from London. AXU and VT-DWW via AKL and ZB to EBS has his last show report. EAI is on 1.7 mc. 'phone. AKW and BFB are home for summer. New hams: EAY, EBZ, EDY, DMP's mast blew down in storm. CVI works DX. DAW moved to Monroe. The New Orleans Radio Club is conducting a training course for beginners.

Traffic: W5B 3 DKL 24 CQX 5 BPL-HR 2 CTR 3 DLD 2 BDD 30.

MISSISSIPPI—Acting SCM. W. P. Allen, W5VY—DIE is operating portable at Boy Scout Camp Binachi and is handling traffic between the Camo and Meridian. CWQ schedules 5MN, 4PL, 5 CLD and 4BIA.

Traffic: W5CQ 20 DE 22.

HUDSON DIVISION

EASTERN NEW YORK—SCM. R. E. Knight, W2LU-BLU worked first foreigner. LU and BSH attended Hudson Division banquet. EGF moved to Schenectady. BJX is member of A-1 Club. GTO helps BRS drive new Henry. FQG is on 7 mc. W1EFM-2 is back at Pittsfield. DSH reports QST broadcast via WAF. WEAF was visited by 8AW from Detroit. KW uses GSA final. UL is painting the shack. CC is hitting DX. DC works Europe. WAC drives new 50-sec. activity. ATM was on N.C.R. active duty. HCZ had 100 QSO's in month. ESO is out of college. BLL got a Silver SB. ACY had 32 DX contacts. FXC is rebuilding. BDO attends Hudson Division Convention. CVT is building new rig. DDW plans visit to World's Fair. GWY works DX on 14 and 7 mc. CJG is painting and house cleaning. CBN is in Brooklyn for summer.
CVL and OYJ joined N.C.R. CPQ and SCM had FB QSO. HCV is pounding out in each.

Traffic: 2E1Z 416 BLF 410 JN 246 EGF 332 BJX 295 GTO 8Q 4Q 71 BJA 62 WIEF 52 DSM 253 DYC 13 18 KW 16 UL 14 CC 14 GPE 13 12 DC 7 GNI 6 AJE 4 GTW 4 ATM 3 ACA 3 HJC 1 ESO 1.

N.C. & LONG ISLAND—SCM, Ed. L. Haunsch, W2AZ, Long Branch, N.J. CB is operating 2000-volt antennae. Acting N.C.S. for Southern N. Y. DJP has C.C. rig. BYS was heard in Austria on 3.5 mc. KI sent first report in 10 years. CYX schedules R.1. 3 days a week. FF in CB is operating new antenna system. CYO has 62's PP final. CCD is 14. DOE. FEB charges $1.00 per month. DOG participated in portable field day. FCQ reports new ham, HDT. FBE received card from a YL in Germany, who heard his sign on 7 mc. BTF was laid up with injury to left eye. AEN reported EXQ got married; it should have read "EXM got married in March." AZV is trying new Herts. RKP took the final leap. BUU has new 660's. COB was heard in Poland during the S.S. DWP is going 59 mc. for summer. BAS is at new QRA, 128-73rd St., Bklyn. AUF operates on 1980-2 kc. PHONE. US is using R2K and '52's. AXN is with Emerson Radio Co. HBK is a new station in N. Y. C. OAC, the Williamsburg Radio Club, had a power transformer stolen. The station has no working on phone job. FBE reports new club organizing in Greenpoint.

CHT, pres.: FBE, v.-pres.: EQE, treas. CRL, ERH, PDU, EDZ are trying 56 mc. EQU worked Holland with 110 volts. ARG is back after a five-year layoff. EFB has added 24th. PLY is getting in shape; he was in the fleet when he was in Hudson River. AEN worked CT2B, who was using 'phone on 7 mc. BGC is at new QRA in N. Y. C. OVA reports that Astoria Club was guest of Sunrise Club recently. AHC, DQO, DQO, DXO of Northern Nassau Wireless Assn. did a fine job of Trir Club hamfest and out. BVT is chief electrician of Woolworth Hldg. AOB uses 82's final on 3.9- mc. PHONE.

Traffic: EQY 416 ELK 468 DJP 165 CHL 129 AYJ 99 ZY 85 DJQ 79 KJ 50 CYX 35 GLJ 27 FP 24 DDP 14 CS0 14 CCD 8 CEH 6 FIP 5 DOG 5 EQA 4 FCQ 3 FIK 5 GUA 4 EDZ 2 BRB 2 FBE 2 BTR 1 EVA 1 AEN 42 AZY 38 BKP 15 ERA 4 AGO 1 AY 2 10 LA 20Y 6 BVT 2 ADW 6 GZ 6 AOY 8 AG 6.

NORTHERN NEW JERSEY—Acting SCM, Robert Maloney, W2BPE—EMK gained much pleasure by sharing his beer with BCX and BPY at the hamfest. BCX is new RM. CQX spent all of his time on 7 mc. CJM handled traffic with W2PM and D4ABR will be at camp in 8th district until Sept. 1st. LK is an A.A.R.S. ECO and DBH received Class-A ticket. FLT was heard in Germany two days in a row on 3.5 mc. GZS was change of a new band. GVZ has rack and panel 450-watt job. BXM is in charge on 3.9- and 1.7-mc. 'phone mainly. ESX claims his troubles will keep him busy for next ten years. BJY is another one. FMN starts out with his first. BPY is still trying to put "That Hartley" together. The T.C.R.A. brought all hamfest records to this section in putting over the Perth Amboy affair on June 18th. With an actual attendance of over 1000 people, and a swell program, there were able to hold it. Ed Whitnah, ex-2DIU, is now 9RYD in St. Louis, got radiotelephone first-class ticket.

Traffic: EKM 1524 BCX 1534 ENE 571 CTT 28 CJX 265 DPP 73 CIM 7 TOP 7 JK 47 ECO 27 FLT 6 DOP 3 CE 10 FPN 1 BPM 3.

MIDWEST DIVISION

IOWA—SCM, Bill Boardman, W9LEZ—ABE, Chief RM, 9EPA, Rm. Banks operates in Iowa. SCM has radio. Works anything. Does everything in my power to make our Section a leader. Please mail your future reports to me on 325 Kirkwood Blvd., Davenport. Tri-City Amateur Radio Club announces a most successful hamfest with over 400 amateurs registered. LEX makes BCQ 17th. Divides time between traffic and rag-chewing. ADD is building 14- mc. 'phone. NTA reports for NUC. NUC worked 3 KB's. NZW desires ORS. KMJ is on 3.5 mc. MXX is on summer vacation. IQS's antenna blew down. NTV works 3.5 mc. with 15-foot antenna.

Traffic: W9LEZ 519 CYX 226 QSO 16 LEC 113 NTA 13 NUC 7 NWZ 52 RDK 3 NTW 3.

KANSAS—SCM, O. J. Spetter, W9FGL—6KQ and 910L RM's. 9E6L. 'phone RM. MUY moves to Topkea. KTV is new QSO. CDR is QRL Hamburger joint in Salina. SCM is transferred to Emporia-DPL. SCM is operating on 748 kHz. Temp. SNCs. JSN is temp. ASNCs for summer. BEZ and NLZ plan USNR cruise. MJ5 is trying c.e. Portable 60CW in Wichita applied for 9 call. HTP is on again. LKD uses 89's with Class-B modulator. LPD is building 2 1/2-watt h.t. 906 for operation. Summer, 1945. Operating CXX on three years, will be at the other end of schedules this May. DMP is putting in '03A. DSD got hitched June 9th. Congrats, OM. DSD and AYE are at KPE plant. IGY has new 'phone. GML is on 14-mc. 'phone. HWW has new receiver in Armony. NLZ is active in NCK. APF took fleo-power (2-watt) 3.9-mc. 'phone on vacation in Ozarks, and kept schedules with home port. FUX is in Amarillo, Tex., awaiting 5 call. HUB and OW entertained SARG with a cherry pie feed. BCY and FNX plan 56-mc. field day. FMX, CNW, GWY, PMY. WFA were on field day June 9th-10th, but nary a QSO. EMT is with Sellograh Oil Survey Co. In this area, in TPS-B, is using QSA. ARA, Z00C, R2Q, Telephonism 2nd. GCQ has many crystals. JUX has new bug. MBK moved to Parks, Ariz. POM has 45's P.P. ASY works 1.7-mc. 'phone. IEW has contract to build Lawenworth Police Radio Station. OXQ is ex-Commercial QSL and destroyed. WRX is new 3-mc. crystal. PZW, RBH and YNB are new Channeo calls. DKL works spasmodically on 1.7-mc. 'phone and 3.5- mc. c.w. ABE has MOPA with 152 final. JAG is on 1.7-mc. 'phone, also RAW. EVR is active again. PBU is back at Salina from K.U. ATN has new '52. JEE and JDY combine their equipment. NOB and ATN are experimenting with Mobile KNG transceivers to be used at Camp this summer. Rebuilding: ABJ, IGY, 17-mc. 'phone with 211 final; ABE rack and panel job; RNJ 17-mc. 'phone; OER 'phone with 261 final. Club Notes: SARC is taking vacation until Sept. 1st. Large delegation from Welichita went to Winfield, June 7th, for joint meeting with Walnut Valley Radio Club. Beloit hams are organizing Radio Club. Nile Owl Amateur Radio Club had picnic at FEL's, May 20th. Club Secretaries, please keep the SCM informed on your club activities.

Traffic: W9FGL 128 IGI 50 IRE 39 AW 26 PDK 23 KOB 15 HWW 14 CMV 14 MUY 11 PB 07 OZN 63 CAO 01.

MISSOURI—SCM, C. R. Candy, W9EIG-JPT—NNZ turned to 7 and 14 mc. ORM is trying to get rig back to 14 mc. HUG antenna is down. DHC attended Kaw Valley meeting at Topeka. DJC is working 800 final. GBJ is experimenting with 28 mc. PBZ has silver s.s. super. IAC is working on 1-kw. 'phone. CJL is on 1.7-mc. 'phone. JXG has Class A, KBV and 12W work good DX on 7 mc. BLU is changing to c.e. CHE is experimenting with 56-mc. 'phone. MND worked 4 continents with 10 watts. CGA gets out FB on 14- mc. 'phone. LCO is training prospective hams in St. Joseph, NIS and OZC works duplex 'phone. MLR is located in Boonville, not Moberly as per June QST. DHN is building new receiver. DLC visited four Sedalia hams. NNF uses OIA's on 14 mc. CCZ moved. FAB wants high-powered tube. NBH changed one RF choke, and is now getting out FB. NBE is changing to 14mc. PB.Z moved to 1310A Wright Ave., St. Louis. Rebuilding: KEF, LLN, GQG, GSO, PW, NKS is new member of ARF of St. Louis. KIK is on 3.5 mc. at intervals. GPB has new job. LCO and VEN are experimenting with on-waves, c.e. CVN and NEW want ASIA for WAC. SAA and LNE are new hams in St. Louis. PYD is working on new receiver. EFC finally masters 3.9-mc. 'phone. DLB got married. EYG is moving to farm. SMARA meeting was held at St. Louis. PYD is working 14m. Sunday in August. KANSAS CITY CONVENTION FOR MISSOURI at Hotel President, August 4th-5th. Big time for all.—Registration $2.00.
Traffic: WJWJ 1720 AM 148 ENF 79 NZN 86 CRM 30 CJ 22 HUG 17 DIC 20 KVN 7 AHU 7 DCO 5 AAN 4 LW 4 GBJ 1 FIV 58 DPJ 7 BMA 28 GTK 4 EFC 9 BGE 3.

THE MASSACHUSETTS—SCM, Samuel C. Wallace, W9FAM—DMY has been experimenting. OPP keeps lot of schedules. DGL Champ DXX, is going strong. EZ0 is organizing N.C.R. unit. D1 is going on cruise. FAM is on Sunday morning until 11:30 a.m. RUI is new reporter. FWT has been experimenting. L514.


NEW ENGLAND DIVISION

CONNECTICUT—SCM, Frederick Ellis, Jr., W1CTT—I'MK gets big thrill QSOing his dad. AMG BPL on deliveries. DOW hangs on to CRA traffic carrier. CVL, CJD, OKF, BDI, "Fai" and UE were active on Five-day. EFW is looking for schedules. BUM is experimenting with antenna. BHI is home for summer. WIBY is new station in West Hartford. The hamfest at East Hartford, June 24th, under auspices of Hartford County A.A.R. and Manchester Radio Club, was big success; started 800 stations! BDI and UE in building will be guests at Count Brasspound's Dinner at Darien on June 14th.

Traffic: WMK 336 AMG 333 DOW 234 UE 220 CVL 79 FIO 55 BDI 39 CTT 33 GGGX 28 HJJW 25 EAF 17 HM 14 MCR 13 GP 7 12 CDD 7 5 ILE 5 EBIT 5 HTTN 2 BPN 1 IBT 1 SJY 1 DGG 99.

MAINE—SCM, John W. Singleton, W1CDX—GKC is building receiver. EFA plans trip on Mt. Katahdin for 50-mc tests. BTQ has been made. 17-mc phone. CXL portable was on top Walker Hill near Wilton during Field Day. ERB visited SCM. BLI has 800 final. ERO has 80 c.c. rig. CBU has new c.c. rig. EEY schedules S.C.M. EZR is new member A.A.R.S. HXO is on 3.58 on 50 mc. ALO carried on 50 mc from Portland. FRO is making fixed. JOY is under doctor's care. CRP climbed Mt. Pleasant, June 10th, for 50-mc. Field Day. HUX helped operate W1CDX BID. IDN and JEE are new Wilton hams. FA is experimenting on 50 mc. parade was on walking on a farm. New club formed at Wilton, called "The 73 Radio Club," has 15 members.

Traffic: GKC 118 EFA 49 BTQ 45 CDX 42 ERB 41 CIF 18 BLI 13 ERO 3 CBH 6 EEE 6 DHF 7 EGR 15.

EASTERN MASSACHUSETTS—SCM, Joseph A. Mullen, W1AAS—KH is reporting for SCM ASL who is on his honeymoon. The blessings of the Section be upon them! FRO, our expert YL op, leads the Section! CBI will conduct classes to QSL your QSO 09BMQ and 11XX on 28 mc. VES, the old reliable, is QRT for summer. CRA says Harvard finals QTA schedules. BZO worked across the pond for first time. ABG was QSO 47 stations in 4 hours portable Field Day. EPO is helping hands handle codes. COL reports FB A.A.R.S. traffic for following: GG6, ATD, GWB, ZK, CCL, AZF, DFE, AAR, WX, GZL. Two filter condensers refused to condense for EVT. FYT gets out with 71A. ACD is again pushing the key. DOL is pleased with his new O.P.S. DF58 will be on 28 mc. week-end. HJK built new Tri-tet and monitor. HZU is active with 50 mc. portable. CWB is back on the air. WY last month was QSO 17 countries, making total 651 IB and XYL. 1159 was QSO 273 others. ZO kept 170 schedules on 50 mc. with VT in charge of Boston Post booth at Home Beautiful show, assisted by ASI, HSF, KH, VA, VS, WW, and HOM, who flew over the building. ORIO traffic through W2R. GZL is new OPS. FNY is at lake for summer. EBO graduated from high school. ERS has 100-watt job. ERZ is building 51 kw. outfit. DIE joined c.c. gang. DDK is building a.c. freq. meter. DVW is graduating from college. COI is changing to 59. FRQ finally worked a station on 50 mc. ZB got W.A.C. Hates off to Carl! EHR moved to E. Mass. ASY helped beat his c.c. friends at baseball at Hartford Hamfest.

Traffic: W1BVR 445 GZL 153 FNY 114 EOB 75 ERS 64 DIE 30 EAX 29 HNP 27 AWZ 23 DDR 23 DWZ 11 HGO 7 COI 6 FRQ 5 ARR 2 ZB 4 DZU 2 YK 1.

IN NEW HAMPSHIRE—SCM, Basil F. Cutting, W1APK—FFL leads Section. ERQ joined the Navy, so we won't have his fine reports for a few years! EJH pounds out fine 50-mc. sigs. FFZ has trouble with FBXZ. GHT is busy on 50-mc. transmitter. BQF is building 5.5-mc. rig. HTQ has Tri-tet. AGO has an FB receiver built by Dr. Pickard. AUY is QRL hamfests. GEY was heard by 55HT on 1.7 mc. FGC operates from Jeremy Hill in Pelham on 50 mc. BDN and HFQ operate on Mt. Uncannoeou on 50 mc. DMI moved to Old Orchard Beach, Me. KGE and HOY operate at DMD on Sunday p.m. 50-mc. tests. FX has been 55 mc. the SCM has heard so far. APK and XYL climbed Mt. Kearsarge, June 24th, and worked 16 stations on 50 mc. EAW father was 55 mc. at home. This week, S. Cove, has been organized in Concord with DMD at the head.

Traffic: W1FFL 297 GHT 29 EJZ 8 ROU 16 FFZ 185 HJ 32 APK 24.

VERMONT—SCM, Harry Page, WlATF—GAE is telephone lineman. DQK entertained BJP, GAN, SLY, 8FYC, and VE2FD. BD is still grinding crystals. GNF is going to roll up traffic now school is over. AXN is QRL growing family. BJP "spurios Versvik" in the Fridgeville milk cooler rush in northern VT. DPO arrived in Wir, OK, but found he lost his OPS ticket in Ky (where he stopped to visit a YL). Har! Har! Har! Traffic: W1BD 80 DQK 21 AYP 8 GNF 4 GAE 2.

NORTHERN DIVISION

ALASKA—SCM, Richard J. Fox, K7QQ—DJA uses A-TRI-TET, EBR returned from vacation in Wrangell. UHR is using a Gross outfit. EGO left for vacation trip to States. VH has plenty grief as Radio Engineer for Signal Corps. AOC is heard from Todd. CTU visited PQ. BEU was transferred to Guard Island Lighthouse. ASI schedules VEP. CHR finds ZL and VK easy to work. ABW was transferred to Juneau, AOA and CKK are on for summer. ARQ is new ham at Exaucion Inlet. BNW was laid up account of sickness. BXX bought a new boat—a converted Coast Guard Cutter. Drot cut on CFP's revamped, and everything is OK! DWM is building a Tri-tet. EZ has trouble with BCLs. DJZ schedules 68MJ. PQ makes BPL.

Traffic: K7QQ 206 DJA 37 EBR 31 EGO 42 VIN 66 CKE 22 DJZ 6.

IDAHO—SCM, Don D. Oberbillig, W7AVP—DMT, KI operate radio section at Idaho. AYP, CHT, AVP, DZO assist as net stations for N.G. traffic. New hams: EMN, ELZ, EMT, BNJ is taking three months vacation, DSL had a backstage from grinding crystals. DZO takes press from N.G. camp for hometown newspaper. BRY, ACP, BKF helped AYP put up new antenna pole. DXY. DBP attended hamfest at Spokan. BAA lost most of members at last. A unit of GNP, N.Y., installed QRL. BCL auto radios. CFX, AIS, BCU are on 14 mc. CAX, CAP are on 3.5 mc. CHW has new c.c. rig. NH joined A.A.A.R. CHT worked FSEO. CSW is dispatcher at ranger station. BRZ has his QTH, and D1 doesn't forget Jenny Lake Hamfest, Aug. 4th, 5th, and 6th.

Traffic: WYNH 12 AYP 343 BRU 3.

MONTANA—SCM, O. W. Vines, W7AAT—BDJ is rebuilding. DZW has new rig. CNN, ABT, CRH, CEG, ARR, DXX, BRA, and AOD attended Spokan Hamfest. EAG left for Los Angeles. BVI was heard in Germany. APS is going high power.


OREGON—SCM, Raymond W. Cummins, W7ABZ—AVY is operating C.C.C. station WUBG. DNP is an O.P.S. DWP is QRL duty. DVW works ZL, and VK.

August, 1934
—Field Day at Minges Mt. ALU and HAG made BPL QC had portable, on N.C. Colorado River patrol. KOL is moving to Miami, FQG, JLO, JQW, IF, 1MK, DBR and FOH have new PR-17s. BRL works 10X daily. KFC uses 265-D's P.P. IQY lacks only Africa for W.A.C. 1IF schedules DPS and KKE on portable. KBJ uses c.e.e. P.P. 48s. HBU went to Ohio on visit to his father. DTDW is operating at Phoenix airport. DDQ is building BC station. EFC and GSF are on 14Mc. phone. GYM is radio serviceman. HJX moved to Super. KJU and ANO work for transient camp radio at Prescott EB and headquarters. AEK at Phoenix, HEK at Iron Springs. EX-522B-DZG. KJU just got a new house on a cactus! TDR is putting 530 on air. ILL is moving to 1.75Mc. phone. CHR moved to Phoenix. KOA is on 1.7mc. phone. KWI is new Bisbee ham. AWA and RGO were Phoenix visitors from S.F. FHE returns to Detroit, Mich., for summer. KKTR and KTG are together on 3.5 mc. JRK and KQT are also working together. AND and DRE work Europe and Asia. On 14 mc. Phoenix Radio Club has a special night for bridge enthusiasts each week. DKE/GBH is employed in BC station in Kentucky. JYQ is rebuilding to e.c.e. P.P. 211. BLP is back with nifty new outfit. KGL has 2 222-Ds for modulating final 92. GJO likes c.e.e. FEX sold to SFG. Phoenix Radio Club has fine prizes since reorganization. Dues are now one dollar a year, and ten cents at each meeting for punch, prizes, etc. Meetings every other Wednesday at 9. C. Bldg. 8 p.m.


PHILIPPINES—SCM. Newton E. Thompson, KAIKA Annual hamfest at JRB, Sunday, June 26th. Another Guam station is with us: OM2AA.


SANT DGO—SCM. Barry A. Ambler. WSGOP—BMG will be on portable. FQG is c.e.e. EFK worked a VK on portable with 300 volts. GMT is buying a Super. GNT works 3.5 and 7 mc. BAM worked France. HUZ left for Orient. GMT tries 14 mc. phone. FCT blew filter condenser. GOH and EBX went to Los Angeles to club meeting.

Traffic: W6BMC 683 FQG 160 DQN 146 EFK 110 HIF 79 FJW 38 AXN 18 GTM 14 CNK 8 GNT 2 KFC 1.

SAN JOAQUIN VALLEY—SCM. G. H. Lavender, WD6ZN—HLJ and HIP joined A.A.R.S. Work on chicken ranch keeps EXH busy. DXL is president. Stockton R.C. GOQ was QRQ teaching school. GXL is still using little nag and dines for a 92. DFLI finally obtained a record. DQZ is back on air. Now is the time to nominate your man for office of SCM. Nominations open until November 1.

Traffic: W6BYM 53 DSN 42 EXH 33 AOJ 18.

ROANOKE DIVISION

NORTH CAROLINA—SCM. G. H. Wright, Jr. W4AV—MR's DX list is headed with J2GK! ZH worked J2H. CGL worked FB, VPE, and OB. CCH hears plenty of DX. RV reports organization of a club in Durham. OG went to Atlantic Division Convention and the World's Fair. AAK and IF are rebuilding. BST, COK, and BCO Hamfest is now out. W4AHR Radio Club has new 47 mc. Amailizer, new Collins antenna, and a new SW 3 receiver. Winston-Salem Amateur Radio Club, operating NC portable, on top of a near-by mountain, participated in the Field Day. New stations: CYE, CYN, COC, CJC, CXR, CXXG, CXC, CXXL, CXL.

Traffic: W4NC 46 CIP 28 BRT 18 VB 10 CUA 10 BPL 5 BKS 6 ALK 5 BVD 5 RV 5 TJ 5 BRI 5 CCH 4 OG 4 IF 2 CVQ 2 CIP 2 AAK 1 CM 1 CGL 1 CGY 1 COK 1 CWO 1 CHL.

VIRGINIA—SCM, R. N. Eubank. W3AAW—ANT schedules K4AA daily. ALF has 56-mc. rig. CKM is at C.C.G. Camp. FNO worked 1MK. ENJ has six operators. CA is working on conversion. EEN is traveling LT. for U.S.N.R. EHL is now AARS. CNY is 3672-ko. e.e. phone. 1DB is Petersburg Club Station. DZW is now ORS. AAJ spends most of his time on "Bull" and VA work. BKK wants ORS. BKH is now VK1EE and 1QGL at C.C.G.C. Camp. WVGH. ASK was heard in Moscow on 3.9 Mc. phone. BIG is on 3905-ko. 'phone. FJ is Exp. with 56-mc. phone. OM has new location. EBD is building new receiver. DWE is back at Harrisonburg. CSG is going on 7 mc. for summer. HCM is now CMCTR. BBH1A, BBH1C. BZE uses e.e. now. CFV was hit by lightning. JG uses 54P P. EAP wants 56 mc. reports. ERW was on month. 37BP QRL work on Little PVC. Discovery, ex-W4ARR is 1018 mc. getting ticket now. EDG Exp. portable while traveling. GV is back on phone. AUGE is QRL tennis. UVA is back from West Coast trip. IQJ is Pres. Peninsula Club. CFL is back from Ohio State U. CML is at C.C.G. Camp. Petersburg, BZ is rebuilding for 1.7mc. phone. AKR is trustee for club station. AJJ is on 1.7mc. phone and 3.5-mc. e.e. BAD is trying Tri-tet. EDG uses e.e. on 7 and 3.5 mc. EJK is home from U. of Md. DGT, ELJ and ELA are rebuilding. FMX will have 59 Tri-tet soon. CXM2 is going to P. L. in August. Luck. BN! AVU has two runs on 3.5 mc. at Scout camp. BNH is chief op. of Richmond police Ric. WO'S QRA is E.A.T., Baito. Anyone in Va. having any equipment for弗gs. above 14,000, peg put on report card. DCM now with BC steer. WMBG. QN and OM go to all hamfests in Va. NORTFOLK-VA. BEACH.HAMFEST IN AUGUST! FLEET WILL BE IN! Special mention goes to Official Offices GY-BIG-CNY for taking first places in last OP/S Contest. Have any equipment that will operate from Heat in Emergency? Put on card or write card to A.R.R.L. Ex-ARU is on 56 mc. EDG uses portable while traveling. ERW is active.

Traffic: W5ANT 86 BWA 76 ALJ 31 CKM 22 EBC 20 EML 18 CHA 17 ERN 15 EKL 9 CNY 8 D7 7 D2W 6 AAI 5 AAF 5 BEX 3 HR7 10CJU 45 ASK 4 AP2 2 HIG 5 FJ 53 OM 27 EBD 24 DWE 12 CSJ 8 KXN 4 WM 4 RB3 3 ELB 3 CFV 2 JG 2 CXZ 2 COO 1 EAP 1 EKJ 10 EX4 1.

WEST VIRGINIA—SCM, C. S. Hoffmann, Jr. W8HHD—DPO is first in state to make a WAC! FB. OM. KJSJ has new 03A P.P. e.e. job. HWT joins WV Net. HCL uses 53A P.P. HGO moves to Youngstown. BOW and FQB BTV are home on vacations. CSPs are wheelsing. W8ELJ works as NCS on "WV" Net. 8EIK/WL1H works as Army NCS on 3487.5 kc. on WLM's schedules. 8WM is building set for JQP. New stations: Bluefield MCL, Yukon MCR, Weston MCL. LUX works all U.S. on 14 mc., BDD, AKP, QVQ, W8HPP, W8XLD, DMU and OW, and KJW visited AIS. CBS sold out. CHM has new all-band portable. HIU, BIX, CHM entered Second Annual ARL Field Day Convention. KKG and DME attended. DXL is now 56 mc. transmitter at Hamfest. AVC of Zanesville, Ohio, was in Clarksburg. AMX operates Clarksburg Police Station. New officers, Mountainer Amateur Radio Assn. (Fairmount); JWL, Pres.; KGT, V.-Pres.; Bob Pelly, Secy.; JM, Traffic Mgr. Clarksburg hams worked ex-S81B (from 6TMW), who is on his way to British Columbia to live. KUW bought big set from "IT. ASI is using 'phone. IXT on 3888 e.e. CMI has new RME receiver. LS8K worked 55 stations with 10 watts on 7 mc. LSJ worked 4 districts on 3.5 mc. AHF was appointed phone assistant. K2E worked 10X daily. ERS announces arrival of new YL op.

August, 1934
WYOMING: WTAEC reports his OW licensed with call ELI. Congrats. CLG is equipped for portable operation. CTY built c.c. rig. DJS and W2B6V among those who visited S.L.C. hams. FB hamfest of Wyoming hams at Thermopolis. Utah A.R.C. Hamfest at Comet Springs successful in spite of rain. Fifty-five present. Their pleasure was to have the presence of Director Andrew K. Mrs. Andrews was 3CGX, 7DIE, 7COO and 7TBZ. Don't forget W1MU at Jenkay Lake on Aug. 4th, 5th, and 6th.

Traffic: W6FRN 712 EXL 208 BSE 166 KDI 47 GQJ 2766 KGQ 7A1W 27 TITW 2 QGZ 565. W7C0F 61 AMU 43 CSE 22 AEC 1 COO 1.

COLORADO—SCM, T. R. Becker, WB9TO—ESA is on vacation; GNK reports a nice total. IFD has an 800 tube. NIT worked a VP with 14 watts input. JFD gets good reports with impendence matching. W6DVU is a brother ofWNIT. W6GGQ is still pounding them out.

EHO has been active in field experiments. FXQ is on at Cragmor. JNV continues to improve in health FB OM. YL left for the University Camp. GFS worked a ZL ex. c.c. phone. LAT has his home in Denver. BQZ is on and CTD has his job. WYK is having trouble with his oscillator. DDP is putting in new 50-watt rig. BTO will have separate transmitters on all bands. BYY is going Fone. CQJ plans another meter work. LYE is working for Remler. EMU is overhauling his speech and receiver. FYY is back to his 50 watt. HRI has fully recovered from his accident. CBU is planning to be on soon. BNJ is reported better after a short illness. FA is on now and then. GNY is on a Navy cruise. Joe Boher is working at KQO. AAB is having trouble with his back again. 5-meter activity seems to have acquired a large amount of interest here. Well, fellows, that's about all for this month as the summer QRN seems to have taken command of the Radio activities. Here's hoping that the activity increases next month: CDE is active at his QRA.

Traffic: W9ESA 953 GNK 138 GJQ 731 EHC 88 FGS 8 JRV 1 GIL 75.

SOUTHEASTERN DIVISION

ALABAMA—SCM, L. D. Elwell, W4KPl—DS, chief A. R. M. Amateur Radio gang. APU, RM, for mobiles. Worked some 14-mc. DX. BJA holds up his end of state. AJY works plenty of DX. ATD is active with new rig. ADL is pounding on 3.5 mc. AWQ has new 7-mc. rig. ABU has increased power in the phone and gets F8. BNM, the 'Phone RM,' is doing FB FM. CUE, B’ham Club station, works fine. KP is headed for 14 mc. BGO returned from school. BMF is QRL U.S.N.R.


ORANGE COUNTY, FL—CALHORN for A.R.A.R. CEM, Ray Atkinson, W4NN—The Central Florida Radio Club sure knows how to put on a convention! Over 100 hams attended at Orlando. The work of Captain Cole and tireless effort of Convention Committee is to be commended. BNI, now on 3.9 mc, BQZ has new PB. RM, is doing PB FM. CUE, 3.5 mc. CWV is new ham at Haines City. BDQ and B2N are on 3.5 mc. BWZ is building new receiver. BUM will work portable in ninth district this summer. 9EU is now on 3.9 mc. AAB will be here in this summer. AZB has fifteen stitches in head from speedboat accident. WS has code class of five youngsters.

Traffic: W4WGS 40 NN 26 ASR 3 BNI 1.

FLORIDA—SCM, Edward J. Collins, W4MS—RMS: 4AUW, ACB. The hamfest at Tallahassee went off in great style. The West Fl. Shortwave Club was reorganized under name of "Suwanee Transmitters Association." CUR is putting a wallops all over country. CTX holds things down with CLP in Purcell. BGA joined U.S.N.R. BFD plans new receiver. QK was heard in Hung, QU received U.S.N.R. commission.

COG handles Gulf Coast Storm Net schedules over MS. CWF is newcomer in DeFunk's. BSJ is our fourth W.A.C. AUA is getting rig in shape. ACB wants an F7BA. EB is getting set for his hamfest. AQI is with the State Highway Dept. CTA is on in Pensacola. CMJ is on vacation. COG seems to have returned to his visiting 0USA. ASV has M.O.P.A. AUW is getting up some traffic lanes; let him know your operating hours. CRU swears by Comet Pro. Reports received from: BKE, BCO and SMH. AQA, ABQ. NWZ and ASV. was visitor to Pensacola gang. CDE bags DX. CBD wants to sell out.

Traffic: W4MS 27, EB 83, COG 11, BFD 6, VR 14, BBN 10, QX 4, QU 1, CTA 3, CTZ 2, ABO 12, AUW 10, CDE 18.

SOUTHERN CAROLINA—Assistant SCM, Bannie Stewart, W4CE—CQQ is on 3.9-mc. phone. CPZ is on 14-mc. c.e. BNN is building suppressor grid transmitter of May QST. BON is back on from Clio, S. C. MN teaches Radio at U. of S. B. CXX finds 1.7-mc. 'phone holding up well. BJC is back from Clemson College. CUS and CZA are new in Charleston. S. C. OW plans medium-power 'phone. BN, an old-timer, is located in Summerton. APQ was married recently. CE was on cruise up north with Naval Reserve. All South Carolina amateurs please send a report to 4CE, by the 20th of each month.


WEST GULF DIVISION

NORTHERN TEXAS—SCM, G. E. Talbott, W5AUL—ZD is honor traffic man. ARS is still doing the family washing. BKH has a "swell shack." AOD and 6DG'T are getting ready for a big traffic season at Lubbock. B7J is "Granpop's" DAA reports CZZ, CAE, CJY, active. EPO and EEE are new hams in Clarendon. EPO reports for first time. DSA is with C.C.C. at Dub- lin. COK takes rig to Chicago for the summer. BCW reports 49KS has moved to Osage. IBY is saving up for Chi-Fair. NW and DUR attended the "bowl game" at Tulsa. DXA is a "vocal cinema" op. DMA is Mayor, J. P. R. Agent, leading Ham and Gangster in his City. AUJ joined the T.N.G. BAY says his Tri-tet portable is the berries. The Ableine and San Angelo Clubs held their annual spring hamfest at Buffalo Gap.

Traffic: W57ZD 174 BII 159 CPB 92 AW 82 ARS 69 CIJ 32 BKO 31 CPT 30 AOD 26 BTJ 10 DAA 11 CIJS 9 ARV 8 EFC 1 EEF 7.

SOUTHERN OKLAHOMA—C.M. Carter, Jr. Simpson, W5CEZ— CEZ installed plug-in inductances. BZQ is now RM. CON is going to spend the summer in Calif. AMT makes application for A.A.R.S. AYF was QRL preparing for Convention in Tulsa. ORS is new O.B.S. COA is new O.R.S. IDDW is on the 'phone. AA has new crystal for 3.9-mc. 'phone. The Section suffered a great loss in the death of Edward H. Dogroot III, 5AMC of Oklahoma City. The Semi-annual Joint State Convention was held in Tulsa, June 16th and 17th. The next meeting in this series, which are jointly sponsored by the Tulsa Amateur Radio Club and the Ponca City Key Clickers Club, will be held in Ponca during the latter part of January. AIR is now O.O. The amateurs of Ponca have organized a club. The Mike and Key Club.

Traffic: W5C5EZ 599 BQG 90 CON 78 AMT 36 BAR 27 D7C 23 AYP 24 ASQ 22 CRS 11 COA 6 CIJ 8 BWN 7 H6D 8 A. Ashteville, N.

SOUTHERN TEXAS—SCM, D. H. Calk, W5BHO—MN keeps eight regular schedules. BJ is rebuilding Final to 211. ADZ made W.A.C. SGDF holds four schedules daily on 3.5-mc. phone. DPX is rebuilding to 450. BVO is in U. F. At the recent Convention Field, MS visited Chi. Fair. HP has new receiver. AQK is attending radio school, Austin. W5APM and W5CNO visited with MS. CCD is building c.e. rig. CCA is building 26-mc. to transmitter. DFP has FB new c.e. rig. DSI works VSKs. The Houston Amateur Radio Club held its annual Ban-B-Q, May 27th, at the San Jacinto Battle
ONOTARIO DIVISION

ONTARIO--SCM, S. B. Trainer, Jr., VE3GT--JT is now RM for Toronto. RK has been to camp. LF also, taking a portable with them. SG will have his hands full with City Hall Centennial traffic. 3AL will have his portable, 3AL, going at Stoney Lake. MX is in Kingston for summer. JJ visited W8AAL and SKIR. MB is new QRS. KD is decorating. GH is setting up 14-mc. 'phone. NJ has c.e. power now. DU and LW, PA, QC, WW, VR, and KC operated KC in portable contest, working 70 stations in terrific QAN. GT and JT were out, too, but were washed out with thunderstorm. PN will soon be on 'phone. YY reports activities on 28 mc. It is with reluctance that I report HP has resigned as RM and QRS. QB is saving for new set of B Batteries. AZ, GR, GT, SG, JT, MJ, UY, JO, IB and CN are working on Convention plans for Oct, 5th and 6th.

Traffic: VE3JT 213 VD 9 GT 49 MB 17 RK 133 JI 22 MX 27 DW 1 NO 30 YS 5 WE 35 SG 57 QB 24. VE3AL 34.

NEW MEXICO-SCM, Dan W. DeLay, W7DUI--CJP is now reporter from Santa Fe. Portable DYZ in Boy Scout camp schedules CJP. DLG is prospective OBS.

Traffic: W7DUI 09 ZM 34 CIP 17 DLG 7 EAO 7 AAX 3 DSN 3 AQU 1.

VANALTA DIVISION

ALBERTA--SCM, J. Smallest, Jr., VE4GD--BG attended Lethbridge Hamfest. KG keeps Calgary on map. GD attended Spokane hamfest with AX, AW, NH and GK. LX has daily schedule with KKBAB. LX worked first Aussie ever called. PF built emergency transceiver. LG, RU and SD are new Edmonton hams. LQ is now on. 6QW is building new rig. EA2's DX looks like list of calls heard. FR likes 14 mc. HM hooked ON, G, and VK in 30 minutes. EX plans trip to Portland, Aug. 15. Lethbridge Hamfest was huge success, with QA and EU long-distance visitors. GM slipped to 14 mc. GE working at Lake Louise for summer. HC and EXCA visited JP. HQ, CV and FI like 14-mc. 'phone. EO captured first prize in Lethbridge Club Contest, BZ second and JR third. HW works plenty DX.

Traffic: VE4BZ 73 KG 34 AF 39 GD 8 LX 25 LK 6 QX 2 HM 7.

BRITISH COLUMBIA--SCM, R. K. Town, VE5AC--EC is putting in 250 watt. DQ visited the SCM. HP is QRL commercial operating. EP waits schedules. GI moved to Bridge River. IO, EJ and JJ attended Spokane Hamfest, CM is a constant rebuild. JK plans more power on 14-mc. 'phone. GH, a newcomer, plans c.e. EA's 2.8-mc. 'phone was heard in Palestine. GZ is first-aid man and mechanic at Bralorne mine. RU takes to c.e. with tints. IQ and FU are newcomers. JJ is on vacation. JO has c.e. BE makes good on 3.5 mc. AU is on. 6XU and KD 115 are working Expedition. GP handled emergency traffic for a forced down plane. KN has nice 1.7-mc. 'phone.


PRAIRIE DIVISION

MANITOBA--SCM, Reg Strong, VE4GC--DK is operating commercial up north. Winners in M.W.E.A. local QSO contest: DZ, AG, MV and KU. BG has kilowatt input. DJ tried 14 mc. AE dismantled Collins coupling unit. GQ is building 250-watt stage. NW would like a Patterson receiver. XX has modulation troubles. KU nearly lost antenna. FC checks overmodulation. GC has 12 in final. CP is looking for good receiver. DU made W.A.C. LB schedules GR. GD is on 6. ED is on 'phone. IT has c.e. rig. CL left for the west. QA uses 7-mc. crystal in Tri-tet. OB and JT are on 28 mc. DF is going c.e. NT west to Gimli. RO is looking for a pair of 600. EK moved to 14 mc. NZ built new receiver. SB is experimenting with crystals. IP is on 14 mc. 'phone. HZ popped a pair of tens.

Traffic: VE4BZ 27 EU 25 OG 19 AG 9 NT 7 RO 2. SASKATCHEWAN--SCM, Wilfred Skalle, VE4EL--Moses Jaw staged an Air Hamfest with 71 attending. MH is building XMOPA with his prize 81a in power pack. LZ and MH are trying portable 50 and 28-mc. work. CN burnt out M.G. GN gets great DXC with a 45. BP spent Christmas holiday at WIN. Wallrus and made lots of QSOs. JJ worked ten VKs and one G. EH is working on 'phone. PM keeps daily schedule with Winnipeg and Edmonton. ND works Saskatoon and Lethbridge daily. EL visited Swift Current and had nice QST operating over CV and ND, also nice chat with CB on return trip.


LATE AND ADDITIONAL REPORTS

VE1FR was licensed June 10, 1928: is now working 20 mc. 9MXL. MF, HF, QL and LZQ attended HPK's wedding. 9MXL was best man. 8KZJ is going strong with DX on 14 mc. 8HGF has new rig. 8EQC is going FB. 8DG and GGU are rebuilding.
Greetings from the French Amateurs

Réseau des Émetteurs Français,
17 rue Mayet, Paris

Dear Colleagues:

On the occasion of the twentieth anniversary of the founding of your association, we are happy to send you all our best wishes for your future success.

As the oldest section of the International Amateur Radio Union, next to the A.R.R.L., we hope that the splendid relations existing between our two groups will be continued as they have in the past.

Believe, dear colleagues, in our most friendly wishes, and all our 73.

For the council:
A. Auger, F8EF, President, R. E. F.

More Birthday Wishes

Berlin, Germany, June 9th, DJ4BUF via W1HIU A.R.R.L.

WESTHARTFORD
THE HEARTIEST AND CORDIAL CONGRATULATIONS TO THE TWENTY YEARS JUBILEE OF YOUR MIGHTY ORGANIZATION.

DEUTSCHER AMATEUR SENSE-UND-EMPFANGS DIENT

Should Maximum Power Be Reduced?

Staten Island Amateur Radio Association,
Staten Island, New York

Editor, QST:

This communication from the Staten Island Amateur Radio Association is a proposal which we offer for serious consideration by the League and which we believe will materially help in minimizing the ever-increasing congestion in the amateur bands, both 'phone and c.w. It is proposed that “the Federal Radio Commission limit the power input of all amateur stations, 'phone or c.w., to a maximum value of 100 watts.”

The present power input limitation is 1 kw. This limitation has existed since amateur stations were first licensed (15 years ago), and appears to be a heritage of the old spark days. In the old spark days there were not the number of stations there are to-day, furthermore 1 kw. was required to obtain any fair distance. With present-day receivers a transmitter with 5 watts input to the last stage can accomplish with equal consistency the same results as the 1 kw. spark.

Congestion in our bands is becoming serious, and more so because of the ever increasing number of potential hams contemplating putting transmitters on the air. We have spread the bands with crystal-filter receiving equipment to avoid the effect of crowding that has developed from the increasing number of hams that have come to the bands already. Having overcome to a large extent the effect of crowding, we are now facing the problem developing from the increasing number of hams who are resorting to high power to force their signals through. The result of this is that many of the hams are striving to obtain adequate high-power equipment with limited funds so that they may have an even chance with high-power hams. If this practice continues it would mean gradual development of all stations to high power (aggravating an already bad condition). There still will be many hams who would not care to resort to high power or who could not afford to purchase such equipment; they will eventually have to give up the game.

It is our contention that very successful communications can be maintained over the same distances, and greater distances, with even better consistency, if all stations limited their power input to 100 watts. In this way every station owner would concentrate his attention on perfecting his transmitting and receiving equipment, and every one would have an even chance.

The Staten Island Amateur Radio Association is 100% behind this movement. We are now counseling other hams throughout the States (over the air) on this matter, and it is hoped that through this means, together with the assistance of the A.R.R.L., we may have the Federal Radio Commission alter the maximum power limitation to 100 watts.

We shall be glad to offer whatever cooperation we may to the League in fostering this matter.

William C. Csak, President, S. I. A. R. A.

Morse

Sioux City, Iowa

Editor, QST:

In submitting the letter, which appeared under the caption “Copying Behind” in the March
This month we are writing from Los Angeles after having been away from the shop for nearly a month. On the way out we visited several ham-fests, many amateur stations and most of the supply houses. To me it certainly has been a real pleasure to meet some of the fellows that we have so often worked or heard over the air: W8CPC, W8CNZ, W8AWK, W8DFH, W9AA, W9VD, W9CP, W9LJ, W9KB, W9MTG, W9LIP, W9PRR, W9DDR, W4AG, W5AFX, W5JU, W6CNE, W6GWY, W6CGQ, W6JU, W6PT, W6ELR, and many many others as well as to renew such old acquaintances as: W8BAH, W8BIT, W9UZ, W9RA, W9DCX, W9LD, W9CK, W9EFH, W9KL, W6EZ, W6JA, W6FI, W6GWY, etc., etc.

We have with us the 100-watt “all-band” transmitter with the RK-20’s that was mentioned on this page the month before last. Although it still weighs the same two-hundred pounds, it has been made “portable” by the addition of a pair of handles. All this week we have had it set up on the twenty-meter phone band at the shack of W6GWY in South Pasadena and are now looking forward to dropping down to the ten-meter band to-morrow for the regular Sunday morning schedule.

With the mountain-top locations and ungodly high masts that these W6’s of Southern California seem to have in such abundance, we have high hopes of QSOing with W1SZ, W1KH, W4KR, W4TW, W4AJX, W2TP, W1CTW, — or some of the other West Coast ten-meter outfits in spite of our modest one hundred watts.

Incidentally, the West Coast hams not only have “locations” and rotatable directional antennas (W6CNE), but they consider it a gross misuse of good equipment if a pair of 852’s is run at anything less than 999 FRC watts! — or for that matter, a single 852 if a pair is not available.

One of the most frequently asked questions — aside, of course, from data on the transmitter — is about our plans for a new receiver. It seems that many of the fellows have heard of the new model we have been trying to work on quietly during the past six months and have the opinion that it is being designed to replace the FB7A and the FB8A. This is not so. The new receiver is intended to fill the existing gap between the FB7 and the AGS in both price and performance. It is intended as a strictly amateur receiver incorporating as far as possible all of those features which we believe to be desirable for amateur band operation. It will have a two-stage pre-selector; use a radically new type SFL gang condenser with precision pre-loaded worm drive tuning; a new dial; a separate built-in vacuum tube voltmeter for direct reading of carrier intensities; a Lamb-type Single Signal crystal filter with front-of-panel control and calibrated plug-in coils ganged for easy handling. As the advertising men say, “It will bristle with new features.” Obviously this means it has been necessary to design this new receiver without the restrictions as to cost which were given so much consideration in the case of the FB series. We will tell you more about it later, but present indications are that the list price will be slightly over two hundred dollars and that production sets will be available in September.

We feel that the FB7A or XA in its present form is a darn good set and one that will not be outclassed by anything selling at anywhere near the same price for a long time to come. Of course minor changes and improvements will be made from time to time in order to keep it in step with the progress of the art, just as was done with the SWV3. We do not now, however, know of any new developments or existing faults that would justify a new model for the coming season.

JAMES MILLEN
BY ALL MEANS COMPARE these transceivers with any others — you be the judge

REALLY PORTABLE TRANSCEIVERS with battery space in same case

This feature will be appreciated by anyone doing serious 5 meter work in the field.

SOLD AT PRICES YOU WOULD LIKE TO PAY BUT NOT BUILT DOWN TO THOSE PRICES

NATICO transceivers can be supplied in three models, all of which have the same outward appearance.

Type TR-1: Battery Model $10.95
(less tubes and batteries)

This NATICO 5 meter transceiver is strictly portable, allowing two-way communication even when being carried. This is accomplished by the fact that the two dry cells and 90 to 135 volt B battery are self contained in the one case. TUBES REQUIRED: One 30 and One 33

Type TR-2: Mobile Model $11.95
(less tubes, battery or eliminator)

Specially designed for automobile use or wherever a 6 volt battery is available. The case has sufficient space to hold the 133 to 180 volts of B battery and a 6 volt B Eliminator which eliminates the necessary of all B batteries. TUBES REQUIRED: One 76 and One 41

Type TR-3: A.C. Model $16.95
(covering power supply, less tubes)

Here you have a portable A.C. transceiver which includes power supply in the same case (size only 6¼" x 7¾" x 12¾"). It can be operated anywhere that 110 volt A.C. is available. TUBES REQUIRED: One 76, One 41 and One 90.

ACCESSORIES:

Matched Kits of National Union Tubes for...

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<tr>
<th>Model</th>
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<td>TR-1</td>
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<td>TR-3</td>
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6 VOLT B Eliminator for TR-2 $11.50
Hygrade very high gain handmike with battery switch, special $5.50

Natico's Exclusive Distributors:

GROSS RADIO INC.
51 VESEY ST.  NEW YORK CITY
Hoyt Antenna Meter

Hot wire antenna meters, 2 1/2" mounting hole, bracket 3" diameter, supplied in 15", 20", 25", and 5 amperes ranges. Way work without extra parts when you buy the meter at this special price.

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Perfectly damped meters at a price. These are not to be confused with the usual inexpensive meters. 2" mounting hole, range 25, 50, 100, 150, 250, 300 ma, 4 V, AC, 10 V, AC, 15 V, AC, 10 V, DC. Price each $1.49. 3 for $3.66.

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EXTRA SPECIAL!!

866 tubes that carry our full guarantee.

IOSLANTITE top — Heavy duty rectifiers.

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GUARANTEED TUBES

Gross 210 Thoriated filament.

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99’s.

$1.50

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83a, 47s, 46s.

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$0.80

5, 7 and 1 watt Neon Bulbs.

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RAYTHEON RK-20

The New RF Pentode Power Amplifier Tube in stock.

$15.00

(See page 14 June QST)

SPECIAL TUBES!

CARBON TOTATE 210.

$0.75

HIGH QUALITY Cased Cond.

2 mid 2000 V working.

$3.95

2 mid 1000 V working.

$2.10

NEW WARD LEONARD PROTECTIVE MAGNETIC RELAYS

Overload Relay

Catalog

Price

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$5.10

S07—S13

$10.00

$0.50

NEW!!

GROSS 100-WATT PHONE TRANSFORMER

Uses new KENNYON DREADNAUGHT power and Class B transformers in addition to other high quality components.

Write for data on this and other Gross transformers.

$13.95

GROSS C C TRANSFORMER — OUTPUT 25-30 WATTS

The “CW-25” transmitter kit due to its low cost makes it possible for anyone to own a modern crystal controlled station. A schematic hook-up and parts layout sheet as well as tuning instructions are furnished, thus enabling the most inexperienced operator to wire and put the set on the air, for real results. The “CW-25” is supplied with a shrivelled finished sturdy metal chassis under which all parts are mounted, making the wiring and components dustproof. A plug-in crystal holder is furnished with the kit. Only one milliammeter is required for tuning the transmitter and each stage is provided with a jack for this purpose. The “CW-25” uses one ‘47 as crystal oscillator, one ‘46 as buffer or doubler and two ‘46’s in the amplifier stage, set of three coils supplied with kit for 20, 40, 80 or 160 band.

Additional coils $0.75 each. Complete kit, less tubes and crystal.

$13.95

GROSS SPECIAL TRANSFORMER

600 volts each side of C.T. 200 MA

2 1/2 V, 10 amps, 5 V, 3 amps...

$3.39

3 1/2 V, 3 amps...

$3.39

Cased Combination Filament Transformer

1 1/2 V, C.T. 10 amps for 600’s

10 V, C.T. 7.5 for 50’s or 62’s

1500 volts insulation...

$1.50

FILAMENT TRANSFORMER FOR BRIDGE RECTIFIER

using 83 tubes 5 1/3-5 1/3 at 3 ampe.

C.T. — 3000 volt insulation...

$2.25

CLASS B TRANSF. — 19 TUBES per pair...

$5.00

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GROSS 30 H 200 MA cased choke...

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MIDGET DOUBLE SPACED NEUTRALIZING CAP.

35 mmf. — a real buy...

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Ward Leonard Vitreous Resistors

832 long with variable sliders — will dissipate 200 watts.

1000 ohms...

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10000 ohms...

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15000 ohms...

$1.20

25000 ohms...

$1.25

35000 ohms...

$1.30

50000 ohms...

$1.45

60000 ohms...

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80000 ohms...

$1.50

100000 ohms...

$1.65

Mounted Center Tapped Filament Transformers

2 1/2 v 8 a — 2 1/2 v 8 a...

$1.25

2 1/2 v 8 a — 2 1/2 v 8 a — 5 v 8 a...

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2 1/2 v 4 a — 7 1/2 v 2 1/2 a — 7 1/2 v 2 1/2 a...

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5 v 3 a — 7 1/2 v 2 1/2 a — 7 1/2 v 2 1/2 a...

$1.25

7 1/2 v 6 a — CT (midget)

$0.75

6 5 v 3 a — CT (midget)

$0.75

7 1/2 v 3 a — CT (midget)

$0.80

GROSS C ADED POWER TRANSFORMERS

650 v ea. side C.T. 450 ma, 2-175 v C.T. and 1-5 v will give 500 v with choke input using 83 or 523 tubes. You can run your entire R.F. and class B off this transformer...

$5.50

750 v ea. side C.T. 300 ma, 2-75 v C.T. and 1-5 v will give 1000 v, 750-1000 v ea. side of C.T. 350 ma...

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850-1500-2000 v ea. side of C.T. 500 ma...

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1500-2000 v ea. side of C.T. 800 ma...

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Filament Transformers shielded in metal cases, center tapped secondaries.

2.5 Volt 10 amperes for 866’s...

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10 to 12 Volt 5 ampere, any size...

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Special 10-12 Volt 7.5 amperes filament transformer, extra special...

$1.10

The “EAGLE” Three-Tube Short Wave Receiver

“Band Spread” over any portion of the tuning range — only finest material used throughout. Employs one 25 R.F., one 92 detector and one 33 Pentode Audio. 15 to 200 meters — four coils, supplied.

The “EAGLE” is robbed in the following two size coils will operate the filament. See March or April 1933 QST for full description of this most excellent value in short wave receivers.

“Eagle” completely wired and tested...

$11.95

Three tubes tested in your receiver...

$3.00

20% deposit with all C.O.D. orders. Remit by M.O. Include postage.

GROSS RADIO, INC., 51 VESEY STREET, NEW YORK CITY

Say You Saw It in QST — It Identifies You and Helps QST
LEEDS LEADS
Why Not Lead
with Leeds Apparatus

We have been pioneers in the ultra high frequency field, chiefly because of our engineer "56 mc Griffin's" unflagging interest in the use of the ultra-high frequencies. Over a year ago his first article on mopa transmitters appeared in QST, followed by another in August 1933. Our 5-A receiver is another contribution that sets a new standard for super-regenerator performance.

Now it looks as though every ham will become 56 mc minded. The July QST article discloses an entirely new field for amateur endeavor and enjoyment that can be justly called revolutionary.

We are prepared to fill your requirements for quality apparatus and parts at the lowest prices. Our engineering department is at your service.

NEW
A 5½ x 19 standard panel 3 position mixer, MP-3 and a combination keyer amplifier and audio oscillator on a 5½ x 19 panel KP-1 are now available. Ea. $15

Amateur apparatus is "ham built" but it should have commercial "eye appeal." SO — We are pleased to introduce a complete line of LEEDS cased audio transformers that are ideal for base mounting; all leads are coded and go through a ¾" hole in the chassis. You can save both time and money with these transformers and improve the appearance of your equipment at the same time.

Double button mike to grid; single plate to grid; single plate to push pull grids, plate to 500-200 ohm line: 500-200 w. line to 500-200 line. Any type $1.75.

LEEDS Sensitive Relays, ideal for that keying unit operating on 1.5 MA. . . . . $3.00

We now have descriptive bulletins available on all LEEDS Amateur units. 1-B Freq-monitor, 1-C Wave, 1-D Freq-meter checker, 1-E and 1-F Power supplies, 5-A Receiver, DB 5-0 56 mc Oscillator, DB-5-A 56 mc amplifier, DBS Speech Amplifier, DB 46M-210M Modulator Units, MP-3 and KP-1 units, Demi Base, Full Base, Standard Rack Panels and Racks.

Just send us 5c stamps or coin for these data sheets.

45 Vesey St., New York City

Crystal Control — The Key to Heaven

Hinsdale, Illinois

Editor, QST:
"Occasionally there springs up in the amateur ranks a pest—or better, a parasite—" or so we've been told.

It appears that this foul creature takes an unholy joy in tormenting those few of our righteounous brethren who are wont to sit back in crystal-controlled complacency, knowing that their signals are the perfect picture of virginal purity and innocence.

Who is this fiend, warped and twisted as he must be, who insinuates himself into a QSO only to hurl poison darts of criticism at his victim? Why must he smear the conscious virtue of these alabaster saints? What can be his hidden purpose? Does he suffer from hallucinations that he finds evil where it does not exist? Or can it be that the evil does exist? Is it possible that conceit and a crystal are insufficient to guarantee perfection?

We have heard many a "... t4 signal ..." that was "... out of the band and wobbling back and forth, besides a few other discrepancies ..." and, upon closer inspection a T9 parent signal was discovered well within the band, signing the same call, working the same station, and otherwise indicating origin from the same source. In one of these instances, the FRC also heard and promptly QSL'd the chagrined amateur. Has the commission gone in for "... Rotten Humor ..."?

We firmly believe it is our duty to report all poor quality signals to the operators; therefore, if any list of macabre humorists is to be made, we respectfully request to be included.

—W9DEY
—W9IPP/PVH

How About Television?

140 Rumsey Road, Yonkers, N. Y.

Editor, QST:
"Television is just around the corner" has a familiar ring. It is said one way or another every year—the latest grammatical con- torsion being, "Television is here, but—".

I think it is time we amateurs gave television a thought. The thrill of being the first to reach out into new realms should scumper through the
SUMMER TIME IS VACATION TIME

Whether you travel "Cook's Tours" — "By Auto" or just walk the "ties," drop in at LEEDS when in New York. We are always happy to meet our amateur friends from other sections of the country. By the way, LEEDS is New York Headquarters for radio amateurs.

It Won't Comb Your Hair — It Won't Brush Your Teeth — BUT
the Amateur's Analyzer, as described and illustrated in the June issue, performs a number of functions that are essential to proper operation of your station. In the long run it will save you money by insuring proper operation of your equipment. Complete unit wired and tested $17.50. Complete kit of parts $11.95.

EVERYBODY'S TALKING ABOUT
our new 5-A Super Regenerative receiver, described in June QST, $13.75 brings you the most sensitive super regenerator on the market — Rating to get $9.75 brings you the complete kit, including drilled cabinet and sub chassis.

NATIONAL
After four years rapid radio growth, the SW-3 still remains the standard of comparison for tuned r.f. receivers.

All short wave and band spread coil ranges $3.00

$17.70

"The Good Book" says:
(11th edition, p. 70) that every ama-
teur station should employ an absorption wavemeter. May we suggest our type 1-C unit which covers all the amateur bands. It is a sim-
plified version of the wavemeter feature of the Amateur's Analyzer described in the June issue. Dope sheet on request. Complete $4.25 kit.

Cut your own socket and meter holes with a "PAWOOD" circle cutter. No. J for holes 1 to 4" diameter $1.25. No. S heavy duty 1 to 5" diameter. $1.95
Extra blades 30c.

Since we introduced "STRETCHLESS" antenna wire, we have found it necessary to buy it by the mile, to meet the demand of particular amateurs. All hard drawn.
+12 tinned copper wire, 100 ft. 55c
+10 tinned copper wire, 100 ft. 85c
+7 phosphor bronze wire, 100 ft. 75c
+10 phosphor bronze wire, 100 ft. 1.25
Other lengths in proportion

Our prices on Hammarlund and Cardwell products are just less a maximum discount of 40% and 25%, for cash. Leeds policy does not include unfair competitive practices and we have no desire to engage in competition unfair to other Hammar-
lund and Cardwell distributors.

Leeds
45 Vesey Street, New York City
New York Headquarters for Transmitting Apparatus and Short Wave Equipment

LEEDS 1-B
Frequency Meter Monitor

FULLY DESCRIBED IN APRIL ISSUE QST.

This instrument sets a new standard in frequency monitor design. This 2-purpose instrument furnished complete with 2 tubes and in a large calibration chart for $19.75.

NEW! We are pleased to announce that we have been appointed New York Distributors for "MYGALEX" developed by General Electric. Mycalex is not only the finest insulation, but unlike ceramic insulation, it can be sawed, drilled and topped to suit your particular requirements.

Sheet Form Round Rods
Thick Per Sq. In. Dia. Linear Lm.
.125 .03 .37 .06
.094 .045 .45 .08
.062 .06 .12 .05
.045 .09 .16 .04
.032 .11 .22 .04
.022 .15 .34 .04
.015 .18 .47 .04
.012 .21 .74 .04
.010 .22 .67 .04

Mycalex strips for Cardwell condensers will improve their efficiency. Undrilled strips large enough for all midway condensers 35c. Transmitting size T-109 — T-183 etc., 85c and up.

In stock — The improved WING TRANS-
CRIER, using the rugged 6 volt tubes. This is outstanding due to its durable construction, excellent receiver sensitivity and large power output, to $16.50 way nothing of its low price, striped for $11.50.

With tubes $18.25. Bronze steering column mounting $1.75. We recommend the Mallory type 1125mifier for $11.50.

OVERSEAS Export Service
GOING UP!
Leeds has been working "WAC" for a long time. We are proud to announce that our 36 country record has jumped to 44 since last month.

The Customer is NOT always Right.
Quite often we find orders coming in for parts that are not only expensive but really not suitable for the job. They may be inadequate in size or excessively costly. In such cases we point out the error and suggest more suitable parts. Competent engineering is part of LEEDS Service for those who desire it.
veins of every radio experimenter. And it does. The excitement that followed each successive "jump" in frequency until 56 mc. was reached only started a search for new worlds to conquer. Let that search begin in the realms of television—with QST supplying the dope.

—Fred J. Runde, Jr.

Missouri State Convention
(Midwest Division)

KANSAS CITY, MO., for the first time is sponsoring a state convention to be held at the President Hotel, August 4th-5th, under the auspices of the Heart of America Radio Club. The registration will open Saturday morning, the 4th, but, should visitors or delegates arrive early the night before, an outdoor activity meeting will be held at Swope Park. A big banquet, Saturday afternoon, at which the State Activity Cup will be presented by the S.C.M. All meetings and the banquet can be had for the registration fee of $2.00. It's a bargain for the price; and a worthwhile prize will be up for the ham holding the lucky number if his ticket was purchased a week prior to the convention. Just write J. R. Tracy, 229 Ward Parkway, Kansas City, Mo., and register now.

Noise-Reducing Antenna Systems
(Continued from page 74)

acting as a single wire (two in parallel) capacity coupled, through the windings of the transformer, to the receiver input. The elimination of this coupling effectively eliminates the light line (which is capacitively coupled to the twisted pair by sheer proximity) as a source of noise carried off the street directly into the input of the receiver. These winding-to-winding capacities are not so important in the broadcast band, as experience has shown.

FOR HAM-BAND PEAKS

The choice of resonances in the design shown is for best performance in the prominent shortwave broadcast bands. Amateurs who have put such systems into use have been mixed in their reactions; some for, most reasonably satisfied, some indifferent. It is reasonable to argue that the amateur needs a compromise set-up in which the dimensions are about 56 feet for each top half and 31 feet for each pendant one, to give him a resultant curve of the type shown in Fig. 13 but with prominent peaks at 4 and 7 mc., and not too much drop at 14 mc.

Approximately doubling the top length of the antenna, as well as the short arms, makes an unwieldy and space-consuming rig which could not be installed in many locations. However, the antenna may be of regular dimensions with the addition of loading coils to achieve the proper electrical equivalent for the amateur bands. These loading coils are designed to increase a...
For Frequency Stability . . .

Collins uses Bliley Crystals

To maintain their recognized standard of performance, Collins Radio Company selects equipment for its transmitters only after exacting tests.

It is a tribute to the high quality and operating performance of Bliley Mounted Crystals that they are used by this well known manufacturer of transmitting equipment.

Type BC3 mounted crystals manufactured in the 1.7, 3.5 and 7.0 Mc bands having a precision of .03% are supplied within 25 Kcs or any frequency from distributor's stock for $4.95 — to exact specified Kc at slight additional cost. Bliley Crystals are sold by all progressive distributors of amateur equipment. If our distributor doesn't have your choice in stock, he can get it for you quickly; order from him. Bliley Electric Company, 208 Union Station Building, Erie, Pa.

M. B. Kahn of the Collins Radio Company inspecting a Collins Transmitter furnished Byrd Antarctic Expedition. Arrow points to Bliley Mounted Crystal which is standard equipment on the set.

See Our Display at the 1934 World's Fair Radio Amateur Exhibit

UNIVERSAL
MODEL "E"
Condenser Type Microphone
Amazing quality at a sensationally low price. 90° Swivel Head with Automatic Barometric Adjustment — 2-Stage Amplifier — Non-Microphonic Tubes — Solid Bar Grating Diaphragm Protection — Polished Aluminum and Chrome Plated — At dealers’ net cost of $35.28, this is by all odds the greatest value in microphone history.

UNIVERSAL MICROPHONE CO., Ltd.
424 Warren Lane, Inglewood, Calif., U. S. A.

THE HAIGIS
TRANSMITTER-RECEIVER
A Real Instrument
Built by Experts
for the
56-60 MC
Band
THE SAME UNIT with all its original built-in features.
PLUS — Volume Control, Filament Voltmeter Jack, Special Rheostat for 2 or 6 volt operation, and a 6 paged Instruction Book with plenty of additional Ultra-High Frequency data.

Imitations using our original circuit arrangements, minus all the features and built with little regard for electrical or mechanical design, are being offered.

BUT

If you want a non-critical, very efficient unit which operates smoothly over the entire frequency range which was designed by an authority, and which is built and tested by experts, insist on The HAIGIS Type AM Transmitter-Receiver.

PRICE $19.90 NET

The HAIGIS LABORATORIES, Inc.
Maple Shade, N. J.
Pioneers in the Ultra-High Frequency Field
For 160 and 80 Meters

As a companion to our popular Type 677-U Coil Form, a new and larger form particularly suited to 160 and 80-meter low-power transmitter use is available. Low-loss — ribbed and notched for any wire to number 12 — plug-in type or coil alone available — interchangeable with the smaller Type 677-U.

SPECIFICATIONS

TYPE 677-Y COIL FORM
Over-all length .................. 4 3/4 inches
Winding Length ............ 3 inches (30 threads)
Over-all diameter ............. 3 3/8 inches
Inductance, wound full with No. 12 wire 69 μh.
Fits Type 677-P Plug Base
For 160 meter Low-C and 80 meter Low or High-C circuits with provision for extra coupling turns.

PRICES

Type 677-Y Coil Form (alone) ........ 75 cents
Type 677-P Coil Form Spacers (2 required) .......... 15 cents each
Type 678-P Plug Base with 7 plugs .... 70 cents
Type 678-J Jack Base with 7 jacks ........ 65 cents

For 161 1/2-foot length to a 29-foot equivalent. On the same basis they could increase a 20-foot length to a 41 1/2-foot equivalent, or two of them would make the 29-foot length equivalent to 54 feet. As shown in Fig. 14, by actually increasing each 29-foot portion to 33 feet and inserting two such loading coils in series, adjacent to the center cross-over insulator, an effective 58-foot length per top half can be realized without trying to hang 116 feet of wire for both halves. Each short leg should have an inserted loading coil to raise it to 29-foot equivalence, the loading coils in every case being connected in next to the cross-over insulator. Six inexpensive and compact loading coils would be required to do this, saving about 20 additional feet of height, requirement and some 50-odd feet of length. Using three loading coils per top half might permit cutting the overall span down from 66 to 41 feet, or to 20 1/2 feet per half. This also might permit some additional saving of height, although that is not especially desirable since increased height in itself helps to reduce noise pick-up.

One more point: RCA's story is that the 110-foot unit of line, which they assert must not be cut, was arrived at a few feet at a time for best overall short-wave broadcast results. One might experiment likewise for optimum length on the amateur bands. But change of the very effective transformer should not be necessary if the standard twisted line of 180-ohm impedance is used.

Operating Notes

(Continued from page 91)

Where a station controls only one other transmitter (the usual case), the intermediate operator may say: THIS IS STATION B RETRANSMITTING STATION A AND COMMUNICATING WITH STATION C. A and C will, of course, also address identifying announcements at the end of each transmission. Telegraphic relaying practice would shorten intermediate announcements to "C de B." A chain of stations A to B to C to D would sign individually as follows immediately after the announcement of the originating station (A). "B de A," "C de B," "D de C," and "A de D," the letters representing station call signals. AR, VA, K, of course, will be added, or the appropriate voice equivalent. "I am through now" (ending this transmission), "Signing off," "Goodbye," and "Go ahead," will be used by voice stations for the operating signals. This standard procedure requires only a 30-second stand-by while each individual station on the chain (on different frequencies) breaks in and identifies itself. Whether involving two or a dozen stations, the system will take the same short time for complete identification.

No reference to retransmission is necessary where the originating station has announced a "standby for identification" and the control (intermediate station) operator has properly cut off the transmission of any call signal other than his own in connection with identification periods.

GENERAL TRAFFIC PERIOD: As per the League's booklet, Operating an Amateur Radio Station, a daily period 6:30 to 8:00 p.m. (your local time) has been designated to help fellows not keeping schedules (or with limited operating time) who may have messages they want to get into the hands of Official Relay Station operators and other reliable men who have schedule facilities or routes. It's useful. CQ TFC is the general call made by stations that desire traffic. Stations that sign ORS should be able to help you QSP to brother hams.
NEW and DIFFERENT!
SMALL IN SIZE — BIG IN PERFORMANCE — LOW IN COST

JOHNSON TYPE "D" TRANSMITTING CONDENSERS
Single and Dual-Section (split-stator) Models

JOHNSON Type "D" Transmitting Condensers achieve capacity values and high voltage ratings in the most compact assemblies ever constructed. Though small in size, they are superior in performance to many units of larger size. Note a few of the exclusive features:

- Sturdy, rigid, polished plates, .051" thick. Heaviest plates of any condenser of comparable rating. Corners accurately rounded and polished for high flash-over voltage.
- MYCALEX Low-Loss high-frequency insulation standard.
- Integral, laminated low-resistance phosphor-bronze contacts — best ever used on small condensers.
- Bi-Metallic cone bearing front and rear. Adjustable.
- Large diameter (.5/8") spacers and thick plates result in exceptional rigidity of rotor assembly.

A full range of capacity values, in both Single and Dual-Section (split-stator) types. Voltage ratings, per section: 3500 RMS (.080" spacing) and 7000 RMS (.175" spacing).

A FEW POPULAR DUAL-SECTION MODELS
3500 Volt Rating Per Section

<table>
<thead>
<tr>
<th>No.</th>
<th>Cap. Per Section</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>100DD35</td>
<td>100</td>
<td>$12.50</td>
</tr>
<tr>
<td>200DD35</td>
<td>200</td>
<td>$18.50</td>
</tr>
</tbody>
</table>

Ask Any AUTHORIZED JOHNSON DISTRIBUTOR for BULLETIN 200 Which Gives Full Details

E. F. JOHNSON COMPANY ... WAASECA, MINN., U. S. A. Manufacturers of Radio Transmitting Equipment

SANGAMO ACCURATE CONDENSERS
Available in 5000 volt construction for use in short wave transmitters
Write for catalog sheet
SANGAMO ELECTRIC CO.
SPRINGFIELD, ILLINOIS

CQ—AMATEURS of the West
Just off the Press, send for your copy
1934 CATALOG
All Nationally advertised parts for Transmitting and Receiving
Lowest Prices
RADIO SUPPLY CO.
H. A. DEMAREST, President
912-14 So. Broadway Los Angeles, Calif.
(W6FBI, located in Building)

"I'VE GOT A BIG JOB FOR YOU!"
Suppose I said . . .

... would you be qualified to accept it? Would your general education or radio experience give you the background required for the big jobs in Radio and the big salaries that go with them? Most men would have to say "NO", and it's for these men that we designed the CREI courses.

Enrollments now accepted for our One Year Residence Course in practical Radio Engineering beginning in September.

Every phase of Radio Engineering is covered in this thorough Residence Course. The newest equipment known to radio is in use in our laboratories, and our staff of instructors is composed of college trained men with years of actual radio engineering experience. This is not an ordinary school, but an institution offering advanced radio engineering to ambitious men. The CREI diploma is your best reference.

WRITE FOR FREE 40-PAGE CATALOG

Capitol Radio Engineering Institute
14th and Park Road, Washington, D. C.
Dept. QS-8

Say You Saw It in QST — It Identifies You and Helps QST
The Improved Cathode-Ray Oscilloscope

Linear sweep model for broadcast stations and advanced amateurs, physics labs., etc.

- Controlled linear sweep 0-150,000 C.P.S.
- Controlled external sweep.
- Freq. changing device for sweep frequency.
- Picture centering adjustments.
- Wide range focus adjustments. Complete component shielding.
- Unit is self contained and includes batteries and 110 volt power supply.
- Tubes RCA 906-885-254 281-280.
- This instrument embodies all features ordinarily contained in only the highest priced Cathode Ray equipment.

COMPLETELY EQUIPPED READY TO USE

F.O.B. Newark — $97.50

August Dollar Sale

The prices in this sale apply only during the month ending August 31, 1944.

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>KRR 15W-210s</td>
<td>$1.00</td>
</tr>
<tr>
<td>Sungco 5000W-202</td>
<td>$1.00</td>
</tr>
<tr>
<td>KRR 250</td>
<td>$1.00</td>
</tr>
<tr>
<td>Pentut resistor R.M.A. 1 Watt — 42 for</td>
<td>$1.00</td>
</tr>
<tr>
<td>16 henry-100 ma filter chokes</td>
<td>$1.00</td>
</tr>
<tr>
<td>C.C.A. 8 micro-ohm — Electrolytic Condenser, 2 for</td>
<td>$1.00</td>
</tr>
<tr>
<td>3-wire shielded milka cable — 21 ft.</td>
<td>$1.00</td>
</tr>
<tr>
<td>No. 12 enamal wire 200 ft.</td>
<td>$1.00</td>
</tr>
<tr>
<td>Comb, fill, trans. 2½-3A-⅝-Ⅲ-3A</td>
<td>$1.00</td>
</tr>
<tr>
<td>16 Glass lamplugs, 12 for</td>
<td>$1.00</td>
</tr>
<tr>
<td>4, 5, 6, 7,9000 coil forms, 8 for</td>
<td>$1.00</td>
</tr>
<tr>
<td>38 tubes shield, 10 for</td>
<td>$1.00</td>
</tr>
<tr>
<td>Transistion blocks, 12 for</td>
<td>$1.00</td>
</tr>
<tr>
<td>Jacobs — all types, 10 for</td>
<td>$1.00</td>
</tr>
<tr>
<td>500 ma 5 Pt. rect. chokes</td>
<td>$1.00</td>
</tr>
<tr>
<td>KRR 866 HD</td>
<td>$1.35</td>
</tr>
</tbody>
</table>

The revolutionary HAIGS DUPLEX 5-METER TRANSCEIVER — $17.40

PLATE TRANSFORMER — 2½ and two 7½ volt, all windings — 350-750-1500 ma — $3.50

DUPLEX POWER SUPPLY

110vac. 250 ma. 550v. 250ma.

$35.00

These units can be had on special order in any size mounting or form.

Uses four 83's in a bridge rectifier — completely filtered in both voltage legs.

We are specializing in transmitter construction to customers specifications. Write for quotation on your favorite transmitter.

Special code classes for beginners. No charge. Telephone for appointment.

KALTMAN & ROMANDER
62 Court St.
Newark, N. J.

The time: 6:30 to 8:00 p.m. Where to look for stations to QSP? To facilitate better “general” work, it is suggested that stations get together on designated A.R.R.L. traffic channels in the following bands:

3825-3875 kos.
3575-3625 kos.

Some traffic moves over long jumps on 7 mc., so we wonder if it would also be helpful to suggest 7145-7155 kos. as a “traffic frequency” in this band. That would help segregate traffic work in the center, and make the band edges better for “DX.” If you like the idea, try it and tell us how it works out. Or suggest something better to improve operating for everybody, please.

OPERATORS on 14,000 kc. Your DX will be better, less QRM on your QSOs, and more QSOs possible, if you adjust your telegraph transmitters carefully in 14,000-14,150 and 14,250-14,400 kc. sections of the band. Avoid telegraph work in the 14,150-14,250-kc. territory, where 'phone is allowed. Just as you would avoid getting into 3900-4000 or 1500-2000 kc. bands. Be courteous, and check frequency as suggested, and see if you don’t get more DX. Both ‘phone work and o.w. on “20” will be made more enjoyable.

—F. E. H.

Standard Frequency Transmissions

<table>
<thead>
<tr>
<th>Date Schedule</th>
<th>Frequency</th>
<th>Date Schedule</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 1 C</td>
<td>W9XAN</td>
<td>Sept. 5</td>
<td>BB</td>
</tr>
<tr>
<td>Aug. 3 B</td>
<td>W9XAN</td>
<td>Sept. 7</td>
<td>BB</td>
</tr>
<tr>
<td>Aug. 8 BB</td>
<td>W9XAN</td>
<td>Sept. 8</td>
<td>BX</td>
</tr>
<tr>
<td>Aug. 10 BB</td>
<td>W6XX</td>
<td>Sept. 9</td>
<td>C</td>
</tr>
<tr>
<td>Aug. 12 C</td>
<td>W9XAN</td>
<td>Sept. 14</td>
<td>A</td>
</tr>
<tr>
<td>Aug. 24 B</td>
<td>W9XAN</td>
<td>Sept. 28</td>
<td>B</td>
</tr>
<tr>
<td>Aug. 29 C</td>
<td>W9XAN</td>
<td>Sept. 20</td>
<td>C</td>
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<tr>
<td>Aug. 31 B</td>
<td>W9XAN</td>
<td>Sept. 28</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>BX</td>
<td></td>
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</table>

STANDARD FREQUENCY SCHEDULES

<table>
<thead>
<tr>
<th>Time</th>
<th>Sched. and Freq. (kc)</th>
<th>Time</th>
<th>Sched. and Freq. (kc)</th>
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<tbody>
<tr>
<td>(p.m.)</td>
<td>A (p.m.)</td>
<td>B</td>
<td>(p.m.)</td>
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<tr>
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<td>3500</td>
<td>7000</td>
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<tr>
<td>8:08</td>
<td>3600</td>
<td>7100</td>
<td>4:08</td>
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<tr>
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<td>3700</td>
<td>7200</td>
<td>4:16</td>
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<tr>
<td>8:24</td>
<td>3800</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
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<td>6:16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6:24</td>
</tr>
</tbody>
</table>

The time specified in the schedules is local standard time at the transmitting station. W1X uses Eastern Standard Time, W0XAN, Central Standard Time, and W6XX, Pacific Standard Time.

(See June QST for Procedure)
WEAR THE EMBLEM

FOR A.R.R.L. MEMBERS ONLY

The League Emblem, in heavy rolled gold and black enamel, either pin or button. Special colors available for Communications Department appointees. Red background for the SCM, green background for the RM, blue background for the ORS. Red and green colors available in pin type only, blue available both in pin and button types. Price only $1 postpaid.

American Radio Relay League
West Hartford, Connecticut

PRECISION CRYSTALS

A Plug-in, dustproof holder included with each amateur band crystal purchased. PRECISION Crystals are of the highest quality obtainable. Only after they have undergone a most rigid test and check up to the requirements of an A-1 crystal are they sent out to you with our guarantee of the finest obtainable.

PRECISION Crystals are X cut, one inch square from the finest quality of Brazilian quartz and carefully ground for maximum power output. They will be supplied to your specified frequency accurate to 0.1% and calibrated accurate to within 0.3%. It will pay you to buy these quality crystals. 1750 and 1500 kc. bands—$4.50 ea., 7000 kc. band $7.00. (Above prices include holder illustrated.) Holder alone—$1.50. Jacks to plug holder into—$1 pair.

Crystals and oven for commercial use quoted on your request. When ordering our product you are assured of the finest obtainable. Now in our 5th year of business.

PRECISION PIEZOE SERVICE
427 Asia Street
Baton Rouge, La.

RADIO ENGINEERING
RCA Institutes offer a combined course of high standard embracing all phases of Radio. Practical training with modern equipment at New York and Chicago schools. Also specialized courses and Home Study Courses under "No obligation" plan. Illustrated catalog on request.
RCA INSTITUTES, INC. Dept. ST-34
75 Varick St., New York, 1164 Merchandise Mart, Chicago
Recognized Standard in Radio Instruction Since 1909

What Every "Ham" has been waiting for!

PORCELAIN CASED MICA UNITS
Again Cornell-Dubilier engineers sense the demand—and meet it. Here's the new Type 86 Porcelain Case Mica Capacitor for plate-plate blooming functions, featuring:
★ Far more efficient than previous types.
★ Mounted in handsome glazed black porcelain containers.
★ Minimum dielectric losses; no leakage; no metal in field; no worries about breakdown.

A FEW POPULAR TYPE 86 UNITS

<table>
<thead>
<tr>
<th>Cap. Mfd.</th>
<th>Maximum Operating V.</th>
<th>List Price</th>
<th>Your Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A.C.</td>
<td>D.C.</td>
<td></td>
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<tr>
<td>.0001</td>
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<td>12,500</td>
<td>$3.75</td>
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<tr>
<td>.001</td>
<td>10,000</td>
<td>12,500</td>
<td>5.00</td>
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Write for Dope on this latest capacitor development, as well as the complete C-60 line of capacitors for every radio, laboratory and experimental requirement. See the actual units at your local supply house.

CORNELL-DUBILIER CORPORATION
JOBBER'S DIVISION
4373 Bronx Blvd.
New York City

Say You Saw It in QST — It Identifies You and Helps QST
When buying an instrument, look first for the name the instrument bears, for it is your best measure of design and craftsmanship. There is one name that you can accept as the symbol of quality and dependability—the name which the entire electrical industry has long accepted as the standard in instrument performance. That name is Weston. Make it your guide in selecting radio instruments... Weston Electrical Instrument Corporation, 602 Frelinghuysen Avenue, Newark, N. J.

Weston Radio Instruments
Weston Electrical Instrument Corporation
602 Frelinghuysen Avenue, Newark, N. J.
Send Bulletin on Weston Radio Instruments.
Name
Address
City and State

WWV 5000-Kc. Transmissions

The 5000-kc. transmissions of the Bureau of Standards' station, WWV, are given every Tuesday continuously from 12:00 noon to 2:00 p.m., and from 10:00 p.m. to midnight, E.S.T. These transmissions are accurate to \( \frac{1}{2} \) cycle (one in ten million).

J. J. L.

I. A. R. U. News

(Continued from page 53)

$7, the station license fee $13 per annum. Official receiving stations are licensed, also. The maximum power input is 50 watts. No third-party traffic is permitted.

No more hopeful omen for the future of amateur radio can be conceived than the comparative liberality of viewpoint demonstrated by this cross-section of the amateur regulations of the world, in contrast to the viewpoint exemplified by the same countries at the Washington conference in 1927. We have achieved privileges and a practical recognition undreamed of ten years ago.

C. B. D.

New Protective Relays for Amateur Transmitters

Two new relays of the midget magnetic type, designed for operation as protective devices in the plate circuits of transmitting tubes, are shown in the accompanying photograph. That at the left is for overload protection, the solenoid being connected in series with the negative plate supply lead. The contacts, which are normally closed, are intended to break the primary circuit of the power transformer, and are rated to carry 6 amperes at 120 volts. If a current surge occurs the contacts open and the armature is caught by a mechanical latch which must be released by hand. Two models of the relay are made, one rated to open on 250 milliamperes d.c. and the other on 500 milliamperes.

The relay at the right is for underload protection of a Class-B modulator, operating to remove the plate power from the Class-B stage should the modulated Class-C amplifier fail to draw its rated plate current. The relay coil is connected in series with the negative side of the Class-C stage plate supply; the contacts go in a similar position in the Class-B supply lead. Plate voltage cannot be applied to the modulator until
PRESELECTION

The National Preselector Unit has thoroughly demonstrated its utility for use with either superheterodyne or T.R.F. receivers. Although originally designed for use with the FB-7, it is equally effective with the SW-3 or receivers of other make. The improvement in general performance is notable with any type of receiver, while with superheterodynes the gain in image frequency suppression makes its use particularly desirable.

The preselector is designated as type PSK. Its List Price is $25.00 including one plug-in coil. Additional coils are available to match all the FB-7 ranges, at a list price of $6.00 per coil. A discount of 40% applies, when purchases are made through an authorized distributor.

NATIONAL COMPANY, INC., MALDEN, MASS.
CONGRATULATIONS
ELMIRA RADIO AMATEUR
ASSOCIATION

ON YOUR CONTRIBUTION
TO AMATEUR RADIO HISTORY

Through the untiring efforts of the Elmira Radio Amateur Association in co-operation with the Soaring Society of America, Inc., the first successful radiophone communication between glider pilots and from glider to ground was achieved at the National Gliding and Soaring Contests held at Elmira, N. Y., June 23 to July 8.

These communications were so successful that they were re-broadcast over the public address system at the gliding field and were clearly and distinctly heard by a large audience.

Naturally, the transceivers in the gliders were battery-powered.

Eveready Radio Batteries were used exclusively.

eveready
batteries

enough current is flowing through the relay coil to provide the proper load for the modulator. The closing or “pick-up” current is adjustable by means of a screw at the top of the relay coil. Two ranges are supplied, one covering 100–200 milliamperes, the second 200–400 milliamperes. Both the overload and underload relays are adjusted for operation in the vertical position.

The new relays are made by the Ward Leonard Electric Co., Mt. Vernon, N. Y.

Northwestern Division Convention
August 18th–19th—Seattle, Wash.

HAMS! Come to the Hotel Gowman to the 1934 divisional convention to be held under the auspices of the Amateur Radio Club. Be sure to be there early Saturday morning, because a get-acquainted breakfast will be served through the courtesy of the club to all the registered delegates—your registration badge will be sufficient for your admission. The committee has prepared a good program with visits to points of interest, good speakers, entertainments to satisfy everyone. It is expected that John L. Reinartz, W1QP, who went to the Arctic Circle with MacMillan will be one of our prominent speakers. A.R.R.L. is sending Fieldman Hebert. Special rates for YL’s and XYL’s. Remember this: good speakers, entertainments and a real banquet. Advise C. C. Lieschke, Convention Chairman, 2319 Second Avenue, Seattle, Wash., of your intention to attend.

Dr. George W. Kirk, WASRJ

THE passing away on May 29th of Dr. George W. Kirk, WASRJ, at the time of his death oldest licensed amateur in the United States and probably in the world, is mourned not only by relatives and close personal friends but by amateurs in this and other countries; and especially by his fellow members of the Chair Warmers Club. Dr. Kirk was 83 years of age when he died. Infantile paralysis had left him handicapped since the age of 18 months, but in spite of the fact that his left side was practically useless all his life, he carried on as few people have been able to do. He served the folk of Cortice, Ohio, for twenty-five years in the practice of medicine, retiring in 1915 when his physical disability became too great. His interest in radio dated from 1920; his first transmitter went on the air in 1930. He was a member of the Chair Warmers Club when it was first organized, being made Charter Member No. 1 in recognition of his age.

His key will henceforth be silent, but with us there will remain the spirit of a true amateur.
At last, the ideal microphone for amateur stations! The new Turner Type G Crystal Mike which is licensed under the Brush Patents provides a moderate-priced instrument with performance characteristics closely approaching those of high-priced condenser jobs. The Turner Type G is a precision-built crystal mike with exceptionally flat frequency response. It eliminates the hiss which is inherent to carbon mikes. Join the parade of the better amateur stations that are turning to crystal mikes as the ideal instrument for this service. The Turner Type G Mike is arranged for either spring or base mounting. List price, $20.00. Net to amateurs, $13.72. If your jobber is not yet supplied, send order direct. Money will be refunded if the instrument is not entirely satisfactory.

THE TURNER COMPANY, 700 Third Avenue, Cedar Rapids, Iowa
Silent Keys

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

Carl A. Archae, W3AJR, Summit, N. J.
John Debeve, W9GTY, North Chicago, Ill.
Earl Deets, ex-W8BGB, Youngstown, Ohio
Edward H. DeGroot III, W5AMC, Oklahoma City, Okla.
Joe Ennis, W8GFA, Johnstown, N. Y.
Benjamin Glaser, W2CFK, Cedarhurst, N. Y.
William Harris, Kingston, Jamaica
Dr. George W. Kirk, WSARJ, Curbice, Ohio
John B. Little, W2FBN, New Brunswick, N. J.
Leon W. Kocheven, W9HUK, Chisholm, Minn.
Richard H. Loos, W2GOG, Linden, N. J.
George C. McElmtock, W2BHR, Railway, N. J.
Ted Ramsey, W5PY, Shreveport, La.
Clarence E. Ridgway, W6RJU, La Habra, Calif.
Eugene Sanders, W5CQB, Quapaw, Okla.

Central New York Convention
(Atlantic Division)

The Onondaga Hotel, Syracuse, N. Y., was the scene of convention activities on Saturday, May 26, 1934. The crowd gathered early, and kept the Convention Committee busy. Visits to local broadcasting stations WFBK and WSYR were scheduled in the afternoon, and many took advantage of the opportunity.

At 1:15 p.m. a talk officially opening the convention was broadcast from WFBK by the representative from A.R.R.L. Headquarters, assisted by W3AOW. There followed general hamfesting and participation in the code speed and other contests under management of W8CP. The first afternoon meeting was a talk on League affairs by Communications Manager F. E. Handy, W1BD, with a "question and answer" period included. A. R. Marey, chief engineer of WFBK, discussed amplifier operation at length, showing the use of tube characteristics and formulae for computing various operating constants and arriving at conditions for practical operation. R. B. Sherman, W1BJL, discussed vacuum tubes in interesting and informative fashion.

The banquet was a fully enjoyable affair under the guidance of Toastmaster McGouldrick, W8HYR. Eleven clubs were represented, and a large group of NCR men were present. The principal banquet speaker was Dr. Burton T. Simpson, W8CPC, Assistant Director of the Atlantic
Johnny Q. Ham, one fine summer day,  
Started to swim from Class B to Class A.  
The "blub's" show his fate, so dear reader take note:  
If you try the same trip, better hire the boat!

THE RADIO AMATEUR'S LICENSE MANUAL

25¢, postpaid, no stamps, please

Indispensable for the already-licensed amateur.  
A necessity for the beginner. Full and complete 
dope on renewal and modification procedure, the Class A exam (with questions and answers), portable procedure, etc. All the 
dope on every phase of amateur licensing procedure and, of course, the complete text of the 
new radio regulations and pertinent extracts from the basic radio law.

Going over your first ham ticket? You need 
the Manual for its instructions on where to 
apply, how to go about it in the right way, and 
most important of all, for the nearly 200 typi-
cal license exam questions and answers.

Get a copy of "The Radio Amateur's License 
Manual" and be sure to get your ticket.

(No. 9 in the series entitled The Radio Amateur's Library)

THE AMERICAN RADIO RELAY LEAGUE, WEST HARTFORD, CONN.

RADIO'S NEW DEVELOPMENT

Special Noise-Reducing Lead-In Cable

by the pioneer of noise-free aereios

- Improves Reception
- Simple to Attach
- Inexpensive

Lynch Cable

Makes any double aerial work better. Incorporates features which give low H.F. resistance; very low impedance; accurate impedance match with aerial.

See These Exceptional Results

300 feet of wire used to connect the antenna to both the re-

ceiver and the 150 watt, 1000 volt transmitter, at the New 
York Home. Every part of the country and parts of Canada were worked on radiophone. Hams have used 300 feet to feed a 5 meter rig successfully.

Special 110 ft. length for the new 

R. C. A. World-Wide Antenna System........... $6.50 List

Lynch Antenna System complete with 35 feet of the .

List

Write for Free Descriptive Folder

ARTHUR H. LYNCH, Inc., 217 Fulton St., New York, N. Y.

LEARN RADIO

Now Classes Now Forming! Send for 40-page catalog, ex-

plains fully, 180 licensed graduates placed in past 2½ years in 
broadcasting, shipping, police radio, aviation, etc. We teach all branches. Oldest, largest and best equipped school in New Eng-

land. Equipped with Western Electric sound and broadcasting 
equipment and RCA marine transmitter. Course prepares for 
United States Government telegraph or telephone license.

MASS. RADIO SCHOOL, 18 Boylston Street, BOSTON

Say You Saw It in QST — It Identifies You and Helps QST
To OUR READERS who are not A.R.R.L. Members

You should become a member of the League! That you are interested in amateur radio is shown by your reading of QST. From it you have gained a knowledge of the nature of the League and what it does, and you have read its purposes as set forth on the page opposite the editorial page of this issue. We should like to have you become a full-fledged member and add your strength to ours in the things we are undertaking for Amateur Radio. You will have QST delivered at your door each month. A convenient application form is printed below — clip it out and mail it today.

A bonafide interest in amateur radio is the only essential qualification for membership

AMERICAN RADIO RELAY LEAGUE
West Hartford, Conn., U. S. A.

I hereby apply for membership in the American Radio Relay League, and enclose $2.50 ($3.00 outside of the United States and its Possessions, and Canada) in payment of one year's dues, $1.25 of which is for a subscription to QST for the same period. Please begin my subscription with the ....... issue. Mail my Certificate of Membership and send QST to the following name and address.


Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may send him a sample copy of QST?

Thanks

The Hudson Division Convention

The Hudson Division Convention held on May 24th, 25th and 26th, at the Hotel Pennsylvania, in New York City, turned out to be one grand affair.

The program was full of events that appealed to amateurs of all types, modes and ages. There was a short-wave exhibit where the latest receiving and transmitting apparatus was displayed. The Garden City Radio Club and the Radio Club of Brooklyn cooperated and supplied, installed and operated three 'phone transmitters in the Official Convention Station Booth. In contrast to the modern transmitters the Nassau Radio Club installed and operated, for demonstration only, a complete old-time spark transmitting and receiving station. The noise of the "old rock crusher" proved to be of great interest to the young "squirts" in the game, and the old-timers took pleasure in telling about their experiences in the early days when radio was called wireless.

The following took part in the technical program: Hugo Romander, W2NB, lectured on and
QST Binders

To enhance the appearance of your station, to facilitate your reference work, and to preserve the records of the advancement of the radio art, you need a BINDER. You need one for this year's issues and one for each of the accumulated year's issues that you have. It will accommodate twelve issues of QST and a yearly index. The QST Binder is covered in deep maroon cloth. It is cleverly designed to take each issue as received and hold it firmly without mutilation. It permits the removal of any desired issue without disturbing the rest of the file.

A GOOD INVESTMENT AT

$1.50 POSTPAID

AMERICAN RADIO RELAY LEAGUE
West Hartford, Connecticut

READ AND SEND

CODE

Learn Easily at Home this Quicker Way:

No experience needed. Beginners read code quickly, copy accurately. It already an op, speed up your wpm this approved way and make better money. "Almost human!" experts call the amazing New Master Teleplex. Only instrument ever produced which records your sending in visible dots and dashes — then sends back to you audibly through headphones: Fascinating, fool-proof, gets results because you learn by HEARING as well as seeing. Has taught code to more students in past few years than all other systems combined. Used by U. S. Army and Navy, R. C. A., A. T. & T., and others. We furnish Complete Course, lend you the New Master Teleplex, and give you personal instruction with a MONEY-BACK GUARANTEE. Low cost, easy terms. Write today for folder Q20: no obligation.

TELEPLEX CO.
76 Conlandt Street
NEW YORK, N. Y.

LOW RANGE FUSES

- Littelfuses for Instruments: Ams..; 1/100, 1/32, 1/16-20c ea. 1/8, 1/4, 3/8, 1/2-15c ea. 1, 2-10c ea. For millimeters, jam rectifiers, etc. Use 1/8 for radio B circuits. High tolerance.
- Littelfuses 1000, 2000, 10,000 volt ranges in 1/16, 1/8, 1/4, 3/8, 1/2, 3/4, 1, 11/4, 2 amperes. Renewable. Price 5c to $1.25 ea.
- "Quicker than a Short Circuit" LITTLEFUSES
- "Now — 100 Protection Guarantee. Get New Cat. F.

NEW BULLETIN

Describing in detail TRANSCEIVERS with various models and specifications.

5-10 METER TRANSMITTERS with outputs of 3-10 watts for portable or fixed use.

RK-20 POWER AMPLIFIER employing two of the new suppressor grid tubes in push-pull permitting 100 watts CW output on four bands and 30 watts when modulated. Requires but 2 watts excitation for full output.

This new bulletin is free for the asking. Write for yours today and see why, in the short space of two years, our products have been enthusiastically received in this and ten different foreign countries.

HARVEY RADIO LABORATORIES
12 Boylston Street
Brookline, Mass.

Say You Saw It in QST — It Identifies You and Helps QST
Don't Worry About That Exam!

Candler Specialized Training Will Make It Easy for You

The better class Amateur and Com't op will tell you Candler Training in Code Fundamentals is as necessary to Skill and Speed as is a knowledge of Ohm's Law to an understanding of Electricity.

PRACTICE IS IMPORTANT. Knowing how to practice, as taught only by Candler, is more important. Any skilled op will tell you WHAT THESE CHAMPIONS AND OTHERS SAY:

"As champion Radio op for 13 years, official speed 5634 wpm., and holder of all-time American Morse speed record of 70 wpm., I can say that I never had any other training except CANDLER SYSTEM HIGH-SPEED TELEGRAPHING "MILL" COURSE made it possible for me to win the Radio championship in Class "E." — James H. Hudson, WJBAK.

"CANDLER Specialized Training enabled me to pass rigid, competitive test for this position." — Richard D. Watson, Oo, WBHEW, Byrd Expedition.

"I owe my position as code instructor, Air Corps, Primary Flying School to CANDLER Specialized Training. I instruct over 200 student flyers in code every 4 months which requires absolute accuracy." — Carl W. Muller, 9th Squadron, Randolph Field, Texas.

"Am working trans-Pacific circuit between Honolulu and Frisco. Am combination op. American Morse and Continental. Hold a 1st class license. I could not have done this without the aid of Candler Specialized Training." — James Light, U. S. N. Radio Station WAILUPE, Honolulu, T. H.

FREE — New BOOK OF FACTS. It tells amazing story of what others are accomplishing through this unique and exciting training. Stop worrying about your code speed and passing the exam. This BOOK will be a pleasant revelation to you.

CANDLER SYSTEM CO.
Depl. Q-8
6343 S. Kedzie Avenue, Chicago

PROFIT BY THE EXPERIENCE OF OTHERS—Thousands of Amateurs Have Read HINTS AND KINKS

If you haven't yet gotten a copy of this indispensable compilation of the money-saving ideas of 189 experimenters, you'll be glad to know that the original supply, exhausted in less than six months, has been replenished by a second printing. You'll find in it hundreds of good ideas which amateurs have found helpful. It will return its cost many times in money savings — and it will save hours of time. Many of these little dodges would probably never occur to you. Order your copy at once.

HINTS AND KINKS FOR THE RADIO AMATEUR

No. 10 in the A.R.R.L. series entitled The Radio Amateur's Library

EIGHTY PAGES IN ATTRACTIVE PAPER COVERS

50 cents, postpaid anywhere (no stamps, please)

THE AMERICAN RADIO RELAY LEAGUE

West Hartford, Connecticut

demonstrated the "Cathode Ray Oscilloscope and Its Application to Amateur Stations"; E. M. Glaser, W2BRB, spoke on "Antenna Systems for Transmitters"; John L. Reinartz talked on transmitters, also presented an illustrated lecture on his experiences with the MacMillen expedition; Mr. J. I. Mitchel spoke on "Improved Circuit Data Requirements for Class B Audio Systems"; Mr. Bailey spoke on "Condensors"; Mr. J. N. Whittaker spoke on "Receivers—Then and Now"; Mr. J. K. Whittaker presented an interesting talk on "Ethics in Amateur Operation"; Mr. A. H. Lynch spoke on "Noiseless Antenna Systems"; Mr. Denton on "Modern Superhet's" and Bob Hertzberg on "DX Reception."

The Open Forum presented on Saturday afternoon turned out to be one of the outstanding features of the convention. The following are a few of the prominent people present who took part in the Forum: K. B. Warner, Paul M. Segal, Dr. L. J. Dunn, Director Fuld and Dr. C. B. Jolliffe, Chief Engineer of the Federal Radio Commission.

Several inspection trips scheduled on the program were also well attended. The trips were to the new NBC Studios; the A. T. & T. Co.'s Transatlantic Radiotelephone; Broadcast Central, and the Commercial Traffic Department. Of course there were lots of contests—old and new. The liars and the code contests proved to be the most popular.

The banquet on Saturday evening wound up the convention. Among the distinguished guests were: K. B. Warner; Paul M. Segal; Dr. Charles B. Jolliffe, Lt.-Commander Freeman, Major L. J. Dunn and J. L. Reinartz. A first-class entertainment program, lasting for over one hour and under the direction of Eddie Green, W2AKM, was presented. Many outstanding entertainers took part, including the Don Hall Trio of NBC fame, a fan dancer extraordinary, a first-class orchestra and many others.

This was the second consecutive and successful convention conducted during the administration of Director B. J. Fuld. Both conventions have been under the management of S. M. Riccobono, W2TT.

—S. M. R.

Observations on Long-Delay Radio Echoes

(Continued from page 13)

I would be interested also in receiving reports of reception of long-delay echoes on any other stations, especially high-frequency stations of this country. It may, on the other hand, be difficult to be certain of any echoes observed because of the lack of silent periods as in the special signals from the two European stations.

Summaries of the results of this investigation will be made available later in publications in this country. Persons desiring to keep in touch with all details of the project meanwhile can do so by consulting the weekly issues of World-Radio, published by Broadcasting House, London, W. 1, England.

SS Say You Saw it in QST — It Identifies You and Helps QST
LOG BOOKS

Bound with heavy paper covers. 8½ x 10¾. Contains 39 log pages, and same number of blank pages for miscellaneous notes. Also list of Q sigs, message number sheet and sheet of cross-section paper. 40c each or 3 for $1.00. Postpaid.

MESSAGE BLANKS

Most convenient form. Designed by the Communications Department of the A.R.R.L. Well printed on good bond paper. Size 8½ x 7¼. Put up in pads of 100 sheets. One pad postpaid for 35c or 3 pads for $1.00.

THE AMERICAN RADIO RELAY LEAGUE—WEST HARTFORD, CONN.

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BY

H. F. OLSON, E.E., Ph.D. and F. MASSA, B.S., MSc.
Acoustical Research Engineers, RCA-Victor Co., Inc.

444 Pages 228 Figs. Fabrikoid $4.50

A MODERN book dealing with microphones, loud speakers, head phones and audio systems. Fully illustrated with numerous sketches and theoretical and measured characteristics of all types of modern microphones, loud speakers and head phones. Design of magnetic circuits, frequency compensation in amplifiers, oscillators, linear and logarithmic detectors, etc.

P. BLAKISTON'S SON & CO., INC.
1012 Walnut Street, Philadelphia

LIFT the LID!

Note the high quality of every part in the ROSS JUPITER. Study the workmanship—the design. Then try it in your own shack on amateur band reception. The results will mean far more than any claims we might make here. Only $59.50 with speaker (less tubes). Write for details of 5-day Test-For-Yourself offer.

A. H. ROSS & CO.
Kaswick Ave. & Waverly Rd.
GLENSIDE, Pa.
(Near Philadelphia)

THORDARSON
WE STOCK 'EM ALL!

In fact we believe we have the most complete stock in the country.
Every standard transmitter made by Thordarson, is in stock for rush shipment.

TRANSMITTER GUIDE

Contains exact data on all popular circuits. It is free with orders for Thordarson parts or send 10c (stamps) for postage and mailing.

Write for our free catalog

CAMERADIO
603 GRANT ST.
PITTSBURGH - - PA.

Say You Saw It in QST — It Identifies You and Helps QST
HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in the pursuit of the art.

(2) No display of any character will be accepted, nor can any special typographical matter, such as all or part capital letters be used which would tend to make one advertisement stand out from the others.

(3) The Ham-Ad rate is 15¢ per word, except as noted in paragraph (4) below.

(4) Remittance in full must accompany copy. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ad is the 22nd of the second month preceding publication date.

(6) Rate of 7¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and which is not signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment, literature, etc. by an individual or amateur is offered for exchange or advertising in qualifying for special equipment, if by a member of the American Radio Relay League takes the 7¢ rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and takes the 15¢ rate per word. Paragraphs (1), (2), (4) and (6) apply to all advertising in this column regardless of which rate may apply.

Having made no investigation of the advertisers in the classified columns, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products advertised.

MICROPHONE and meter repairs. Low prices. Quick service. Sound Engineering Corp., 418 N. Leavitt St., Chicago, III.

RADIO engineering, broadcasting, aviation and police radio, servicing, marine and Morse telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Byrd St., Valparaiso, Ind.


NEW—All is necessary tune to put on air. C.G. 25 Gain unit, $100. W. O. Porter, Kendey, Tex.

CRYSTALS, 50, 100 bands. $1.10. WDFHS, 4433 N. Kilbourn, Chicago.


QSLs, 75¢ a 100, two colors. W2DFH, 1816 5th Ave., Minneapolis, Minn.

CRYSTALS: $1.35 Hipower oscillators 3500-1700 kc. Bands, close to your specified frequency, 7000 kc. $1.25. Plug-in holders with movements $1.50. Blanks 60¢. Immediate delivery and complete price list on request. Crystal Bd. for Broadcasters, stations, prices on request. Hipower Crystal Co., 3097 N. Lake Ave., Chicago, Ill. You cannot buy a better crystal than Hipower.


GENE-Motor, 5 meter rig, transformers, parts. 1238 Crane St., Schenectady, N. Y.

QSLs! W2DFH QSLs! World's finest samples! W2BHE, Holland, Mich.

TRANSMITTER, $2, W1HVE.

SEE June hamad, meters repair, satisfaction or money back. W7AJG.


RADIOTELEPHONE engineers—original modulation system, efficient, data 30¢. Progressive Technicians, 1608 S. Goodman, N. Y. Square.

QSL cards, two color, cartoon, message blanks, stationery, snappy service. Write for free samples to-day. W2FEB, 16 Stockbridge Ave., Lowell, Mass.


QSLs, SWLS, W6DOU, Hayward, Calif.

QSLs! See these first! W6FZQ, Box 1894, Phoenix, Arizona. 211E, $2.50; $4.50. $5. Guaranteed. W2DCJ.

WONDERFUL bargain—complete 500 watt CW transmitter. Completely metered, 3 power supplies, 20As pushpull output. Details write to W7AVJ, 4016 N. E. Skidmore, Portland, Oregon, with your best offer, and many others coming in "R.O." $15.00 yearly; for $10.00; $15.50. 1455 Glencoe, Los Angeles.

NATIONAL AGS, latest model, rack mounted complete. Especially useful. Wholesale cost $284.00. W8IKO.


SWAP, higher accountability course for short wave receiver. W9XKK.

FB7s, Telephones, Microphones, Telephones, receivers, meters, microphones. Bought, sold, traded. Ryan Radio Co., Hannibal, Mo.


New opportunity for amateurs, experimenters. We buy, exchange, sell or trade equipment of standard make. Write for trade in allowance on receivers or supplies before buying. Our stock largest in middle west. National Hammerschmidt, E. R. Bickel, Westlingwood, etc. Walter Ahe Radio Co., 1100 Pine St., St. Louis, Mo.

QSLs, two colors. Samples. Printer, Coralville, Iowa.

SELL National SW3, 20-40-80 coils, tubes, National pack, $15. Weston 0-15 volts a.c. $3. Rollin Smith 0-3 m.m. d.c. $3.50. Receiver aluminum case, 34 detector 33 tube radios, $5. Philip Battiato, W2ACW, 270 Fairmount Ave., Newark, N. J.


CLASS B transmitters—Universal for two or four 46's, 200's, RK18's, etc., $7.75 per postpaid anywhere in United States. 70 watts of audio from 46's. Write for details. WS8D, Douglas, Michigan.

FB7-A complete. Make cash offer. W8NO.


PEP up the station. Relay relays, panels, Hi-Q power equipment, Edison batteries, wind generators. See May display, June, July hamfests. Rectifier Engineering Service.

CRYSTAL holders ruggedly designed for minimum frequency drift. $2. Write for full Galactic catalog on crystals, etc. Commercial Radio Equipment Co., Box 7022, Kansas City, Mo.

GUARANTEED stals, $1, W9GEG.


SELL transmitter, Hartley single 210, 500 volt power supply, tubes, antenna. All for $15. cash. W3DDW.

CRYSTALS guaranteed. 160-80 meter, 3½ to 1½, X or Y within 10 kc. $1.35. 1½, within 2 kc. $2.55, oscillating blanks 75¢, blanks from the saw 50¢, grinding instructions 25¢, plug-in holders $1.10. Wm. Trenor, WSF5N, 4021 Davis Ave., Cheviot, Ohio.


Two new Taylor S85's, $3.50 each. WS3BS.

WANTED—204A, W5EQQ.

WILL pay cash. Best offer. 100 watt 160 mtone complete. W5EQQ.

CRYSTALS: 1½ mc. cut-out 80-160 meters within 5 kc, your approximate frequency, $2.75 mc. 25¢, $3.75. Unconditionally guaranteed. Plug-in dustproof holders, silvered electrodes, 75¢, Gentry Labs., 803 W. Maple, Independence, Mo.
Radio Operating
Radio Servicing—
Classes open for fall term—
September 4th

Prepare for the new Government Radio Operating license examinations; Radio Operator, Marine and Broadcasting. Also Radio Amateur Telegraph and Telephone. Resident courses.

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NOW . . . A FULL-SIZE
2-BUTTON MICROPHONE

AT ONLY $10 LIST!
The new Shure Model 5D—ideal for amateur radio-telephone transmitters and low cost sound systems. The large frames with the regular full-size precision adjustable buttons assure superior tone quality. Performance, quality of materials and the exclusive SHURE features are retained. Blocked, 15½ oz. Subject to Licensed-Amateur Discount AT YOUR JOBBER.

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Which Way Is Best for
CODE Practice at Home?
Before making a decision, send post card for details of the Instructograph Automatic Code Practice Machine. Provides CODE practice at any speed. Saves time, money and disappointment. Runs as low as 8c per month, a month for a month. Convince yourself—in your own home that this is the best way to practice code at home. If not, send it back.

INSTRUCTOGRAPH CO., Dept. Q
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All Sizes Cut to Order
BAKELITE TUBING & RODS
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ALUMINUM CHASSIS—Threaded brazed studs for 4/4 screws.
Length from 1½” to 0”—price 5c to 30c.

Installing bushings
Couplings in braze

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MFG. CO.
Est. 1923
15 Greenwich St., New York

Say You Saw It in QST — It Identifies You and Helps QST

You'll Like This Husky TEN-WATTER

WIRE-WOUND, vitreous-enamelled, non-porous. Rapid heat dissipation.
Non-corrosive Monel Metal contact bands and lugs, plus pigtales for convenience.

Same type made in three sizes, three ratings and 67 resistance values.

Write Dept. Q-8 for FREE General Catalog and Vest Pocket Volume Control Guide

THE RADIO SHACK GUARANTEES
every purchase—100%—if not satisfied return it in 5 days for a refund.
CANA YOU ASK FOR MORE?

PYRANOL TRANSMITTING CONDENSERS
2MFD—2000V...

1000 already sold—get yours now

POWER TRANSFORMERS

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<tr>
<th>Transformer</th>
<th>30H-150 Mf. Choke</th>
<th>200 D.C. Res.</th>
<th>30H-200 M. Ch.</th>
<th>600-600 900 mls.</th>
<th>71/2 V. @ 3 A</th>
<th>21/2 V. @ 3 A</th>
<th>21/2 V. @ 12 Amps</th>
</tr>
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<tbody>
<tr>
<td>600-0-600</td>
<td>$9.00</td>
<td>$9.00</td>
<td>$8.50</td>
<td>$8.50</td>
<td>$3.95</td>
<td>$3.95</td>
<td>$1.25</td>
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<tr>
<td>R.S. 800 (40V)</td>
<td>5.95</td>
<td>5.95</td>
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<tr>
<td>RCA 866 (used)</td>
<td>12.00</td>
<td>12.00</td>
<td>12.00</td>
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<tr>
<td>HAIIBS 5M. TRANSCEIVERS</td>
<td>$17.40</td>
<td>$17.40</td>
<td>$17.40</td>
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QUOTATIONS FURNISHED
Cardwell—Hammond—Tubs—National—Triplet, etc.
866 Tubes Heavy Duty...

5 METER SPECIALS

Audio Trans. with mike
$1.20
4 Pole D.P. Toggle switch...
$1.84
Output Transformer...
90
R.C.A. S.B. Hand Mike 1.19
Sickles 3M. KR...
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50 Watt C.W. Outfit, Rack Mounted, 59 xtal, 841 Driver, 830 Final, Complete, ready to go...
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Mail Orders Filed—Include Postage

THE RADIO SHACK
46 Brattle Street
Boston, Mass.

91
# Your Nearest Dealer

Your nearest dealer is entitled to your patronage. You can trust him. He is equipped with a knowledge and understanding of amateur radio. He is your logical and safe source of advice and counsel on what equipment to purchase.

**Patronize the dealer nearest you—**

<table>
<thead>
<tr>
<th>ALLENTOWN, PENNSYLVANIA</th>
<th>CHICAGO, ILLINOIS</th>
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</thead>
<tbody>
<tr>
<td>Radio Electric Service Co.</td>
<td>Mid-West Radio Mart</td>
</tr>
<tr>
<td>1024 Hamilton Street</td>
<td>550 S. State Street</td>
</tr>
<tr>
<td>Complete stocks transmitting equipment</td>
<td>All standard lines carried in stock</td>
</tr>
</tbody>
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<thead>
<tr>
<th>BALTIMORE, MARYLAND</th>
<th>CLEVELAND, OHIO</th>
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<tbody>
<tr>
<td>Radio Electric Service Co.</td>
<td>Northern Ohio Laboratories</td>
</tr>
<tr>
<td>303 W. Baltimore Street</td>
<td>2073 West 85 Street</td>
</tr>
<tr>
<td>Everything for the amateur</td>
<td>Wholesale Distr. for National, Hammarlund, Thordarson, Cardwell</td>
</tr>
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<tr>
<th>BOSTON, MASSACHUSETTS</th>
<th>CLEVELAND, OHIO</th>
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<tbody>
<tr>
<td>Nutter &amp; Cross, Inc.</td>
<td>Radio Servicemen’s Supply Co.</td>
</tr>
<tr>
<td>99A Milk Street</td>
<td>206 Prospect Street</td>
</tr>
<tr>
<td>All OMs, OWs, and YLs welcome — W1HRF</td>
<td>Wholesale Distributors catering to Amateurs, Dealers, Servicemen</td>
</tr>
</tbody>
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<thead>
<tr>
<th>BROCKTON, MASSACHUSETTS</th>
<th>DENVER, COLORADO</th>
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<tbody>
<tr>
<td>Ware Radio Supply Company</td>
<td>Inter-State Radio &amp; Supply Co.</td>
</tr>
<tr>
<td>913 Centre Street</td>
<td>1639 Tremont Place</td>
</tr>
<tr>
<td>Everything in parts. Comet Pro in stock with crystal filter</td>
<td>Amateur Radio Headquarters in the Rocky Mountain Region</td>
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<thead>
<tr>
<th>BUFFALO, NEW YORK</th>
<th>DETROIT, MICHIGAN</th>
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</thead>
<tbody>
<tr>
<td>Dynac Radio</td>
<td>Radio Equipment Sales Co.</td>
</tr>
<tr>
<td>359 Canen Blvd. — Tel. Univ. 9380</td>
<td>14036 Woodward Avenue, Highland Park</td>
</tr>
<tr>
<td>Complete Stock Amateur Parts — Standard Discounts — WBAWK</td>
<td>A complete stock of amateur, shortwave and service parts</td>
</tr>
</tbody>
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<thead>
<tr>
<th>BUFFALO, NEW YORK</th>
<th>DETROIT, MICHIGAN</th>
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<tbody>
<tr>
<td>Kronson Service Company</td>
<td>Radio Specialties Company</td>
</tr>
<tr>
<td>143 East Genesee Street</td>
<td>171 E. Jefferson Avenue</td>
</tr>
<tr>
<td>Western New York's largest wholesale distributors — W8EHF</td>
<td>Ham Supplies — National &amp; Hammarlund Sets and Parts</td>
</tr>
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<thead>
<tr>
<th>CHARLOTTE, MICHIGAN</th>
<th>DETROIT, MICHIGAN</th>
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<tbody>
<tr>
<td>General Engineering Corporation</td>
<td>Serlin</td>
</tr>
<tr>
<td>Everything for the Transmitting Station</td>
<td>1419 Broadway</td>
</tr>
<tr>
<td>Detroit's Pioneer Radio Merchants</td>
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<tr>
<th>CHICAGO, ILLINOIS</th>
<th>ERIE, PENNSYLVANIA</th>
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<tbody>
<tr>
<td>Allied Radio Corporation</td>
<td>Jordan Radio Laboratory</td>
</tr>
<tr>
<td>833 West Jackson Blvd.</td>
<td>1019 East Fifth Street</td>
</tr>
<tr>
<td>Distributors National, Hammarlund and Cardwell Lines</td>
<td>Amateur, service parts, including Bliley, National, Raytheon. W8CKG</td>
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<tr>
<th>CHICAGO, ILLINOIS</th>
<th>HARTFORD, CONNECTICUT</th>
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<tbody>
<tr>
<td>Chicago Radio Apparatus Company</td>
<td>Radio Inspection Service Company</td>
</tr>
<tr>
<td>415 South Dearborn Street</td>
<td>227 Asylum Street</td>
</tr>
<tr>
<td>Dependable Radio Equipment, Established 1921. All Standard Lines</td>
<td>Yes, we'll take your old set in trade</td>
</tr>
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<thead>
<tr>
<th>CHICAGO, ILLINOIS</th>
<th>HOUSTON, TEXAS</th>
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<tbody>
<tr>
<td>Newark Electric Company</td>
<td>Straus-Frank Company</td>
</tr>
<tr>
<td>226 W. Madison Street</td>
<td>Distributors for nationally advertised amateur products</td>
</tr>
<tr>
<td>Chicago's oldest radio parts store — established 1921</td>
<td>RCA-DeForest transmitting tubes</td>
</tr>
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<tr>
<th>CHICAGO, ILLINOIS</th>
<th>JACKSONVILLE, FLORIDA</th>
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<tbody>
<tr>
<td>Glovers Weiss Co.</td>
<td>Burstein-Applebee Company</td>
</tr>
<tr>
<td>Radio Headquarters for Southeast</td>
<td>1012-14 McGee Street</td>
</tr>
<tr>
<td>Distributors: RCA Victor, Stromberg-Carlson, Standard Ham Lines</td>
<td>&quot;Specialists&quot; in supplies for the Amateur and Serviceman</td>
</tr>
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This advertisement is paid for by the firms listed above. Qualified dealers

---

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Is Your Best Friend

you should buy. His stock is complete. He can supply your needs without delay. His prices are fair and consistent with the high quality of the goods he carries. He is responsible to you and interested in you.

You can have confidence in him

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<thead>
<tr>
<th>KANSAS CITY, MISSOURI</th>
<th>ST. PAUL, MINNESOTA</th>
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</thead>
<tbody>
<tr>
<td>Radio Laboratories</td>
<td>Law Bonn Company</td>
</tr>
<tr>
<td>1515 Grand Avenue</td>
<td>2484 University Avenue</td>
</tr>
<tr>
<td>Amateur Headquarters — Complete Stock — Quality Parts</td>
<td>Rex L. Munger, W9LIP, Sales Engineer</td>
</tr>
<tr>
<td></td>
<td>Radio Wholesaler</td>
</tr>
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<td></td>
<td>Complete Stock</td>
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<tr>
<th>MANCHESTER, NEW HAMPSHIRE</th>
<th>SAN ANTONIO, TEXAS</th>
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<tbody>
<tr>
<td>Radio Service Lab. of N. H.</td>
<td>Straus-Frank Company</td>
</tr>
<tr>
<td>1008 Elm Street — Tel. 218-W</td>
<td>Distributors for nationally advertised amateur products</td>
</tr>
<tr>
<td>Branches — Portland, Me. and Barre, Vt</td>
<td>RCA-Deforest transmitting tubes</td>
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<tr>
<th>MILWAUKEE, WISCONSIN</th>
<th>SAN FRANCISCO, CALIFORNIA</th>
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<tbody>
<tr>
<td>Radio Parts Company, Inc.</td>
<td>Offenbach Electric Company, Ltd.</td>
</tr>
<tr>
<td>332 West Street</td>
<td>1452 Market Street</td>
</tr>
<tr>
<td>Complete stock Nationally Known products</td>
<td>&quot;The House of a Million Radio Parts&quot;</td>
</tr>
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<tr>
<th>NEWARK, NEW JERSEY</th>
<th>SPRINGFIELD, MASSACHUSETTS</th>
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<tbody>
<tr>
<td>Kaltman &amp; Romander</td>
<td>T. F. Cushing</td>
</tr>
<tr>
<td>62 Court Street</td>
<td>349 Worthington Street</td>
</tr>
<tr>
<td>Drop in for an over-counter QSO</td>
<td>An amateur, endeavoring to sell good parts</td>
</tr>
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<tr>
<th>PHILADELPHIA, PENNSYLVANIA</th>
<th>SYRACUSE, NEW YORK</th>
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<tbody>
<tr>
<td>Freeland Radio Supply Co.</td>
<td>Roy C. Stage, W8IGF</td>
</tr>
<tr>
<td>5 N. 7th Street</td>
<td>Complete stock of standard Ham &amp; BCL parts</td>
</tr>
<tr>
<td>&quot;If it's radio we have it&quot;</td>
<td>Standard Discounts: Free technical service</td>
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<tr>
<th>PHILADELPHIA, PENNSYLVANIA</th>
<th>TORONTO, CANADA</th>
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<tbody>
<tr>
<td>Radio Electric Service Co., Inc.</td>
<td>A &amp; A Radio Service Supply</td>
</tr>
<tr>
<td>N. E. Cor. Seventh &amp; Arch Sts.</td>
<td>101 Queen Street, West</td>
</tr>
<tr>
<td>All nationally advertised lines in stock</td>
<td>We specialize in service! Try it!</td>
</tr>
</tbody>
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<tr>
<th>PHILADELPHIA, PENNSYLVANIA</th>
<th>TORONTO, CANADA</th>
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<tbody>
<tr>
<td>Eugene G. Wile</td>
<td>Wholesale Radio Company, Limited</td>
</tr>
<tr>
<td>10 S. Tenth Street</td>
<td>355 Danforth Avenue</td>
</tr>
<tr>
<td>Complete Stock of Quality Merchandise</td>
<td>Canada's Largest Amateur Supply House</td>
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<tr>
<th>PITTSBURGH, PENNSYLVANIA</th>
<th>TRENTON, NEW JERSEY</th>
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<tbody>
<tr>
<td>Cameradio Company</td>
<td>American Radio Co.</td>
</tr>
<tr>
<td>603 Grant Street</td>
<td>5 N. Broad Street</td>
</tr>
<tr>
<td>Tri-State &quot;Ham&quot; Headquarters</td>
<td>Central Jersey's leading radio parts store</td>
</tr>
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<tr>
<th>PROVIDENCE, RHODE ISLAND</th>
<th>WASHINGTON, D. C.</th>
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<tbody>
<tr>
<td>32 Broadway, Room 23</td>
<td>816 F Street, N.W.</td>
</tr>
<tr>
<td>Amateur Equipment — Nationel, Hammerlund, RCA Tubes</td>
<td>Washington's largest distributor of radio parts</td>
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<tr>
<th>ST. LOUIS, MISSOURI</th>
<th>ZANESVILLE, OHIO</th>
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<tbody>
<tr>
<td>Walter Ashe Radio Company</td>
<td>Thompson Battery &amp; Radio Service</td>
</tr>
<tr>
<td>1100 Pine Street</td>
<td>128 Main Street</td>
</tr>
<tr>
<td>W9FIS in charge of the oldest and largest parts store in St. Louis</td>
<td>Distributor radio equipment for amateurs and servicemen</td>
</tr>
</tbody>
</table>

are invited to apply for resale, etc., to Advertising Department, QST

Say You Saw It in QST — It Identifies You and Helps QST
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"Advertising for QST is accepted only from firms who, in the publisher's opinion, are of established integrity and whose products secure the approval of the technical staff of the American Radio Relay League."

Quoted from QST's advertising rate card.

Every conceivable need of a radio amateur can be supplied by the advertisers in QST. And you will know the product has the approval of the League's technical staff.
It Is the Radio Amateur's Number One Piece of Equipment—order your copy today

the eleventh edition

RADIO AMATEUR'S HANDBOOK

The new eleventh edition of the Radio Amateur's Handbook is a complete revision and enlargement from the previous edition. It is the standard of the world as the textbook of Amateur Radio. Its 260 pages and 224 illustrations are a complete education in the technique and practices which have been developed through the years—right up to now.

THE MOST COMPLETE BOOK ON AMATEUR RADIO EVER PRINTED

Price

$1

postpaid anywhere

(in buckram binding, $2)

THE AMERICAN RADIO RELAY LEAGUE, INC.
West Hartford, Connecticut
Toughness isn't everything—...you've got to be able to take it!

and brother,

CARDWELLS can take it!

This is the history of a CARDWELL condenser used and re-used for eight years by W9IOE-W9ECC. He was kind enough to give its interesting history. Here it is:

Purchased in 1925, as a Type 152-B receiving condenser—
First used in a regenerative receiver—
Triple spaced and used in monitor—
Plates replaced and used for antenna tuning condenser in 20 meter CW rig—
Double spaced and used as a neutralizing condenser with fifty wattter in single-ended amplifier.
All plates replaced—now in use as tank condenser for a '10 buffer amplifier.

Naturally, not everyone has the time, the patience, nor the skill to utilize a piece of apparatus to the extent described above, but anyone can appreciate the ruggedness and real worth in a condenser which will stand that kind of treatment and retain its usefulness and efficiency indefinitely.

Send for literature describing Cardwells for every tube and purpose.

"The Standard of Comparison"

CARDWELL "STANDARD" MODELS FOR RECEIVERS and MEDIUM POWER TRANSMITTERS
CARDWELL MIDWAY "FEATHERWEIGHT" CONDENSERS, RECEIVING and TRANSMITTING
CARDWELL 14-B TRANSMITTING CONDENSERS FOR LARGER TRANSMITTERS
CARDWELL HIGH VOLTAGE CONDENSERS FOR COMMERCIAL RADIO-TELEGRAPH and BROADCASTING STATIONS
CARDWELL 5-2844 OIL DIELECTRIC FIXED CONDENSERS FOR HIGH FREQUENCY FURNACES and TUBE BOMBARDE

The ALLEN D. CARDWELL MFG. CORP'N.
83 Prospect Street, Brooklyn, N. Y.
PERMANENT LOGGING
Single control, one-dial logging; Fixed Band Spreads, True Tracking—these make permanent, accurate, calibration possible.

FIXED BAND SPREAD
On each of the bands, the special bandspread coils give a fixed uniform 100 division tuning range, no receiver adjustments being required.

PANEL COIL CHANGE
All coil changes are made through the panel of the receiver, swiftly, easily and without lifting the cover or disturbing any shielding.

NO CROSS MODULATION
In addition to being a type of superheterodyne, inherently free from cross modulation, all FB receivers employ a type 57 detector, which the most thorough laboratory tests show to be superior to any other tube for this purpose.

EXTERNAL POWER PACK
Saving valuable space on the operating table as well as providing equipment flexibility that often results in tangible savings to the amateur, the external power pack is a much-prized feature of National SW receivers.


An arrangement has been made with the Canadian Marconi Company for the inclusive distribution of National receivers in Canada.
DESIGNED ESPECIALLY FOR THE AMATEUR

* THE NEW RCA 801 *

The RCA 801 is a new transmitting tube of improved design and construction. Interchangeable with the type 10 in amateur transmitters, the RCA 801 is capable of considerably greater plate dissipation and output and is rated at 600 maximum plate volts. Incorporating many advanced features of design, the RCA 801 will find ready application and bring improved performance to amateur stations. The RCA 801 may be operated under maximum rated conditions of input at frequencies up to and including 60 megacycles. For characteristics and technical information on the RCA 801, or other RCA types, see your RCA deForest Distributor, or write to:

RCA deForest AMATEUR RADIO DIVISION
RCA RADIOTRON COMPANY, INC.
CAMDEN, NEW JERSEY