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JULY
1933

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NUMBER 7

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Address all general correspondence to the executive headquarters at West Hartford, Connecticut
IT IS not too early to give a thought to the Cairo conference. We believe that the time is now ripe for us to move towards a job that we have long wanted to undertake, a much-warranted widening of some of our bands.

Since the Washington conference, the first international radio conclave since the advent of short waves, our job has been as much to keep a finger on the pulse of radio development and international sentiment as it has been the actual representation of the amateur. Things are changing. The atmosphere of the Washington conference was violently hostile towards the amateur. As we have become better known and our merits appreciated, we have grown in strength and recognition. By participation in all of the recent international conferences, amateur radio has achieved for itself the position of a service for which adequate provision must be made. Much as we wanted to plug for enlargement of our bands at Madrid, it was evident that the time had not yet arrived; nor, being only the second international conference since the exploitation of high frequencies commenced, could one have any reasonable idea of what outcome to expect; and we couldn't even sell our own government, the most liberal in the world, the notion of enlargement. Now the situation changes. There is a difference in the sentiment towards us, in our own numbers and strength, in the relative needs of other services. We now believe that we can look forward to this thing we have wanted so long, in particular an enlargement of our 40-meter band.

Heaven knows we need more room. There are 36,000 of us in this one country alone, perhaps 60,000 of us in the world. We are packed in like cord-wood while all around us there are vast open spaces in which almost nothing is to be heard. Partly, we suppose, the business depression may be responsible; but it is true that there was a stampede to the high frequencies akin to a gold rush and that allocations were staked out by different services out of all proportion to their actual needs. The last several years not only have shown this but have displayed that high-frequency operation is not all cakes and ale. A lot of this hysteria has disappeared and a much more realistic viewpoint prevails.

Our lower-frequency bands may be adequate. It's a pretty tough job to run a radio station in the 3500-4000 band these days but we are still able to do it and we may be able to continue it if we don't experience too much additional growth. But our 7-megacycle band has an effective width less than a third as great, and simply because it is the world-wide meeting place for international communication between the amateurs of every country on the globe, it presents an intolerable condition, interference such as the radio art has never elsewhere seen.

Simple justice requires a correction of this condition, a readjustment that will give the amateur his just due. It is unfair that our valuable work should be so sorely handicapped when there is not pressing need for the frequencies assigned to other services near us. The time is at hand. We hereby serve notice on the radio world that the amateur 40-meter band must be adequately widened at Cairo.

EVERY amateur knows that there are a lot of rotten conditions in our bands. Whenever we get together we talk about them, cast about for remedies. We realize that things grow steadily worse, so that the enjoyment of every amateur is seriously threatened. Of course some of these are simply operating evils, of the sort that a cluck operator can create with a perfectly good signal. But by and large they are caused by bad signals. Did it even occur to you that practically every one of these burdensome interferences with legitimate amateur operation is in violation of radio regulations and that if we had any adequate enforcement of regulations in this country they would virtually disappear?

A moment's reflection and you will see that we are right. Raw a.c. on oscillators, wobbled signals, harmonics, broad modulated signals, intentional tone modulation, key clicks—all are strictly prohibited by the amateur regulations. The plain truth of the matter is that there is no radio enforcement in the amateur bands. For several years past there has been almost none. At the moment, what with reduced appropriations and one thing and another, it is at almost an absolute zero. The rôle of the League ought to be to protect decent amateurs against tyrannical administration. We should not be forced by circumstances to be egging on the government to be stricter against us— it is almost ludicrous. Yet for years back we have had to do that thing, and we have the spectacle of the American Radio
Relay League going year after year to the Secretary of Commerce and later to the Commission and demanding of those worthies that they enforce the provisions of the Radio Act of 1927. Our Board of Directors has been impelled to this by self-defense, in the simple knowledge that the recalcitrants that always occur in any good-sized cross-section of humanity must be kept in check or they will spoil the game for all of us.

One cannot blame the district inspectors for this condition very much. The fault is at Washington, where there is a tendency to centralize everything, with reduced staffs and reduced appropriations and reduced apparatus in the field. The situation ought to be the reverse, for it is only from the field, and in the hands of resident inspectors, that intelligent administration can be conducted.

Here we are, then, with a mounting total of amateurs, freely licensed (as is proper) and freely turned loose in bands under certain guarding regulations (as is proper), but with the government doing nothing about it from that point on. For the nth time we rise in righteous indignation to demand, for our own good, that the Federal Radio Commission undertake the enforcement of the amateur regulations as called for in the law. And if they can't do it, then we want for radio amateurs the right of self-policing, with enough deputized authority to make our disciplinary measures stick.

K. R. W.

World's Fair A.R.R.L. Convention

Chicago, August 3rd, 4th, 5th

ALL radio amateurs are invited and urged to attend this convention. It is being held at the height of the season at A Century of Progress Exposition.

With its hundreds of buildings A Century of Progress contains over 90 miles of displays. Dioramas portray the distribution of electricity and the execution of many other phases of modern civilization. Everything new and historical in radio will be there. Amateur stations W9USA and W9USB, located in the Amateur Radio Exhibit in the Travel and Transport Building, will be on a 24-hour-operation schedule throughout the Fair.

Special conducted tours for convention delegates will take visiting amateurs direct to all vital and interesting displays for radio men. There will be so many new things exhibited that these conducted tours will be most valuable. The convention program is being so balanced that attending amateurs can view all the significant features of the Fair, in addition to participating in all convention activities.

During the three-day convention the elimination trials and final selection of the amateur code speed champion of the world will be held. The award for this event will be a beautiful trophy offered by A Century of Progress.

There will be other events for which the prizes will be many and desirable. A balanced program of talks on all phases of radio will be of interest to all amateurs.

Make your reservations now. Sixty-five million people and 1400 conventions are scheduled to visit A Century of Progress this summer. The convention fee, which includes the banquet and trips through the Exposition, has been set at $4.50. Mail in your check or money order now; the ticket will be sent you immediately. Write to Wm. E. Schweitzer, W9AAW, 3800 North Western Ave., Chicago, Ill. Hotel accommodations are available at the convention headquarters, the Medinah Michigan Avenue Club, 505 N. Michigan Ave., at rates ranging from $3.00 for single rooms to as low as $2.00 each for groups of four per room. Special travel rates from all parts of the world will be in effect; ask your local transportation agent for special information.

Chicago will become the Mecca of hundreds of radio amateurs from all parts of the country during latter July and the first of August. Make sure that you will have a foremost place among them by making your plans and reservations now.

Who Received the Message?

ALL the information needed to solve the problem is contained in the following story. Every statement has an important bearing on the solution. See if you can find who received the message.

Six active hams, W7DEF, W6GHI, W6ABC, W9JKL, W6MNO, and W7PQR had formed a relay network. All six handled traffic at every opportunity. W7DEF heard W6GHI sending CQ. W6ABC couldn't copy over 15 words per minute. A 30 word message was sent at 10 o'clock. W9JKL was near sighted. The message was received while W5MNO, with the curtain down to keep the sun out of his eyes, was eating crackers in bed. The receiver of the message noted the time on his watch across the room, and marked the time on the message as being received at 10.01. W7DEF worked every day in a shoe store, while his friend, W7PQR was out of a job. W6GHI was on the air from 9 to 11 p.m. every night, but only operated for the two hours. Who received the message?

W6EIJ

Solution of this problem will be published next month. — Editor.

QST for
TEN years ago the Department of Terrestrial Magnetism of the Carnegie Institution of Washington established a magnetic observatory at Huancayo, Peru, South America. One of the prime objects in establishing this observatory was the study of the earth’s magnetic and electric fields and related studies at great altitudes. The observatory is located 11,000 feet above sea-level. The following years indicated the value of the determinations made at this site, and in 1931 experimental radio work was added to the program built up since 1921 to cover as many fields of geophysical research as possible.

The trip to the Huancayo Magnetic Observatory from the seaport Callao and through Lima is one of the most interesting in the world. In order to get there it is necessary to take the Ferrocarril Central de Peru (Central Railroad of Peru) and travel all day through the Scenic Sierra rising to heights of well over 16,000 feet. Leaving Lima at seven in the morning, one starts immediately to climb the western slope of the Andes. At about two in the afternoon you are near the top, Ticlio, the highest point of standard-gage track in the world at an altitude of 16,000 feet above sea-level. A headache, maybe, and loss of interest in the interesting views en route may prevent the traveler looking out of the window, but if courage enough is mustered one will be greeted by snow-clad peaks rising to heights of almost four miles. Huancayo is reached at nine in the evening and then it is necessary to drive in a car for fifteen kilometers, over roads equal to some in our old Virginia, to arrive finally at the station. Usually nothing further is done the evening of arrival except to partake of a cup of tea and turn in.

The morning following arrival will be marked by either rain, indicating that it is the rainy season, or by sunshine, showing that the dry season is at hand. Seven months of the year are dry and the remainder damp and rainy. The radio building lies to the east of the main living-quarters and some 300 yards away. As you enter the laboratory, on the right will be found the operating table with the receivers, the controls for the transmitters,

*Department of Terrestrial Magnetism, Carnegie Inst. of Washington, Washington, D. C.

(Continued on page 31)
The Micrometer Frequency Meter

Improving Accuracy to Make More Operating Territory Available

By G. F. Lampkin, W8ALK*

ALTHOUGH it has been emphasized in QST and in The Radio Amateur’s Handbook 1 that the portion of our amateur bands actually available for our individual use is limited by the accuracy of the frequency measuring equipment we happen to have on tap, the full significance of this important fact is not generally realized. With the better frequency meters (such as the electron-coupled type described recently in QST and in the Handbook) having accuracy dependable to within $\frac{\lambda}{100}$ of 1%, one can feel secure in tuning a transmitter to within only that percentage of a band limit. On the 80-meter band, for instance, with a frequency meter of this accuracy it is unsafe to tune closer than within 3.5 kc. of 3500 kc. or within 4 kc. of 4000 kc. Otherwise there is the liability that the transmitter frequency may fall outside the band altogether. On the higher frequency bands the number of kilocycles that would have to be left in the doubtful regions becomes proportionately greater. Hence, for the four amateur bands from the 1750-kc. to the 14-mc. inclusive there must be a total of almost 64 kilocycles unavailable to the amateur whose frequency meter is accurate to no better than $\frac{\lambda}{10}$ percent. With meters of lesser accuracy the unavailable marginal territory must be proportionately greater.

It is apparent, then, that further improvement in frequency meter accuracy will be repaid in additional operating territory made available.

The factors determining accuracy all must be recognized and coordinated. These are accuracy of the source of calibration, precision in setting and readability of the calibration scale and charted curve, and stability. In the heterodyne type meter the frequency stability depends primarily on electrical effects and mechanical effects, the latter being principally a function of temperature. In the micrometer frequency meter these factors have been recognized and coordinated with maximum of expense. The result is an improvement of over 6 times in the dependable accuracy. The necessary precision in setting and readability is provided by a micrometer type condenser while the stability has been improved first, by proper proportioning of the supply voltages on the electron-coupled type oscillator and second, by a temperature compensating condenser.

THE MICROMETER CONDENSER

In Fig. 1 is shown a sketch of the micrometer condenser about which the frequency meter is built. The micrometer head is made a force fit into the aluminum bell casting. On the micrometer spindle is mounted a cylindrical aluminum rotor so that it may travel in and out of a short piece of aluminum tubing. The latter forms the stator plate, and is supported and insulated by isolantite beads forced in by setscrews through the wall of the casting. The length of travel of the rotor in or out of the stator, and thereby the capacity of the condenser, is measured on the micrometer scale. The whole makes a rugged and sturdy assembly, though hardly in the form

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usually associated with a precision variable condenser.

Both rotor and stator are slightly more than 1 inch long, in order that over the entire 1-inch travel of the micrometer spindle the capacity will vary linearly without "bending" because of end effects. For the construction pictured the measured maximum and minimum values of capacity are respectively 50.3 and 17.6 \( \mu \)fd. The construction shown allows the micrometer condenser to be mounted either above or below the panel, the cast housing giving perfect shielding against external capacity effects. The condenser can be used in a vertical or horizontal position.

It is important that the machine work going into the construction of the condenser be of the best. The rotor must run true to less than one-thousandth inch, and the stator must be concentric with the rotor to the same tolerance. The effects of inaccuracy in machine work are worst when the rotor and stator are fully engaged, for two reasons: one, if the spindle arm is out of true, and is fully extended, it will have the greatest throw from side to side; the other, since the effective dielectric area is at a maximum, any eccentricity of the rotor will cause a maximum wobbling in capacity, over one revolution of the spindle. If the stator is not concentric with the rotor, its misplacement will greatly magnify even a slight eccentricity of the rotor.

Measurement of wobbling in terms of capacity is difficult, since the values involved are of the order of .01 \( \mu \)fd. However, in the frequency meter one revolution of the spindle corresponds to a frequency change of about ten kilocycles, and over this limited range the change in capacity is strictly proportional to the change in frequency. In Fig. 2, a shows the frequency calibration at intervals of one-thousandth inch, over one revolution of the spindle near the maximum capacity position. The curve shows no wobbling whatever within the limits of observation. If, however, the stator be no more than three-thousandths inch off center, the calibration resulting is that of \( b \), which could add an error of 800 cycles to a frequency determination.

The micrometer can be had with a scale reading 0 to 1000, or 0 to 2500. In the former case, each division is over \( \frac{3}{8} \)inch wide, and there are 1000 of these full-sized divisions. Therein lies the inherent reason for the precision of the micrometer frequency meter. The developed scale length of the micrometer condenser is 64.4 inches, whereas that of a 6-inch dial over 180° is only 9.4 inches, and of a 4-inch dial 6.3 inches. If a dial were made having a scale length equivalent to that of the micrometer, it would be 41 inches in diameter!

The micrometer might be equipped with vernier reading to ten-thousandths but, as will be seen later, this would be superfluous. The errors due to estimated readings to ten-thousandths on the 0 to 1000 scale are less than those due to temperature or calibration. Since the capacity varies linearly up to and past the ends of the scale, the frequency band may be spread over the whole scale rather than over the usual 80 or 85 percent. When the micrometer reads zero, the rotor and stator are fully engaged and the capacity is a maximum. As a result, the frequency calibrations vary directly as the dial reading, an increase in reading giving an increase in frequency. Finally, the micrometer head is built so that changes of two or three divisions in the calibration may be corrected without having to draw complete new calibration curves. The longitudinal scale and index line on the micrometer are carried on a thin sleeve. With a small spanner wrench this sleeve may be slipped around and the index lined up to correspond to the calibration. By periodically checking the meter at one high and one low point, and resetting if necessary, the old calibration curves may be used much longer than otherwise.

Such is the micrometer condenser. It may be applied to existing frequency meters, where its open scale will be appreciated. In spite of the length of the scale, it does not take long to go from one end to the other; when the spindle is rotated the inertia of the rotor helps to keep it spinning on through the range, and the action
is not to be compared to that of a 40-to-1 ratio dial, for instance.

THE FREQUENCY METER CIRCUIT

To match the precision of the micrometer condenser, however, requires new design on the frequency meter circuit. By "new" is meant

![Circuit Diagram]

FIG. 3 — CIRCUIT OF THE MICROMETER FREQUENCY METER

C1 — Micrometer condenser.
C2 — Automatic temperature compensating condenser.
C3 — Hammarlund MC-100-M midget condenser with rotor lock.
C4 — 100-µfd. molded mica condenser.
C5 — Twisted hook-up wire 5 inches long.
C6 — .004-µfd. mica bypass condenser.
C7 — .01-µfd. mica bypass condenser.
C8 — 2-µfd. 400-volt filter condenser.
L — 59 turns No. 32 s.c.c. close wound, 1 inch dia., tap 19 turns up.
R — 30,000-ohm metallized 1-watt resistor.
R1 — 50,000-ohm metallized 1-watt resistor.
R2 — 5000-ohm metallized 1-watt resistor.
R3 — 100,000-ohm metallized 1-watt resistor.
J — Yaxley insulated tip jack.
T — Transformer, 115-v. 60-cycle to 165/2/5/2.5 v.

actually a departure from commonly accepted present-day amateur practices. However, there is nothing complicated in either the construction or the technique, and the same fundamental principles still apply. The result is a self-contained micrometer frequency meter, no larger than 10 by 5 by 6 inches. It is completely a.c. operated, requires no batteries or other external apparatus, and can be used five minutes after tuning on. The m.f.m. is automatically compensated for temperature changes, is compensated for line voltage changes, and, as seen above, can be corrected for aging. It is proof against ordinary mechanical shocks and stresses, and has both precision and stability such that frequencies in the 3500 kc. band can be determined to ±500 cycles, or with an error of not more than .015 percent.

CONSTRUCTIONAL LAYOUT

The circuit of the meter, shown in Fig. 3, is essentially that used in the W1MK electron-coupled frequency meter described in July, 1932, QST, and in the Handbook (tenth edition). The oscillator works on fundamental frequencies in the 1715-ke. band, although calibrations are made and used on the 1150-ke. band. A midget condenser is used for a padding and "spotting" condenser in the oscillator tank. One side of the filament of the oscillator is grounded directly rather than through mica bypasses, since there was found no operating difference in the two methods. The output coupling condenser is made of two pieces of push-back hook-up wire twisted together for 5 inches. This construction has a capacity of 1.3 µfd. per inch. Alternatively, two pieces of No. 14 solid bus wire laid together with one layer of spaghetti between them would have a capacity of some 1.7 µfd. per inch.

A small power transformer, a 27 rectifier, a resistance-capacity filter, and a potential divider constitute the power supply. The .004-µfd. mica bypass across the rectifier is useful in removing the last small vestige of raggedness in the note.

During the development and use of the m.f.m. it was found that after the parts had warmed up for a while, any slight jar would hop the frequency several hundred cycles, and continued shocks would change it by as much as two thousand cycles. This happened, not with a fixed mica tank condenser, but only when using the midget variable as tank condenser. The cure was found to be a lock on the rear bearing, made in the manner of the sketch in Fig. 4. It was not a case of rotation of the rotor, for a lock at the front bearing had no effect. Rather it was movement of the bearing plate along the shaft. The rear bearing lock completely eliminates frequency shifts due to mechanical shocks, and, of course, also permanently fixes the position of the rotor plates.

Not a small contribution to the mechanical stability is given by the cast aluminum shield box. The walls are ½-inch thick, all one piece with no joints or cracks. The rigidity is such that pressure anywhere on the box itself has zero effect on the frequency, although heavy pressure on the ½-inch aluminum panel may change the fre-
frequency 30 or 40 cycles at 3500 kc. The cast box is fitted with small rubber feet screwed in from the bottom. Three fibre washers, whose function will appear later, are used to space the micrometer condenser from the panel. Two vents, screened with perforated brass sheet, are cut, one in the base of the box casting and one in the panel, for ventilation.

**Voltage Compensation**

In describing the electron-coupled oscillator, Dow showed that by properly proportioning the screen and plate voltages frequency variations due to these factors could be cancelled out. If filament, screen, and plate voltages are all secured from the same source, one or other of the latter may be over-emphasized so as to make the cancellation cover all three factors.

All values of frequency variation given hereafter are referred to 3500 kc. The frequency variations were measured by beating the m.f.m. against 3500 kc. from a precision, temperature-controlled crystal oscillator, and measuring the tone with a beat-frequency oscillator. Short time measurements could be made with precision of five to twenty cycles.

To determine this optimum condition, the Type 24A electron-coupled oscillator was supplied from a separate filament transformer. The plate voltage was supplied directly from the "B"- eliminator and the screen voltage from a tap on a 50,000-ohm potentiometer across the eliminator.

For different positions of the screen tap, the frequency variation was measured against varying a.c. line voltage. This procedure gave the curves of Fig. 5A. Next, the line voltage on the "B"-eliminator was held constant, while that on the filament-transformer primary was varied. The resulting frequency variation is shown by 5B, which curve was the same for all positions of the screen tap. To make the effect of combined screen and plate voltage cancel that of the filament voltage, one of the curves of 5A must be picked whose slope is equal and opposite to that of 5B. This is most easily done in 5C, where the slopes of the A curves are plotted against position of the screen tap; also is plotted the slope of B, with sign reversed. The crossing of the two curves gives the correct position of the screen tap for cancelling out frequency variations due to line voltage shifts.

Actually, when the tap as indicated is tried, the immediate effects of a line voltage change are cancelled. However, as the tube adjusts itself to a new filament temperature, requiring a period of a few minutes, another new cause of frequency drift enters. Recognizing this cause and including it among the factors to be cancelled places the best position for the screen tap at the point P, whereby the resistance values in the potentiometer are determined. The resulting d.c. plate and screen voltages from the eliminator shown are 185 and 10 volts, respectively. The low screen voltage cuts the strength of the harmonics on the 14- and 28-mc. bands somewhat, but leaves a sufficiency to work with.

Editor's Note: In a second article, to follow in an early issue, the author will describe the simple method of automatic temperature compensation and give instructions for precision calibration of the micrometer frequency meter.

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* Strays *

A simple arrangement for keeping the filaments from blinking when the transmitter is keyed is to wind a few extra turns on the core of the power transformer, if space will permit, and connect them in series with the primary of the filament transformer. Three or four turns usually is enough. The key should be in the primary circuit of the power transformer.

— W7ASQ
An Unusual 56-mc. Super-Regenerative Receiver

Details of a Portable Set With Self-Quenching Detector

By J. G. Haydock, Jr., W3ACD*

IN ORDER to obtain super-regeneration it is necessary to upset the normal oscillations of the detector in such a fashion that they are never permitted to grow to a fully sustained steady state. The oscillations are allowed to build up to a value approaching the steady state and then by either reducing the plate voltage or raising the grid bias the tube is suddenly rendered incapable of oscillating. This condition is maintained while the free oscillations in the tuned circuit die out. Then the proper voltages are restored and oscillation begins to build up again. To obtain this effect, some method of periodically varying plate voltage or grid bias is needed. In the super-regenerative receivers commonly used by amateurs, it is generated by a separate tube. In the receiver to be described, it is generated by the detector tube itself.

Where weight and battery limitations are severe, it is obviously desirable to dispense with the separate oscillator tube and to use the type of detector which generates its own quenching voltage.

Those who have made regenerative receivers for the lower frequencies doubtless remember that too much feedback often causes the detector to squeal. This phenomenon is caused by an excessive accumulation of electrons on the grid condenser which increases the negative bias on the tube, stopping oscillation in the tube momentarily until the bias is reduced by drainage through the grid leak. The frequency of this trigger action depends on the sizes of grid condenser and leak and on the $L/C$ ratio of the tuned circuits and can be made to meet the requirements of super-regeneration.

Quenching of this type is used in the portable receiver illustrated. The circuit diagram, Fig. 3, shows the tuned-plate tuned-grid detector and the audio amplifier. Two Type 30 tubes are used.

The detector is constructed as an integral unit. The wafer tube socket serves as a support for the flat copper strip coils which are soldered to eyelets. To permit single-dial control the grid and plate tuning condensers are ganged. For compactness a standard 7-plate Insolantite insulated condenser was used. Screws pass from the tube socket through metal stand-off sleeves to the end frame pieces of the condenser which is stiffened in addition by a small bakelite strip which holds the bearings in line. The middle rotor plate has been removed and the brass stator support rods have been sawed in two, making a compact double stator condenser of about 20 µfd. per section. Each section tunes one coil. The shaft of the condenser is placed parallel to the center line of the plate and grid pins of the tube to make the leads the same length. The coils are flat copper strip cut from No. 20 gauge stock. The fixed mica grid and blocking condensers are made up as one unit. This is not essential from the performance standpoint but does shorten the tuned circuits somewhat.

The arrangement of parts of the detector unit is very similar to their location on the wiring diagram. Close examination of Fig. 1, which shows the plate and grid terminal side of the detector socket, illustrates how symmetrical connections to the tube, coils and condenser is obtained. Symmetrical location of the plate and grid blocking condensers is also important. They are not visible but are placed on the under side of the socket on a line parallel with the filament pins of the tube. In building sets of this type the general idea of this layout of parts might well be followed closely.

The entire unit is mounted on a heavy brass bracket attached to the base, using the regular one hole mounting fittings of the condenser. The battery cable sheath is the ground lead. It is carried into the set through one of the five connector pins. Inside the set this ground lead goes directly to the condenser shaft contact, making the detector mounting bracket the only ground connection to the cabinet. The leads of the variable grid leak need not be short, and are made of twisted pair.

The antenna is directly coupled, a lead to the pin jack antenna terminal being soldered to the...
grid coil. The proper location for this connection must be determined by trial for the type of antenna to be used.

The audio amplifier circuit is somewhat unconventional. Bias is obtained with a 750-ohm resistor which carries the plate current of both tubes. The resistance-capacity shunt across the transformer secondary is intended to deaden the hiss and reduce the intensity of the interruption frequency voltage appearing as excitation on the amplifier. The values given for this shunt are correct for the interstage transformers used (they were taken from a Radiola 28), but will be approximately so for any transformer of comparable ratio.

Being designed for operation on a small one cell lead storage battery this set has no filament rheostat. For two dry cells a 10-ohm variable resistor should be used. It need not be accessible from the panel.

This receiver is about the limit of compactness for the tube types now available and any closer clearances between the detector coils and surroundings probably would be undesirable.

The first tests of the set should be made with the antenna disconnected. With a small amount of grid leak resistance the detector should oscillate in the normal manner, as indicated by any of the usual tests. As the grid leak resistance is increased a sharp click will be heard, which is the beginning of trigger action. As the resistance is further increased, the hiss should become louder. With the full 500,000 ohms a high pitched squeal should be audible. The next step in the preliminary test is to determine the tuning range and adjust it to cover the band properly. The coils will bring the range close enough so that it will be necessary only to squeeze the turns closer together if the receiver does not tune to a low enough frequency or spread them apart if the reverse is true.

The tracking of the two tuned circuits may be checked in one of two ways. Press the turns closer together on one coil and note whether the hiss becomes louder or weaker. If it becomes weaker, pull the turns apart until it becomes weaker again after passing through a point of greater intensity. The point of greatest hiss intensity is the proper adjustment. In the other method a milliammeter is connected to read detector plate current and the spacing of the turns of one coil is adjusted until it is a minimum. These adjustments should be made with some non-conducting tools.

Having completed these adjustments, the proper point to attach the antenna should be determined. Start with it just above the point where the grid coil is connected to the grid condenser. Move it step by step toward the grid end of the coil until the farthest point is reached where the receiver will super-regenerate properly over the entire tuning range.

In operating, there are two controls: tuning and quenching frequency. When tuning, the variable grid leak should be set at the point where the hiss is loudest. When a signal is heard the grid leak may be adjusted for best signal strength. This indicates that too little grid leak resistance is being used, or sometimes that the plate or filament voltages are low.

This set may be used on any of the nonsymmetrical antennas. The writer usually uses a single wire feed half-wave type 8 feet long with the feeder attached 19 inches off center. A vertical 8 foot wire may be used, plugged into the antenna terminal, but for best sensitivity the tap on the grid coil will have to be moved farther over toward the grid end than for the single wire type. A one-quarter wave antenna usually must be attached somewhere on the lead from the junction of the two mica condensers to the condenser shaft to avoid loss of super-regeneration.

In performance, this receiver has proved very...
satisfactory. It has not failed, so far, to produce intelligible speech from any signal which could be understood on more complex super-regenerators. On account of the reduced hiss it is a very comfortable set to use with headphones, and the filter in the audio systems absorbs enough of the inaudible quenching voltage so that the amplifier has capacity to handle louder speech with less distortion than many receivers which have been tried.

Comparisons between this receiver and ones using separate quenching oscillators shows that there is slightly more sensitivity available in the latter. On account of the noise conditions at all but the most remote locations, however, it is doubtful if that additional sensitivity is really usable.

More DX on 56 Mc.

THE airplane 56-mc. tests announced in May QST and run off on schedule on May 7th, aroused terrific interest on the part of New England's 56-mc. workers. During the one-hour flight from Natick, Mass., to Providence, R. I., WT0XU-WICO0 worked 16 stations—a very insignificant fraction of the number of stations calling him. The best DX contact was with W1FEX on Mt. Washington. Also flying with 56-mc. gear on the same afternoon were W1IXL (Conn. State Department of Aeronautics) and W10XAO (Westinghouse Electric & Mfg. Co.). Of the swarm of stations participating, only one, as far as we are aware, has the distinction of having worked all three planes. W1AWW, pioneer 56-mc. station on Wilbraham Mountain, picked the plum.

In California, where one can grab off a couple of mile-high mountains without any particular inconvenience, there are magnificent opportunities for 56-mc. DX. Recently, two groups of members of the Cogswell Radio Society, San Francisco, set out to exploit these opportunities. They succeeded in working solid duplex between the two points chosen—Blue Canyon, a town located one mile high in the Sierra Nevada Mountains, and Mt. Diablo, 3850 feet high. The distance covered was 120 miles.

Transmitters at both stations were m.o.p.a. rigs with Type 10's as output amplifiers modulated with Type 46's. After the first contact, directive antennas were strung up and found to provide an enormous gain in signal strength. Voice signals were readable 200 feet from the loud speakers. The amateurs responsible for the work were Frank Kirby, W6WI; Charles Moody, W6HEV; Russell Brosame; Lloyd Case and Arnold Stenfors.

* This station and its activities were described in the March, 1933, QST.

W1FEX*, station of the International Polar Year group on Mt. Washington, N. H., continues to set the pace for 56-mc. DX. Most notable exchange of strong signals has been with WA5F-W1CSF at a distance of 142.5 miles. Innumerable other contacts have been established over distances above 100 miles. According to present plans, the station will continue to be operated during the summer with additional equipment on the 28-mc. band.

U. S. amateurs are by no means alone in their exploitation of the 56-mc. band for airplane work. A recent report received from the R.S.G.B. tells of G5CV, flying at 10,000 feet over the North Sea, receiving good signals from G6QB, 130 miles away. Input to the transmitter at the time was 10 watts.

Kansas National Guard Station CX7

AMATEURS often have shown stellar performance to the general public in time of emergency—have always been only too glad to display their skill. The A.A.R.S. and U.S.N.R. systems appeal to many hundreds of amateurs for year round drills for they are only too glad to be of service to Uncle Sam. So it is little wonder that the amateurs in the 169th Infantry, Kansas National Guard, in cooperation with other Kansas amateurs did such excellent work and turned in a record total of traffic. This is an old story to those in the middle west, is a bit of past history, but we think that the work rates more than local interest and commendation for in four weeks activity CX7 handled over six thousand two hundred messages, for an average of 223 messages per day with scheduled stations. Will this record be broken this summer?


It would seem an excellent project to be undertaken by National Guard camps in all parts of the U. S. providing the amateurs in these various outfits were interested enough to exploit the idea to those in charge.

The Kansas gang gave this idea a great deal of thought and schedules were lined up considerably in advance with reliable operators at various stations around the state. One can gain some idea of the scope of contact around the state when it is pointed out that schedules with eighteen different cities were kept each day. This large number of daily schedules necessitated something other than just a typewritten list. An attempt was made to procure a 24-hour clock but none could be found so an electric clock was used that had a 12-inch face.

(Continued on page 88)
Twisted-Pair Feeders for the Transmitting Antenna

By George Grammer, Assistant Technical Editor

The efficiency and flexibility of the Zepp feeder system have been demonstrated conclusively over a period of several years, but the feeders themselves still have some undesirable mechanical features. The ideal feeder construction is one which is light in weight and yet is made so that the two wires are rigidly held at a fixed separation. The wires must not swing with respect to each other or there will be a change in their mutual capacity, which reflects itself as a change in transmitter frequency if the antenna is being fed by a self-excited oscillator. Likewise, the feeder system as a whole must not swing with respect to surrounding objects or a similar capacity change will take place. The ordinary type of Zepp feeder construction in which the wires are held apart by spacers several inches in length is seldom free from either of these defects.

It would seem that a feeder system which really was a unit instead of a loose-jointed affair resembling a mechanical dancing toy would be a distinct improvement. That, at least, has been the opinion of a number of people who have endeavored to make the feeder a unit by twisting the two feeder wires together. The use of twisted pair or other types of double-conductor cable for transmitting radio-frequency power is not a new idea—we have used short pieces of lamp cord to make up deficient feeder lengths temporarily for a number of years—but so far as we can find no one has published any information about the losses in such feeders in comparison with those of the ordinary spaced-wire design.

One obvious characteristic of a feeder system made of two-conductor cable is that it will have a great deal more self-capacity than a spaced feeder. One reason, of course, is that the wires are much closer together; the other is that because they are so close together there must be some insulating material between them to keep them separated, and practically all insulating materials have a higher dielectric constant than air. We might expect, therefore, that a "twisted pair" (used here to indicate any type of double-conductor cable) feeder would be shorter in actual feet than a spaced-wire line of the same electrical length. Unfortunately, too, we might expect that the losses in such a line would be greater than in the spaced line because all insulating materials have greater losses than air. The greater self-capacity of the line also will mean that the circulating current will be large, thus pyramiding the losses. The actual facts bear out these expectations.

**Dummy Antenna Tests**

To get some information on the behavior of different types of lines the test circuit of Fig. 1A was rigged. The driver was a crystal-controlled transmitter having an output of about 100 watts, the frequency being in the 7-mc. band. The standard of comparison was a quarter-wave spaced feeder of two No. 12 wires each 33 feet long built as an ordinary feeder with the 6-inch porcelain spacers made by E. F. Johnson. The input to the line was series-tuned by the condenser marked \( C_1 \) and at the receiving end a low-C parallel-tuned tank circuit, \( L_2 C_2 \), was used to simulate an antenna. A 150-watt lamp served as a dummy load. The feeders were connected directly across the ends of the coil and the number of turns included between the lamp terminals adjusted for maximum power.

Three types of two-conductor wire were tried. One was the ordinary No. 14-equivalent twisted lamp-cord (the kind with the green-yellow cotton cover on each wire) with rubber insulation; the second was a heavier twisted cord moulded in rubber; the third, ordinary No. 14 solid wire with rubber and weatherproof covering, the type used for outside 110-volt wiring and for open housewiring. We shall call them Nos. 1, 2 and 3 respectively.

The first observed fact was that conductors Nos. 1 and 2 could not be 33 feet long and work as quarter-wave feeders with the same approximate settings of the series tuning condensers.
which gave resonance with the spaced-wire feeders. Clipping off a foot or two at a time finally brought the length down to a quarter wave; at this point No. 1 was 27 feet long and No. 2 was 21 feet. No. 3 apparently needed no pruning, for it tuned nicely at the 33-foot length, indicating lower capacity than the other two.

The efficiency of all three lines tuned as Zepp feeders was very noticeably poorer than that of the regular spaced wires. The lamp would light brilliantly with the latter, but the best that could be done with the three two-conductor lines was a reddish glow. Using the tuning system shown at Fig. 1B, with impedances matched at both ends and the line therefore non-resonant, gave an entirely different set of results, however. In this case the power transfer was practically the same with all lines so far as could be judged by watching the brilliance of the lamp.

Further investigation of aperiodic lines showed that the tuned circuit (really a matching transformer) at the receiving end of the line could be dispensed with when the two-conductor lines were used, the lamp being connected directly across the ends of the line. By visual observation the power transferred was as good as if not better than with the tuned circuit, indicating that the lamp impedance approached the characteristic impedance of the line. Since the line has no tuning effect under these conditions a further check was made using a twisted-pair line approximately 70 feet long. Again judging visually, the power delivered to the lamp at the end of the longer line was practically the same as with the shorter one.

The interesting feature of the two-conductor untuned lines was the fact that the lamp resistance under the conditions outlined above was between 50 and 100 ohms and therefore of the same order as the resistance of a half-wave Hertz antenna at the center. This opened up the possibility of a simple method of current-feeding a half-wave antenna with a twisted-pair line without an impedance-matching transformer at the antenna end.

**CHECKING WITH AN ANTENNA**

So far observations had been made only with a dummy antenna, which probably had characteristics sufficiently different from those of a regular antenna to make a recheck under operating conditions advisable. Accordingly a half-wave antenna 66 feet long was constructed and strung temporarily on the roof of the building. An ammeter at the center permitted comparative observations of the power delivered to the antenna by the various types of lines.

For the sake of clarity it is perhaps advisable to point out here the difference between the “Zepp” feeders and the “aperiodic,” “untuned” or “matched-impedance” line. A Zepp antenna is a voltage- or end-fed antenna with a two-wire resonant or tuned line. The r.f. potentials on the feeders are different at every point, increasing to maximum at the antenna end. The untuned line, on the other hand, can have any random length, carries the same r.f. potential all along its length, and must be terminated at the antenna in such a way that the antenna impedance at that point is equal to the characteristic impedance of the line. The same pair of wires can be used in both ways; the way they work depends entirely on the method of terminating them at the antenna.

The antenna current reading with the spaced Zepp feeders was taken as a standard. Only two two-conductor lines were used, Nos. 1 and 3, since No. 2 had already shown itself to be definitely inferior to the other two as a Zepp feeder. Although some reduction in antenna power was to be expected, comparative figures using the twisted lines as Zepp feeders were rather surprising—disagreeably. With the twisted lamp cord the antenna current was only 30% of that obtainable with the spaced feeders—in other words, over nine-tenths of the available power was being wasted in the feeders. That there was nothing imaginary about this power loss was evident from the amount of heat developed in the feeders themselves; the entire length became noticeably warm after the transmitter had been running a few minutes. Evidently the twisted lamp cord did not shape up so well as a Zepp feeder.

The hand-twisted solid No. 14 rubber-covered wires were not quite so bad — only four-fifths of the available power was lost in heating the rubber insulation—but still had far too much loss to be considered seriously for end-feeding an antenna.

One misleading feature about two-conductor Zepp feeders is that the feeder current at the transmitting end is much higher than is to be expected with spaced feeders. This is the natural result of the high mutual capacity of the wires.
It looks fine in the station — but doesn't mean a thing in the antenna.

It seems that the answer to the swinging Zepp feeder problem is not a two-conductor cord — unless somebody devises a way to make such a cord without solid insulation or with an insulating material which has losses low enough to be comparable with air and at the same time not susceptible to moisture. Such wire may actually be available, but we have not been able to obtain anything like it in canvassing local supply houses. It has been suggested that small glass or Pyrex beads with holes spaced a half inch or so apart plentifully sprinkled along feeders made of regular enameled wire would do the job satisfactorily. This, it seems to us, would be a highly practical way of getting close wire spacing with the wires held rigidly apart.

UNTUNED FEEDERS

With negative conclusions being reached on the Zepp proposition, the investigation was carried further to determine how closely the twisted line matched the center impedance of the half-wave antenna and to get some idea of the efficiency of this type of line. Since the characteristic impedance of the line is low, the r.f. voltage between the wires also will be low when the line is properly terminated, and the line therefore has a better chance to work well than when used as a Zepp feeder.

The comparisons were made using the same antenna and driver with the feed circuits shown in Fig. 2. The two-conductor line is shown at (B), the spaced Zepp feeders at (A). Two ammeters were used at the center of the antenna to make sure that the current distribution was what it ought to be — or in other words that the line and antenna impedances were somewhere near to being matched. The results were what had been hoped for after the observations made with the lamp dummy antenna recounted previously. The untuned twisted lines showed just about the same efficiency as the spaced Zepp feeders; that is, the antenna currents were practically the same with both systems, the power input at the driver being kept constant.

Different types of two-conductor cords naturally have different impedances, but the impedances are all low and several types tried worked very satisfactorily in putting power into the antenna with negligible losses. The hand-twisted No. 14 wires seem to be the best, with twisted lamp cord a close second. The former are likely to be better for year-round service, since the solid wire is made for outdoor work. Two varieties of shielded wire of the type used for auto ignition systems also were tried, the single inside wire being used for one feeder and the outer metal braid covering as the other. Both these also gave good results, although the efficiency was not quite as good as with the twisted wires. It is questionable whether the “mesh” shield would maintain its conductivity when exposed to the weather, and since the r.f. conductivity is a somewhat doubtful quantity even under the best conditions, it would seem preferable to use the ordinary twisted wires.

Feed lines of this type have two excellent characteristics — they can be any convenient length since they are not tuned; and for all practical purposes the lines are “dead”; that is, the voltage is low and the capacity effects to surrounding objects are negligibly small. The line actually can be picked up, handled, draped on grounded metalwork and in general treated just like an ordinary 110-volt line without visibly affecting meter readings in the transmitter or antenna. No particular insulation is needed beyond that on the wires themselves.

Against this — it seems there is always a catch somewhere — is the fact that a low-impedance line feeding the center of the antenna is all wrong for working on even harmonics so that an antenna fed by such a line becomes a one-band affair for all practical purposes. Naturally this is a disadvantage which throws out this type of feeder if the transmitter is to be shifted from band to band. On the other hand this feature may be helpful if only one band is customarily worked by the transmitting station, because an antenna so fed will discriminate against even harmonics and thus reduce harmonic radiation.

For the benefit of those who may be interested in using twisted-pair feeders, the drawings in Fig. 3 show a number of methods of coupling the transmission line to the transmitter. At (a) is a tank circuit, L-C, tuned to the same frequency as the transmitter and coupled inductively to the output tank. The transmission line is connected across a few turns of L to step down the r.f. voltage to the right value for maximum power transfer to the antenna. The method of adjusting is a little more complicated than ordinary Zepp tuning but is not actually difficult.
The feeders should be clipped across approximately one-fourth the number of turns in \( L \) and the circuit adjusted to resonance by means of condenser \( C \). The coupling between \( L \) and the transmitter tank should be loose. Readjust the transmitter tank tuning condenser for minimum plate current and tighten up the coupling until the tube or tubes draw normal plate current. Now readjust the transmitter condenser for minimum plate current; if the plate current dips appreciably at a different setting of the condenser the number of turns included between the feeders is too small. Try an additional turn and repeat the process. When the adjustments are correctly made the value of plate current obtained by increasing the coupling will also be the minimum current obtained by swinging the transmitting tank condenser. Swinging condenser \( C \) will cause the plate current to drop on both sides of the resonance setting. The inductance-capacity ratio in \( L-C \) is not highly important; a 250-mfd. condenser with a coil which makes resonance come at about the center of the condenser scale will be about right. An r.f. ammeter may be placed in one of the feeder leads, in which case the adjustments giving maximum feeder current will be correct.

The circuit in (b) eliminates the extra tank circuit and thereby simplifies the adjustments. One feeder wire is clipped to the “cold” end of the tank and the other tapped along the coil until the transmitter draws the desired plate current. This also is true of (c), which shows the same type of connection for a push-pull circuit, in which case the feeders are tapped equidistant from the center-tap. The condensers marked \( C_1 \) should have rather large capacity — .0005 or more — and may be of the mica type. Their purpose is to insulate the feeders from the plate voltage when series plate feed is used on the transmitter tank. They are not necessary if parallel plate feed is used.

A third feed possibility is to use a coupling coil of a few turns connected directly to the feeders and to vary the coupling between the coil and the transmitter tank until the transmitter draws normal plate current. This will obviate the necessity for the insulating condensers.

The antenna in all cases must be a half wavelength long. The length can be figured quite closely by using the formula:

\[
\text{Length (feet)} = \frac{468,000}{\text{Freq. in kc.}}
\]

The antenna is cut in the center and an insulator inserted as shown in Fig. 3. The ends of the feeders are simply soldered to the two parts of the antenna right at the insulator.

It will be seen that this antenna-feeder system is exactly like the familiar “doublet” receiving antenna. Its effectiveness for receiving is well known; it results from the fact that the antenna impedance and the feeder impedance are sufficiently well matched to transmit received signals with little loss. It is equally effective as a transmitting antenna for the same reason. The losses with feeder lengths likely to be used by amateur stations can be considered to be negligible at usual frequencies with transmitters of moderate power — that is, for outputs up to a few hundred watts at least. While unsuited to harmonic operation, such an antenna is bound to have many applications. What’s more, the same system can be used both for transmitting and receiving by installing a d. p. d. t. switch in the feeder.

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**Financial Statement**

By ORDER of the Board of Directors the following statement of the income and expenses of the American Radio Relay League, Inc., for the first quarter of 1933 is published for the information of the membership.

K. B. Warner, Secretary

**STATEMENT OF REVENUE AND EXPENSES FOR THE THREE MONTHS ENDED MARCH 31, 1933**

<table>
<thead>
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<th>Revenue</th>
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<tr>
<td>Advertising sales, QST</td>
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<td>Handbook sales</td>
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<tr>
<td>Beginners booklet sales</td>
<td>491.42</td>
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<td>Membership dues</td>
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<td>Membership supplies sales</td>
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<td>Interest earned</td>
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<td>Cash discounts earned</td>
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<td>Bad debts recovered</td>
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**Expenses**

<table>
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<th>Expense</th>
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</thead>
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<tr>
<td>Deduct:</td>
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<td>Returns and allowances</td>
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<td>223.96</td>
</tr>
<tr>
<td>Exchange and collection charges</td>
<td>49.19</td>
</tr>
</tbody>
</table>

**Net Revenue**

| 105.99 | 1,185.99 | 5,019.69 |

**Total expenses**

| 39,001.54 |

**Net gain from operations**

| $4,559.75 |
A Simple Tape Recorder for C.W.

Many of us have wished, at one time or another, that we had a simple and inexpensive tape recording rig for copying c.w. telegraph. It would be useful in “taking down” for permanent record some transmission of historical importance, for instance, or for making a graphical record of our sending so that we might see just what our own “fist” looked like. Unfortunately, however, most of the systems heretofore available have required either a considerable outlay of cash for the necessary equipment or more than ordinary skill and working facilities for making it up. Just recently we had the opportunity of testing a simple and exceptionally effective system that has been developed by Mr. M. A. Noss, of 438 Central Avenue, New Haven, Connecticut. Unlike most systems, it is easily made up, requires no mechanical relays for its operation, nor does it involve the use of a siphon-type pen. The audio-frequency electrical output of the receiver itself does the recording on the tape by an electro-chemical process.

The secret of the system is the use of sensitized tape such that the flow of a small electrical current through the tape causes it to change color. The tape is simply pulled between a pair of electrodes whose points are separated by the paper and which are connected to the output transformer of the receiver. When electrical current flows the tape is discolored and presto! — the dots and dashes of the continental code appear in blue immediately.

As shown in the photograph and sketch, all that is necessary is some sort of mechanism (either electric- or spring-motor driven) to pull the tape through, at a uniform speed which can be adjusted to suit the code speed, and the simple electrode arrangement. In the installation of the photograph the motive power was supplied by an old phonograph motor of the “wind-up” type and the electrode mounting and guide for the tape was made up of pieces of fiber. The electrodes are pieces of stiff steel about the size of darning needles mounted in the binding posts and having their ends rounded so as not to tear the tape.

SENSITIZING THE TAPE

The tape is sensitized to show color when exposed to electrical current by soaking it in a solution consisting of one ounce of ferricyanide of potassium and one pound of sal ammoniac in one gallon of water. The tape should be of a rather porous or pulpy type (in preference to the smooth glazed type generally used for ink recording). A number of rolls may be soaked at one time and kept until used in a sealed container such as a fruit jar. The tape must be moist, although not actually “wet,” when used for recording. If it should become too dry in storage it may be exposed to moist atmosphere, as by steaming for a few minutes. Mr. Noss reports that treated tape that had been dried out for several months recorded satisfactorily upon remoistening.

In making a tape recording, it is necessary only to tune in the signal (with a pair of ‘phones across the output transformer secondary for monitoring) and then adjust the speed of tape travel until satisfactory spacing of the characters is obtained. Since there is no mechanical lag in the circuit, there is no limit...
to the code speed which can be copied. All that is necessary is to run the tape fast enough to make the characters legible.

The inventor, Mr. Noss, will welcome comments and suggestions from those who use the system.

Recording Signals with the Teleplex

NOT long ago the operators of W6FMR were asked to adapt a Master Teleplex to a receiver so code transmissions could be recorded. Since the Teleplex is leased, it was necessary to work out a scheme which would not involve alterations to the machine itself. The idea detailed below has worked out very satisfactorily.

The Teleplex makes use of a vacuum tube relay which is actuated by the conducting properties of metallic ink. This relay is used to actuate the inking pen as shown in Fig. 2.

The signal-recording adapter circuit consists of an audio stage transformer coupled to a tube, B, whose grid bias can be varied over a wide range. It is necessary to have the plate-filament resistance of tube B of such value that the vacuum tube relay, A, in the Teleplex, will not operate when no incoming signal is impressed upon tube B. When a signal is impressed on the grid of tube B the resistance of the plate-to-grid circuit of tube A is decreased, allowing current to flow in the plate circuit and actuating the high-resistance relay. Any type tube may be used at B if sufficient bias voltage is available.

We used 201-A’s throughout, with 45 to 90 volts on the first audio. The grid bias for tube B was obtained from a 22½-volt battery and controlled by a 50,000-ohm potentiometer. It is necessary to have connections from the plate and filament of tube B to the tape contacts as shown in Fig. 2.

This arrangement has recorded satisfactorily commercial tape and “bug” transmissions up to 45 words per minute. The recordings make good code practice tapes as they are accurately spaced and may be run at any speed desired.

---Fitch, Morton, Rietzke, W6FMR

Kansas National Guard Station CX7

(Continued from page 16)

An insulating paint that will stand 1600 volts per mil is now being made by the Eastern Mabelite Corporation, New York, and sold under the trade name of “Mabelite.” The high insulating qualities are attributed to the use of a special chemically-inert pigment which is found only in one deposit in Oklahoma. In addition to its high dielectric strength, the paint made from Mabelite pigment is acid- and alkali-resistant, and is unaffected by heat and light.
Annual Meeting of the Board of Directors

By K. B. Warner, Secretary, A.R.R.L.

The annual meeting of the Board of Directors of the American Radio Relay League was held in Hartford on May 12th. As every amateur knows, this Board is the governing body in organized amateur radio in the United States and Canada, and these annual meetings have an unusual importance in that collected amateur opinion is there analyzed by representatives from all parts of the country, the progress of the League checked up, and new policies made to meet changing conditions. It was in several ways a notable meeting. Unusual harmony prevailed, the directors finding amateur sentiment pretty much the same all over the country on this year's problems, with the result that every action taken was by a unanimous vote. And for the first time since the League "went democratic" in 1923, the Board concluded its labors in a single long day's sessions.

Every director was present except Vice-President Stewart, who lay ill in South Carolina, and Director Culver of the Pacific Division who, through no fault of his own, was unable to get to the meeting in time. It is greatly to be regretted that our very energetic Pacific Division had no representation. The transportation properties for which Mr. Culver is an engineer experienced, less than a week before the Board meeting, a fire that did damage of several million dollars. For some days it seemed hopeless for him to attend the meeting. Eventually he was able to depart from the Coast by air, on a schedule that should have brought him to the meeting late in the day. But adverse weather had set in, the flying service from Oakland east was canceled. The service was still running out of Los Angeles, however, so he flew there and took off for the east, but only to experience further delays and a canceling of schedules both at Wichita and at Pittsburgh, finally arriving at Hartford just a few minutes before noon on the day after the meeting. He had a few hours with us at headquarters and was then obliged to hurry back to his business. His report, which he had mailed by air when it seemed impossible to come to the meeting, was delayed apparently by the same weather conditions and did not reach West Hartford until the first of the following week. Tough luck all around.

First the directors heard the officers report on their stewardship of League affairs in the past year, with their recommendations for the future. Then each director in turn reported to all of the others on the points of view prevailing in his area. These preliminaries formed a foundation of solid information on which the Board then proceeded to the work in hand.

Changing conditions in amateur radio necessitate changes from time to time in the governing regulations of the government. Perhaps the most important of the Board's decisions related to the recommendations to be made to the Federal Radio Commission for changes in its amateur regulations.

First, as has always been the case in recent years, there was the question of 'phone. A year ago the Board instructed the Communications Manager to make a survey of the relative 'phone and c.w. occupancy in the 1715-2000 kc. band. In this band it is both possible and desirable that the sub-division between 'phone and telegraphy be proportional to the relative occupancy. With the data before it, it was apparent to the Board that the 'phone allocation should be increased, and it unanimously voted to request the Commission to expand the 'phone sub-band to embrace the 200 kilocycles from 1800 to 2000 kc. Although a couple of the directors reported sentiment in their divisions in favor of widening the 3900-4000 'phone allocation, all the rest of the country was vigorously opposed to any changes in either this or the 14-mc. band, and the Board decided to make no recommendations on these bands. Our 28-mc. band, it will be remembered, has never been opened to 'phone. Amateur work in these ultra-high-frequency bands has shown that the quickest development can be attained by permitting 'phone operation. Since at certain points in the solar cycle the 28-mc. band performs similarly to the 14-mc. band and is good for extreme DX, it was not felt that all of it should be open to telephony. But a start has been made, by a unanimous vote of the Board requesting the Commission to open from 28,000 to 28,500 kc. to amateur telephony—which will be welcome news to the u.h.f. crowd.

Undoubtedly the most radical and forward-stepping act of the Board related to amateur power supplies. The American Radio Relay League has gone d.c. The expressions of opinion that you fellows have given your directors show that the amateurs in every division of the League are in favor of having a regulation that will make compulsory the use of direct current on all stages of a transmitter, doing away with alternating current on amplifier stages and the superimposing of intentional tone-modulation on d.c. signals. This is not nearly as drastic a step as it sounds, because such changes always lag behind our ability to prepare for them, and it has been the general sentiment of amateur radio for over a year now that we are ready for d.c. signals as a needed improvement in the operating ether—as the best
single thing that can be done to minimize broad and unstable signals with their selfish interference. Again by unanimous vote, then, the Board requested the Commission to amend the regulations for wavelengths above 20 meters so that they call for a simple specification of adequately filtered direct-current plate supply and prohibit the willful application of tone modulation. It is not intended that these specifications apply to "5 & 10", where simple experimental equipment still requires a modulated signal for successful communication.

The Board examined at length the tendency to centralize the examination of radio operators at Washington by mail, with a general lowering of the bars both on technical information and code knowledge. It vigorously opposed all of this and established the League as calling for more careful personal examination of amateur applicants, both as to technique and operating ability. The absence of any adequate enforcement of the regulations was similarly examined and a plan adopted to endeavor to secure the Commission's sanction for an amateur self-policing scheme. There will be further reports in QST on these subjects as news develops.

The Board took a careful look into our traffic handling business and its status, passed a cordial vote of thanks to the Standard Frequency Stations for their valliant assistance, disposed quickly of several questions of internal procedure. After a quite careful examination of the facts, the Board decided to take no action either on a proposal to classify members by confining the voting privilege in the League to the holders of operator licenses, or in increasing the amount of membership dues. The headquarters technical staff was given a large order on behalf of the 'phone men when the Board requested it to investigate the feasibility of applying to amateur radiotelephony methods involving the suppression of one side-band or of the carrier and one side-band! Many other subjects were discussed and, although without formal action to record in minutes, resulted in a profitable interchange of ideas.

It must particularly be noted that the matters hereinabove reported, relating to changes in P.R.C. regulations, have not yet been enacted by that body. They are recommendations from the League's Board of Directors. Meanwhile there is no change in amateur regulations. As always, prompt report will be made in QST and by broadcasts of any changes enacted by the Commission.

The minutes of the meeting follow.

MINUTES OF ANNUAL MEETING, BOARD OF DIRECTORS, AMERICAN RADIO RELAY LEAGUE MAY 12, 1933

In compliance with the constitution and pursuant to notice, the Board of Directors of the American Radio Relay League, Inc., met in regular annual meeting at the Hartford Club, Hartford, Conn., on May 12, 1933. The meeting was called to order at 10:05 a.m., D.S.T., by President Maxim. At opening roll-call there were present Directors Maxim, Andrews, Bailey, Caveness, Corlett, Pull, Gibbons, Hagler, Hill, Kerr, Reid, Windom and Wood. President Maxim was absent, Directors Corlett, Grant, Jr., and Stewart. There were also present Secretary Warner, Treasurer Herbet, Communications Manager Handy, General Counsel Sagal and Assistant Secretary Budlong.

On motion of Mr. Bailey, it was unanimously VOTED that, without reading, the minutes of the last meeting of the Board are approved in the form in which they were issued by the Secretary.

The reports of the President, Secretary, Treasurer, Communications Manager, General Counsel and Executive Committee were read by those officials, respectively. The Chairman also read a communication from Vice-President Stewart, ill and unable to attend the meeting. On motion of Mr. Corlett, it was unanimously VOTED to accept all reports as read and place them on file.

Director Lindesmith entered the meeting at 10:40 a.m., during the reading of the reports.

On motion of Mr. Windom, it was unanimously VOTED that all acts performed and all things done by the Executive Committee since the last meeting of the Board, and by it reported to the Board, are ratified and confirmed by the Board as the actions of the Board.

Mr. Bailey presented his report as Canadian General Manager. In turn, every division director present rendered a report on conditions in his division. During the presentation of the directors' reports the Board, on motion of Mr. Kerr, recessed for luncheon at 12:46 p.m., reconvening with the same attendance at 1 p.m.

On motion of Mr. Windom, it was unanimously VOTED that the sum of twenty-eight hundred dollars ($2800) is hereby appropriated from the surplus of the League, as of this date, for the purpose of defraying the expenses of holding this meeting of the Board of Directors, any unexpended remainder of this sum to be restored to surplus.

The Chairman announced the receipt of a communication from a magazine, "5 & 10", Hollywood, Calif., transmitting what was called a "report" and a series of recommendations. The Secretary read the letter. Moved, by Mr. Bailey, that this letter and all matters pertaining thereto be placed on the table. After discussion, moved, by Mr. Corlett, to amend the motion to provide for tabling these communications until the arrival of Director Culver. But the amendment was rejected. The question of adoption being put, the vote was unanimously in the affirmative. So the communications were tabled.

On the question of widening the sub-allocation for ordinary radiotelephony in the 1715-2000-kc. band, after extended round-table discussion, on motion of Mr. Kerr, it was unanimously VOTED that the Federal Radio Commission is requested to amend its regulations to widen the 'phone sub-band to read 1800 kc. to 2000 kc.

On the question of discontinuing the publication in "QST" of the directory of affiliated clubs, after round-table discussion, on motion of Mr. Kerr, it was unanimously VOTED that the preparation of affiliated-club data be continued and be revised as often as necessary, that copies of this list be furnished directors and, if the expense can be afforded, to the affiliated clubs themselves. That the availability without cost of copies of this list be advertised in every issue of "QST"; that publication in "QST" of the list itself be discontinued.

On the question of Amending Article II of the Constitution as proposed by Mr. Andrews, Mr. Andrews withdrew the proposal.

On the Secretary's proposal to increase the membership dues, after round-table discussion, on motion of Mr. Bailey, it was unanimously VOTED that there be no increase in membership dues.

On the Communications Manager's recommendation regarding membership-card distribution, moved, by Mr. Corlett, that the distribution of membership cards by card method be discontinued. Moved, by Mr. Hill, to amend the motion to provide that the Communications Manager prepare mimeographed lists of new members quarterly; but there was no second, so the motion for amendment failed. The question then being on the adoption of the original motion, the same was unanimously adopted.

QST for
On the subject of show stations, after discussion, on motion of Mr. Corlett, it was unanimously VOTED that the Executive Committee is given full authority to deal with the matter of show stations.

On motion of Mr. Kerr, it was unanimously VOTED that the thanks and appreciation of the A.R.R.L. are extended to the owners and staffs of the A.R.R.L. Standard Frequency Stations for their valuable work.

On the question of operator licensing regulations, after extended discussion, by ruling of the Chair, without objection, the further negotiation of this matter was placed in the hands of the General Counsel and the Secretary, after the Board had unanimously expressed itself as demanding a continuation of code knowledge and code examination by all amateur applicants, personal examinations rather than mail examinations, and a higher standard of qualifications.

On the question of amateur power supplies, after discussion, on motion of Mr. Bailey, it was unanimously VOTED that the Federal Radio Commission is requested to amend its Regulation 382 by deleting certain portions thereof so that it reads: "Licenses of amateur stations shall use adequately filtered direct-current power supply for the transmitting equipment to minimize frequency modulation and prevent the emission of broadcast signals," it being understood that this applies only to the amateur frequency bands below 14,400 kc. and not to amateur frequencies above 28,000 kc.

The Board recessed for dinner at 6:30 p.m., reassembling with the same attendance at 8:32 p.m.

On the question of opening a ten-meter band for amateur radiotelephony, on motion of Mr. Fulic, it was unanimously VOTED that the Federal Radio Commission is asked to open the sub-band 28,000 kc. to 28,500 kc. to unrestricted amateur radiotelephony, type A-3 emission.

On motion of Mr. Fulic, it was unanimously VOTED that the technical staff of "QST" is instructed to investigate the feasibility, and, if feasible, is instructed to undertake the development at reasonable prices, of apparatus and methods for single-side-band and carrierless 'phone transmission.

Moved, by Mr. Fulic, that we recommend to the Federal Radio Commission that the unlimited 'phone privilege be given only after two years experience under license. But there was no second, and Mr. Fulic withdrew the motion.

Moved, by Mr. Fulic, that the portion of the Communications Department report in "QST" which has to do with the individual amateur activities be discontinued, and that said space be devoted to discussion of League policies so far as they may safely be discussed in print, and the encouraging, fostering and aiding of affiliated clubs. There was general discussion, but no second, so the motion failed.

On motion of Mr. Fulic, it was unanimously VOTED that the Board instructs the Secretary and General Counsel to consider and adopt a plan to be submitted to the Federal Radio Commission or its proper division, whereby the policing of the amateur bands shall be assumed by the League and its local appointees under the sanction of the Commission and with specific powers to be conferred by that body.

On motion of Mr. Corlett, it was unanimously VOTED that a telegram be sent to Vice-President Stewart expressing the Board's sympathy in his illness and its regret at his inability to be present.

On motion of Mr. Lindesmith, it was unanimously VOTED that the League recommends to the Federal Radio Commission that no form of wilful modulation for radiotelegraph transmission be permitted on amateur frequencies below 14,400 kc.

During its several sessions the Board, without formal action, discussed the widening of the amateur bands, protection of traffic rights, automobile ordinances, call-book publication, higher standards for club affiliation, compulsory crystal-control, Mexican participation in A.R.R.L.

There being no further business, the Board, on motion of Mr. Bailey, adjourned at 10:16 p.m.

K. B. WARNER, Secretary.

--- J. J. L. ---

### Standard Frequency Transmissions

<table>
<thead>
<tr>
<th>Date</th>
<th>Schedule A</th>
<th>Schedule B</th>
<th>Station</th>
<th>Date</th>
<th>Schedule A</th>
<th>Schedule B</th>
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<td>WIXP</td>
<td>WIXP</td>
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<td>BB</td>
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<td>BB</td>
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<td>B</td>
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### Standard Frequency Schedules

#### Evening

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</tr>
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<td>5000</td>
</tr>
<tr>
<td>7:16</td>
<td>BB</td>
<td>3700</td>
<td>BB</td>
<td>7100</td>
</tr>
<tr>
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<td>BB</td>
<td>7300</td>
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#### Afternoon

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<th>Freq. (kc.)</th>
<th>Schedule B</th>
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<td>BB</td>
<td>7300</td>
<td>BB</td>
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</table>

The time specified in the schedules is local standard time at the transmitting station. W1XK uses Eastern Standard Time, W9XAN, Central Standard Time, and W6XK, Pacific Standard Time.

#### Transmitting Procedure

The time allotted to each transmission is 8 minutes, as divided follows:

2 minutes — QST QST QST de (station call letters).
3 minutes — Characteristic letter of station followed by call letters and statement of frequency. The characteristic letter of WIXP is "G"; that of W9XAN is "O"; and that of W6XK is "M".
1 minute — Statement of frequency in kilocycles and announcement of next frequency.
2 minutes — Time allowed to change to next frequency.

W6XK: Don Lee Broadcasting System, Los Angeles, Calif., Harold Peery in charge.

WWV 5000-KC. TRANSMISSION

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. The accuracy of these transmissions is to better than 1 cycle (one in five million).
A Shack on Wheels

Portable W1FWL Travels Throughout U.S.A.

By Philip S. Rand, W1DBM-W1FWL*

IN 1929 the writer was employed by the New York, Rio, & Buenos Aires Air Line, an air transport line operating a fleet of planes from New York to South America, and stationed in Miami, Florida.

During my stay there I had occasion to see a very interesting trailer that was being used by the Pan American Airways.

Upon inquiry I discovered that it was built in a small town just outside of Miami by Glenn Curtiss of airplane fame. In the next few days I managed to pay the factory a visit and find out just how they were built. I saw the possibility of a shack on wheels, and inasmuch as I did not possess the necessary two or three thousand dollars, I decided I would have to build my own. For the benefit of those who should like to build one, too, I shall give a few of the constructional details.

The first requisite is an old model T Ford axle, either front or rear, front being preferred however. The next thing is to obtain a number of sound 2 by 3’s and two long 2 by 6’s for the frame and several sheets of Insulite wall board for the sides and roof. The outside is covered with a good grade of imitation leather similar to that used on auto tops.

The arrangement of the interior is left to the builder although the layout used at W1DBM is given as an example. A number of very interesting interiors may be drawn up if the builder will use his imagination a little and design his shack to suit his particular needs.

One of the most important considerations in designing a trailer of this sort is the weight. The trailer completely loaded must be light enough so the car that is to be used can tow it easily up grades; it must be high enough to give full head room inside and yet not be top-heavy. All heavy weight must be kept low, near the axle, and evenly distributed on both sides. The more powerful the tow car, the larger and more comfortable may be the “shack.” A car with four speeds ahead and silent second gear is especially desirable.

I shall not attempt to tell the builder how long to cut the 2 by 3’s or how many nails and screws to use but rather to give the general idea so that the builder may go ahead according to his own requirements.

The first thing to do is to build the chassis out of some husky pieces of 2 by 6 something like Fig. 2, using plenty of long lag screws and bolts — the chassis must be strong to stand bumpy roads.

The chassis must be laid out so that you can attach whatever kind of axle and springs are to be used. If a Ford axle is used, a crosspiece to which to attach the spring will be required. The wishbone or torque rods must be made fast to the frame. An axle with springs running lengthwise will give more headroom inside.

The general framework is now built on the chassis along the lines indicated in Fig. 2, being sure to put in a corner brace or angle iron at every corner as the strain is terrific at high speeds.

Fig. 1 shows the general idea for the sliding windows. Portholes may be used, but the windows are to be preferred, especially if the trailer is to be used during warm weather.

After the framework is completed it is time to put on the wallboard. This may be Celotex,

* North Falmouth, Mass.
Insulite, Masonite, or any other material of that nature. The roof construction is similar to that used on autos. After the crosspieces have been cut to the shape wanted for the roof, laths are nailed on lengthwise quite close together and the whole thing covered with several layers of burlap. The final covering is of imitation leather. The sub-layers of burlap make a smoother looking job, and help the leather covering from wearing through quickly.

The whole thing may now be covered with imitation leather, as is Black Maria. If Masonite has been used, it may be Ducoed to match the car that will tow it.

The inside can be completed now if the plans have been decided upon. Space should be left under the bunks for suitcases and luggage. Hooks may be put in the pointed bow to hang up clothes, or it could have several shelves.

The bunks can be made out of ¾-inch pipe similar to those used on shipboard (see Fig. 1), to fit the space available. The upper berths are lashed to the ceiling in the daytime.

The stove is a two-burner gasoline affair, while the sink is made by lining a box with copper and soldering up the joints. Don't forget the drain. The water tank is a ten-gallon gas tank standing on end and lashed in place, with a water faucet soldered to the bottom over the sink. The ice box is made by lining a large box with several thicknesses of Insulite, with zinc in the bottom with a drain. There should be a railing around the shelves of the food locker so that too much won't bounce on the floor when under way.

Dome lights, running lights and a tail light should be provided together with a horn button for signaling the driver. A five-prong socket and tube base make a convenient plug-in arrangement for your electric cable from the car to trailer. Wire the running lights with the car's headlights and they will operate with the switch on the steering wheel.

A swell indoor antenna may be put inside the top before putting on the leather. Small stand-offs take the transmitting feeders out in the usual fashion, while bamboo fish poles are used to support the antenna if no higher support can be found. A five-meter antenna is supported on the bow by three stand-offs. This is a telescoping affair of ¾-inch copper pipe which stretches up to 8'.

Any type of transmitting equipment may be used that is portable, or a rack and panel job may be built right in during the construction. The 160- and 80-meter sets in Black Maria consist of two 38's in parallel crystal controlled and coupled directly to the antenna, running from a set of “B” batteries. The five-meter job has two 12-A's in push-pull modulated by two 38's, also run by “B” batteries.

The Black Maria cruises very comfortably with a party of four. The tow car is a Chrysler 77 convertible coupe which at times has attained a speed of 70 miles per hour with the 1500-lb. shack in tow. I have slept several nights in the trailer while under way on a long trip and can honestly say that I slept better than when on a railroad train.

The coupling that fastens the trailer to the car is a homemade affair, but I should recommend that anyone building a trailer purchase any one of a number of good couplings that are on the market. And one more thing; be sure you have enough road clearance so you can navigate an occasional detour.
Economical Use of a Milliammeter
Using One Meter for the Three Most Important Transmitter Measurements

By William G. Pierpont, W9BLK-HPU*

In the amateur's transmitter it is common to have three types of meters: the d.c. meter for milliamperes and volts, the a.c. meter for filament voltage, and the radio frequency ammeter for the antenna current. Articles have already appeared in QST on using one milliammeter for measuring all the plate and grid currents and the voltages on the plates of the tubes, by using jacks and plugs and various shunts and series resistors. In this article the writer will explain how one meter may be used for measuring plate or grid current, plate or grid voltage, a.c. filament and line voltage, and radio frequency antenna current.

The meter used for all measurements is a d.c. milliammeter having a range of 0–10 or 0–15 milliamperes. This meter should be of the Weston or Jewell type or one having the same type of movement. If you do not already have one, one can be made by using one of the Jewell or Weston low-range voltmeters, such as used for measuring filament voltage on the old battery type receivers. The case must be removed and the series resistor or resistors removed. The small meters used on the old Radiola receivers make excellent milliammeters if of the type mentioned. The movement is about 0–8 or 0–10 mils full scale.

The grid or plate milliammeter

The maximum reading of the low-range milliammeter can be extended quite easily for reading plate and grid currents. Shunts for the meter are connected as shown in Fig. 1A. The lower the resistance of the shunt, the greater will be the full-scale current reading. The shunts may be wound around a small spool after the correct length of wire is determined. The range of the shunted meter may be found by comparison with a meter of reliable make. If the resistance of the milliammeter is known, the shunt resistance needed for any desired range can be found from the following formula:

$$R_s = \frac{R_m}{N - 1}$$

where $R_s$ is the required shunt resistance, $R_m$ is the resistance of the meter, and $N$ is the scale multiplier; i.e., if a 0–10 mil scale is to be extended to 150 milliamperes $N$ is 15, etc.

* 5440 East Douglas Ave., Wichita, Kansas.
THE D.C. VOLTOMETER

Plate or grid voltage may be measured by fitting the meter with series resistors or "multipliers" of the right size and then calibrated by comparison with a standard meter. By using several large resistors in series plate voltages up to 5000 volts may be measured. However, care must be taken that the resistors have well-insulated terminals, for should one of the resistors become shorted the meter will be ruined. The series resistors also must be capable of carrying the full-scale current taken by the milliammeter. Fig. 1B shows the connections for d.c. voltage measurements. The size of the series resistor is found by experiment or from the following formula:

$$R = \frac{E \times 1000}{I}$$

where $R$ is the value of the series or multiplier resistor in ohms, $E$ is the maximum voltage to be measured, and $I$ is the full-scale reading of the meter in milliamperes.

THE A.C. MILLIAMMETER

When the d.c. milliammeter is fitted with a few rectifier discs and a series resistor of the right value, we have a voltmeter for measuring the voltage on the line, or with another series resistor we may measure the filament voltage. Even high voltages may be measured, provided the series resistor is large enough. See Fig. 2A for details. If the low-range a.c. voltmeter is connected across the output of a receiver or speech amplifier the output may be measured. The principle is the same as with meters made especially for the purpose.

THE A.C. MILLIAMMETER

This meter is not often used by amateurs, but it is very handy in some types of work. The milliammeter is fitted with the disc rectifier as for the a.c. voltmeter but shunts are used instead of series resistors. Fig. 3B shows the connections.

THE RADIO FREQUENCY AMMETER

Radio frequency ammeters are expensive, but it is surprising how simply they can be constructed in the shack. The thermocouple is the heart of the r.f. ammeter. It is easy and cheap to build since it usually can be made from scraps of wire left over from other work.

The thermocouple is constructed as follows: Take an old tube of the 01-A or similar type (it may be burnt out), carefully break the glass envelope surrounding the elements, but do not allow the glass stem to be cracked or broken, or the elements to be bent very much while breaking. Cut the filament support wires — not the ones which go through the stem to the tube base connections — close to the stem. Cut the plate, grid and filament wires off one-half inch above the top of the stem. These are the wires which go to the connections in the prongs. Other wires, such as extra wires which support the plate and grid on the other side, are cut close to the stem. Bend the four wires remaining above the stem so that the tip of each forms one corner of a square one-half inch on a side, as shown in Fig. 3. They are bent slanting so that the corners are above the level of the top of the stem.

Now take a piece of resistance wire, about No. 28 B. & S. gauge — may be of nickel, nichrome, constantin, or some of the wire from the grid of the old tube — and solder one end to one of the wires forming the corner of the square. The other end of the resistance wire is soldered to the next adjacent corner wire, so that the wire forms a "V" with the point or apex of the "V" in the center of the square.

Next take a piece of bare copper wire about the same size and length as the resistance wire. Solder one end of it to one of the remaining wires of the square. Pass the free end of the copper wire through the top of the "V" and out through the bottom, and then to the remaining corner wire. Before soldering it to the corner wire pull it tight, so that both the resistance wire and the copper wire are under tension, then solder to the corner wire.

The couple is now complete and may be used as it is, mounting in a regular tube socket. Alternatively, the base may be carefully removed and the glass stem cut off about one-half inch from the pressed end which holds the electrodes, and the assembly mounted in a small box. Do not allow the pressed portion to break or crack as operation of the couple will be impaired.

Fig. 4 shows the method of connecting the couple to the milliammeter. Several couples may be made to give as many ranges as may be desired. No calibration is necessary as comparative measurements are sufficient. However, the meter

(Continued on page 36)
The Governors'-President Relay

MESSAGES from thirty-five states (governors) and three territories to the President on his inaugural day were handled by amateur radio and delivered by the Washington Radio Club following the inauguration. The advance arrangements were as outlined in February QST. The stations were designated by A.R.R.L. Section Communications Managers in the different states of the Union to originate the messages, starting at 5 p.m. E.S.T. on March third. For the next twenty-four hours the air was combed thoroughly by the member-operators of the Washington Radio Club in organized fashion to collect every message. All who relayed these messages promptly and accurately may be proud of their part on this significant occasion. Amateur radio again demonstrated its usefulness not only as a means for communication for this event but also its potentialities in case of any national emergency. Messages from distant possessions as well as those from the state capitols were all smoothly collected into the common message-center formed by member-stations of the Washington Radio Club.

THE WHITE HOUSE
WASHINGTON
March 21, 1933.

My dear Mr. Corderman:

I wish to thank you and your fellow members of the Washington Radio Club, as well as all members of The American Radio Relay League who participated, for your services in transmitting to me the "Governor-President Relay Messages" originating at state capitols in connection with the inaugural proceedings. I derived a great deal of pleasure from my perusal of these messages.

You are to be complimented on having and maintaining at such high state of efficiency an organization composed solely of amateurs in the radio field.

Very sincerely yours,

FRANKLIN D. ROOSEVELT
Roy C. Corderman, Esq.,
4401 Leland Street,
Chevy Chase, Maryland.

WASHINGTON The Washington Radio Club, as well as those from the state capitols were all smoothly collected into the common message-center formed by member-stations of the Washington Radio Club.

W 3 C X L , W 3 L A , W3BWT, W3ASO and W3CXM handled the bulk of this incoming traffic. W3BUP, W3NR, W3BVG, W3ZD, W3APJ, W3ADQ and W3ZY snagged "one state" each. The committee handling the relay in Washington (W3CDQ-W3BWT-W3CAB-W3EI) designated W3BWT to act as key station. Besides "ed," "ld" and "cj," W3CDQ, W3ASE, W3DK and W3CHC were at W3BWT. All incoming messages were telephoned W3CAB-W3EI) designated W3BWT to act as master list so the names of missing states could be supplied at a glance on request. W3AAD and W3BNF worked the key the whole 24 hours although some were relayed on those frequencies. The California message arrived at W3APJ via 14 mc. and all others were received on 3.5 mc. W3ADQ and W3ZY got the Massachusetts and the Georgia messages on 3900-kc. phone. The Michigan message was relayed via several different frequency bands. W3BEJ and W3OZ covered the 1.7-mc. band; W3CIC and W3CYP worked on 3.5 mc.; W3WU, W3CDQ, W3IL, W3EI and W3AWS worked on 7 mc. and W3LX on both 7 and 14 mc. for the duration of the relay. Special mention is due C. A. Briggs, W3CAB, for his efforts to secure the President for delivery of the messages, and Miss E. M. Zandonini, W3CDQ, deserves similar mention for her work on the relatively tremendous task of typing all incoming messages. With the messages was delivered a paper covering the entire story of the relay, the messages, the history of the A.R.R.L. and its functioning.

The Washington Radio Clubs achieved results far beyond expectations. Its stations and operators spent many hours of diligent tuning and work in large part responsible for the fine job that was put over to go down in history to the credit of the amateur. Those were "real" messages, and they were heartily appreciated. The letter from "F. D. R." presented with this article speaks for itself. Congratulations and thanks are extended to all who took a constructive part in this activity, and especially to the operators who sent us copies of their messages making the following full report possible. The routes given below show how the messages travelled and indicate the stations deserving laurels in this work. Eleven of the messages came direct to Washington from state capitols, the remainder being relayed one or several times.

-- F. E. H.

Message Routings

ARIZONA: (Svo. mag.) W6FZQ — W9LKO — ???
ARKANSAS: W5AAR — W5BMI — W5CXL (Ar. 9.37 p.m. 3/3)
CALIFORNIA: (1) W6AHN — W6BYB — W6APJ (Ar. 6.19 p.m. 3/3) (2) W6AHN — W6CIS — W8UO — W9ESA — W9EG — W9FUT — W9OK — W3CXM (Ar. 2.35 a.m. 3/4) (3) W6AHN — W6DVE — W6DIS — W6EDZ — W6GNN — W6GF5 — W6CGK — W8EP — W8QA — ???
CONNECTICUT: W1AFB — W3LA (Ar. 6.07 p.m. 3/3)
GEORGIA: (1) W4KU (fone) — W4ZZAN — W3ZY (fone) (Ar. 2.24 a.m. 3/4) (2) W4KU (fone) — W3AQT (opr. W3ZZ) — W9EDW — W3ZY 4.10 a.m. 3/4
ILLINOIS: W9BMI (W9FKO opr.) — W4JR — W3BWT (Ar. 10.45 p.m. 3/3)
IOWA (From Iowa radio amateur): W9HUY — W9ACL — W3CXM — W3ASO (Ar. 10.20 p.m. 3/3)
KANSAS: W9DEB — W8OQ — W5BMI — W3CXL (Ar. 11.40 p.m. 3/3)

QST for 30
and cold-water supply; it is in the same building with the radio equipment so that work at night and in the early morning may be done with the least amount of discomfort to the operator.

The antennas consist of a current-fed Hertz 325 feet long and 75 feet high for transmitting, and a similar type antenna 40 feet high and 200 feet long for receiving. They are supported upon poles depending on guy-wires for rigidity. An underground antenna is used for receiving when the static gets too bad on the large antenna.

Several other messages were sent which were not officially connected with the relay, including one from the presidential elector of Nevada via W6UO, W9FUT, W2DQK; one from the Democratic committee Portland, Maine, via W1CRP and W1APR; one from Uruguay via CX1OA, W4IN, W2UK and WSCMA, and felicitations via the Minister of Panama via NY1AA, W1MK and W3BWT.

**OA4U—On the Roof of the World**

(Continued from page 6)

**FIG. 1—DIRECTIONAL CHARACTERISTICS OF THE 325-FOOT ANTENNA OPERATED AT 14,012 KC.**

W4BHK is an operator—Linotype in daytime and Spokesperson for machine-shop work when needed in connection with radio problems.

The country near the Observatory is very beautiful and many interesting and profitable days may be spent riding about among the native villages.

At present the operator at OA4U is Harry Wells, exW32D, and later, PMZ.
A Flea-Powered Portable 'Phone With Crystal Control

By G. W. Fox, R. J. Pieracci, and W. L. Huebner*

A PORTABLE 'phone always arouses interest among amateurs. There is a fascination in stopping outside a strange town, plugging in the mike, throwing a switch or two and calling a CQ — especially if you are out of your own district. If you have never toured with a portable, you have missed a lot of the fun connected with the amateur game.

The portable set here described has several novel features by means of which it attains the simplicity and reliability necessary in such a communication unit. First, it has a small collapsible loop which acts simultaneously as the radiator and the tank coil of the modulated stage.

Second, the same batteries are used for transmitting and receiving — a single toggle switch making and breaking six circuits at once. Third, the crystal holder is of the evacuated type and can be used in any position. Fourth, the outfit may be put in operation in less than one minute.

The transmitter is entitled to its name. It has an input of about one watt to a Type '30 tube in the final stage, operating on 3935 kc. After the various losses have been subtracted, the output power approaches the magnitude of flea power. Operating with the call W9JOV and with this low power radiated from the loop, consistent telephone communication has been maintained with W9JI at a distance of seven miles in the daytime. The modulation was excellent. Later tests have extended the range at night to ten miles, although the QRM problem then becomes troublesome.

By substituting a small plate coil for the loop and coupling to the regular transmitting aerial at W9JI, several conversations have been held with stations more than fifty miles distant. Such transmissions are not regular affairs, however. The QRM in the 75-meter 'phone band is so severe that it is difficult to make real DX tests.

The first photograph shows the complete layout. The power is contained in the box at the right, which is large enough to hold the 'phones and the microphone when these are not in use. A much smaller power box could have been built. The one in the figure houses the largest size of 45-volt "B" batteries. The cabinet on the left contains the "works," with the receiver at the left side. Above is the collapsible loop. The second photo shows the arrangement of parts inside the case.

THE COMPLETE OUTFIT, WITH POWER SUPPLY BOX AT THE RIGHT

THE HOME-MADE VACUUM TYPE CRYSTAL MOUNTING

THE PARTS ARE ASSEMBLED "BASEBOARD" STYLE WITHOUT CROWDING

The diagram of the transmitter (Fig. 1) is self-explanatory and shows the circuit constants. The oscillator is a Type 30 tube in the conventional crystal circuit. Ninety volts are supplied to its

* Physics Laboratory, Iowa State College, Ames, Ia.
TRANSMITTER

FIG. 1 — THE SCHEMATIC CIRCUIT IS ACCORDING TO STANDARD

In the transmitter, condensers $C_1$ are 0.001 µfd., $C_2$ are 13-plate midgets and $C_3$ is a 2-plate midget. Oscillator coil $L_1$ has 25 turns of No. 28 enameled on a 1½-inch form. $L_2$ is the loop described in the text.

Plate. The two electrodes of the crystal holder are of the same size as the quartz plate and are slightly pressed together by the light spring. The assemblage is sealed into a closely fitting glass tube which prevents any sidewise motion. The holder has been baked out during exhaustion and sealed off. This type of holder has proved very satisfactory in several installations. It provides a unit completely free from trouble and so small that it requires a minimum sized cabinet where temperature control is desired. Evacuating the holder allows the use of higher plate voltages because there is no danger of arcing between the electrodes.

The amplifier, operated Class C, is also a Type 30 with 135 volts on the plate. The neutralization scheme shown leaves the loop untapped, which is more convenient.

The modulator is a Type 33 pentode in the usual Heising arrangement. With a grid bias of 14 volts and plate voltage of 135, it operates Class A. The speech input is fed directly into the tube through a modulation transformer, a 4½-volt C battery providing microphone current. Operating under these conditions, the 33 is capable of modulating the 30 nearly 100 percent. The adjustment of the transmitter is the same as for any m.o.p.a. arrangement.

Because of the low power of the crystal oscillator, neutralization is determined by observing the plate milliammeter in the crystal oscillator circuit. The neutralizing condenser is adjusted so that the milliammeter does not "kick" when the amplifier tank condenser passes through resonance. To operate the Type 30 as a Class C amplifier, a grid bias of about double the cut off value is required. This can be found experimentally or by doubling the quotient of the rated plate voltage and the amplifying factor of the tube.

The circuit of the receiver with the constants is shown in Fig. 2. The detector is a Type 30 and the amplifier a Type 33 coupled through a high ratio transformer. The antenna connection is to the ground end of the loop.

The metal parts of the 40-inch square loop are brass. Phosphor bronze braided fish line, two turns an inch apart, rests on bakelite supports at the ends of the wood spreaders. In folding, the loop breaks at the center hinge thereby allowing the arms to fold into a position parallel to the center shift. The loop stand also folds and the whole fits into a canvas carrying case.

RECEIVER

FIG. 2 — THE RECEIVER CONSISTS OF REGENERATIVE DETECTOR AND PENTODE AUDIO

The specifications are usual, as for receivers in The Radio Amateur's Handbook.

If your town has police radio it might pay to curb that impulse to make changes in the antenna system in the wee small hours. W2BYE went out on his roof about one a.m. to check upon the feeders and in less than a minute the cops were on the job — with shootin' irons and all! It seems some neighbor had spotted BYE prowling around on the roof and thought it was a burglar.

When testing to see if a transformer winding is continuous, many hams are accustomed to using a small electric-light bulb connected in series with the 110-volt line. If the winding delivers high voltage the resistance may be too great to permit enough current to flow to light the lamp. In cases like this one of the small neon bulbs, substituted for the lamp, will make a good indicator, since the current taken by the neon bulb is minute.

——— W2BYE

July, 1933
Match Your Impedances

Figuring Audio Transformer Ratios to Do the Job

By Daniel E. Noble*

In the operation of radiotelephone transmitters and receivers the amateur is confronted with a number of problems quite different from those encountered in c.w. telegraphy. One of the most important of the problems is concerned with the determination of proper impedance relations in the audio frequency circuits. If one is to judge by the quality of transmission from some of the 'phones on the air, it seems evident that the effect of improper impedance matching on distortion is not clearly understood by many.

The elementary treatment offered below is intended to assist the beginner, and in order that the points to be made may not be obscured, the number of qualifications for the statements made will be limited.

The following questions will be considered:

1. What is the impedance ratio of an audio transformer and how does it relate to the turns ratio?

2. How may the turns and impedance ratios of a transformer be determined for a particular vacuum tube circuit?

3. What happens to the output of an amplifier when we upset the proper impedance relations?

Assuming a perfect transformer (one with no losses) the power output must equal the power input. In other words, the transformer simply acts as a transfer device; it changes the voltage without changing the power. Look at Fig. 1. Amplifier A will deliver its rated output of 10 watts to resistance $R_1$, which is 10,000 ohms. The power will be expressed by the simple relation $W_1 = \frac{E_1^2}{R_1}$, where $E_1$ is the effective audio voltage across the resistance and $W_1$ = watts. Suppose, now, you wish to dissipate the energy output of the amplifier at the rate of ten watts supplied to a 500-ohm resistance instead of a 10,000-ohm resistance. If you simply replaced the 10,000-ohm unit with the 500-ohm unit and other factors at the amplifier, including the voltage, remained the same (they wouldn't), then the 500-ohm unit would dissipate energy at the rate of $E_1^2/500$ as compared to $E_1^2/10,000$, or a total of 20 times 10 watts or 200 watts. It is clear from this that the voltage must be reduced so that $E_1^2/500 = 10$ watts if we are to satisfy the required conditions.

Now is the time to put in the perfect transformer and place the 500-ohm resistance, which we shall designate as $R_2$, across the secondary. $E_2$ will then be the voltage across $R_2$ and $E_2^2/R_2$ must equal 10 watts. The primary of the transformer replaces $R_1$ and, since we assume that the transformer is perfect, the rate of energy dissipation must be the same in $R_2$ with the transformer as with $R_1$ without the transformer. That is:

$$\frac{E_1^2}{R_1} = \frac{E_2^2}{R_2} \text{ or } \frac{R_1}{R_2} = \frac{E_1^2}{E_2^2}$$

Since the voltage ratio of a transformer is the same as the turns ratio we may write:

$$\frac{R_1}{T_1} = \frac{R_2}{T_2}$$

where $T_1$ = primary turns and $T_2$ = secondary turns. $R_1/R_2$ is, then, the ratio (called the impedance ratio) between a primary load resistance and a secondary load resistance for a constant power output. The expression $R_1/R_2 = T_1^2/T_2^2$ shows that the impedance ratio is equal to the square of the turns ratio in a perfect transformer. In practice the transformer efficiency is high enough so that the equation may be used without introducing serious errors.

Refer to Amplifier B: If we look from the amplifier through the transformer to $R_4$ it is clear that $R_4$ must appear as $R_1$ in order that the amplifier may be properly loaded. By selecting the proper turns ratio as indicated in the equation above, the transformer can be made to satisfy such a condition. Example:

$$\frac{R_1}{R_4} = \frac{10,000}{500} = \frac{T_1^2}{T_2^2}$$

Therefore $T_1 = \sqrt{\frac{10,000}{500}} = \frac{4.47}{1}$

This means that 500 ohms across the secondary of a properly constructed transformer will look like 10,000 ohms from the primary if there are 4.47 times as many turns on the primary as there are on the secondary.

Could we put 4.47 turns on the primary, one turn on the secondary and let it go at that? Not at all. That is the reason for the phrase "properly constructed" in the sentence above. It is a long story, but we shall take time to state it this way: With the secondary open, the primary impedance should be very large, compared to the source impedance, at the lowest frequency to be transferred. That explains the large size of the quality audio transformers made for a low frequency...
limit of 30 cycles. If the primary winding is too small it will act simply as a load on the tube at low frequencies. With the idea of impedance ratio clearly in mind, the theory of impedance matching becomes quite simple. Consider a few examples.

1. Your microphone has an impedance of 200 ohms and you wish to couple it to the grid of a Type 56 tube with a 500,000-ohm leak across the grid circuit.

   \[
   \text{Impedance ratio} = \frac{200}{500,000} = \frac{T_1^2}{T_2^2}
   \]

   \[
   \text{Turns ratio} = \sqrt{\frac{200}{500,000}} = \sqrt{\frac{1}{2500}} = \frac{1}{50}
   \]

   Therefore, the secondary must have 50 times as many turns as the primary. The use of the leak to set the secondary impedance will reduce frequency distortion.

2. You wish to couple the output of a Type 12-A tube to a 500-ohm line. If the tube has a dynamic plate impedance of 4000 ohms we can load it with 8000 ohms to obtain maximum output with a minimum of distortion. (If you must load a pentode obtain a data sheet and find the load recommended; but all three-element tubes may be loaded with approximately twice the dynamic plate impedance for best results.)

   \[
   \text{Impedance ratio} = \frac{8000}{500} = \frac{T_1^2}{T_2^2}
   \]

   \[
   \text{Turns ratio} = \sqrt{\frac{8000}{500}} = \sqrt{\frac{16}{1}} = 4
   \]

   That is, the primary must have 4 times as many turns as the secondary.

3. What would happen to Case 2 (tube and transformer operation) if the secondary of the transformer were loaded with 100 ohms instead of the proper value, 500 ohms?

   Since the impedance ratio is 16 to 1, the 100 ohms would appear at the primary as 1600 ohms. Loading the tube with such an impedance so far below the dynamic impedance of the tube would greatly increase the harmonic distortion. (An effect associated with the departure from linearity of the tube characteristic.)

4. Look at Fig. 2. The problem is to couple the volume indicator to the line. The correct arrangement for coupling the line to the volume indicator (the power transfer is negligible) would be to use a transformer in such a way that the reflected impedance at the transformer primary would be as large as possible compared to the line impedance in order that the effect of adding the transformer to the line might be very slight. An ordinary audio interstage step-up transformer could be used with the primary connected to the grid circuit of the vacuum-tube-voltmeter volume indicator and the secondary across the line. Care should be taken to make sure that the indicator operates without drawing appreciable grid current, or the reflected impedance of the grid with a positive bias might load the line. (Particularly important if the transformer is used step-up.)

5. A variable resistance is placed across the secondary of an interstage transformer to act as a volume control. What effect will it have? If the transformer is designed to function in relation to the tube with a minimum of distortion when the transformer secondary is shunted with \( \frac{1}{2} \) megohms, any reduction in the secondary load resistance will decrease the load resistance on the tube in the primary circuit. The result will be increased harmonic distortion as the shunting variable resistance is decreased. This same type of distortion is produced automatically every time the grid of a tube goes positive. The distortion occurs, not necessarily in the tube with the positive swinging grid, but rather it occurs in the preceding tube. The positive grid presents a lowered

\[ \text{FIG. 3} \]
grid is a step-down transformer. This arrangement permits the low grid impedance to be reflected through the transformer to the preceding tube as an impedance large enough for proper loading. In this way distortion is avoided.

6. An audio amplifier designed to feed a normal load of 500 ohms is connected to a 5000-ohm load. How will the output and quality be affected? If we assume that the impedance ratio of the output transformer is 10-to-1, the 500-ohm load would “look” like 5000 ohms to the tube plate and the 5000-ohm load would “look” like 50,000 ohms. Assuming perfect regulation, the voltage across the 5000-ohm load and that across the 500-ohm load will be equal. The power in each case will be $E^2/5000$ and $E^2/500$. This shows that the rate at which energy is dissipated in the 5000-ohm load is one-tenth as great as the rate in the 500-ohm load. In general, it may be said that increasing the effective load resistance in the plate circuit decreases the harmonic distortion and decreases the power output.

7. Two amplifiers are to be connected together with a volume control between. (See Fig. 3.) In an ideal case, where the output impedance and the input impedance are both 500 ohms, a volume control designed so that it will always present an impedance of 500 ohms, regardless of its setting, is used. (Fig. 3A) But the amateur is not likely to have the necessary constant impedance volume control, and in that case he may wish to use an ordinary potentiometer, or more properly a voltage divider, to control the volume. In Fig. 3, B and C show two circuits using potentiometers as volume controls. One of the circuits, B, will work quite well and the other, C, will work with greatly increased distortion at low volume levels. For our explanation we shall assume that amplifier A has an output impedance of 2000 ohms and that amplifier B has an input impedance of 5000 ohms. If we connect a 5000-ohm potentiometer as shown in B the smallest load resistance (2500) will be offered to amplifier A when the control is set for maximum volume. Turning the control to decrease volume will lower the resistance in the input circuit of amplifier B and, at the same time, increase the load resistance on the output of amplifier A. Lowering the reflected impedance at the grid circuit of amplifier B will not cause any serious difficulty, since loading up the grid of a tube does not result in distortion (qualifications omitted). Increasing the load resistance on amplifier A output will decrease output and decrease distortion.

In circuit C, however, the load resistance on the output of amplifier A will be decreased as the control is turned to reduce volume. The resulting decrease in the reflected load resistance on the output of amplifier A will increase distortion. Clearly, the distortion produced at low volume adjustments must be very great.

Observance of these simple rules of impedance matching will eliminate serious distortion in the coupling of audio circuits.

Economical Use of a Milliammeter

(Continued from page 39)

if calibrated is quite as good as those sold for the purpose.

Now that we have the milliammeter arranged so that it will do all the measurements, we may fix up one meter for each purpose, or we may use one meter for everything by suitable arrangements of jacks and plugs. Many other uses for the meter with its attachments may be devised, and also many other ways of connecting it to the apparatus to be measured. A pencil and paper will aid you to get the arrangement you want, for anyone can do it.

Announcing the A-1 Operator Club

TO BECOME a member of the “A-1 Operator Club” you must be nominated by an operator who already “belongs.” The list of “charter members” appears herewith. Each operator listed is being requested to submit his nominations of “A-1 Operators.” When the club gets under way it is hoped that enough nominations will be received so that it will be possible to require more than one nomination for each operator before he is admitted. Lists of new members will appear in QST.

In choosing operators for the “A-1 Operator Club” the following points will be used: (1) General keying. Well formed characters and good spacing will be considered before “speed.” Similarly, good voice operating technique, clearness, brevity, cooperation with other operators, careful choice of words, etc., may be used as criteria in nominating phone operators. (Special extra credit may be given for use of standard word-lists in identifying calls and unusual expressions.) (2) Procedure. Use of correct procedure is a natural qualification. This applies to both general operating and message handling. (Procedure as recommended by A.R.R.L. in the R. & R. and the Handbook is a good standard.) Long CQs, unnecessary testing, long calls without signing, too much repetition when not requested, and all other such poor practice, are grounds for disqualification. (3) Copying ability. This to be judged by proficiency in copying through QRN, QRM and other difficulties, and accuracy of copy, as well as by ability to copy at fast speeds. (4) Judgment and courtesy. The “CUL 73” type operator can never make the grade. An operator should be courteous and willing to consider the
Built in 1922 the William H. Maybury Sanitarium, Northville, Michigan, home of 500 tubercular patients, is not wired for radio. The Goodfellows' Club, an organization of patients doing good deeds for other patients, proposes to do the job for the benefit of all. Already necessary wire and all-wave receivers, and needed parts have been donated. The remaining equipment necessary are plugs and jacks to provide headphone connections for all patients. The Club appeals to all hams, through A. O. Medice, W8LQ-ex-DQW, to dig down into the old junk pile for spare plugs and/or jacks, and send them along to the Maybury Sanitarium.

While thinking of ways and means to dispose of a batch of 01-A's that were beginning to get underfoot we evolved this "super-reflex transmitter." The diagram is almost self-explanatory.

\[
\begin{array}{c}
\text{Ant.} \\
\text{C} \\
\text{Cov.} \\
\text{6V.} \\
\text{Fused D.C. chones} \\
\end{array}
\]

After the battery starts the tube oscillating the circuit supplies its own filament voltage.

The surprising thing is that we have worked a number of stations using no filament voltage and received very nice reports. However, we do not think that it will revolutionize transmitter construction.

---

W9DBB-W9AYM

A ham from Cleveland, Ohio, writes in to say that it pays to attend hamfests. Six hams in his town journeyed to a near-by town for a hamfest and in the prize-drawing all six received prizes, ranging from a condenser mike to a 40-meter crystal.

---

W7BYG

With the announcement of two new League publications, The Radio Amateur's License Manual and Hints & Kinks, in the June, 1933, issue of QST, it has been noted that all League publications are now numbered as part of the Radio Amateur's Library. Many requests have been received for the complete list. It is given below.

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>QST</td>
<td>$2.50 per year</td>
</tr>
<tr>
<td>2</td>
<td>List of Stations</td>
<td>(out of print)</td>
</tr>
<tr>
<td>3</td>
<td>Map of Member Stations</td>
<td>(out of print)</td>
</tr>
<tr>
<td>4</td>
<td>Rules &amp; Regulations of Communications Dept.</td>
<td>Free to members; to others 10¢</td>
</tr>
<tr>
<td>5</td>
<td>The Story of The A.R.R.L.</td>
<td>Free to members; to others 10¢</td>
</tr>
<tr>
<td>6</td>
<td>The Radio Amateur’s Handbook</td>
<td>$1.00</td>
</tr>
<tr>
<td>7</td>
<td>The Log</td>
<td>40¢ each; 3 for $1.00</td>
</tr>
<tr>
<td>8</td>
<td>How to Become a Radio Amateur</td>
<td>25¢</td>
</tr>
<tr>
<td>9</td>
<td>The Radio Amateur’s License Manual</td>
<td>25¢</td>
</tr>
<tr>
<td>10</td>
<td>Hints &amp; Kinks for the Radio Amateur</td>
<td>80¢</td>
</tr>
</tbody>
</table>

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Club Directory Available

A directory of the local amateur radio societies affiliated with the League, showing their times and places of meetings, is available to members upon request, enclosing three-cent stamp, please. Address the Communications Manager. Traveling amateurs will find this list helpful in visiting other clubs.

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Tube Checker Correction

Two errors were made in drafting the circuit diagram of the universal tube checker and circuit analyzer on page 23 of the June issue. The center binding post of the d.c.-a.c. voltmeter connections is shown connected to the grid return circuit, or third switch position. Actually, it should be connected to the cathode circuit, or fourth switch position. The second error was in not showing the filament connection to the cathode circuit, necessary when filament-type tubes are being checked. This is done by simply connecting one side of the filament to the 0-voltage terminal on the transformer.

We want to emphasize again that all rotary switches must be set at the "off" position when the device is to be used as an analyzer. Otherwise both tubes and apparatus may be ruined.
IN THE letter quoted below, Messrs. C. J. Pearce and L. C. Waller, of RCA-Radiotron, emphasize some precautions which should be taken in using Type 83 mercury-vapor rectifiers in bridge circuits for high voltage, and supply some additional information on operating the tubes in this type of circuit:

"We would call your attention to a statement in the article 'A Duplex Plate Supply Using Type 83 Tubes' in March QST. On page 31 the statement is made that 'The inverse peak voltage just meets the tube manufacturers' recommendations.'

"To our knowledge, Type 83 tubes made by all manufacturers are rated at 1400 volts maximum inverse peak. An inspection of the circuit shown on page 31 (reproduced here in essentials in Fig. 1) shows that at the instant when the upper end of the high-voltage secondary is a positive maximum (1.4×1200=1680 volts) there is an instantaneous potential difference between plate 2 and the filament of VT-3 of 1680-15 or 1665 volts, approximately. Also, the four plates of VT-1 and VT-2 are at the same instant only 15 volts positive with respect to the lower end of the secondary; this means that both plates of VT-1 are negative by 1665 volts with respect to the filaments of VT-1, which are still at the positive peak at the instant under consideration. On the next half cycle the conditions of course are reversed, the voltage strain coming between plate 1 and the filament of VT-3 and between both plates and filaments of VT-2.

"The actual amount of the voltage overload is not very large, but many amateurs, assured that the tubes are working within their rating at 1200 volta r.m.s., will unhesitatingly use 1500 or more, on the basis that tubes are usually good for some overloading. This practice should not be recommended. A fact not generally appreciated by amateurs is that conservative operation of their tubes is usually more economical as well as giving more reliable and satisfactory performance.

"The system as shown has considerable merit, if the maximum r.m.s. transformer voltage is reduced to 1000 volts (1400 peak). However, if a fourth 83 is placed in parallel with VT-3 (see Fig. 2), the system will deliver 500 ma. instead of 250, provided that plate load-equalizing resistors are used. Doubling the current output with the addition of only one more tube is an obvious advantage.

"Some very useful combinations can also be obtained by adding the fourth tube in the two-voltage system shown on page 32 (March QST). As before, the total transformer voltage should not exceed 1000 r.m.s. volts, and plate resistors should be used. The following current combinations are then possible:

<table>
<thead>
<tr>
<th>From H. V. Source, ma.</th>
<th>From L. V. Source, ma.</th>
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<tbody>
<tr>
<td>450</td>
<td>50</td>
</tr>
<tr>
<td>350</td>
<td>150</td>
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<td>250</td>
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<td>150</td>
<td>350</td>
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<td>100</td>
<td>400</td>
</tr>
</tbody>
</table>

"Any current may be drawn from the two voltage supplies as long as the total does not exceed 500 milliamperes.

"The disadvantage of reducing the transformer voltage, and hence the output voltage, can be overcome by using a condenser-input filter of ap-

---

**FIG. 1**

**FIG. 2—WITH FOUR 83'S INSTEAD OF THREE THE OUTPUT CURRENT MAY BE INCREASED TO 500 MILLIAMPERES**

The equalizing resistors in each plate lead are essential to cause the load to divide between the plates of individual tubes. The resistors should be 100 ohms each; 50 ohms may be sufficient if the full 500 ma. is drawn.
proximately two microfarads, instead of choke input. With this change, d.c. voltages of 1000 or more can be obtained from a transformer delivering 1000 volts r.m.s. The high current peaks with condenser input are within the peak current rating of the 83. The regulation will not, of course, be as good with the condenser input filter, but it should be adequate for any keyed Class "C" amplifier stage.

"The use of the resistors in each 83 plate lead is essential if the rectifier is to be used at the 500 milliampere rating. Otherwise, as is well known, the plates will not divide the load equally and the tubes will be damaged."

A Different Keying Tube Circuit

The circuit shown in Fig. 3 was devised by the writer for W4BAT, who uses a single 10 Hartley drawing 60 mils at 550 volts. I believe it is about the ultimate in simplicity and effectiveness. The tube drop is nearly negligible when a single 45 of normal characteristics is used to key the load mentioned. The cut-off is complete even though it would not appear so at first glance at the circuit. Actually the current is so low as to be scarcely perceptible on the milliammeter. The tube drop is very low because the grid is tied to the plate when the key is down, and there is no interfering (bias producing) resistor in the grid circuit when the key is pressed. The resistor \( R \) is nothing more than three solid carbon 75,000-ohm resistors in series which gives more than the necessary dissipation. There is no objection to tying the grid and plate together as under the conditions which exist the grid current is not dangerous to the grid structure. It is only when the grid is more positive than the plate that a damaging grid current would flow and this is not the condition in the circuit shown. Since W4BAT already had an extra 2½-volt winding on the power transformer, the cost at net prices was less than $1.00.

The key breaks the current which flows through the resistor, and since this current is of the order of a mill or so and is in shunt with the power supply, not in series with the load, any spark has negligible effect on the output of the oscillator. As a matter of fact the spark produced was not perceptible in daylight and was of no noticeable effect. A single 45 will suffice to key a load of 60 mils or more with small voltage loss. Without changing any constants two or more 45's or other types could be paralleled to key heavier loads. The keyer tube obviously will run cool as its internal resistance is made very low when the grid and plate are tied together. It is obvious also that the tube has less internal resistance than a rectifier or two-element tube of similar construction, as a result of the fact that the grid neutralizes the space charge with some degree of completeness when it is tied to the plate.

Of course the simple circuit shown can be applied to loads of greater current and voltage by using different constants. In any case the resistor \( R \) should be high and of sufficient size to dissipate the necessary heat. The formula \( W = E^2/R \) will give the watts to be dissipated by the resistor when \( E \) is the voltage of the power pack and \( R \) is the resistance in ohms.

— J. D. Blitch, W4IS

A Junk Box Voltage Regulator for the M.G.

Those who use a motor generator for plate supply and require close regulation will be interested in this voltage regulator, which cost 15 cents at the five-and-ten. The 15 cents was expended for two tungsten contact points (Ford) and a birdcage spring. The rest of it comes from the junk pile. It is conventional in every way; see Signal Corps Pamphlet No. 40, 1921, page 190. The heart of it is an ancient audio transformer, a Thordarson 6-to-1 in this instance.

The diagram, Fig. 4, is slightly clarified from the Signal Corps description. In operation the field rheostat of the generator is short-circuited by the contacts as the line voltage rises and falls about a given point, determined by the tension of the spring. The core of the transformer is re-
Homemade Overload Relay

Being of an experimental mind I am constantly making some change in my transmitter with the result that I am forever blowing fuses, so I decided to make an overload relay. Sounds simple but isn’t I found that because of the varying load caused by keying, the relay armature would not stay steady until the proper time to throw, and also that to break the high voltage was impracticable because of the long arc between the contacts. Using a 1500-volt plate supply, the contacts had to open more than an inch to make a complete break. Several systems of latches designed to hold the armature closed until an overload came on and to hold it open after the break proved unsuccessful.

The contacts were changed to make instead of break, and in making contact energize a second relay which in turn breaks the line supply. The transmitter “C” bias batteries are used to operate the second relay. The first relay, carrying the transmitter plate current, is wound with No. 25 d.c. wire; the second with No. 36 enameled wire. As shown in Fig. 6, the first relay is arranged to be adjustable, varying the space between the armature and pole, to take care of different load requirements.

On test this could be adjusted to trip at any load from 150 milliamperes up. Winding with smaller wire would permit it to trip on less load.

— N. M. Patterson, W4EB
NY1AA, Balboa, C. Z.

NY1AA's signal is well known to most amateurs operating in the 14-, 7- and 3.5-mc. bands. Also operating under the call NDG, the station is the Master Control of the Volunteer Communication Reserve, U. S. N. R., 15th Naval District.

The antennas at NY1AA is a single-wire-feed type cut for 3500 kc. Doublets are used for reception, one cut for each amateur band. The antennas are supported by 100-foot masts.

A modulator unit is under construction and should be completed this summer. "Phone operation will be used in the 75- and 21-meter channels. NY1AA has recently conducted some 28-mc. tests and been heard in Canada and New Jersey, strength QSA3/5. Power used was approximately 300 watts input on the fundamental frequency of 14,200 kc.

The Commanding Officer of NDG-NY1AA is J. W. Young, Lieutenant DE-(G) USNR. E. W. Lockwood, Ensign C-V(S) USNR, is the executive officer. Communications and cards should be addressed to the Executive Officer, c/o Box 505, Balboa, Canal Zone.

WSCPY, Ludington, Mich.

The neat low-power station of Leo J. Vachow, 402 S. Washington Ave., Ludington, Mich., is shown in the accompanying photograph. A touch of the unusual in appearance is the uniform aluminum finish on each of the units in the station.

The receiver, at the left in the photograph, is a c.c.-operated, with an untuned r.f. stage using a 24, Type 35 detector, 24 first audio and 210 output as second audio. It measures 6 by 9 by 6 inches. The speaker, a cone Farrand, is not shown but usually takes its place behind the receiver.

The speech amplifier and modulator, to the right of the receiver, uses a 27 first stage impedance-coupled to a second 27, impedance-coupled in turn to a pair of 50's in parallel. This unit measures 5½ x 12 x 1½ inches over all.

The four-stage crystal-controlled transmitter, next in line beside the modulator, measures only 9 x 17 x 1½ inches. It consists of a 27 crystal oscillator, 24 buffer and doubler, 47 buffer and doubler and a pair of 210's in push-pull as the final amplifier.

All parts such as meter, key and cable power leads, crystal and tank coils are made plug in. A multi-connection cable is brought out through the back. The tap for modulation is brought out through the end nearest the speech amplifier.
Key and meter are plugged in the most handy place, the front. The tank coils for the first three stages are wound on the old standby—tube bases. These are tuned by 13-plate midget condensers. Series feed is used and the condensers are therefore all insulated from the metal subpanel. The last stage coil is a self-supporting affair made of solid wire and plugs into jacks mounted on the transmitter chassis.

The key is inserted in the grid circuit of the final stage for blocked-grid keying. A single milliammeter serves to read plate currents for the various stages and also grid current on the last stage. This is a 0–5 voltmeter that previously was used in a Radiola Superhet, and was converted into a low range milliammeter by removing the series resistor inside the case and shunting it across the movable coil.

To use 'phone, the key plug is removed, putting the carrier on continuously, a cord with two plugs is inserted in jacks for the purpose on both transmitter and modulator, the latter is connected to its power supply and the set is ready to go.

The antenna is an 80-meter Zepp with either parallel or series tuning of the feeders. The antenna coils are also plug-in and made the same way as is the final tank coil, but are attached to the tuning panel on the wall. The coupling from final stage to antenna can be varied by moving the whole transmitter with respect to the antenna coil.

The power supplies are two metal panel affairs, one using an 83 rectifier for first three tubes and speech amplifier, while the second, with 866 rectifiers, furnishes 800 volts to the final stage and modulators.

With as low as 300 volts to last stage both coasts have been worked as late as 10:00 a.m. E.S.T. on 40 meters.

Announcing the A-1 Operator Club

(Continued from page 36)

other fellow’s viewpoint. He should QRS or QSZ, without “crabbing” when requested. He should embrace every opportunity to assist beginners, and to help them along through some of the more trying experiences of operating. He should never knowingly QRM another station, but should cooperate as much as possible with stations working on his frequency. He should not decry “lid” operating but should assist the newer operators and offer friendly, courteous advice as to how they might improve their operation. The matter of “good notes,” “sharpy” signals, lack of frequency “wabbulation,” good quality (phone), use of sound technical arrangement and proper adjustment, while not directly points of operating ability, are certainly concerned directly with courtesy and judgment and as such these things must be weighed under (4).

We suggest to A-1 operators, in considering candidates for nomination to the “club” that each of the four qualifications of paragraph two be carefully considered, each counting a possible 25 points (of 100 total). No operator nominated should have a rating of less than 15 on any qualification, and the total must be 80 or over to warrant a recommendation for a particular operator.

Regarding disqualification. After an operator has been nominated if exception shall be taken, or complaint made of faults in his operating work, copy of such complaint shall be sent to him in order that he may profit from constructive suggestions, or explain the circumstances. In the event of a sufficient number of objections to a nomination or lacking a satisfactory explanation, the call may be added to a “disqualified” list or record at Headquarters.

A-1 OPERATORS


Strays

Here’s proof that radio is advancing. A newspaper heading says, “New Blank Radio on Display; Has Tuning Control.” And farther down we read that the new set has a full-version dial. Quite modern, that set!
The Iowa-Midwest Division Convention

WITH a total registration of 420 delegates this year’s Iowa Convention held at Des Moines on April 28th—29th outshone all previous divisional affairs and credit goes to F. J. Sadilek and his committee. A program replete with interesting topics was carried out by such speakers as Prof. G. W. Fox and Mr. J. H. Deming of Iowa State College; Mr. Frazier of the Parrott Film Co. demonstrated the recording of sound on film. Mr. Detrick of McMurdo-Silver held the meeting with considerable interest in explaining their new receiver. Mr. Stedman talked on the “Application of National Electric Code to Amateur Transmitter Installations.” Mr. Burden of the Lincoln T. & T. gave a talk and demonstration on “Spectrums, Audible Light, etc.” Carl Menzer of the University of Iowa, Director Kerr and Ensign Morgan of the Navy all gave interesting talks.

Inspection of ham shacks, police broadcast and several other points were made and the committee saw to it that the delegates were kept interested. The convention coming to a close with a good banquet and speech by Mr. W. J. McDonald, Radio Inspector.

Well done, Des Moines!

Strays

W2DPH sends in the following formula to keep the drill lubricated in drilling holes through glass:

- Camphor, 1 oz.
- Spirits of turpentine, 1 1/2 oz.
- Ether, 3 oz.

July, 1933
OUR section reports have required increased editing for the past three years to take care of the great growth in interest and activity in all branches of amateur work — experimenting, traffic, 'phone, etc. Only four years ago SCMs received an average of six or seven hundred reports (of all varieties of amateur communication) monthly, and felt that amateur work was flourishing. In the early months of this year our reporting section contained over 3000 independent reports on different amateur activities!

In spite of the steps taken to list reports more concisely the situation became acute early this year, and it was necessary to somewhat curtail the space devoted to sectional reports. Section Managers followed an editing plan that eliminated duplicate mention of part of the amateur stations already mentioned in the traffic summaries. This step was required not only to introduce a printing economy but to assist in maintaining the proper balance of technical articles and material on all phases of amateur communication, operating, and experimentation. Effective April QST, new space limitations were adopted. At present we are following a sliding-scale of space determination for section reports which gives 8½ pages to 12 pages per month to activity reports from all amateurs, depending on seasonal considerations. We sincerely hope that every amateur appreciates the space problem and the necessity for S.C.M.s and Headquarters keeping these reports concise. Thru a complete monthly summary of reports it is possible to get a truly national picture of amateur activity. Your S.C.M. (see his address on page 5 of QST) invites and welcomes your postal-card report of what you have been doing in radio, on the 16th of each month.

Perhaps the greatest service rendered by the Volunteer Communication Reserve was during the week following the first shock. Numerous stations maintained practically continuous watch and handled many thousands of dispatches regarding relief activities for the Red Cross, National Guard, various city officials and personal messages regarding safety of residents of the stricken cities. At W6EC alone a total of 3683 messages were handled during a seven day period.

The big thing to remember about this U.S.N.R. emergency work is that it is "organized endeavor" and that it is carried out as nearly as possible in standard Naval style. The Naval Volunteer Communication Reserve stands ready at all times to repeat its excellent performance displayed during the California earthquake.

Ohio Valley Flood

THE U. S. Naval Communication Reserve again stepped in to furnish emergency communication when, on March 18 and 19, a sudden flood emergency developed at Cincinnati and points above and below that point on the Ohio River and its tributaries. The Reserves were mobilized by radio and telephonic communication. Both operators. See the announcement of the new "club" and determine to be such a really-qualified operator. — F. E. H.

U. S. N. R. Active in Southern California Earthquake

SINCE publication of our story on the Southern California earthquake in May QST, the Navy Department has forwarded some pertinent information relative to the activities of members of the Naval Volunteer Communication Reserve during the period of that disaster. It is probably not generally appreciated that the Naval Communication Reserve is kept in constant training to meet just such emergencies. Again in this instance, as it had often done in the past, the Reserve functioned instantly and completely, due to its preparatory training and organization.

In the various reports received from U.S.N.R. officials in the 'quake area amateur operators of the following stations are mentioned as being of invaluable service during the period of the disaster. The majority of these amateurs, practically all of those in the sixth district, are also members of the Naval Communication Reserve, and conducted communication in line with Naval procedure: W9ARR, W9ADH, W9ANS, W9AOA, W9AWC, W9BAM, W9BCT, W9BEX, W9BOE, W9BPC, W9BSV, W9BBV. W9BYF, W9CAH, W9CMQ, W9DBB, W9DEP, W9DER, W9DYL, W9EAC, W9EDW, W9EFE, W9EQG, W9EOP, W9EQQ, W9ETJ, W9ETM, W9EZG, W9EZJ, W9EZK, W9EZT, W9FYT, W9GXM, W9AGA, W9AGB, W9BEC, W9BT, W9M, W9NE, W9QA, W9RO, W2BQO, W5YH, W7BPO, W7CHR, W8IW, W9CSY, W9CWE, W9ERS, W9EYN, W9GEP, W9LFX, W9OLL.
Fleet and Volunteer personnel reported to the Naval Reserve Armory at Cincinnati for such duty as might be required. Communication aid facilities were immediately extended to Civil authorities, the telephone company, Western Union Telegraph, to be available in event such aid was required. All U.S.N.R. Unit Commanders along the Ohio River were advised to stand by for such assistance that might be required. The situation did not become so severe that radio communications were needed but the point of importance is that "a communications network was ready, had it been needed." amateurs who do not happen to belong to the Naval Reserve would do well to pattern after the Navy's policy of "being prepared." Lt. H. F. Breckel (W6NC), Com­mander of the U.S.N.R. Section at Cincinnati, and an active amateur, has been highly commended for the way in which he has organized his Section for emergency work.

1.7 mc. 'Phone in California 'Quake

W6HMW-HMX sends some "hot" dope on activities of 1.7 mc. 'phones during the California earthquake. 1.7 mc. 'phone facilities were taken over by the California National Guard. A network was run swiftly with W6GOY at Artesian, as key station, and W6GRK at the Long Beach Armory as control station. The city of Compton, right in the center of the devastated area, was without means of communication, so W6XXE and W6GKH traveled over there and set up their portable (FXE) in an Army tent in front of the city hall. W6HMW, who had been on the air 50 hours working W6GGQ, Huntington Park station, went to Compton to assist in the operation of W6XXE and stayed on the air another 48 hours as assistant operator. Numerous other amateurs rendered valuable assistance at the stations mentioned and they must not go without commendation:

W6FOH, W6ABF, W6FTR, W6HMW, W6XXE, W6BII, W6DC, W6AAA, W6CFF, W6BUT, W6FOH, W6AFF, W6FTR. There was a wonderfully high spirit of cooperation on the 1.7 mc. 'phone band — a member of the network would but have to give any station a short call and the operator would come right back ready to render any form of service within his power.

Congratulations to all concerned.

Accuracy!

By Merrill Peoples, W7WR *

W7WR. wins the C. E. Centers prizes for this month. Your articles on any phase of amateur communication ac­tivities, and your two articles on the "Ameritron," a tube, and the "2 meter" Handbook, or three logs, or message cards (see announces­ments, pages 5 & 6, March 1932 QST). Send yours today.

F. E. H.

I found the percentage of inaccurate and incomplete messages surprisingly high. In delivering, one finds inaccurate names and addresses that require research into the ancient and modern archives of your city. You become so well acquainted with the telephone company's informa­tion operator that you call her sister. What she calls you isn't spoken above a whisper! After completing the connection to a few addressers and spending one minute reading each message and nine more minutes "explaining and promoting" Amateur Radio, the remaining "no phone" traffic is forwarded via Uncle Sam's uniformed, paid message carriers. Is your job finished? No! Cards come back, embellished, "no such address." There are service messages to be sent to explain to those originat­ing messages.

The one sure remedy for this deplorable situation is ACCURACY — ALL ALONG THE LINE. This is a matter of individual and personal responsibility. The relay man should watch himself constantly because he has two chances, on each message, to make an error. The originating and receiving operator must, of course, exert equal care in transmitting and copying. It is all too easy to originate a message with an incomplete address, to let the delivering operator do the worrying. It saves time, when in doubt, to quickly O.K. messages and take a chance that one's guess is right. But this doesn't spell accuracy.

I do not mean to imply that all messages are so difficult to deliver. Occasionally one comes through with complete preamble, correct name, phone number, street address, city and state, a snappy, important text, a full signature, and is, altogether, a delight to a weary soul. There is a bright side to the picture, too. I've made interesting, lasting friendships. One kindly lady offered to purchase any piece of radio apparatus my heart desired. (F. R. C. please note I said, "No, thanks just the card.") Also, I prize most highly the file of letters and cards bearing thanks for services rendered. But ACCURACY would make my service easier to render!

Short Wave Listeners—Attention!

THE Bell System Radio Telephone Stations operated by A. T. & T. Long Lines Dep't, municipal police radio stations, and Airways telephone stations are Public Service and point to point fixed services (not broadcasting) stations. These stations are not largely interested in listener reports aside as a rule do not "QSL." or verify your reception of transmissions. This means that most such reports are not wanted, and will not be "checked" and in many cases, not even acknowledged. These stations all sign their calls at half-hourly (or more frequent) intervals and may be then identified by reference to a suitable call list.

The laws of the United States and the International Radio Convention imposes upon chance intercepting listeners, a very strict obligation of secrecy with respect to business handled by such stations. Severe penalties (heavy fines and/or imprisonment) may be imposed for violation of this obligation. Under no circumstances may information obtained by listeners to such services or to any specifically addressed transmissions (except broadcast) be used in any manner by the listener, or divulged to unauthorized persons. "All persons who may have knowledge of the text or simply of the existence of radio telegrams, or of any information whatever, obtained by means of the radio service, shall be bound to maintain and ensure the secrecy of correspondence.

O. B. S.

The following is a supplement to the list of A.R.R.L. Official Broadcasting Stations in November QST (page 51):

W1DMI, W3BMT, W5BZT, W8FGV, W9DBO, W9JBA, W9LWk.

July, 1933 45
Routing Traffic Reliably
By Harry E. Legler*

It has been only recently that I have taken to traffic handling in earnest, the result being my appointment as O.R.S. Schedules were established and traffic totals reported to the S.O.C.M. In my traffic work some deplorable practices were revealed. Some messages timed out two weeks old and considerably off the route they should have taken. Stations were heard passing a message around a clique, running up the total for themselves. Without thought to "direction" messages were handed along just to keep them going. Dates on the messages were not recorded so the speed of our service not only should have been kept, but would have been known. When we originate a message for an uninitiated sender, he oftentimes has the idea that our radio system will get it through in good time. He later may hear, however, that the message was received by the addressee, but long after he expected it to be.

Our trunk lines and our five point schedule system are fine and they do move traffic. But A.R.R.L. monthly traffic totals continually show a percent of messages originated but never delivered. Some that are delivered are relayed too many times.

Recently I took a message from a trunk line station that had been originated in an eastern state and addressed to a town in Kansas. The station I took the message from was closer to the destination than I was. I did not know it at the time and he probably did not know it either. I took it because it was traffic. He sent it to me because it went to my state, he being just at the eastern edge of the state. Somehow, I had the impression that the destination was in the central part of the state. Having no schedule soon with anyone in the state, I expected to put the message nearer home by calling CQ Kansas. An answer was received but from southeastern Kansas. I made use of the contact by correctly originating one for a friend who lived in this town. Later I passed the waiting message to another station located nearer where I thought it went. I then looked the location up on a map. It took time to find it, even with the locating key to the map and a state list of towns. To my surprise the location worked was in southeastern Kansas also, only 20 miles from the place just worked. A quick and simple method of looking up locations would have placed the message very close to its destination and saved much time. But a map that does not show all the out-of-the-way places is quite often useless. Something that lists all towns, large and small, is needed. Such a list is available to everyone and is none other than the United States Official Postal Guide. It lists every post office in existence.

The United States Official Postal Guide including postal rates and parcel post information is revised annually in July and placed on sale about September 1st. The Guide contains complete lists of post offices by states, one alphabetically, and one by states and counties. Cloth bound copy is $1.50 from Superintendent of Documents, Government Printing Office, Washington, D. C.

The LIST OF POST OFFICES BY STATES IS ARRANGED AS A PARCEL POST GUIDE, THE UNIT NUMBER OF EACH OFFICE BEING GIVEN AND SPACE PROVIDED FOR THE INSERTION OF THE PARCEL POST ZONE NUMBER. This is the list we are most interested in. Indeed, postmasters are equipped with this list in the addresses of messages, as for example: Hiawatha, Kansas 2919.

The POSTAL GUIDES and monthly supplements (50¢ a year from Washington) are furnished every post office annually, the old ones being replaced with the new ones. Old Guides are kept on file and, I believe, may be obtained gratis if it can be shown good use will be made of them. Paper covered abridged edition copies do not contain the alphabetical list but do contain the State lists of post offices which is what we want.

To use the Postal Guide turn to the state lists. This gives each official post office number, then the post office, the county it is located in, the zone unit number of the office and a blank space for entering the parcel post zone number for a particular office. The zone unit number is what we can use very handily. This number indicates the zone unit the office is located in. The old parcel post map of the United States was divided into squares (30 x 30 miles) each unit one half degree longitude wide and one half degree latitude long. Beginning at the Canadian border these squares were numbered in rows 1, 50, 100, 150, and so on, from east to west, with an additional line (north to south squares) making four figures identifying numbers for each square. All offices located in each unit will have that unit number after it in the Guide. To find where a town is located, look up its unit number, look at the map, find the right square and then look down the row to the unit number. It will quickly locate your town within 15 miles anywhere on the map. These maps have been discontinued by the Postoffice Department with instructions that any left on hand be destroyed, but I located such a map and can furnish copies for each A.R.R.L. Division.* We can see where such a simple method of locating any town on the map would have helped me in placing that message in southeastern Kansas. The message got to Kansas all right but had a hard time in getting to the right part of the state. This happens very often. Local deliveries often take more time than the "long hops." Use of the Postal Guide can help perfect each relay route!

With the numbered square map and Uncle Sam's Postal Guide, the general location of any city or town having any class of post office can be speedily determined to facilitate correct relaying of traffic. A second method uses the Postal Guide to identify the county in which a desired addresser is located, and of course one map or atlas showing this particular information will save you time and enable you to route all traffic intelligently.

1 Official Relay Station appointees, A.R.R.L. Directors, Section Managers, and Route Managers can obtain copies of the parcel post map showing unit numbers by sending $0.50 to the secretary, Section Division in which Division Manager is located.

2 Time might be saved in looking up unit numbers if originating stations would include this in the addresses of messages, as for example: Hiawatha 2919 Kansas.

Ramah (WCEN) Off for Transatlantic Cruise

The schooner Ramah is scheduled to leave Hyannis port, Mass., June 21st at 2:30 a.m. bound for Mediter­ranean stations via the Northwest Passage. Ramah expects to reach Naples between July 25th and August 1st. Ed Brooks of W1TL plans to schedule 3.5 and possibly 7 mc ranches from WCEN using 5530 kc. and the trans­mitter used at WCEN on the Forbes Greenland Expedi­tion (another five phone couples, approximately 3600 kc. to approx. 6200 kc.) may be used for communication with U. S. amateurs at the greater distances.

At present writing a 7 p.m. E.S.T. schedule between WCEN and W1MK is being planned and it is hoped that much general ham work will be possible with amateurs equipped to receive the 5530- and 6200-ke. frequencies.

ARCTIC EXPEDITION

During July and August A. Dutilly, VE2GV, of the Institut Agricole, La Trappe, P. Q., Canada, will accompany a scientific expedition to the Arctic. He plans to transmit regularly from the Arctic Archipelago. Cooperation may be requested in handling traffic for this expedition from remote northern points. Watch for VE2GV.

July 15th-31st VE3XB Contest Open to All Canadian Amateurs

A SPECIAL contest with prizes aggregating over $200 in value, delivered free to any part of Canada is open to all Canadian amateurs. The contest awards will be divided into two groups of prizes, one for c.w. telegraph contestants.

BRASS POUNDERS’ LEAGUE  
(April 16th-May 15th)  

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More-than-one-Operator Stations  

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Traffic Briefs  

EMERGENCY WORK  

A heavy snowfall in northern New England on April 12th and 13th crippled communication with Claremont, N. H., all circuits including telephone, telegraph, etc., being out. On the morning of the 13th W1ATJ at Claremont established contact with W1BL, Manchester, N. H., on 3500-kc. e.w. W1BC assisted ATJ at the Claremont end, and W11P and W1CME carried on with B11 at Manchester. Much important emergency traffic was handled.

July, 1933  47
for the telephone company as well as numerous press items for the Claremont Daily Eagle, and various other messages. Schedules were maintained for two days, up to the time that conditions began to clear. The storm caught W1AT with the transmitting antenna on the ground but he and W1BAC got it in the clear. The local power company tied ATJ in with its emergency circuit to furnish the necessary juice. Telephone company officials were high in the praise of this emergency circuit.

In connection with the same storm of April 12th and 13th, W1ASY, Springfield, Mass., was called upon to get a message through to the Western Union wire chief at Brattleboro, Vt. Being unable to get at his own key until late afternoon ASY turned the message over to W1EBH, who raised a fellow within ten miles of Brattleboro and Q5P’es. When W1ASY finally got on the air he and W1BJS worked in shifts, keeping the station on the air until the message was finally moved — to W1EIM, who got the message through to the wire chief. Credit also goes to the following for assistance rendered in moving this message: W1BVP, W1APL, W1OF, W1CJD and W1BDI.

W1IF of Squantum, Mass., an employee of the New England Tel. & Tel. Co., has organized fellow employees who are also “hams” into an emergency net always at the company’s disposal in times of need.

During the period following the severe tornado at Minden and Arcadia, Louisilas, in which about 60 to 75 persons were killed, amateurs in Shreveport and Minden furnished valuable communication to Barkdale Field military authorities, American Legion relief workers, and the Shreveport Times. A letter of appreciation from the City Editor of the Times lists the following for commendation: W5BZR, W5CW, W5BJA, W5BFB and W5CEN.

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WUSA-WUSB

The Chicago World’s Fair is now under way and operations at WUSA and WUSB have started in earnest. The World’s Fair Radio Amateur Council, under the guidance of which amateur activities are conducted, has made application for the calls WUSUC, WUSB, WUSB, WUSB, WUSB and WUSB to be used in connection with the four stationary transmitters and the portable 56-mc. transmitters. The Council’s plans call for experimentation as well as communication work.

WUSA-WUSB frequencies are as follows: In the 3600-ke. c.w. band — 3600, 3620, 3630-ke. In the 7000-ke. band — 7010, 7120, 7260-ke. In the 14000-ke. band — 14020, 14240-ke. In the 3900-ke. phone band — 3907, 3936-ke. The transmitters are all enclosed within a wire fence to keep visitors from getting hurt or from fooling with the adjstments. As a safety measure rubber mats are used to stand on while tuning the apparatus. The two operating tables, where the receiving is done, are surrounded by a partition, which has a wood base and glass top, thus enabling operators to watch operations without disturbing the operators.

Ed Wilcox, W6DDE, is in charge of communications and is placing ‘phone operation in the hands of a ‘Phone Chief, and c.w. operation in the hands of a C.W. Chief. These Chiefs will be responsible for the operators under them. An extensive network is being planned and it is hoped that a list of scheduled stations and WUSA-WUSB operators will be available for August QST. W9BCT is working up an Illinois net to handle communications within the state.

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WORLD SPEED CHAMPION TO BE SELECTED

According to word from the World’s Fair Radio Amateur Council, the radio amateur code speed champion of the world will be selected at the convention to be held at the Fair August 3rd, 4th and 5th. Elimination contests will be held during the three days of the convention. The winners in the various classes will compete in the final contest for the world’s amateur championship. A beautiful silver loving cup is being awarded by “A Century of Progress Exposition” as the grand prize. Other cups will be given winners in the various classes. Come on, you speed hounds, get in on this!

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When you have traffic for Chicago during the period of the World’s Fair call “CQ CHGO” between 9 p.m. and 1 a.m. C.S.T., and listen for replies between 7050 and 7100-ke. “QSP Chicago,” an organization of amateurs united to handle “incoming” Chicago traffic, is hereby requested not to accept your messages during those hours. Or, if you work on 3500-ke., a group of North Side (Chicago) amateurs are also planning similar work for the 3500-ke. band, using the same name and message forms as QSP CHICAGO. This group will include W9OP, W9DDE, W9EOR and W9DRN.

The San Gabriel Valley Short Wave Club announces a general Ham picnic to be held from Saturday, July 1st to Tuesday, July 4th, at Crystal Lake, San Gabriel Canyon, California. All amateurs are cordially invited. Bring portables. There is no charge other than personal expenses.

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REPORTS WANTED ON CTI EC

The Instituto Geosfico, Cumaca, Coimbra, Portugal, CTI EC requests reports on daily tests sent at 1500, 1800 and 2100 Greenwich on 7000-ke. Meteorological data are also sought from CTI EC on 7000-ke. at 1100 Greenwich daily, six or seven groups of five numbers each being used

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Relative Standings of the Ten Highest Sections—Apr.—May

<table>
<thead>
<tr>
<th>Section</th>
<th>Average % Gain or Loss</th>
<th>Traffic Total %</th>
<th>Standing Based on Average of All Four Ratings %</th>
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<tr>
<td>Washington</td>
<td>53.5%</td>
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<tr>
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<td>58%</td>
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<tr>
<td>Wash.</td>
<td>35%</td>
<td>1199</td>
<td>35%</td>
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</table>

Washington steps into the lead this month, closely followed by Los Angeles. L. A. is the only Section with over 60% of its traffic, and Washington, Eastern Pennsylvania, East Bay, Oregon, Ohio, Virginia and North Carolina (tied), Southern Minnesota, Oklahoma, Iowa, Colorado, Connecticut, N. Y. C. L., L., Arkansas and Tennessee (tied), Alabama, British Columbia and California, all tied for 45% of their traffic. The next highest Section, E. Texas, 47.5%, delivered 4989, total 112,424, (87.6% del.) (78.8 p.g.).

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The telegraph station was put into operation A.R.R.L. by CQ QST for April by 10 new reporting stations: Va. 54.6%, N. C. 30%, Wash. 20%, Ore. 17.3%.

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Los Ang. 15.9%, Mo. 13.9%, Ind. 13.4%, Mich. 12.3%, Ohio 8.5%, Ill. 5.7%.

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QST for
according to the International Meteorological Code. Please report reception of C11KC by postal direct to the Institute Geophysique, giving complete information on signal strength, fading, atmosphere, wind, general weather, etc.

**XX6AR**

P. S. Francis, W66AR, and five other Naval officers will sail a twenty-five-ton yacht, Tamoshan, from Hongkong about the middle of June. The first stop will be at Japan, where the yacht is equipped with an auxiliary beam transmitter consisting of a '47 crystal oscillator driving a '46 amplifier fed by a motor. Receiver consists of '36 detector and pentode. The call XX6AR will be used on 7220-ke., 7250-ke., and 8570-ke. Most all listening will be on the amateur bands, and amateurs are requested to keep a lookout for XX6AR and assist with weather reports or any other information which may be needed.

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**ATLANTIC DIVISION**

**EASTERN PENNSYLVANIA** — SCM, Jack Wagen- seller, W3GB-B — W3EKG, EQ, BL, BEY, W5PLA, W3AQN and ALX make the BPL. W3CFF is on 'phone. W3CHU joined A.A.R.S. W3AKB is going to rebuild. W3AVV is QRL U.S.N.R. W3AMR is back from college. W3BPX reports via radiogram. W3AEF is QRL work. W3AQN and ALX make the BPL. W3BFT is moving to better QRA. W3BNR is QRL farming. W3CZH helped W3CLH with his activity. The Frederick A.R.A., the Washington A.R.A., the Institute of Radio Conference, the Washington A.R.A., and the Washington A.R.A., the Institute of Radio Conference, have good total next month. W3DD is on 'phone. W3CNF is on 'phone. W3AOV is new ORS. W3ARV is rebuilding. Everything going FB at club stations. W3AAV is QRL U.S.N.R. W3AMR is back from college. W3BSK is moving to better QRA. W3BF is moving to better QRA. W3BAK doesn't expect to handle much traffic from Hongkong.

**CENTRAL DIVISION**

**ILLINOIS** — SCM, F. E. Linda, W5APY-W5WR — RM W5CRT Forest Wallace, RM W9DDE Ed Wilcox. WSHQI wants to know why we don't make all RM, SCM, AO, ORS and OBS use PDC on the air to set an example. W5WFF and YA are at the same QRA but are getting along fine with A.A.R.S. W8DNV reports organization of the Rocky Grove Amateur Radio Club in Franklin. W8KU has been working. W8VAV is going back to 3.5 me. W8CFF dug a hole for his pole. W5WEU reports for CMG, CCW, ORS and CER. W8CUG is constructing.

**SOUTHERN NEW JERSEY** — SOM, Gedney M. Rigor, W3QL — Unless stations report to the SOM direct reports conditions bad. W8DMJ is changing. W8GWT is going to Camp Dix. W8ECY schedules W8JSM. W8KFP has B.S. completed. W5CLL, HNZ, LT, ALX, EXT and ENV have applied for portable licenses. W8DWJ is back from his southern home. The Elmira Radio Amateur Association have a new method of checking up on illegally operated stations. W8DIQ was heard by J1EG. W5IAA has been appointed Route Manager after W5AEJ resigned. W8GUX reports. W8CCD will have good total next month. W8KID is pouting out. W8DNV reports organization of the Rocky Grove Amateur Radio Club in Franklin. W8KU has been working. W8VAV is going back to 3.5 me. W8CFF dug a hole for his pole. W5WEU reports for CMG, CCW, ORS and CER.

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INDIANA — SCM, Arthur L. Braun, W8TE — W9KJ is active as OD. W9AT makes BPL. W8APY is doing 60 mc. work. W8BTR reports for first time. W8BIM is planning for fall schedules. W8EIR is working EQ and EAR. W8EQG is helping with the Ir. traffic net. W8XEM is on with 50 watt. W8FDY is building a.c. receiver. W8GNY is ready for test. W8QGJ spent 100% of his time "calling." W8OJU was visited by W8JUZ of Michigan. W8JU was heard by a ZL on 3.5 mc. W8HVU is now ORS. W8JML will have a YL on soon! W8USA is a DXer. W8KGH has new receiver. W8MBB, M2R and MOK are new. W8MSW is getting out. W8NJU moved to Richmond. W8KPPs has p.d.c. W8KQY is QRL work. W8KZU uses 94s in PP. W9FEBB uses c.c. W9FQ2 sticks by his 45s. W9FW is QRL YLA. W9HGT is building 50 mc. rig. The Evansville Radio Club is now affiliated with A.R.R.L. W9HEK burnt out his rig, and now has a new one. W9HPR is Head for End. Fair net. W9PJU and H3P are going c.e. W9JLR is proud to be the only YL op in Indiana. W9QJO is Comm. Mgr. at Ft. Wayne club. W9RJ built a cond. mike. W9WDE, AED and P2D are now OWIC. W9RRL rebuilt from EFIC. W9M3H and B3GQ with K6. W9GLV is building a EC freq. meter. W9LCL is collecting parts. W9LOW’s light bill went up! W9MYC is new ham. W9JUB has KB phone. W9RE is coming on with high power. W9CIA is building old c.e. freq. meter. W9SWI visited Ft. Wayne club. W9HUQ has moved. W9KPI is teaching his YL the code. W9LIK and ADD are planning phones. W9AMM is DXing. W9JKK joined the Forest Army. W9KZK is doing service work. W9KZK’s part is building a c.c. transmitter. St. Joe, Valley Club elected new officers: W9FIIH pres.; W9LIG vice-pres.; W9KJY secy.; W9CCF treas. The ham having the highest traffic total wants state ORS club to meet on air. W9CDA is rebuilding for Lam’s s.s. Lightning scared W9BAN out of shack. W9HAX’s antenna. “W9ARL -BZS-OX-CNE”-JOY-W9GFS 7 JLH 10 BKJ-TE 7 AXH 6 FYB a CTT 4 D.JJ of officers: W9FBH pres.; W9LG vice-pres.; W9AKJ secy., W9KLJ is now ORS. District No. 9. W93QG reports from Muncie. W8DUV may be RM of this district. W8QYJ wants a new QRA. W9KGM is now ORS. W8BZW is now on traffic. Best DX for W8RIN is W8BYD. W9GNO is good on 15, 20, 40, 80, 160. W8HCQ has stepped up power on ‘03A. W8JZG and ERZ are new ORSs. W9JZA is GQG 24 BBP 17 CEX 15 CES 10 DCN 4 DJR-EV1-HSQ 2 JH 15 LID 2 CWR 1. Ohio — SCM, Harry a Tummond, W8BAl — W8DDS Chief RM Ohio. The SCM would like a message from those reading this. District 1. RM W8KRM. New ham is W8JTO. W8GQF will be on this summer. W8E2Z is now ORS. District No. 9. W8GRG reports from Marietta. W8DUV may be RM of this district, District No. 8. RM W8HSH. W8DRH will be ORS soon. W8GC3D is moving to new QRA. W8HTU is building new receiver. W8GCG says 11 new hams in Mansfield. W8GUU has new c.e. rig, operating. W8PO is now RM for all Ohio Portable work. His portable call is W8BHE. District No. 7. RM RP WPV. W8FTQ uses a doubler for receiving. W8WCF lost his antenna. District No. 6. RM W8EYJ. W8EBJ reports for Queen City Radio Amateurs of Cincinnati. “Dayton DX, good on 15, 20, 40, 80, 160. W8DFD is new exp. New sso going up at W8KBE. District No. 5. RM W8GCV. W8FDF is awaiting good weather. W8BKR reports by radio. W8GER at Dayton is A.R.L. QSL. Mgr. The five year old ‘52 at W8BBR is no more. District No. 3. RM W8APC. W8BZD is on WADI, Str. W. A. Reiss. W8GDH says new ham at Dresier, W8HJ. W8GIC has stepped up power on 30. W8GQG and EZ2Z report. W8AEF reports for Michigan. W8QJ is King Radio Amateur Dy. Report for District. 1. RM W8BMR. W8FRK is new rig at W8GKE. W8FWP reports 1% on traffic. Best DX for W8ACZ is Netherlands. W8ZBZ is getting ready for contest. W8FXF and QL report. W8BMK has spring fever. C.e. rig at W8QX. No schedules at W8BBR. W8BMK has more time for traffic. New a.c. receiver at W8SVL. W8AUM is now ORS. W8JLL applies for ORS. W8QCU wants schedules. W8BGK made 1200 points in A.A.R.S. Contest. W8GSC is ready for RI. W8GGJ spent 100% of his time on traffic. W8CT5 has some old time schedules working. W8BHR is getting ready for portable tests. W8FXJ is on Str. John Reiss, K7TLM. W8UHS is rebuilding. W8HCP is now in Cleveland. W8RN is on Str. J. H. Sheadle, K7U. W8BB is now W8JGQ.
SOUTHERN MINNESOTA — SCM, Norman Beck, W6FJ-CGR — W8BN and BHZ worked NY1AA. W6CSY is organizing a 26 mc. network in the Cities. W6BXX is QRL for WP1C and wants SWL's to pass word down. W6WBN operates the electric show traffic. W6BNB has portable MKA. W6JID leaves us for Northern Minnesota Section. W6YE7's new c.c. rig is ready to go. W6CSU and DHE had great time at the Convention. W6WBP is operating the business. W6DRG and JBA blew rectifiers. W6JEQ has new crystal. W6BKK has its license 39-866. W6CPF keeps two schedules. W6QCN wants ORS. W6QLE is QRL tropical fish. W6KDI and IDJ are almost ready to go back to Milwaukee to finish school. W6QQA applies for portable. W6DGE is boss on river. W6LOQ put seventh push in sky-voice. W6FMA deserts us for No. Minn. forests. W6ZU puts up new radiators. W6DRK, EZZ and TJ have a trio-corner 50 mc. net. W6QDG takes 'photos by ultra-high-frequency. Minneapolis gang, get ORS reporting cards from W6LN. Wisconsin beat us in contest.


DELT A DIVISION

ARKANSAS — SCM, Henry E. Velt, W6SAA — W6BMB leads the state in traffic. W6JK ran up nice total in ZAG Contest. W6AJJ reported by radio. W6BED moved to Gentry. W6DFM is a new station in Gentry. W6QSO has just joined us from Oklahoma. W6KDI is his transmitting station on 10 mc. W6RZ handles tornado traffic. W6GZT is getting ready for Class "B" phone. W6XZ is on two transmitters. East and west.

Traffic: W6BM1 343 IQ 271 AJJ 201 BFD 120 TX 130 JK 105 AHI 78 CSQ 12.

LOUISIANA — SCM, W. J. Wilkinson, Jr., W5WF — W5QJ is QRL work. W5AWF and AYZ are going strong. W5BIO took unto himself a wife. W5BYV is on occasionally. W5KQ will take part in Field Day. W5BDJ says Booking liquor good for cleaning crystals. W5CQO is ex-DJ. W5BZC handled tornado traffic. W5EBT is well on track. W5CEN is rebuilding. W5DBW is new station. W5ERF is on all bands. W5AOD, AXS and BS are active. W5H6Y has c.c. W5CRC is in Shreveport. W5BF and AOO are building c.c. rigs. W5BNK and ZK are in A.A.R.S. W5AICW will be home for summer. W5BSB will operate W5CNS at Scout Camp in July: freqs. 3047 and 7294 kc.


TENNESSEE — SCM, F. P. Purdy, WA4PM — Mrs. Rosie Campbell (W4APF's XYL) of Johnson City is the first OW operator in the state. During the Army-Amateur ZAG contest, W4AEW scooped the highest score in the Fourth Corps Area. W4O1 has a dandy U.S.N.R. Net going in and around Memphis. The second issue of the States Bulletin, "Back-Waves," was received very enthusiastically. All it takes to get on the mailing list is a monthly report of station activities. These reports are due the 16th of each month, so if you want a copy of the bulletin, get busy. W4BOZ is the Alt. SNCS for A.A.R.S. W4AAO joined the Reforestation project. W4PL is in Florida. W4MU is becoming nationally known on radio-


HUDSON DIVISION

EASTERN NEW YORK — SCM, R. E. Haight, W2LU - 301 Main St., Waterbury, Conn.; and the "Star Hams" group. Handler, W2ATM joined U.S.N.R. W2UL enjoyed active duty at Floyd Bennett Field. W2DTB says all boys in his city going strong. W2QY has fine luck receiving DX on 56 mc. from fire tower. W2CBN puts thru FB QSP for Albany for SCM. W2QXQ is student. W2BRX, 83 continuing. CQs with only 6 signs! W2SZQ SOed with airplane during RPI House Day, New antennas at W2ENY. W2EKW is open for inspection. W2CJS reports an article, "Some Observations on Operating and Procedure." by RM W2BZA, read at A.A.R.L. meeting. W2FEN is new ham, W2DYV is enjoying 56 mc. W2DWO reports on activities of Mid-Hudson Amateur Radio Club. W2DRN will move to summer quarters. The boy with the meanest bug in Paterson is W2BRY. W2FEA tried to cash a National Guard pay check during the bank moratorium! W2DOV wants to dispose of his 211. W2EIC admitted his one-tube super was impractical.

W2DNX enjoys high school. W2FAP is on 3.5 mc. W2EYE has no luck with DX. W2QXQ QSOed his first EAR. W2QXQ is党委书记 of Asbury Park has portable W2FOR. W2DOV wants to dispose of his present outfit. W2BLQ is sporting portable FNX. W2EES reports portable FDO. W2DNR and BOY spend most of their time on 3.5 mc. W2BPY works 1.7-mc. 'phone. Bloomfield Radio Club intends to hold 25 mc. party in Sussex County first weekend in June.


MIWEST DIVISION

IOWA — SCM, R. E. Haight, W2AEB — RM; W9FPM, RM. W9CBB is QRL Standard Oil Co. W9MUY is ORS applicant. W9BYM was heard in the boom. W9WLJ reports 56 me. on the booms. W9WFL reports 1.7-mc. "phone. Bloomfield Radio Club intends to hold 25 mc. party in Sussex County first weekend in June. W9MOQ is new station of the 3rd U.S.N.R. Unit.

Traffic: W9ABE 508 DNB 319 HPA 250 ZAF 221 AXL 216 DUN 203 FYC 103 OWG 109 HPU 105 FED 100 I6Z 107 GXX 69 DMX 95 AYO 14 FRX 10 KW 8 AFQ 8 FYX 8 BPG 7 DEA 5 LFIL 4 CYL 13. KANSAS — SCM, O. J. Spetter, W9FLG — W9QGK and W9CFF, RM. W9QGK leads the states again. W9CFF says W9QGK is "on fire," for traffic. W9PQG is new station of the 3rd U.S.N.R. Unit. W9QZL was heard constantly during A.A.R.L. ZAG contest. W9VDQ visits EF. W9BTG is QRL Standard Oil Co. W9MMU is ORS applicant. W9UYM was heard in the boom. W9LEQ is on 1.7-mc. 'phone. W9BYM was heard in the boom. W9CBB is QRL Standard Oil Co. W9QGK is making plans to affiliate with A.A.R.L. W9WFL reports 1.7-mc. "phone. Bloomfield Radio Club intends to hold 25 mc. party in Sussex County first weekend in June. W9QGK is new station of the 3rd U.S.N.R. Unit.

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appointed RM.

are five new operators in Southington. WIFPM has

is putting W2ESR on air. WIA VB

will put a .52 on 14 me. WIBHM is proud

up power pack. WIUZ says the "water is fine" at High­

keeps QRM off W1CTI's freq. W1BIQ reported by radio.

W1FKT is

W1QV has a '04A. W1CTI popped filter, W1BES blew

W9EWO uses high power. W9DI says school soon over.

the reins of the SSARC. W1CPD gets mad now if the

theory for DX. W1FVJ is latest addition to the Quincy

ruling. W1ASK - Por the month of June 16th to July

is on 7 me. W1BBX moved to Franklin. W1VA is on 56

traffic falling off. W9AHH received extra first

ticket. W9GJG is trying 14 me. W1DLC keeps the
to handle N.Y.C. and N.J, traffic. W1BMA, W1CJR is working in

is going strong on three bands. W1DBF finally got going. W1BWE keeps

W9BMA, W9CJR, W9DFF finally got going. W9EHW keeps

traffic. W9BMA 458 FJV 451 NP 345 ASV 285 CJR

traffic. W9BMA 222 KGG 110 W1KlW 104 FTA 70 EOW

was visited by W1CNU, W1TD made 400 points in ORS

in Connecticut. W1FVJ is latest addition to the Quincy

and experimenting in 28 me. work. W9ASV says Joplin gang experimenting in 28 me. work.

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traffic. W9BMA 458 FJV 451 NP 345 ASV 285 CJR
New Hampshire — SCM, V. W. Hodge, W1ATJ — W1UN continues to lead the Section. W1DXX reports he rated a fine time in AARS contest. W1AXL reports traffic scarce. W1AUY sent in a voluminous report. Outside interests keep W1IP busy. W1BGL is keeping schedules. W1AUY sent in a voluminous report. Outside interests W1DNC has to cope with. W1GJE is new ham in Lancaster. W1COl used the convention as a meeting place for W. Mass. gang. W1ADF is traffic minded. W1DCL, DEX, DBR, and DHE are new CBARC hams. W1BUF is going 1.7 me. 'phone. W1MY and AVB have been working FB DX. W1SY had a vacation in Mexico. 1.7 me. 'phone net is being formed by W1AHZ with AEM, and CFM. All interested in this net, get in touch immediately with AHZ. W1IJT has e.o. on 3.5 me. W1QW is on 'phone again. W1BDU went to work. W1BVR sticks to 56 me. W1BRH is an A.A.R.S. W1AQX wonders why his 1000 watt 'phone GRMs BGY and DP made good scores in ZAG contest. W1AIP gets on the air. W1BO got unlimited 'phone ticket. W1BEE has FB7. W1AYN is using portable BBQ. W1BUT, and ZZAR are in new locations. W1BDG, and ZX were hosts to a hamfest in Waldport. W1WR wins ORS prize for most effort in helping SCM. W1AYV shared honors. W1DZD made 14 deliveries on first day of operating. W1LSP has portable W1MPF has o.e. freq. meter. W1TVL is QRL. W1DCR advises scheme examined by Rose City Radio Club announces plans complete for the biggest and best convention ever held. Dates Aug. 18 and 19th, 1935.

Traffic: W1AOL 149 KL 653 LT 334 MF 505 AXI 297 ABG 245 DP 223 WR 214 AHJ 200 SY 196 FL 176 CEJ 155 BLJ 167 AYJ 130 APE 120 AJX 98 HD-SB 95 AB5 87 CFM 54 AEM 52 AMF 52 CXJ 49 BLN 46 BZS 45 WY 37 DDZ 24 COU 21 BOO 19 ABD 14 AHJ 11 ADP 10 BBO 9 AOX 8 AIO 7 BWD 6 BMK-ALM 5 BKJ-1 2 BOH-AJZ-BMA 1.

WASHINGTON — SCM, John P. Gruble, WVRT — Due to outside business, I regret that I must resign my office of SCM for this Section. Thanks to you, gang, for your splendid support in the past. W1AYO, of Yakima, is acting SCM, to whom all reports should be sent until the election of a regular SCM in the near future. Address all correspondence to: Stanley Belliveau, W1AYO, Route 7, Box 387, Yakima, Wash. W1BYY is visiting L. A. W1QG is to be congratulated on making BPL. W1B, OM through 1·1V-36, and best convention ever held. Dates Aug. 18 and 19th, 1935.
schedules daily. W6FUO is going in for 'phone. W6BTJ rebuilds. W6EAD is rebuilding.

Traffic: W6AJP 211 UO 112.

LOS ANGELES — SCM, Francis C. Martin, W6AAN says: "W6BAI is completing a move from Los Angeles to Long Beach. Our reports indicate W6BDZ has signed up an assistant op for life. W6MK is back in communication. W6EAD is rebuilding.

and AAN.

PIONEER. W5TH spent some time with W6CXW. Give W6AOD a call this mon­

W6GSH. W6DJC recently operated on USGS ship Healdsburg plans 56 me. expedition with BTZ, AER, and CSKX to Mt. St. Helena. RM W6BVL is going after a commercial ticket. W6TV schedules WUSA. W6AXZ has nice signal on 28 me. W6BIP was heard in Latvia on 14 me. Let's have those reports gang, so you can get "HAM FLASHES," which runs six pages now.

SAN FRANCISCO — SCM, Byron Goodman, W6CAL, from San Gabriel Valley Club meeting take plenty of gasolene—ask W6FEW and AAN, HI.

Traffic: W6AJP 211 UO 112.

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SANTA CLARA VALLEY — SCM, Bruce Stone, W6AAM — W6BFW is speedily recovering from his opera­tion. W6HBF works scheduled duties.

W6BU and W6AVU have been plugging along. W6AIM is back on the job. W6NT worked a K7 on 14 me. 'phone. W6GZU plans new rig, with W6GUN standing by for orders. New shack at W6AFU. If you attend San Gabriel Valley Club meeting take plenty of gasolene—ask W6FEW and AAN, HI.

Traffic: W6AJP 211 UO 112.

W6AHN attends Oakland Hamfest. W6HEP is ex-BBR. W6GUV is pursuing studies at the Chico teachers college. W6EHM is preparing to find that naval signal somewhere in the west. W6ERZ has an extra stage of AF. W6GUV is building. W6APT joined the AARS. W6GYA is QRL 15.

W6HBF is going up for finals. W6AVU has new antenna. W6ANS-AHI put up new antenna. W6GUV looks good as an extra stage of AF.

Traffic: W6AJP 211 UO 112.

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TRAFFIC: W6EFC 734 AL 117 BLP 215 GBN 105 QC 84 DRE 24 BRI 14 GAU 11 CEC 8 CGF/HBF 7 BFG 6 GBR 5 DDF.

PHILIPPINES: Acting SCM, Newton E. Thompson, KAIAXA -- P.I. amateurs held monthly meeting at KAIHR May 28.

Traffic: W6MC 935 KIL 123 DQN-AXN 119 EF7 93 FWY 67 DUY 20 EYO 15 BIZ 0 IBK 4 AKY-CTP 3 BCP-BVY.

SAN JOAQUIN VALLEY: SCM, G. H. Lavender, W6DNZ -- W6CUL is radio op on a pleasure cruise in the South Sea Isalnds. W6AV is QRL U.S.N.R. W6FAG is heard on 3.9 mc. 'phone. W6BLZ reports a new ham in Lagania. W6GVU is now in Oceanside. W6FFP, EWO and GJU called on the SCM. W6AXN was in A.A.R.S. contest. W6CQNC cancelled schedules for the summer. W6LD reports via 1.7 mc. 'phone. W6BAM is building new receiver. W6DNS is building transmitting sets for fishing boats. W6CIZK is back in town. W6APG has a new 7 receiver. W6FGU is now in Oceanside. W6FP, EWO and GVU called on the SCM. W6BXB turned to 'phone. W6BFH is Alt Unit DJQ.

MEXICO: W6IP 56 CGR, CFL. Working DX: W3BFQ, AG, BLE, AZU, CAY, ALT, BFW.

FLORIDA: AAF, AYR, MQ. After A.A.R.S.: W3BLE, and BAD.

WEST VIRGINIA: SCM, C. S. Hoffmann, Jr., W8CNB: W8HD has W9USA schedule. W8EIK and GB will possibly be alternates. W8CMJ won the crystal offered by W6GB for handling the most traffic! WSCDF and ELO graduated from electrical engineering dept. of Linsly Institute at Wheeling. W8DBG, FQB and ETX are building c.c. rigs. W8DWZ is house-cleaning.

TEXAS: W8HWT boasts a new rig. W8WKL is using a new radio. W8BFT is building a new receiver. W8CMSF left for reforestation c.amp in 'fennes. WSCSF left for restoration camps in the State. W8CO is working on going to mountains for the summer. W8BVR handled 500 messages last month and forgot to report.


BOULDER: Hansen hams were host to a number of fellows on Engineers Day, May 23rd. The P.N.R. Bulletin is offering a $25 prize for the best W.B.B.W. report for the month. W9ESA takes the lead in traffic. W8CDE and HFW are pounding out A.A.R.S. traffic. W9IN is running a school.

KANSAS: W6GEG is rebuilding. W6ENA is active A.A.R.S. W6CVT has new c.c. job. W6DQV is back on the air. W6FFP is QRL family. W6ENB and AOZ have new equipment. W6DNS is working on going to mountains for the summer. W6WVR handled 500 messages last month and forgot to report.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, T. R. Beeler, W8GTO -- Congratulations to the Rocky Ford gang on the fine hamfest of May 13th. Colo. Springs is making a strong bid for the State Convention. Boulder hams were host to a number of fellows on Engineers Day, May 23rd. The U.N.R. Bulletin is offering a $25 prize for the best W.B.B.W. report for the month. W9ESA takes the lead in traffic. W8CDE and HFW are pounding out A.A.R.S. traffic. W9IN is running a school.
is a doctor. W4AUP is on the active list, W4BJA and AG

EYN 536 LQO 3 GLI 19 GNK 159 JNV 55 ODE 39

W4BGG made the 100 total club. New 'phones: says the bulletin FB. W4BSQ is working for the Birmingham 50 watter in his 1''A. W9AUJ is QRL beer. W9JB has a transmitter is working FB, and will be on during the gang up with that bug of his. W9HRI, BYK., CBU, W9GLG is QRL job. W9KKY, LNB, and IFD are on W9JA V moved to the mountains. W9MKG reports from

broadcasts on 36:13 kc, 6:30 p.m. Tues., Thurs., and Sat. W9EYN will be on 56 mc 'phone. Ex-W4AVD has an op license. W4CDS is a new station. W4MS-ZZP is building MOPA. Traffic: W4AIR 55 MS 12 AXP 1 BSJ 11 ACG 4 AGS 2 BFS 1 ZAAO 3 AGY 2 BFI 1 ARI -AUW 3. N

Traffic: W4AIR 199 A22 BWN 50 BS 6 BW 9 BQX 15 BRG 27 MA 51 VX 3 BDT 4 ATZ 20.

W4AAAQ handled

for beginners. W9GNK is control station for Celo, U.S.N.R. The kid brother is the latest addition to the brnading family of W9QLL. W9EYN will be on 56 and 28 mc. from the top of Pikes Peak, June 10-11. W9EHY is convoeacing. W9FTO is now signing W9JM. W9QG is on a new QRA. W9EXV is back from west coast. W9DNP dropped in from Boulder. W9CKO will soon have a new rig. W9LIOU, LYM, MEP, and MVI are new Celo. hams. W9GLG is QRL job. W9KKY, LNB, and IFD are on 1.7 mc. 'phone. W9CLX is rebuilding, W9BAK is on with new outfit. W9QJF used unlimited 'phone. W4AVC reports traffic. W9BTO is running 700 watts into a pair of '32s. W9JM is building a super. W5FYG is on from Alma signing QVN. W6CJY is QRL KF6L. W9IUU dropping radio in favor of propesing. W9FYF will burn the gang up with that bug of his. W9FHY, BYK, CBU, HDI, BTP and BTO are proud owners of new receivers, W9IPH says the a.r. super is FB. W9FYY is trying a 50 'tach. in his 141.L. AJP, UF, and AVE. W9BAK is on new QRA with 14 rooms. W9JN and EYN are planning new a.c. club transmitter. The Springs portable emergency transmitter will be working FB, and will be on during the tests next fifty, and will host his station.

Traffic: W9BTO 16 IFW 4 JB 12 ACY 25 JFP 9 MJM 34 EYN 536 LQO 3 GLI 19 GNK 55 ODE 39 ESA 872 JQ 7 LFE 6 LQS 1 IFD 2. UTAH-WOMING, SCM, C. R. Miller, W9FDJ-W6ZZZ - RM W6ZZZ, Watch for W9JGF passed unlimited 'phone. W9ACV says the s.s, super is FB. W9BYY is trying a 50 watter in his 1''A. W9HRI is QRL beer. W9JB has a transmitter is working FB, and will be on during the gang up with that bug of his. W9HRI, BYK., CBU, W9GLG is QRL job. W9KKY, LNB, and IFD are on W9JA V moved to the mountains. W9MKG reports from

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Traffic: W4AIR 199 A22 BWN 50 BS 6 BW 9 BQX 15 BRG 27 MA 51 VX 3 BDT 4 ATZ 20.
new ham, WS4DZ worked KN5. W5YR worked VE3's. WS4F reports W3ZZAD on the air in the Alamo City. W5ON is building 13.9-m. meter 'phones for the fellows in Houston. W5OX is QRL KI2G.

Traffic: Traffic: W5OW 1015 BKE 107 AFQ 84 MN 48 YL 47 YR 17 PF 10 BU 5 BKY 6 ADZ 3 DBN-ABH 2. New Mexico SCM, Jerry Quinn, Jr., W5AUW - W5BNT is our prize traffic man. W5CMW is leaving us to be a W9. W6BV reports new hams in Clovis, W6CXP. W5MP is back from R.C.A. W5OCG is bothered by local power co. W5AOPT gives a new batch of traffic. W5JZ wants a second set and W5UV is hunting up 52s. All correspondence to the SCM should be addressed to Jerry Quinn, Jr., 524 West Coal Ave., Albuquerque, N. M.


Canada

Maritime Division

Nova Scotia - SCM, A. M. Crowell, VE1DQ - VE1ER tops the list. VE1EX keeps the Island on the map. VE1BV handled some death traffic. VE1OY would send FB dope on club. VE3HV is home from Toronto. VE3NN is fishing. BE1CR is servicing BCL sets. VE3CK likes reports on DX, and DN. VE3HN is strong supporter of VE1A. 47 YH 17 PF 10 BUV 5 BKY 6 ADZ 3 DBN-AH.

Traffic: VE1A 111 EQ 19 MG-HE 17.

British Columbia - SCM, J. King Cavalsky, VE3AI - VE3AM is building new rig. VE3BI blew his 10s. VE3AG has gone to sea. VE3BU was a visitor in town. VE3CC is off schedules. VE3HJ is working crystal. VE3JC is hot on DX. VE3HE is in town. VE3DZ is on the move. VE3DK is a new hams in Roseland, VE3AI is on 'phone. VE3BE6 schedules Victoria, VE3SA is a new call.

Traffic: VE3CB 25 JM 60 DX 26 EQ-HP 27 HP 180 HI 3 FG 3 GS 6 AL 2 CQ 3 HG 4.

Prairie Division

Manitoba - SCM, Reg Strong, VE4GC - The M.W.E.A. has had many favorable comments on the "Ball." VE4AX schedules AE and HI. VE4De worked much DX. VE4AMW scheduled death message. VE4BO leads the DX hunt. VE4DK's fifty is deceased. VE4MY suggests using crystals for monocles. VE4CD is a new-comer. VE4AU needs pair of tens. VE4GP is going east. VE4AW won a scholarship at McGill. VE4AG is building his commercial ticket. VE4UI and FT are QRL. VE4BZ is O.O. VE4BJ has fishing tackle oscillating. VE4JY is active at signal corps station. VE4ZV is getting nearer OK. VE4LI has new typewriter. VE4RC has a new aerial. VE4MT doesn't believe in crystals. VE4BG has heard cards from both VE and ZL. VE4ACF chews the rag at high speed. VE4FU keeps the new hams in line. VE4D9 should have call changed to "UK!"

Traffic: VE4BZ 60 MW 55 AX 24 CQ 20 DJ 9 KU 6 GC-AM 3.

Saskatchewan - SCM, W. Skaife, VE4EL - VE4EU is a nice 'phone outfit on 1.7 mc. VE4AT hooked a VK. The SCM visited OTTAWA and TORONTO. VE4EL has heard W9DNZ and WK3KU. VE4FZ will be visiting New England Convention. VE4FZ will be visiting New England Convention.

Traffic: VE4AF 200 BB 70 at 59 GR 80 EL 23 AU 15.

28-MC. Notes

WB5TW, Glen Rose, Texas, heard WS4DZ and WS4DG on 28 mc. at 8:30 p.m. CST, May 15. On May 14 he also heard WS4DO and X9A but believes they were 14 mc. harmonics. On May 7th W9GFF, Wheaton, Ill., working on 28 mc., was QSO W5BTT at 9:45 a.m. CST. On the same date WS4DZ heard QSO QSO W9QF. W9QFZ on 28 mc. has heard the 14 mc. harmonics of XDA. W2AU, W5AMC, W5CAQ, W5CM, W9CDM, W9DNZ and W1KU/1WU. W5BWT and W9QFZ will be on 28 mc. each week-end. It is suggested that stations working such CW should always let the new QRA, VE2GE know they are not receiving "harmonics."
Conducted by Clinton B. DeSoto

General:

Amateur radio is scheduled to play an important part again in the third Belgian ascent into the stratosphere, which will this year be conducted personally by the brilliant young Belgian radio amateur and physicist, Max Cosyns, B9, assistant to Prof. Piccard, who accompanied the distinguished Belgian savant on the two previous flights. The ascent is now definitely scheduled for July from Hoar-Havenne in the province of Namen, although the exact date is not known at the time of writing. Experimental tests with various forms of radio equipment in aircraft are being conducted by Jacques Mahieu under the call: X.XON4AU, preliminary to the construction of the apparatus actually to be used in the stratosphere. The Reseau Beige and the A.R.R.L. have arranged cooperative schedule's in connection with these tests, which are being conducted in the 7- and 14-mc. amateur bands.

Officially authorized by the Soviet government, amateurs in the U.S.S.R. are now using the prefix "U" in place of the previous "EU" for Europe and "AU" for Asia. This is in conformity with the table of call letter distribution adopted at the Madrid conference, to be generally effective the first of next year.

The R.S.G.B.'s recent 3.5 mc. contest was well supported, it is learned from J. Clariceotes, secretary, with the laurels going to Scotland. Jack Wylie, G5YG, Scottish manager of the R.S.G.B., won first place with a score of 202 points. W. A. Clarke, G5FY, R. A. Bartlett, G6RB, and S. A. French, G6FN, were runners-up with scores of 163, 161 and 160 points respectively. Thus Scotland wins its third R.S.G.B. contest this season, the others being the 1.7 mc. and low power tests.

Quite a number of reports of inter-Antipodes overhearing on the 7-mc. band the long way 'round have been elicited by recent comments on this subject in these columns. The term "long way around" is used advisedly: some are inclined to insist that the signals travelled through the daylight zone. At any rate, it is all highly interesting evidence, more effective than any amount of theory or words, that radio conditions are again approaching those of ten or eleven years ago.

National:

In continuation of the series of articles on the national member-societies of the Union, we present this month the following account of the development and growth of amateur radio organization in South Africa.

Amateur Radio in South Africa

By R. C. H. Taylor, Honorary Secretary, S.A.R.R.L.

As in the case of most of our sister societies, organized amateur activity in this country is of comparatively short duration. At the same time it is interesting to note the several phases of radio development which led up to the formation of the South African Radio Relay League in 1925. With this in view we go back to the period of the Boer War (1899-1902), when military operations were assisted by the use of several field stations, though no record can be found to show that this service was of material advantage.

Of amateur activity at this period there is no evidence and it is not until 1912 that we learn of isolated groups of amateurs working "spark" in several of the larger towns. Contact between stations more than a few miles apart was out of the question and no attempt was made to organize on lines such as we have today.

The advent of the Great War, of course, saw the immediate cessation of all amateur activity,
and there the thread of the story is lost for the time being.

In 1924 we find 21 licensed amateur transmitters in the Union of South Africa and Rhodesia, several of whom, even at this early stage, were experimenting with telephony. Their efforts, while lacking greatly in the technique which is characteristic of modern high-quality transmission, were nevertheless received and enjoyed over OBZSK, THE THOUSAND-MILE-PER-WATT STATION OF HORACE G. GRAY AT SARAWAK

With seven watts maximum input, the world was worked from the wilds of Borneo.

a surprisingly wide range by listeners in. (Commercial broadcasting commenced in June 1924 with regular nightly programmes from the Johannesburg station. Undoubtedly the efforts of our pioneers paved the way for this service by whetting the public appetite and showing just what could be done even with the limited apparatus then available).

It was not until the publication in May 1924 of "Radio," South Africa's first radio journal, that the question of organizing began to be considered. It is certain that the S.A.R.R.L. owes its existence to the efforts of Mears, Raymond Coombs and L. E. Green, of the editorial staff of that paper. These two pioneers soon collected around them a nucleus of prominent experimenters and the South African Radio Relay League came into being, membership being strictly limited to those holding transmitting licenses. The wisdom of this exclusive policy subsequently became apparent. It was impossible for the proxy to function satisfactorily. Whenever business of importance came before the executive it had to be referred back to Divisions before it could finally be voted on and disposed of. For years agitation against this system continued, sponsored by those who suffered most under its limitations. Eventually, early in 1926, an entirely new constitution was adopted, and so far has proved most satisfactory. Supreme control is now vested in a council which meets monthly at League Headquarters in Johannesburg, and is elected annually by ballot of the membership. The Divisional committees continue to function as before.

By May of 1925 the organization had been considerably increased and the sub-continent split up into territorial divisions extending as far north as Kenya and Uganda.

One of the first official acts was the relay of royal greetings via amateur stations to H.R.H. The Prince of Wales, K.G., on the occasion of his visit to South Africa.

In June 1925 international radio history was made when Streeter, A4Z, established the first DX contact with Braggio, CB8, of Buenos Aires.

About this time the ranks of the League were thrown open to any person not in possession of a transmitting license but professing a genuine interest in the science of radio.

In January, 1926, Mr. Joseph White, M.C., A.M.I.E.E., accepted the office of President and it is pleasing to record that he holds this position today. To him the League owes a great debt on account of the skilful way in which he has guided its destinies through troublous and disheartening times.

During September and October of 1926 an event took place, the recounting of which will be of interest to readers of QST. This was the Silver Springbok Contest in the course of which amateurs throughout the United States concentrated on effecting two-way contacts with South Africa. The event was won by Borden, U-1CMX, with some 35 contacts to his credit, while in South Africa, Marks, A3B, topped the list with 307 American contacts. The prize of a silver springbok was duly presented by the editor of the "Rand Daily Mail" to 1CMX.

We come now to a consideration of present phases of the League's activities, and it is fitting that a word should be said at this stage regarding the government of this organization of ours. As has already been stated, the sub-continent was originally split up into a number of territorial divisions the headquarters of which were situated at convenient points. The control of each of these territories was vested in a committee, the chairman of which was also a member of the Executive Committee at League Headquarters in Johannesburg. In view of the fact that in most cases he was resident hundreds of miles away and unable to attend meetings at Headquarters, a proxy assumed his place on the central executive. The weaknesses of this system very soon became apparent. It was impossible for the proxy to function satisfactorily. Whenever business of importance came before the executive it had to be referred back to Divisions before it could finally be voted on and disposed of. For years agitation against this system continued, sponsored by those who suffered most under its limitations. Eventually, early in 1926, an entirely new constitution was adopted, and so far has proved most satisfactory. Supreme control is now vested in a council which meets monthly at League Headquarters in Johannesburg, and is elected annually by ballot of the membership. The Divisional committees continue to function as before.

The business of the League is conducted by honorary officials, whose spare time is almost entirely devoted to the work.

Membership is divided into four grades: Full, Associate, Empire (applicable to British subjects resident outside the Union of South Africa), and

QST for
Foreign. The number of members today remains fairly steady at about 400, of whom, it is pleasing to note, a fair percentage are amateurs in other parts of the world, including Great Britain and the United States. This fact is particularly gratifying to us in view of the greater facilities offered by Societies overseas.

The League’s development has been bound up largely with that of its news-organ. In 1926 the “FO Bulletin” made its first appearance and was extremely well received by the scattered membership. It consisted of four mimeographed sheets and was published fortnightly. After an honorable life it was superseded by a printed journal, QTC, published monthly, which, in its fifth year, continues to flourish and finds its way into all parts of the world. It is surprising how this little 20 page publication has won through despite a world depression and consequent decrease in revenue. To QTC goes the honor of being (we believe) the only ham journal to have had one of its editorials reproduced in full in the columns of the Akyab Trophy. The O and B Trophy has editorials reproduced in full in the columns of and was published fortnightly. After an honorable mission, however, is the Emergency Communications Scheme under which a number of QTC, published monthly, which, in its fifth year, continues to flourish and finds its way into all parts of the world. It is surprising how this little 20 page publication has won through despite a world depression and consequent decrease in revenue. To QTC goes the honor of being (we believe) the only ham journal to have had one of its editorials reproduced in full in the columns of QST?

Contests are frequently held. Three floating trophies change hands annually. They are the HOS Trof, donated by Mr. Raymond Coombs; the C and B Trophy, awarded to the amateur who performs the most meritorious feat of the year; and the Akyab Trophy. The C and B Trophy has been held both by Mr. Macgregor, the first South African to effect contact with New Zealand in the “good old days,” and Mr. Drennan, who gave 10-metre work a great fillip by working Germany at a time when very little was known about this band.

A recent contest which aroused considerable interest was a relay of messages through each of the five territorial divisions which comprise the Union. The best time put up was 2½ hours, which is remarkable in view of the natural disabilities at present affecting short distance work.

South Africa by virtue of her geographical position can truly be said to be unique in that at times radio conditions prevail which are found in no other parts of the world. An analysis of the bands is instructive:

<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>160 meters</td>
<td>Very seldom used.</td>
<td></td>
</tr>
<tr>
<td>80 meters</td>
<td>Usable during summer on account of constant and terrific QRN. Enjoys a fair measure of popularity during winter when conditions prevent local contacts on higher frequencies.</td>
<td></td>
</tr>
<tr>
<td>40 meters</td>
<td>Generally recognized as the most popular band for all-round working. During winter months signals on this band from stations between 10 and 500 miles away often fade out suddenly at sunset and do not reappear until the following morning. This phenomenon when it first appeared caused quite a little consternation in the fold.</td>
<td></td>
</tr>
<tr>
<td>20 meters</td>
<td>Used for DX contacts in a few isolated instances. Was a most popular band a few years ago.</td>
<td></td>
</tr>
<tr>
<td>10 meters</td>
<td>Not used at all at the time of writing.</td>
<td></td>
</tr>
<tr>
<td>5 meters</td>
<td>Considerable interest in this band has been aroused by the publication of results achieved in Europe and America. Unfortunately it has not as yet achieved the popularity it deserves. More organized investigation is sadly needed.</td>
<td></td>
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</table>

As is generally the case throughout the British Empire, the control of the communications system is a government monopoly. Amateur transmissions are therefore confined to messages concerning the experiments in hand. An interesting development, however, is the Emergency Communications Scheme under which a number of picked stations, all members of the S.A.R.R.L., are handling traffic connected with the administration of the League and its divisions. This system is sponsored by the Department of Defence and already a traffic network is in existence which can at a moment’s notice be placed at the disposal of the authorities in time of stress or national disaster. So reliable has this network become that gradually all correspondence connected with the administration of the S.A.R.R.L. has been diverted to it from the postal system, special permission for this having been granted by the Postmaster-General.

South African amateurs have reason to congratulate themselves on the attitude adopted by the Postmaster-General who has on many occasions shown himself as sympathetically disposed towards amateur operation. None of the bands laid down at Washington have been curtailed, except in the case of 40 meters where the use of telephony is somewhat restricted. The Department of Posts and Telegraphs has taken a keen interest in special amateur experiments and on several occasions has consulted the League in connection with local technical difficulties. This co-operation is particularly appreciated.

Telephony has been a feature of local amateur operation for at least eight years. From time to time it has achieved a wave of popularity when every second station on the air was modulating with voice. Generally speaking, however, the quality has been of a low standard.

In conclusion, may we add that nothing gives us greater pleasure than to have the opportunity of meeting and entertaining brother amateurs from other shores? We sincerely trust that those who contemplate visiting this country will not omit to advise us of the fact in order that we may kill the fatted calf and get the beer on ice!

W5BSK suggests tacking tinned braid around the wooden transmitter frames that many hams use. Grounds can be made to the braid just as conveniently as to the regular metal frames.
Pre-War Stuff

Columbus, Ga.

Editor, QST:
I have read with increasing interest the several letters and articles of old timers who recall those halcyon days when spark reigned supreme. To me there has always been a great respect for the spark, whether a ten-inch Marconi coil, the rotary or the quenched gap. Few of us old timers have forgotten the joy of getting that "pure d.c." touch to an old ten-inch coil grunt, or that melodious hum of the rotary doing its stuff. What a kick I got when I first heard Von Lepel's whistling arc, on which he played all kinds of tunes—not to forget Poulsen's arc.

My first "wireless" days were in 1908, when I learned the intricate art of the work. My first assignment was aboard the Empress of Britain in 1909 as second operator, with Fred Beatson, a Scot who loved his wee doch and dorach, as my senior operator. On this 18,000-ton ship, our rig consisted of a Marconi ten-inch spark coil, huge Leyden jars and a Maggie detector. For long distance to get press from Poldhu and WCC we had a receiving inductance that stood four feet high on the table to the left and contained miles of wire, I expect. Some of you OT's will remember that this was about the time that Jack Binns had saved the Republic. It was a very puffed up second operator who strutted the decks in his white uniform and gold braid, to hear the passengers whisper to each other: "There goes the only man who can save the ship after the Captain gives up hope." Did I strut? Shall I ever forget the day when Capt. Murray brought the Earl and Countess of Macclesfield into the radio room to see the wonders thereof, when the Skipper accidentally sat on the key just as Beatson had grabbed hold of a brass rod to disconnect the sending set from the receiver; how he yelled a terrific oath as he got the full charge of about 30,000 volts and jumped six feet back and put his head through a glass chart on the wall. It took several whiskies at the Skipper's expense to revive him!!

I notice a reference in January issue to the United Wireless Company. I wonder if the writer remembers the grand old feud between the United Wireless and the Clark Wireless Company centering around Lake Erie. Whenever one of them would start operating, the Buffalo station had a tank of brine in which were two electrodes. The operator just screwed the key down and the brine solution and electrodes did the rest. If I remember rightly this jamming kept up by the hour on end. Not much traffic got through when those boys were on the job.

I wonder how many OT's remember the 5-kw. Telefunken station that I worked on for a summer on the top of the T. Eaton store in Toronto. DX with 5 kw? Why, old boy, I could even get Tobermory on the Georgian Bay, 200 miles away. My old friend Keith Russell of Toronto used to work a Clapp-Eastham quenched gap Hi-Tone set that used to be the delight of my life. So did Conway Todd while I worked on VGU, the Ontario No. 1 on Lake Ontario, using a S.F.R. transmitter and receiver, with a 1000-cycle alternator and an air-blown gap. I worked New York, WSK Siasconsett I think, on that set one dark night.

Then do you recall the war days when sigs were reduced to a minimum'? What a torment the American ship operators used to be to those who were not used to their dragging style of sending, as we labored on His Britannic Majesty's Naval Stations off the coast of Nova Scotia with a ten-inch spark coil for short distance and a two kw. rotary for DX. Oh boy! Do I get a laugh out of it all as I look back! Would you believe me if I told you that before I went afloat in 1909 I knew the call sign of every ship on the Atlantic? That was required before going out.

Yours for DX and fond memories of the past,
—Geoffrey Hinshelwood, W4BBV

Ham Publications

408 Sicily Ave., Ravenna, Nebr.

Editor, QST:
Just how many ham sheets in these United States can be considered successful? I refer to the smaller publications edited for the purpose of disclosing the activities of amateurs within a limited area.

During the past two years I have subscribed to several such publications. Not one of these was successful, and all were discontinued before the subscription had been fulfilled. Such business as this certainly does not promote good will between the subscriber and the publisher and it tends to destroy faith in these publications, which are in reality a wonderful asset to the amateur.

What would the American Radio Relay League
LAST MONTH

on this page, we pointed out a number of design features — such as Isolantite Stator Insulation, thick aluminum plates, constant impedance pigtail, insulated bearings — which are in part responsible for the wide acceptance of NATIONAL condensers as a standard of quality.

Most amateurs with a keen technical interest in the art know what these refinements offer, but many have made the pardonable mistake of feeling the price must be prohibitive.

So let's consider price. From the wide selection tabulated, pick a popular size, such as ST-100, with 100 mmf. capacity and 180° rotation, and note the very modest list price of $2.25, to which the usual discounts apply.

And to make a thoroughly convincing comparison, go to your dealers and see one. Compare it, detail for detail, dollar for dollar, with any competitive make.

When you have done this, you will know why communication engineers and advanced amateurs have specified National ultra-high-frequency condensers for years.

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</tr>
</tbody>
</table>

*Per Section | 13000 Volt Rating | 2Usual Trade Discounts Apply
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 bona fide 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

Using the Head

1406 Butternut St., Syracuse, N. Y.

Editor, QST:

Without doubt you are familiar with the fact that no two amateurs will build the same unit in exactly the same way, and also that an article appearing in QST will surely be revised to suit the requirements of the individual. Along these lines let me submit to you certain refinements which have been incorporated into the more popular transmitting circuits by the amateurs in this area.

At the time that the push-pull 45 transmitter came along, it was immediately accepted by a number of the fellows around here, and worked very FB. The natural thing to do was to increase power, use larger tubes, and get out better. But that's where the rub came in. Most of us didn't get out better. A change to 203-A's in the same circuit did not justify itself as far as results were concerned. What's to do about it, let's put out the lights and go to bed? I guess not. Digging around in QST files looking for push-pull articles we find one applying this circuit to 852's. The first difference that strikes the eye is that of the plate tank: tuning arrangement. We read that a double-section condenser is necessary to balance up both sides of this circuit, so let's go and see how our present single-section condenser is acting. Testing with a neon bulb the glow on one side is fully double that on the other. Reversing the rotor and stator connections to the tank condenser reverses the hot side of the circuit. It is possible to get the two sides nearly even by adjusting the feed point with our coil center tap clip, but this point is nearly two turns off. Having decided that we need a split condenser we proceed to cobble the one we have or else get another one. We hook it up as shown in the 852 diagram and discover that our plate coil is too small. The new coil is made and inserted and again we're ready to steamboat. This time things act normal, and the note in the monitor is much smoother. Also the output has gone up. Guess that's because the r.f. choke that's been giving us such a headache is working at last. And so it goes, The whole set is designed to conform to the higher power and the results are at last gratifying.

Mentionnez que vous l'avez lu dans le QST — Cela vous identifie et aide le QST
VACATION SALE for July only!

The NEW "20-W JR." Crystal Controlled Transmitter Kit, $10.95

This efficient little transmitter is very low priced, making it possible for anyone to use crystal control at less than it would cost you to get the parts together for a self excited rig of this type. The "20-W Jr." is simple to wire and get on the air and the most inexperienced operator will have success with it. The size of the transmitter is only 6" x 17" and is therefore suitable for portable use. Only one milliammeter is required for tuning the transmitter and blocks are provided for this purpose, for each stage. The plug-in crystal holder is supplied with the set at an additional cost. The "20-W Jr." uses one 947 as crystal oscillator, one 48 as buffer or doubler and two 46's in the amplifier. One set of three coils is supplied with the set for either 20, 40, or 80 meters, 50 cents extra for the set of 160 meter coils. When ordering mention your choice of coils.

90 or 160 meter X cut crystals supplied for only $2.75 if purchased with the "20-W Jr." kit. Hiert milliammeter if purchased with the kit only $1.25

The "EAGLE" Three-Tube Short Wave Receiver

Only finest material used throughout — employs one 32 R.F., one 32 Detector and one 33 Pentode Audio — 15 to 200 meters — four coils supplied. The "Eagle" is economical — two dry cells will operate the filaments. See March or April QST for full description on this most excellent value in short wave receivers.

"Eagle" Completely Wired and Tested... $10.95

Three Tubes Tested in Your Receiver... $3.00

GROSS

Special Power Transformer

for use with '38 tube will give an output of 500 volts D.C. at 300 MA with choke input. Run your entire R.F. and Class B off this transformer. The regulation for the class B is about 5%, filaments are two 7½ v, and one 5 v. Special... $5.75

A transformer having the same filament windings as above — at 300 MA, having 750 volts each side of C.T., Special... $5.75

750-1000 V, each side of C.T., 300 watts. Extra special... $6.50

High grade filament transformers shielded in metal cases, center tapped secondaries. 2.5 volt 10 amperes for 866's, 10 to 12 volts at 8 amperes — other types. Special... $2.35

Special — 10 to 12 volt 7.5 amp, filament transformer, extra special... $1.85

CARDWELL CONDENSERS

123-B .0005 mfd... $7.35
164-B .0002 mfd... $2.35
167-B .00005 mfd... $4.10
T-199 .00033 mfd... $5.88
T-183 .00011 mfd... $5.50

GUARANTEED TUBES

Heavy Duty Isolantite top 800... $2.10
888 or 871... $1.15
83 and 47's... $0.90
281 Plain... $0.90
210's... $1.30
Deforest 46's... $0.70
Deforest 410's... $1.15

Stranded about 6 gauge 7/16 Silicon Bronze antenna wire hard drawn — won't stretch. $3.00 per 100 ft.

The "GC 30" SERIES XTAL TRANSMITTERS

See May QST

20% deposit with all C. O. D. orders. Remit by M. O. Include Postage.
Recently a mighty fine little rig appeared in QST that struck my fancy. I'm referring to the 47 crystal oscillator and 46 doubler. BUT I don't want a doubler, what I want is an amplifier. So I dig up the dope on the 46, and go around asking questions of W8CYT, W8CP, and W8CDB. Talk about your divided opinions! Where one says the two grids should be tied together, the other says the inner grid should go to plate. At any rate I build the thing (changed to suit my individual taste) using series plate feed. That's because I feel the chokes will be more efficient. Secondly there is a choke in the crystal circuit. Thanks to W8CYT I put that in right off the bat, and W8CP found his crystal wouldn't oscillate without it. From any literature I can find on the 46 it says that this tube needs no bias. Having tried it from no bias in thousand-ohm stages up to ten thousand, I found that two thousand ohms was what I wanted to use. Note that I didn't say that that value was correct. Not being a radio engineer, I can only cut and try, and then use what strikes me as being best in my rig. Also having watched the inner grid in a 46 burn out when it was tied to the plate in a rig that WSAXC was building I decided to use it with both grids tied together. WSAXC is now using this circuit with a Type 10 as amplifier. Mine is a 46. His puts out more wallop, but mine bothers the BCL's less. There you are and take your pick. This is written just to suggest that things can be done to adopt any circuit to any need, and possibly to assist some in making changes.

—Arnold M. Weichert, W8AOW-GNW

Counting Messages

516 N. Harvard Blvd., Los Angeles, Calif.

Editor, QST:

I wish to offer a suggestion that I believe would greatly reduce the number of non-deliveries of messages.

The weak point in the present system is the crediting of two messages to a station that relays a message. It is much easier to pass a message along for some other chap to deliver than to mail it. Ships at sea relay traffic without charging for two messages and I see no reason why the amateur should collect double credit for a QSP.

The man who delivers messages can make the BPL more easily, you may say, but he deserves it for his expense on postage and trouble in mailing. An impressive total tickles some amateurs' vanities and relaying certainly inflates their totals. I have known selfish hams to hand messages around the city to all of their friends so the section in which they were operating could have a large total! Under the present system a message can hang around the country for weeks, so long as each station clears it within 48 hours, and still credit each station with two messages. There is greater chance for error, passing through so many hands, and eventually
A.R.R.L. Letterheads. Write your radio letters on League stationery—it identifies you. Lithographed on 8½ x 11 heavy bond paper. Postpaid. 100 sheets, 50c; 250 sheets, $1.00; 500 sheets, $1.75.

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THE AMERICAN RADIO RELAY LEAGUE, INC.
WEST HARTFORD, CONN., U. S. A.
it may reach a non-A.R.R.L. operator who will throw it away because it is so old. If a message has reached the Continent it is intended for I believe it should be mailed within three days of its filing date!

A point which should be stressed is correct routing of traffic. If a message originates in New York for Los Angeles it should be relayed, not mailed, from Denver but one originating in Manila for New York should be mailed from Los Angeles to insure delivery and ample time will be saved.

I have held an ORS appointment and intend to apply for another one shortly but have often had better deliveries from non-ORS operators who had no ulterior motive in accepting messages. They would deliver instead of relaying traffic.

If amateur traffic handling is to serve public convenience it is the deliveries that count! If it is merely to have large numbers after station calls in QST the present system is flawless.

— Geo. Dery, W6HG, ex-WQBY

Receivers vs. High Power

Editor, QST:

For three years I have been content to read QST from cover to cover without the desire to voice any opinions of my own. I always enjoy reading the Correspondence Department, and have often wondered if that department is unpopular with the majority of the QST readers. It seems to me that if any thought at all is given to the numerous excellent letters that appear therein, there could not be such an utter disregard to so many of the finer considerations in amateur radio operating.

Let that be as it may. The purpose of this letter is not to cover old territory. It has been covered before, but not so often as the "Long CQ" topic, for instance. Here goes, so let's hope that someone will read this who will appreciate the sincerity with which it is written and act accordingly.

I have constructed my own version of Jim Lamb's new Single Signal Superhet. The crystal in the i.f. filter has been omitted for the present, and since 'phone is used mostly here at W9FVR, the mistake held in believing that a high-powered transmitter is the only requirement for "getting out" through the QRM — at the same time overlooking the fact another strong carrier on the already crowded band is only making matters worse, and that results will be obtained only as long as the average power used by amateurs remains less than our own power. When most of the boys
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(who have dough) are using the maximum power allowed to hams, what are they going to do next to pierce the QRM? When that time comes, surely they will realize their folly.

I find that with this receiver, about all that is necessary for reception is the presence of a carrier, be it ever so low in power. I have received 5- and 10-watt 'phones on both coasts on the 160-meter band, QSA5 early in the evening, when the high-power babies give them a chance to get through. I have also noted the instance where three DX stations were coming in QSA5, side by side, with no QRM to each other, when a 250-watt carrier came on top of them and put them clear out of the picture. The 250-watt carrier was some 600 miles away, and just a shade higher in frequency than the higher one of the other three. No more was heard of the other three stations until the high-power boy flopped his switches off again.

Also, I have been able to receive good DX not more than 50 km removed from a 20-watt carrier from a station located just 12 miles from me. I have been able to hear all districts on 160 meters before 9 p.m. On my old receiver, a tuned r.f. job, I could hear only 9's and 5's consistently, with occasional reception of the higher powered 8's and an infrequent 2 or 3. Where I used to get nothing but a pile of heterodynes, I can now pick out readable stations.

The point is this. Receiver sensitivity and selectivity can be increased to an unknown limit without adding to the present QRM. Transmitter power can be increased only to a very definite limit, with the sorrowful result now evident on the ham bands. To you fellows with the jack, if you must spend it on receivers; give the 10- and 20-watt 'phones a chance, and note the improvement in the QRM situation. The transmitter power at W9FVR is about 25 watts. Since putting the super into use, the number of contacts has been increased some fifty per cent. The same might have been accomplished by increasing the transmitter power, but no additional QRM has been caused, and a genuine feeling of pleasure is experienced with each QSO that would have been impossible with the old tuned r.f. job. With a good receiver, a 10- to 20-watt carrier is ample to reach any place in the good old U.S.A., so all power over that amount is good for nothing but QRM.

Whatever happened to the idea of the "High Power Holiday"? Let's have it —by making high-power unnecessary.

—E. R. Jensen, W9FVR

Five-Meter Fone

12 N. Westminster Ave., Greensburg, Penn.
Editor, QST:

"Five-meter fone, just some more of that ultra-high-frequency stuff. You can't work anybody with it." And with some such remark the ham turns to more interesting pages of QST. How many times have you hams said the above? The OM used to say it every time he ran across
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(See page 2)
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Stomach Ache

Springfield, Ohio

Editor, QST: The enclosed report on Standard frequency transmissions is another illustration of the
ARE you proud that you are an amateur—proud of your A.R.R.L. membership? Then proclaim it! Let the hams who meet you on the street, in the radio store, or traveling, know it. Wear your A.R.R.L. emblem! The distinctive League emblem comes in three different forms. Its use by members is endorsed and encouraged by the League. Every member should endeavor to display the insignia of his organization in every possible way.

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Say You Saw It in QST — It Identifies You and Helps QST
thoughtless brass pounding that continually fills the air on all amateur frequencies.

It was not to be expected that the transmission from W9XAN would be heard as the whole evening showed evidence of skip distance, but there was every reason to expect that W6XK should come in with reasonable volume. All evening stations six hundred miles and more were coming in with loud speaker strength and some of the loudest stations heard were those in the sixth district.

The first transmission from W6XK on 7000 kc. was satisfactory as there was no other signal near that frequency, but after the shift to 7100 kc. it was just too bad. On that frequency and all of the rest in the band there was no chances for any use of the transmission in this part of the country.

Of course I suppose that it was all done by those hams that never learned to read and so were not able to read in QST just when the transmissions were to be on the air, and such being the case, we will forgive them for this time and hope they all are in bed with the stomach ache when the next transmission is being put on.

--- Paul Crowel

Extending the Frequency Calibration

PAUL E. GRIFFITH, W9DBW, 910-YA, State University of Iowa, at Iowa City, offers a practicable method of getting calibration points beyond the band limits.

"The amateur possessing a frequency-meter of the heterodyne type, calibrated in either the 1.75-mc. or 3.5-mc. band but operating in the 1.75-mc. band, can easily extend its range on both sides of the band for which it is calibrated. All he needs is a receiver which will oscillate in the 14-mc. band and an accurate calibration of his frequency meter.

"To find a point beyond the high-frequency end of the band, first multiply the frequency desired by seven and divide the product by eight. This will give the frequency in the calibrated portion of the band at which to set the meter. Set it there and tune your receiver until you find the eighth harmonic of this frequency, somewhere close to 14 mc. Zero-beat it on the receiver and return the frequency-meter to the other end of the band until a harmonic beats with the receiver. This will be the seventh harmonic of the frequency end of the calibrated portion of the band.

"An example may clear this up: Suppose it is desired to find a point beyond the low-frequency end of the band, multiply the desired frequency by eight and divide the product by seven. This will give a setting of the meter in the low-frequency end of the calibrated portion of the band.

"A quantity product throughout 40, 80, 160 M. Scx' crystals supplied within 225 kc. of specified frequency. $4.50, 5kc. $5.50, 85kc. $6.50. 30M quartz crystals within 50 kc. $12.75. Each crystal frequency within 0.55 cc. of calibrated value $6.50. 50 kc. $12.50. With parallel trimmer. $7.40. 100 kc. $17.00. With BR plugs spaced 1½". $1.25. Quartz crystals manufactured to specifications from 20 kc. to 15 M. C."

--- Paul Crowel

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$5. Philco 12 watt demonstration dynamic $7. Western Electric 22B, 355A 1600 volt $125. 230 volt $175. 200 volt $300. Ward's 203As brand new, Westinghouse or GE, $10.00. 20BA class B transmitters $35.50 pr. Counterbalanced Cardwell 166Bs $30.00 each.

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SELL: 75 watt controlled transmitter, complete with tubes, crystals, power supply, W8DRF, 1975 Taylor Rd., East Standing, Ohio.

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- See Editorial April issue of QST

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A few still left as advertised last month. Write us for the one you are interested in if we still have it we'll hold it for you.

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503-A and 545 tubes, now manufactured under R.C.A. supervision; each...

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Leeds dustproof holder...1.45
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<td>$3.00</td>
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<td>A127</td>
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<td>Open and Closed</td>
<td>3.50</td>
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