AMATEUR EQUIPMENT

TYPE 358 AMATEUR WAVEMETER
The Type 358 Wavemeter is especially designed for amateur use in checking wavelengths. It covers a range from 15 to 220 meters by means of four coils of low loss construction. Each instrument is individually calibrated.
Type 358 Wavemeter with Calibration Chart...

TYPE 127-C HOT WIRE AMMETER
The Type 127 Hot Wire Ammeters are equally accurate on direct or alternating currents of any frequency. They may be used for measuring filament currents, antenna radiation and have many other purposes.
Priced from $7.25 to $9.00, according to range.

TYPE 334 TRANSMITTING CONDENSER
The Type 334 Transmitting Condensers may be used in short wave transmitters with voltages up to 2000. Plates of both the rotor and stator groups are soldered to insure perfect electrical contact.
Type 334-T Condenser, Capacity 100 MMF...
Type 334-V Condenser, Capacity 50 MMF...

TYPE 356 CRYSTAL HOLDER
The Type 376A Amateur Quartz Plate is intended primarily for use by amateurs in controlling the frequency of transmitters, but of course may be used for any purpose in which plates in general are adapted. Supplied at random frequencies between 1750 and 2000 kilocycles.
Type 276-A Quartz Plate...
Type 356 Crystal Holders (As illustrated)...

General Radio Co

We welcome your correspondence in regard to technical problems. Bulletin No. 929 describing our complete line of apparatus will be sent on request.

30 State St., Cambridge, Mass. 274 Brannan St., San Francisco, Calif.
In these days of fluctuating line voltages which seriously affect the operation of AC Receivers the Stoelting Regulator is a practical necessity and is one of the most noteworthy contributions to the radio industry since its inception.

(1) Maintains practically constant voltage input to the receiver even though the line voltage fluctuates from 95 to 135.

(2) The Stoelting Regulator functions in a manner to control or adjust the voltage applied to the receiver so that just the proper voltage is applied to the receiver at all times regardless of the line voltage at the light socket which enables the best operation on the receiver.

(3) Very compact and simple to install.

(4) Employs usual plug connection to lamp socket.

(5) Very simple nothing to get out of order, no replacements, will last a life time.

(6) Made in following sizes:

Type A—60 watts—60 cycle

C—60 "—25 "

D—120 "—25 "

The 60 watt type units are designed for operating receivers using the standard 121 or 121 type power tubes. 120 watt units are designed to operate receivers employing the 210 or 250 type power units.

(7) The Stoelting Regulator will operate receivers regardless of the number of tubes employed. It greatly prolongs life of radio tubes.

(8) A boon to owners of radio receiving sets in localities where line voltage is constantly either excessively high or excessively low. If the line voltage is too low it automatically raises it or if it is too high it automatically lowers it to the proper operating voltage for the receiving set.

(9) The addition of the regulator adds practically nothing to the cost of operating the receiving set.

(10) The Stoelting Regulator will operate all types of receivers which operate on lighting current lighting from commercial light service.

(11) Manufactured exclusively by the Amrad Corporation under the applications of H. H. Stoelting.

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MEDFORD HILLSIDE, MASS.
Don't take Chances with Condenser Breakdown!

"The man who tries to save a few cents by buying cheap condensers is always in danger of having to pay out many dollars for replacement parts. A cheap condenser is expensive when it breaks down."

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Play safe with PARVOLTS!

The rapidly increasing use of by-pass and filter condensers in modern A.C. operated circuits demands the greatest caution against poor quality, inaccuracy of rating and non-uniformity in condensers.

Nothing can do so much harm to impair radio reception or effect such costly losses in assembled parts as defective or inaccurate condensers.

It is of vital importance to use condensers of proper ratings, and to know the ratings actually are as stated and that all stated ratings are uniform.

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Condensers which possess these qualities not only aid quality reception, but overcome the possibility of breakdown and heavy losses from ruined tubes, transformers and other parts.

All Acme Parvolt Condensers are made and tested to standards of the R.M.A. and N.E.M.A. They are used and recommended by leading radio engineers, designers, service men and custom-builders everywhere. Play safe with Parvolts! Made by THE ACME WIRE CO., New Haven, Conn., manufacturers of magnet and enameled wire, varnished insulations, coil windings, insulated tubing and radio cables.

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Made by the Manufacturers of
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| *Temporary officials appointed to act until the membership of the Section concerned choose permanent SCMs by the nomination and election.
The simple signal given by two lanterns hung in the belfry of Boston's Old North Church, started Paul Revere on that famous ride of April 18, 1775, immortalized by Longfellow's poem.

**Ease of operation**—simplicity, as simple, indeed, as the signals which played so important a part in the birth of our nation; that is naturally expected in any A-C (alternating current) light-socket operated receiver.

But the Grebe Synchrophase A-C Six offers far more than mere ease of operation; far more than relief from bother with batteries.

In addition to the convenience of light-socket operation, you have freedom from A-C hum (so annoying in many A-C sets), incomparable tonal beauty, range and selectivity, and exclusive Grebe improvements resulting from nineteen years of outstanding leadership in the radio field.

Grebe Synchrophase Seven, $145; Grebe Synchrophase Five, $105; Grebe Natural Speaker, $35; Grebe No. 1750 Speaker, $17.50.

A demonstration of the Grebe Synchrophase A-C Six will convince you of its superiority. The features of this new receiver are fully explained in Booklet Q, which we'll be glad to send you.

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A. H. Grebe & Company, Inc., 109 West 57th Street, New York City

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Some Overlooked Possibilities for the Radio Club
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Calls Heard
Correspondence

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The American Radio Relay League

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

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

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

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

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Address General Correspondence to Executive Headquarters, Hartford, Conn.
THE current amateur regulations define an amateur station as 'a station operated by a person interested in radio technique solely with a personal aim and without pecuniary interest. Amateur licenses will not be issued,' the regulations say, 'to stations of other classes.' The regulations also state that 'amateur stations are not authorized to broadcast news, music, lectures, sermons or any form of entertainment, or to conduct any form of commercial correspondence.'

Today a number of stations are operating in violation of these regulations. Frequency assignments are hard to get these days and for this reason, or because the owners of these stations have a commercial interest in communicating with amateurs, our bands have been invaded. It is an improper situation and one to which the League objects. For some months it has been receiving the League's attention and we have protests on file at Washington now against the granting of amateur licenses to such stations. No company whose interest is a pecuniary one should be permitted to operate on the amateur waves. They are not amateurs, and even if we had plenty of kilocycles to spare, which we have not, these people should not be permitted to operate amateur stations to communicate with amateurs for their own business purposes. Their operation is so plainly in violation of the regulations that we do not see why their licenses are not cancelled. The very purpose of the specification against conducting commercial correspondence over amateur stations is to deny commercial companies the right to use our wavelengths for such purposes. If they are entitled to use radio they should have limited commercial licenses, which are provided for that purpose, and corresponding frequency assignments outside of the amateur bands.

If any such stations get definitely established in our bands there is no reason why any number of similar agencies cannot demand such licenses and result ultimately in crowding us out, so that our bands eventually become occupied by a collection of what ought to be limited-commercial stations. Naturally the League is opposing this tendency vigorously, and is demanding of the Commission that these stations be removed from our bands. The amateur bands are for amateurs, and it is the rankest kind of subterfuge for commercial establishments to carry on communications that relate to or are on behalf of their business enterprises, under an amateur license. Our bands must be protected, and we must arouse ourselves at this encroachment by business interests. We do not care whether these interests are eventually given limited commercial licenses or not—it is not for us to say what kind of license, if any, they should have—but we are certain that if their operation is permitted it should not be on amateur wavelengths. Some of these interests desire limited commercial licenses; some of them flaunt in the face of the Commission the promise to stop doing things which are illegal under amateur licenses as soon as they are given the other kind of license they are requesting; others do not seem to be particularly urging the matter because they wish to retain amateur licenses so that they may continue, for business purposes, to communicate with amateurs. Needless to say, the League feels that they have absolutely no right to such a license.

In addition to using frequencies improperly in our rapidly narrowing bands, some of these stations are making such a tremendous bid for the establishment of 'good will' amongst amateurs, on behalf of their proprietors, that they are quite completely monopolizing amateur message traffic in their vicinity. With their relatively enormous resources, compared with amateurs, they put in excellent high-powered apparatus and hire day and night shifts of operators, and, by their ability to afford constant operation, gobble up all of the message traffic in sight—in an endeavor, on behalf of the enterprises sponsoring them, to make contact with the amateur world, display interest in amateur affairs, and generally to ingratiate themselves with amateurs. As a result, amateur traffic distribution is monopolized, for the rest of us cannot compete with such practices, and in such districts it is getting to a situation where there is very little enjoyment in traffic operation except for the favored correspondents of these stations. While we would welcome the creation of so good a traffic-handling system by an amateur, and laud him in our columns as being a king of brasspounders, we can't be expected to like it when commercial enterprises come into our band and do this thing for their own selfish purposes—and we don't think we should have to put up with
it any longer than it takes Washington to cancel their licenses.

Such stations offer amateur radio no good. They should not receive encouragement from amateurs; we really ought to ignore them on the air. Communication with them constitutes 'fraternizing with the enemy' who has invaded our bands; traffic handling with them permits the monopolization of our traffic by people who are not amateurs; and friendly intercourse with them enables them to say that they have amateur good will, to which they are not entitled.

—K. R. W.

Standard Frequency Transmissions from 9XL

Station 9XL is a special station, comprising one of the three portions of the 'Gold Medal Station', WCCO-9XL-9WI at Anoka, Minnesota. WCCO operates as broadcstation, 9XL purely as a standard frequency station and 9WI as a general amateur station, the three transmitters having independent equipment and antennas but a common power supply. Through arrangements made by K. V. R. Lansing of the Official Wave Length Station Committee of the Experimenters' Section, A.R.R.L., 9XL is operated on schedules regularly announced in QST. The work of operating the station is done without charge by Chief Operator Hugh S. McCartney and his operating staff.

While no guarantee of accuracy is made on a gratis service, it is the aim of the staff to maintain an accuracy of 1/10 of 1%, which is materially better than can be held by most wave meters. The frequency values are based on the standards of the Bureau of Standards and have been checked by the Communications Laboratory of The Massachusetts Institute of Technology, also by Cruft Laboratory at Harvard University.

Important Notice—The continuation of this free service from month to month depends on the response received. Direct acknowledgments to 'Experimenters' Section, A.R.R.L., 1711 Park Street, Hartford, Conn.', using ordinary stationery or else the special blanks supplied by the Experimenters' Section, on request. A goodly number of these blanks has been gathered and as the number grows we will gradually gain a unique and accurate record of transmission phenomena possible with no other station.

9XL now uses a small percentage of tone modulation to make the signal distinctive.

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<td>Time Schedule A</td>
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<td>9:30 3.5 (80.7) 7.0 (42.5)</td>
<td>3:00 14.0 (21.4)</td>
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<td>8:42 4.0 (75.0) 7.1 (40.5)</td>
<td>8:12 14.2 (23.1)</td>
<td>8:42 4.0 (75.0) 7.1 (40.5)</td>
<td>8:12 14.2 (23.1)</td>
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<td>9:06 5.5 (35.3) 7.6 (39.5)</td>
<td>9:36 15.0 (20.0)</td>
<td>9:06 5.5 (35.3) 7.6 (39.5)</td>
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<td>9:18 9.9 (32.3) 7.8 (36.4)</td>
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<td>9:18 9.9 (32.3) 7.8 (36.4)</td>
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<td><strong>DIVISION OF TIME</strong></td>
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<td>5 minutes—QST QST QST on 9XL.</td>
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<td>3 minutes—5 sec. dashes broken by station call letters every half minute.</td>
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<td>1 minute—announcement of frequency in megacycles per second (8.75 megacycles per sec. is sent as &quot;S 75 MC&quot;)</td>
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**Strays**

The attention of all amateurs is again directed to General Order No. 26, Federal Radio Commission, appearing on page 15 of our May issue, announcing the termination of all old Department of Commerce amateur station licenses on August 31st. If not already done, application for renewal must be filed with the Supervisor not later than July 31st.

Another reference to that same page is important: amateur operator's licenses will not be renewed without re-examination unless application therefor is made prior to expiration. Keep your date in mind.

The postage to New Zealand is two cents for both cards and letters, explains Wood of oz1FE. Many American hams are putting five cents on their cards and letters, he says, and this is simply a waste of good cash.
Electrical Prospecting
A New Field for the Amateur
By J. J. Jakosky*

INDUCTIVE methods of prospecting such as those described in this paper may be another vocation for the radio amateur. Such work has all the thrills of prospecting and at the same time requires close attention and technical study.

Electrical methods of geophysical prospecting have been assuming increasing importance during the past two years. Geologists and mining engineers are finding such methods of great value, both for the first study and for the later development of mining property. Especially is this true in mountainous districts where the geology is complex and in territories where the geology has not been worked out sufficiently to be of direct help in predicting the location or extent of "mineralized zones".

Much of the mining area of Canada is overlain with glacial debris and the mining engineer or geologist has but scant surface indications on which to interpret the property. In such cases the electrical methods of prospecting are of inestimable value.

During the past two years it is estimated that electrical methods have surveyed ninety percent of the total area studied by geophysical methods in the United States and Canada for mining exploration (this does not include oil exploration). In other words, the electrical methods have been used in over ninety percent of the area surveyed, while the remaining ten percent of area was surveyed by the other methods, such as the torsion balance, magnetometer, variometer, seismic method, etc.

The Radiore field crew usually consists of four men; the crew chief, the assistant crew chief, the radio technician, and a junior engineer. The first two mentioned are usually graduate mining engineers with practical mining experience and knowledge of geology. The radio technician may be an electrical engineering graduate or an amateur with sufficient electrical knowledge to operate and keep in repair the transmitting and direction-finding equipment, and to carry out such tests and calibrations as may be required in the conduct of the work. The work is done by the "inductive" method. This paper will describe briefly the major phases of the inductive methods and point out a few of the electrical factors which must be studied and understood if reliable results are to be obtained from the field work. Before going to this, one must explain that all the electrical methods of prospecting depend for their results on the effects of electrical currents produced in the earth, and further that they detect the presence of bodies of ore (or other material to be found) by the fact that these bodies are usually much better electrical conductors than the "matrix" around them. Sometimes this relation is reversed but in all cases the material to be located must have a considerably higher or lower conductivity than the matrix. All this will be considered in detail later in this paper.

THE "ENERGISER" OR TRANSMITTER
The battery output is converted to a.c. by the apparatus in the box on the ground. The vacuum tube oscillator on the tripod leg converts this to any desired frequency within a wide range so that the larger induction loop may carry audio frequency current, radio frequency or intermediate frequency. The field of the loop induces in the earth and in ore bodies the secondary fields on which the system depends.

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*Consulting Engineer, in charge Research and Development, the Radiore Company, Hollingsworth Building, Los Angeles, Calif. Also Research Engineer, Geophysical Prospecting, Department of Metallurgical Research, University of Utah, Salt Lake City, Utah.

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1. See QST for March, 1928, page 43.
THE INDUCTIVE METHOD

The inductive method is so named because the current flowing in the earth is obtained by electro-magnetic induction instead of by the use of ground electrodes.

Inductive methods of geophysical prospecting as used by the Radiore Co. have two well known and comparatively simple operating phenomena; electromagnetic induction, by means of which an alternating electromagnetic field on the surface of the ground causes or induces a current to flow in a sub-surface conductive body, and second, a modified radio direction finding station by means of which directional readings can be made and the conductor located.

Whenever an alternating magnetic field cuts a conductor, an electromotive force is generated in that conductor, the magnitude of which is proportional to the strength of the alternating magnetic field and its frequency. In turn, the induced e.m.f. will cause a current to flow, the magnitude of which will be dependent on the effective conductivity of the conductor. In our practice the magnetic field is obtained by causing an alternating current to flow in a closed coil such as shown in the accompanying photograph of the Radiore high frequency "energizing" apparatus. The essential parts consist of storage batteries for power supply, a frequency changer where the direct current from the storage batteries is changed to a low frequency alternating current, an oscillator box where the low frequency is changed to a high frequency current, (usually 40,000 cycles) by use of power vacuum tubes, and the vertical loop or coil through which the high frequency current flows. The high frequency current flowing in the vertical coil creates the high frequency electromagnetic field, which induces a current to flow in the conductive ore-body.

FIELD SURROUNDING A SIMPLE CONDUCTOR

An alternating current flowing in a conductor sets up an alternating electromagnetic field having the same frequency as the current. In the case of a simple conductor, such as a small diameter wire of great length suspended alone in air, the field will surround the wire and travel outward from it in the form of concentric circles as shown in Fig. 1. It is well known that in this simple case a direction finding coil would give maximum and minimum signals when located as shown in the figure. This must not be understood to mean that in the practical case the coil when giving max. signal will always "point" at the conductor. On the contrary it will "point" to the apparent location of the conductor, which is to say it will be at right angles to the advancing wave front, but that wave front will almost certainly be very much distorted. In radio compass work such distortion is a great nuisance but in Radiore work this is precisely one of the most important effects used in locating the conducting deposits one is in search of.
FIELD SURROUNDING A SIMPLE COIL CARRYING AN ALTERNATING CURRENT

An alternating current flowing in a simple coil will create an electro-magnetic field which will have the same frequency as the current, and will radiate outward in closed magnetic or flux circles. The flux circles will travel outward with uniform velocity but the field intensity or flux density will not be uniform, but will be maximum in the plane of the coil and minimum along the axis of the coil perpendicular to that plane. If we plot intensity of the field in every direction in a plane containing that axis the well-known "figure-eight" curve will be obtained.

DETECTION OF SECONDARY FIELD

The field produced by the current in the sub-surface conductor (one body) is generally known as the secondary field in distinction from the primary field produced by the engineer. There are a number of methods that may be employed to study the secondary field. The most satisfactory form of detecting equipment is that employing a direction-finding coil and a set-box containing a vacuum tube "detector", amplifying and compensating stages, and

THE SPECIAL APPARATUS USED IN WORKING WITH OUT-OF-PHASE AND DISTORTED FIELDS

This apparatus consists of a completely shielded, (compensated antenna pick-up) receiver and two coils rotatably mounted on a six-foot arm. A graduated arc and vernier are attached to the arm to allow direct reading of angles. The two coils are of identical electrical characteristics and so connected that their induced Emfs. are impressed upon separate vacuum tubes. The output or plate circuits of these tubes are opposingly connected through a differential transformer.

head phones. This method is similar to the direction finders used by shore radio stations in determining the position of ships at sea. Maximum signal (for an undistorted wave-front) is obtained when the plane of the loop is in such positions as shown in Fig. 1, while minimum signal is obtained at 90° from those positions, that is to say when the plane of the coil is at right angles to a line joining the coil and the axis of the field. This is also shown in Fig. 1. In actual field practice, minima are observed due to the fact that they are much "sharper" than the maxima. It should be noted, however, that in the case of geophysical prospecting the coil is working in a vertical plane as opposed to the horizontal plane in which ship direction finders work.

In one of the photographs is shown the direction finding apparatus. The pick-up coil is mounted upon a surveying transit,
and the angle toward the conductor (called the "dip") is measured by the vertical arc of the transit. The operator rotates the coil until the position of minimum signal strength is noted.

The elementary conditions prevailing in actual operation can best be illustrated by referring to Fig. 2. Here is pictured an end view of a long, thin conductor so placed as to be in the field of the energizing coil. The primary, secondary and resultant fields are shown by vectors. The direction finding coil will be seen to have two fields linking it. At position A, the component fields would exert the following effect: Since the energizing coil is placed vertically, it will tend to cause the direction finding coil to give the maximum signal when it too is vertical as represented by the vertical or primary vector; the field surrounding the conductor will tend to produce the maximum signal in the direction finding coil at the angle shown by the vector (called the secondary vector) pointing toward the conductor. The resultant effects of the primary and secondary fields are added vectorially and the coil will actually give the maximum signal when in the position shown by the resultant vector. Moving the direction finding coil to the position C, which is directly above the conductor, results in a vertical angle being obtained. At this point both the primary and the secondary fields will induce the maximum signals in the coil when it is vertical. As the coil is moved beyond the vertical position the dip angle changes, as shown by the vectors D and E.

**ADDITIONAL FACTORS**

If the primary and secondary fields arrive at the receiver in phase a definite resultant direction will be obtained for any given ratio of strengths of the two fields; and also "sharp" minima will be obtained. The resultant is the vector sum of the vectors representing each field.

Oftentimes the two fields are *not* in phase, especially when using the higher frequencies. Under such conditions no position of zero signals is possible, and as a result the minima are not sharp, and will vary in direction depending upon the relative magnitude of the two fields. Such a condition is readily recognized in practice; the remedy of course is to change the energizer frequency until "in-phase" conditions are obtained.

A shift in the phase relation between primary and secondary fields is due largely to the following factors: average depth of the ore-body as compared to the distance between energizing and receiving equipment; distortion of wave-front; difference in velocity of propagation between air (through which the primary field travels in reaching the receiver) and the earth.
(through which travel the portion of the primary field energizing the conductor and the useful portion of the secondary field); transformer action, and distribution of current in the conductor.

When working at low frequencies, say 500 to 1000 cycles, there is usually only a negligible shift in phase between the two fields. At a higher frequency the phase shift may be of sufficient magnitude to introduce a serious error in the indicated direction. Errors of $10^\circ$ or more may be encountered in field work due to out-of-phase relations.

**EFFECT OF DIFFERENT MEDIA**

An electromagnetic wave travels most rapidly through the air. The velocity in any other substance will be less than that for air, and dependent upon the magnetic permeability dielectric constant, and other factors. Measurements made in the Darwin, California, mining field gave an average value of velocity through the earth of about one-fourth that for air.

A simple example will show the phase shifting effect caused by waves traveling through different media. Consider an energizer generating a field of 60 Kc. frequency. In air this is equivalent to a wavelength of 5000 meters. Let us find the phase shift (due to difference in velocity of propagation alone) at a point near the surface and 500 meters distant from the transmitter. Assuming the test is made under similar conditions to those prevailing at Darwin, the wavelength of the sub-surface wave is $\frac{1}{4} \times 5000 = 1250$ meters. The phase shift is then

\[
\left( \frac{500}{1250} \right) \times 360^\circ = 108^\circ
\]

Now if we consider a wave whose frequency is but 500 cycles, the resultant phase shift will be only $0.8^\circ$.

Measurements are made of wave front distortion by use of the special apparatus shown in one of the photos. In making measurements, the apparatus is so placed that the axis of rotation for the arm carrying the two coils is parallel with the effective axis of the conductor. The arm is then rotated until no signal is heard. The angle which the arm makes with (for instance) the vertical gives the angle of the wave front at that particular point, after balancing out the primary field.

In Fig. 2 is plotted the secondary field wave front for conditions similar to those prevailing at Darwin. Note that the curve is not a circle after the wave emerges from the effective surface of the earth. This figure is plotted by assuming the earth as a homogeneous material or medium. The direction finding coil is shown in positions of maximum signal strength. A study of them will show the reason (see paragraph headed Field Surrounding A Simple Conductor) why particular attention was called to the fact that maximum signal strength is obtained when the coil is perpendicular to a tangent to the wave front, and not when it “points” toward the orebody. Compare this figure with Fig. 1.

The effect of wave front distortion is to give an indicated depth less than the true depth of the conductor. By making several readings on each side of the vertical it is possible to calculate the distortion and then to locate the conductor even though the wave front is highly distorted. An accuracy in depth of about $\pm 10\%$ (sufficient for most mining purposes) may be expected for bodies less than 500 feet deep, though such calculations are subject to errors which often must be compensated for, such as effects of non-homogeneity, relative conductivity, adjacent conductors, topography, etc. In Fig. 3 is shown the primary and secondary field vectors where the secondary field is distorted. Note that the secondary field vectors do not point toward the conductor, and compare these directions with Fig. 2 and 1. The angles shown for the secondary vectors were taken directly from Fig. 2.

**DISTORTION OF PRIMARY FIELD**

The primary field from the energizer is also subject to distortion as indicated by Fig. 4 where again the velocity of the sub-surface wave has been assumed as one-
fourth that of a wave in air. It will readily be seen that the distortion of the primary wave at the receiver will vary with the height of the receiver above the ground. Note that distortion caused by differing velocities of propagation is independent of the frequency. In other words this kind of distortion occurs whether a 500-cycle or a 50,000-cycle current is used in the energizing coil.

**PHANTOM DIPS**

Due to the distortion of the primary fields or improper alignment of energizing and receiving equipment it often happens that a (usually less than 20') "dip" is obtained. This is called a *phantom dip* and is the angle which the direction finding coil makes with the vertical when no secondary fields are present (see right-hand view of Fig. 5). If the energizing coil is vertical, the direction finding coil will give a vertical reading only when the wave front is not distorted and no conductive mineralized zones are present. Phantom dips can readily be recognized by the experienced operator however. In case of doubt, it is usually only necessary to move the energizer and note changes in angles. Phantom dips do not, as a rule, give proper converging lines. Such dips are also obtained under proper conditions when the energizer and direction finding coils are located on a ridge or in a narrow valley or canyon. The greater the distance between the energizer and the direction finding coils, the greater is the wave front distortion. Distortion of wave front and improper alignment of energizer and direction finding coils can also cause phantom dips.

Because of the comparatively short operating distances between the energizing and direction finding coils in the application of the Radiore process, together with the small size of the energizing coil compared to the operating wavelength, the field is almost wholly induction, with a minor radiation component.

The emf. generated in a conductor by an induction field is proportional to the product of the energizer current, the frequency and the mutual inductance between the energizer and the conductive body. The voltage induced cannot be calculated in these cases, as the mutual inductance is a complicated relationship depending upon many factors. The current flowing in the ore body caused by the induced emf. will depend largely on the effective conductivity of the ore body. The current along the ore body will be less rapidly attenuated than the primary field; elementarily this may be considered a "line radio" effect. The signal strength of the induction field from the energizer traveling through air decreases much more rapidly ( inversely as the square of the distance) than the waves traveling over conductors (often inversely as the square root of the distance).

**FINAL DETERMINATION OF CONDUCTOR LOCATION**

A. Plan Location of Conductor.
To make a plan view of the conductor or the "indication", it is merely necessary for the field surveying party to locate a series of points where the indications are vertical on either side of which converging dips are obtained. The simplest method is actually to move along a traverse until the vertical is found thereby locating a series of points which are vertically above the mineralized zone. Light weight direction finding equipment such as shown in the photographs allow this to be done rapidly. An average operator can set up the apparatus, level it, and make a reading in about 30 seconds.

B. DETERMINING DEPTH OF CONDUCTOR
In field practice the operator reads only the resultant direction. In determining the depth of the "indication" a series of read-

**FIG. 5. AN ILLUSTRATION OF A DISTORTED WAVE-FRONT DUE ONLY TO THE ENERGIZER'S BEING PLACED "BACK" AND A LITTLE TO ONE SIDE OF A HILL**
tings (often seven to ten) are made across the conductor, and the angles read. If these readings are plotted now, a series of lines would be obtained somewhat as indicated by A, B, C, etc. in Fig. 6 where the method of plotting is explained.

As previously mentioned, the ratio of primary to secondary field varies with the distance between energizer and direction finding apparatus. In Fig. 7 two curves are shown (plotted as shown in Fig. 6). Curve A was obtained for a strong ratio of Primary field while in curve B the two fields were approximately of equal strength. Note the general shape of the two curves, and the difference in the length of the “tips”. In actual practice this is compensated for by making the direction finding readings within certain predetermined distances of the energizer coil. If a “smooth” curve were drawn, thereby neglecting the “tip”, we would get an intersection with the resultant vertical which would be below the actual axis of the conductor. This may be seen by reference to Fig. 7, where the “smooth” correction curves are shown by dotted lines.

EXPERIMENTAL AND DEVELOPMENT SHOP WHERE NEW IMPROVEMENTS ARE WORKED OUT

It can therefore be seen that by neglecting the “tip” we get an indicated depth below the actual electrical axis of the conductor. As was shown in Fig. 2, however, distortion of wave front causes an indicated depth less than the actual electrical axis. Under proper operating conditions, these two effects are more or less compensating. In practice, therefore, the “smooth” curve shown in Fig. 7 is used. This curve is empirical and was originally obtained by studying the survey data of the experimental work at Darwin, California. However it has since been used extensively in the United States and Canada and found correct when later checked by diamond drilling or actual mining. The results obtained are sufficiently accurate for general mining work down to depths of 100 to 150 feet. Results of within ±20% limits are obtained down to 300 or 400 feet, which still comes within ordinary mining limits.

completed survey map

The method of determining the plan location of the conductor has already been mentioned; this is frequently known as the reconnaissance survey from the rapidity with which the general layout of the conductors of “indications” is learned. A detail survey then follows to ascertain the depth of the conductor at various points as mentioned in the paragraph above, from which an elevation view can be obtained. Fig. 8 shows a complete map such as is delivered to the owners after completion of the Radiore work.

when electrical methods can be employed

Electrical methods can be advantageously employed when the electrical conductivities of different strata or components of the earth’s surface differ considerably. Generally speaking, this means that the ore body must be a good conductor in compari-
son with the surrounding envelope or country rock. Ratios of conductivity of approximately 100 to 1 or greater are usually necessary for good indications; these are common, while ratios of as high as 1000 to 1 or 10,000 to 1 are not uncommon. The results of the many surveys completed in

the United States and Canada to date indicate that the mineralized areas are highly conductive, the conductivity varying considerably with the frequency.

The ores which are amendable to electrical prospecting are generally speaking those which occur in nature in such a form as to be electrically conductive. The question of conductivity is a relative one. The common "conductive" ores include pyrites, graphite, chalcopyrite, arsenopyrite, some anthracite coals, a few carboniferous shales, galena, pyrolusite, magnetite, and the metals.

Many ores (such as the majority of the oxides, carbonates, and silicates, and two common sulphides, stibnite and sphalerite) are non-conductive. Such ores may often be located indirectly due to their occurrence in association with another ore which is conductive. Thus zinc sulphide, a non-conductor, sometimes occurs with iron pyrite, a conductor, in which case the more commercially valuable zinc sulphide would be located by tracing the electrical indications of the iron pyrite, which in itself has no commercial value. In general, electrical prospecting shows the location of conductors without indicating the commercial value of the ores. This may be predicted to an extent, however, by the experienced geologist or mining engineer from previous investigations, outcroppings and general conditions.

ELECTRICAL CONDUCTIVITY OF ORES

All electrical prospecting methods depend for their operation upon the effects produced by a flow of current.

The effective conductivity of an ore-body takes into account the following factors: (1) type of mineralization; (2) relative conductivity; (3) frequency effects, and (4) current distribution. These will now be considered.

1. Type of Mineralization. It will readily be seen that the type of mineralization will have a great effect on the indications, mostly in its effect on the three factors considered below. The conductivity of the ore material is important but usually secondary to its continuity. If the ore material is thin or "sheet-like" or has numerous conductive bodies occur in close proximity to each other, the current distribution will be different from that of a single body having uniform cross-section.

2. Relative Conductivity. The absolute or unit conductivity of an ore must be considered in connection with its effective area and mass. For instance, it is quite common for an ore-body of low unit conductivity and large cross-section to manifest the same electrical effect as an ore-body of high unit conductivity and small cross-section. In other words, conductivity, shape and size determine a factor which the writer calls "mass" or "total conductivity." The conductivity of the ore relative, to the surrounding envelope also must be considered. An ore having a relative conductivity of say 100 in an envelope of a relative conductivity 1, will behave electrically similar when using the inductive processes to another ore body having a relative conductivity 1000 in an envelope with a relative conductivity 10.

3. Frequency Effects. Frequency effects are of considerable importance since they influence both the unit conductivity and the effective conductivity due to "skin effect". In many ores the conductivity for direct current is quite different from that for alternating current; some ores have nearly the same conductivity to both direct and alternating currents. Disseminated
ores may be considered as composed of small conducting particles distributed in a gangue or matrix. As a rule this matrix is calcite, quartz, etc., and has a low electrical conductivity; i.e., a high resistance.

The impedance offered by a disseminated ore body to an alternating current varies inversely with its effective capacity and the frequency of the impressed emf., when the matrix is considered to be non-conductive. In many ores, however, the matrix is conductive due to moisture and impurities. Conductivity is a factor which is dependent on the so-called constants of the electric circuit, which in this case are resistance (largely in the matrix) and capacitance between particles. The conductivity or admittance determines the current flow for a given emf. (electromotive force of 'voltage').

Returning to the question of frequency, the use of a high frequency results in a small value of capacitive reactance and a resultant large value for the admittance of a parallel circuit. Frequency, however, also must be considered from another viewpoint. The higher the frequency, the greater the skin effect or redistribution of current toward the outside of the conductive mass. The effective resistance therefore increases due to the fact that the central or interior portions of the conductor are carrying only a very small portion of the total current flowing through the conductor. As the higher frequencies are approached it will be found that the increase in effective resistance overcomes the decrease in capacitive reactance in broken or disseminated ores. It can thus be seen that the shape and size of a conductive body, together with the type of mineralization govern the frequency which will cause the greatest current flow in that particular conductor.

4. Current Distribution. The effect upon electrical geophysical instruments depends
considerably upon the distribution of current through the conductive ore-body and the surrounding earth.

ACKNOWLEDGMENTS

The information contained in this paper is largely the result of early investigative work conducted by the Radiore Company. Special acknowledgment is made to Mr. Paul M. Segal, 1BGF of Hartford, has joined the Headquarters Staff as assistant to Mr. Hull in the technical development program announced in our last and preceding issues of QST. Mr. Briggs has eight years of successful amateur experience during which he has made most of his apparatus. His early shortwave tuner, in the first days of 100-meter work, attained a considerable vogue, especially in South America where it was put up in kit form and advertised as *el circuito P. O'Briggs!*

As mentioned elsewhere in this issue, L. A. Jones has resigned his position as Assistant to the Communications Manager to become radio observer and operator on the Yacht *Carnegie* which has just sailed for a three year cruise to all parts of the globe. 'LJ' will be missed at 1MK but we shall have plenty of opportunity to keep in touch through WSBS, the 250 watt C.C. outfit on the *Carnegie*. Louis R. Huber, 9DOA, of Tipton Iowa, well known as former Section Communications Manager of Iowa, will succeed Mr. Jones, coming to headquarters directly on completion of his University work at Iowa City.

Thanks are hereby publicly tendered Mr. R. H. Barclay of Stone & Webster at Boston for the calculation charts he so generously donated. The demand has in the end considerably exceeded the supply and many requests have had to remain unfulfilled.

Three autos-full of Headquarters staff drove up to the recent New England Division Convention at Boston. Ross Hull insists that he got a greater ‘kick’ out of the trip than anyone else. On the Saturday, he engaged his newly-purchased Hudson in a splendid auto wreck in which the other fellow’s machine was almost demolished. After spending a half day trying to keep out of jail he drove his slightly bent auto back to the parking area at the Hotel from which, on Sunday, it was stolen. No, it was not insured.

Throughout May and June 1XM will transmit on 28 megacycles (10.71 meters) using crystal controlled 852's and an automatic tape transmitter. The schedules: Saturday, noon to 2 p.m., E.S.T. (1700-1900 Greenwich) and Sunday, 9 to 11 a.m., E.S.T. (1400-1600) and 1 p.m. to 3 p.m., E.S.T. (1800-2000). A ten-meter watch will be kept and stations worked when possible. Reports are requested and should be sent to 1XM.
A Short and Medium Wave Receiver
By Chauncey Coston*

THE set to be described is not "just another tube base receiver". I cannot make a secret of the fact that I have been actively engaged in radio only about two and one half years. However, during that time I have devoted a lot of it to the designing and building of radio sets, mostly short wave. Although at times activity was slight because of financial depression, I feel that enough progress has been made to justify my telling QST readers about it, not with the view of discouraging experimenters but of encouraging beginners and saving them money.

The set I am going to talk about is the old three circuit tuner with a few improvements. Variable (not merely adjustable) primary control was found to eliminate 'holes' in the tuning range when a choke coil failed. A fixed tickler with throttle control is essential to plug-in coils. Incorporating the idea (page 28, Dec., '27, QST), for preventing 'fringe howl', was necessary to the satisfactory reception of SW broadcasting. The coils and mountings themselves are self-designed for cheapness and efficiency. The set incorporates smoothness of control, both of tuning and regeneration, ease of change for different wavebands, adaptability to different aerials, compactness, good performance at all wavebands, and can be calibrated.

There are but one major and two minor tuning controls, and the two minor ones can be fixed to cover, in most cases, one waveband with the secondary condenser, without change. The regeneration condenser causes minimum change in tuning. The variable primary causes more change, however, and for that reason should always be placed as close to the secondary as possible, making calibration possible. This set can be calibrated with more accuracy than any plug-in coil receiver I have yet seen. There should be no dead spots within the 20-, 40- and 80-meter bands, broadcasting and ships, but on the 12- and 150-meter bands there may be. Here is where the variable primary comes in. You can tune the 80-meter band with ease but, if you drop much lower, say to KDKA on 63 meters, a tuning 'hole' (no regeneration) might be encountered. By moving the primary away from the secondary, the set is made to oscillate again. Little change in volume is noticed. (Using different aerials these 'holes' may be found on different waves.)

The annoying phenomenon called 'fringe howl', found on some wavebands just as the set is thrown in and out of oscillation, must be eliminated before SW broadcasting can be enjoyed. This is accomplished by a variable resistance, 0 to 500,000 ohms, across the secondary of the first audio transformer and also serves the purpose of a volume control. No smaller resistance is recommended because it cuts down the volume. If a volume control is not wanted, a .5-megohm grid leak can be used. The rest of the set is conventional. The circuit is given in Fig. 1.

Proper construction of the coils is most important. The coils are of strictly low-loss and low distributed capacity design, especially on the higher frequencies. Because of their diameter of two inches, they are unusually compact. The smallest wire judged efficient for the frequencies was used. Even with their mountings, the weight is inconsiderable. The complete coil construction follows. First, comes the dope, a mixture of scrap auto side curtain celluloid and acetone. The celluloid can be obtained free at almost any garage and

**7ABN, 924 Smith Ave., Hoquiam, Washington.

FIG. 1

THE LIST OF PARTS IS AS FOLLOWS

L1, primary coil, special construction and mounting.
L2, L3, secondary and tickler coils, ditto.
7 old UX tube bases for coil mountings.
3 UX sockets, (one for coil socket).
Bakelite or hardrubber for mounting coils, 3/8" wide by 3.16" thick.
Two dozen 6/32 brass roundhead machine screws.
C1, C2, .00025 μfd. SLF variable condensers.
2 vernier dials, (any good make).
R1, variable grid leak.
C3, grid condenser to match Bradley leak.
R3, 0-500,000 ohms variable resistance, (any good make).
R5, Bradleystat.
T, audio transformer, 6-1 ratio.
J, open circuit jack, (can be filament control to eliminate switch).
Bakelite or hardrubber panel, 7" x 18" x 3/16".
Subpanel, veneer or hardrubber, 9½" x 16½".
2 subpanel brackets.
the acetone at any drug store. The celluloid should be cut with scissors into strips about ½" wide and an inch long. These are to be mixed with the acetone until the acetone reaches a saturated solution or it seems hard to make the acetone dissolve the celluloid. It is easier to mix this dope about four ounces at a time. It should be mixed in a bottle and shaken until the celluloid is dissolved. It should be applied

with a small paint brush, preferably the water-color size. The bottle should have a narrow mouth to prevent evaporation of the acetone while in use.

The coils are wound on cardboard tubing two inches in outside diameter. It is easy to make enough tubing by winding cardboard around a bottle and gluing. The tubing can be cut away from the finished coil and not saved as it is not worth while to use twice. In winding the coils, the ends of the wire must be secure. I fastened them by punching three holes in the tubing and threading the wire through, ending with the wire on the inside of the tubing. The wire must be absolutely straight during winding. In the 40- and 80-meter coils that use No. 18 bare wire, allowance must be made for the spacing while winding. Allow about three fourths as much more space as there would be for the wire wound closely. This part may require a little experience. The 12- and 20-meter coils are wound the same way, but these only need to be spaced by eye, as they are made of No. 14 bare wire. On the 40- and 80-meter coils, this must be done with string, however and may be done as follows. Four strips of celluloid ½" wide and as long as necessary are slipped under the wire and spaced equi distant from each other. Care must be taken, when the coils are wound, that the wire ends on each go over the same celluloid strip. This secures the ends when the dope is applied. (The foregoing applies to all spaced coils as well as to the 40-and 80-meter ones.) After the strips are under the wire, take ordinary cotton twine, not cord, and starting at the beginning of the winding, wind the string between the turns. If the turns will not space straight, work at them with your fingers.

When the turns are spaced, carefully unwind the string and on the wire over the celluloid strips paint the dope with the brush, taking care to paint between the turns. Go around the coil twice then let the dope dry about a quarter of an hour. Then go over the coil again until the dope lies rather rounded over the strips. If this precaution is not taken the wire will stick out like the ribs of a dead horse and the coil will not be so strong when finished. When the ‘doping’ is completed, let the coil dry for at least two hours. The longer you let it dry the less likely it will be to get out of shape when removed from the tubing. Don't be in too much of a hurry. The finished coil should have the leads all coming out at the same celluloid strip. After removing the coil from the tubing, all excess celluloid should be cut off.

We now come to the mountings. Take the UX-tube bases (they need not be removed from the tube) place them on something solid and with a hack-saw cut off the part with the prongs on it about 3/16" up from the bottom. Turn the base as you saw to prevent cutting off the clinched part of the prongs. Drill a hole to fit your machine screws (6/32 screws need a 9/64" drill) exactly in the center of the base between the prongs. The Bakelite for all the coil mountings should be cut ¾" wide by as long as the coil. They go two to a coil and should be placed over the celluloid strip that holds the leads, clamping there by means of the machine screw that goes through the base, the bakelite strips and the celluloid between the secondary and tickler coils. The tap is placed on the screw inside the coil. It was not thought advisable to countersink a flathead screw in the tube base between the prongs, as it would weaken the base too much. Instead, a hole the size of the screw head must be drilled in the UX socket used as a coil socket, between the connection holes. This is neces-sary to prevent the threads from cutting into the Bakelite or tube base. For the lower connection, the Bakelite strips can be bent over the prongs and held in place with roundheaded screws. The UX socket has only three connection holes, but they are in the right place for connecting to the upper and lower connections of the coil. The UX is then screwed into the plate coil socket, which is fastened to the outside base of the tube by means of machine screws.
necessary to have the coil steady on its socket. Before fastening the coil to the base run the leads down the tube prongs as shown; if necessary, cleaning the prongs of solder with a drill. The coil is then fastened on the base and the leads soldered at the tips as they were formerly with the tube. The complete result should be a compact, strong coil. I have dropped them on the floor without hurting them except bending the edge wires. If you drop them always examine them carefully as an edge turn might be shorted. The 150-meter coil, as it is wound with No. 22 d.c.c., should be given four coats of dope, two at a time as before, covering the entire outside of the coil. On all the unspaced coils no celluloid strips are used. The same should be done with the broadcast and 600-meter coils but it is recommended that, because of the fine wire used in the latter, it be wound on bakelite tubing to give it strength, in which case the dope need not be used. The winding can be divided in order to let the machine screw through. The broadcast coil may also be wound on bakelite tubing and very little, if any, difference will be noticed in results. In all these coils, the tickler and secondary are always wound together. If the tickler is too far from or too near to the secondary, the set may not be satisfactory in oscillation control. If so, a new coil should be wound. The number of turns as given, should be followed, however.

The construction of the primary coil and mounting is important. The coil itself is of No. 22 d.c.c., 15 turns and supported by the dope. As with all the others it is two inches in diameter. Two flexible leads go from it to their connections. The coil is made variable to the secondary by clamping it (with a small strip of bakelite) on one end of a lever, with the other end through a slot in the panel. The lever is of bakelite and is pivoted at a point that will be most satisfactory. Due to the fact that I had mine running under a variable condenser with the slot under the dial, I had to use bakelite washers to build the lever up to have the primary on the same level as the secondary. This made it necessary to splice the lever. By putting your coil socket lower or your variable condenser higher, you may be able to keep from doing this. The lever should slide on a bakelite strip for smooth action. The idea is to place the pivot at a point that will allow the coil to be moved far enough from the secondary without having too large a slot in the panel. Probably there are better ways of making the primary variable but the main thing is to get it variable from the panel. Placing it on a shaft as a rotor positively will not do, as the coil must always be as close to the secondary as possible except when used to ‘iron’ out ‘holes.’ The farther the primary is from the secondary, the easier the set oscillates. The connections to the coil base are shown in Fig. 2. The coil socket must be wired up to match so it is also shown in Fig. 2A.

**Some Hints**

There are a few tips I want to give about the set and its operation.

If the set doesn’t oscillate at first maybe you have a ‘bum’ tube. Have your tubes tested and change them around.

Before connecting up the set to the batteries, examine the coils and socket to make sure that when you put the coils into the socket it will not connect the tickler to the secondary. This would short your B battery and burn out the audio transformer. It only requires a little care to prevent any accidents.

Be sure the throttle condenser is mechanically strong and has no rotor and stator plates touching. A momentary touch shorts the B battery and makes a lot of noise.

The throttle condenser need not be SLF but it looks better in the set if it matches the other.

Don’t crowd your apparatus and be sure to place the coils at least two inches from the secondary condenser.
An eighteen-inch panel and a 9½-inch sub-panel should be ample for two stages of audio amplification. One stage gives good headphone volume. Add a power stage for loudspeaker operation.

If you want to use DuPont's or some favorite dope, go ahead, but be sure you have had experience. I believe the dope described is cheaper and better.

Be sure to wind all the coils the same way. I wind the wire away from me, over the top of the tubing.

The wire should be cut the right length and fastened to some object while being wound to keep it straight. To find the correct length of wire remember that it is the number of turns times the coil circumference plus six or eight inches for leads. The circumference of any circle is found by multiplying the diameter by 3.1416. In this case, the circumference would be about 6 5/16 inches.

Filament control jack and automatic filament control resistances may be used. The tube filaments are not critical.

A variable grid leak is recommended. It aids in short-wave broadcast reception. It should be placed on the sub-panel away from the panel.

Body capacity should not be encountered if the variable condenser rotates, the sub-panel brackets, and all the free metal in the set are grounded. The coils should be as far away from the panel as possible.

In my experimenting I used a UX socket and tube base for connecting the battery leads. As there are really only four leads to the set, this worked ok.

SPECIAL NOTES

The coils have very low distributed capacity. The turns given for the coils are not enough, if you wish to use a secondary condenser that exactly covers the SW bands. Add 2 turns to the 20-meter, 3 to the 40-meter, and 4 or 5 to the 80-meter coils. The coils were wound for the 0.0025-

\[ \mu \text{fd.} \]

d condenser and on the 20-meter coil go up to WGY, on the 40-meter down to the Australian bands and covers the naval stations, and on 80 meters goes down to KDKA and WLW. The range of the coils was intentional and not a mistake, as the amateur bands are easily covered with the condenser and a good vernier dial.

The coils may be used as the oscillator and first detector of a SW super-heterodyne. The only difference is that the intermediate frequency transformer feeding the second detector must have a tickler for c.w. reception. These coils and set construction may also be used in a tubeless SW adapter. Here is a chance for the experimenter.

The operation of this set is exactly the same as any other regenerative set, so there is no use to take the space to explain it.

I will answer all inquiries regarding this set providing a stamped, addressed envelope is supplied.

Fred Schnell, 9UZ, will be delighted to send cigars to any Hams who care to forward him the coupon on page 98 of this issue. 9UZ announces, as justification for his gracious offer, the arrival on April 19th of Richard Elliott.

At a column bottom on the radio page of a local news sheet oh6DJU found this inspiring thought:

VOLTOMETER NEEDED AROUND RADIO SET

One of the most useful investments to have around the set is a voltmeter of suitable range. With it one can test whether the filament and plate volt acid can be neutralized with ammonium hydroxide, potassium or sodium hydroxide. These substances are found in every home in the form of ammonia water and lyes. Do not use too much nor too strong.

Yes, we are inclined to think not.

Additions to the Headquarters personnel invariably are the cause of anguish and distress among the stenographers. Dictaphones are used almost exclusively for the dictation of correspondence, and strange voices, according to the stenographers, sound tantalizingly un-understandable for the first few days. Which, perhaps, explains why Lamb, ex9CEI-3CEI, the new Technical Information Service man, discovered in one of his letters that, 'The tuning condenser may be a 75 \mu \text{fd.} Cardwell paper plate.' Anyway, Lamb says that the thing would be appropriate for a portable set for picnics this summer.
Keying for Break-In

By J. T. McCormick*

A LARGE share of the credit for this story belongs to Mr. Handy, because he gave us "heck" for not asking our neighbors about key-clicks. I asked mine. I received reply; sorrowed; tested; wept; went to work; tested again; wept again; began to really think; went to work again; tested, hopefully, but not confidently. Eureka!

Truly, virtue is rewarded.

For the benefit of the fellow who wants the "dope" without the "why," I shall put the cart before the horse and call your attention to Fig. 1. Now run along and hook it up. The rest of us wants to find out how the thing works.

The keying system shown in Fig. 1 has the following merits: 1. Break-in can be worked right on your own wavelength and without the use of remote control; 2. It is cheap. (Cheap parts can be used because they do not have to withstand high voltage or carry heavy current); 3. It is reliable. (Same reason as No. 2); 4. It tends to improve one's sending. (Who isn't familiar with the "squawk" produced by some keying circuits when the key is open, giving the effect of trying to read a backwave?); 5. It tends to reduce "nerves". (Same reason as 4); 6. It permits a "bug" to be used without a relay. ("Bug" contacts can be made to carry heavy current, but there is another reason for using a relay. One must be able to listen to one's sending when using a "bug" and, if we use a keying method which produces a backwave effect in the receiver, we are forced to use a relay, so that we may listen to the relay!); 7. It may save your life. (It pacifies BCLS!)

Faults? Yes, if you want to call it that, there is one. If the grid of your tube is insufficiently excited, the tube will block at an audible frequency and produce an unbearable racket when the key is open. The reason for this is that the tube ceases to oscillate when the grid reaches a certain not-very-negative value. Oscillation starts, stops and starts again, etc.

If the feedback is ample, however, the tube blocks completely; no plate current flows, and thirty seconds to several minutes time elapse before oscillation again faintly begins. This can be stopped again by a touch of the key. The phenomenon just discussed and which we called a "fault" should really be regarded as a blessing in disguise because it tells us when the transmitter is on the verge of instability. Keying in the plate circuit, we would be unaware of this unstable condition and, upon closing the key, oscillation would not start until the plate voltage reached a fairly high value. Result? Clicks—in spite of all the thump filters under the sun.

Adjusting the transmitter so as to obtain sufficient grid excitation is simplest in the case of the Ultraudion. Simply reduce the capacity of the condenser which controls feedback until the desired keying effect is obtained. The Hartley is a bit awkward. It will be necessary to move the grid clip so as to include more turns—and one turn may be too much, especially if the helix is large in diameter. However, we can console ourselves with the knowledge that the previous adjustment was equally wrong. The Colpitts is fairly simple. Decrease the capacity of the variable condenser between grid and filament and increase the capacity of the plate-filament condenser at the same time so as to preserve the original wavelength. You fellows who are using T.P.T.G., Meissner, etc., will have to work out your own salvation as I lack "first-hand" knowledge of these circuits.

As you have noticed, Fig. 1 is simply the usual form of grid keying shown in Fig. 2

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*9BHR, 210 N. Knox, Topeka, Kansas.
with the addition of a thump filter which controls, not plate current, but grid current.

If we close the key in Fig. 2, the negative charge on the grid will be drained off so rapidly that the tube will go into oscillation with a “hang,” causing a bad key-click. The grid leak allows current to flow according to Ohm’s Law and this current flow is maximum at the very instant the key is closed. Opening the key will be much the same, the grid current will be almost instantly stopped and a charge will accumulate on the grid so rapidly as to cause a thump because of the sudden stopping of oscillation.

Inductance, in electrical circuits, is very similar to the phenomenon of momentum and inertia in mechanics. A locomotive does not move at the instant the engine opens the throttle; soon it moves and then moves faster and faster as inertia releases it. A moving train cannot be stopped by the brakes until its momentum has been gradually overcome.

Now let’s hook up our thump filter and see how it works. Consider the key closed and the set oscillating. Grid current is steadily flowing through the choke, X, C1, of course, is practically short-circuited by the key. Open the key. At first, grid current starts flowing into C1 as if nothing had happened. A charge soon builds up on C1, but it cannot instantly stop the grid current because the current flowing through X possesses a sort of electrical momentum (inductance). Eventually the grid current is stopped, but the stopping is done in the smooth manner of a train halting by means of its brakes. The action of Fig. 1 compares to Fig. 2 as the stopping of a strain by brakes compares to stopping by reason of collision. (Yeh, some thump!)

Now close the key. If R were not present, the entire charge on C1 would pass instantly through the contacts and, perhaps, cause them to stick. R being in the circuit, C1 discharges through R and the key according to Ohm’s Law and all is well. Insofar as key-thump is concerned, R is useless, for the discharge is far too rapid, but our friend, “X,” is on the job and refuses to allow current to flow at the instant C1 discharges. (The locomotive didn’t move, you remember, when the engineer opened the throttle.) Current starts flowing through X and rapidly increases. The grid slides smoothly to operating potential as X allows the negative charge to drain off.

Speaking in terms of coulombs, however, there is not a great amount of electricity to be drained from the grid, regardless of its potential. The charge on C2 plus that on the grid condenser (both condensers of small capacity) constitutes the whole of the grid charge as soon as C1 has been “shorted” by the key. For this reason, the starting of oscillation is apt to be sufficiently abrupt to cause a little QRM if your BCL neighbors are very close. Never mind! We still have Fig. 3. This requires an additional choke, but surely you can find another old audio transformer in the junk box.

Fig. 3 works almost exactly like Fig. 1 when the key opens. But, whenever the contacts close, C1 finds that it must drain its charge through Y. Since Y is an inductance, the discharging of C1 takes time, because the electrical inertia of Y must be overcome. The grid charge, of course, cannot be drained except as C1 is drained. In Fig. 3, C1 is working on both halves of—shall I say, “the cycle?” The double primary of an output push-pull transformer might be used as “X” and “Y.”

If you are causing no QRM to BCLs and feel that your dots are being clipped too short, use a smaller condenser at C1 or else substitute chokes of lower inductance for the transformer primaries used at X and Y. Does the filter work as well as all that? I’ll say it does! If transformer secondaries are substituted for primaries in Fig. 3 and 2 microfarads capacity used at C1, the oscillator is not allowed to reach full power during the course of a dot made by a “bug” key adjusted to send at less than fifteen words a minute. Dashes will arrive late and wear “tails.”

C2 is not absolutely essential to the system, but it does provide a “footing” for the grid choke and bypasses r.f. which would otherwise wander about the shack via the key wiring. If you wish to elaborate, a pair of r.f. chokes placed in the leads between key-filter and set will make C2 more effective. C2 does not affect the r.f. system of the transmitter provided the grid choke, R.F.C., is all that it should be. By winding the grid choke exactly like the plate choke, you can make sure that the former is at least as effective as the latter.

The general “leakiness” of the paper condenser used at C1 determines the length
of time the grid will stay negative after the key is opened. Frequent recurrence of oscillation is very annoying to the operator if he happens to be working break-in on his own wavelength. An ORS who handles much traffic will find it advantageous to incorporate the "keeper" battery shown. This battery has nothing to do with determination of grid bias. Its only purpose is to prevent leakage through C1 by neutralizing the voltage across it. The life of the battery will be equal to the shelf life. About 100 volts will keep the grid of a UX-210 blocked indefinitely.

The foregoing lengthy description of filter action is offered so that everyone may have an understanding of what is going on in the circuit and should not be taken to mean that there is anything particularly difficult about getting the affair into action.

Before one can hope to work break-in, the power supply must be quiet. Don't be discouraged. When the motor-generator used at this station was first installed, the situation looked hopeless. Nothing could be heard through the rattle produced when the thing was running. It even caused QR in neighboring BCL receivers. A pair of r.f. chokes installed after the manner of the Esco ads helped a little, but break-in was still impossible. A ground attached to the frame common to both motor and generator solved the problem. The same ground, incidentally, is shared by the receiver. Mechanical noise was subdued by "mounting" the m.g. on two rolls of old rags. The receiver is just 3 feet distant from the generator and the latter can be heard in the former, but the effect is to raise the noise level but slightly.

The solution in your case may not be the same nor as simple, but there is a solution if you will only find it.

I do not advise the use of a relay to keep the receiver from paralyzing unless you are using high power. I once used such a relay to break the plate current of the detector tube. The tube no longer paralyzed, but my ears did! The popping was actually painful. I make one exception: one might use a second stage of audio with only about 4½ volts on the plate. This is really an excellent stunt, because it removes all painfully loud noises and decreases the DX not a bit. (See QST, June, 1927, p. 36.)

For the common, or garden variety of receiver, I suggest the use of a short receiving antenna. This may, or may not decrease your DX reception—depending on the noise level at your station. The higher your power, the shorter the receiving antenna will need to be for practical break-in work.

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Financial Statement

By order of the Board of Directors the following statement of the income and disbursements of the American Radio Relay League for the first quarter of 1928 is published for the information of the membership.

K. B. WARNER, Secretary.

STATEMENT OF REVENUE AND EXPENSES FOR THE THREE MONTHS ENDED MARCH 31, 1928

<table>
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<tr>
<td>Advertising sales, QST</td>
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<td>Newsdealer sales</td>
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<td>Handbook sales</td>
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<td>Dues and subscriptions</td>
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<td>Rack numbers, etc</td>
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Deduct:

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<tr>
<td><strong>Total Expenses</strong></td>
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Net gain from Operations                           | **$2,446.60**|
Some Overlooked Possibilities for the Radio Club

By M. H. Pancost*

SOME form of radio activity exists in nearly every high school program. In most schools, this is built around some existing feature in the program. It may be that in manual arts classes a few radio receivers are built; a physics laboratory may have a radio receiver or small transmitting station as a part of its equipment; one of the school clubs may be a radio club. In each of these cases, except the last, nothing is accomplished beyond the aims of the class to which radio is attached. In the last case, some knowledge or skill in radio itself may be attained.

It is my purpose to show that radio, organized as a separate part of the high school program, can accomplish each of the things noted above and in addition give the pupil a fair start in what may later be a remunerative vocation or an interesting avocation and at the same time widen his knowledge of geography, meteorology, physics, chemistry, foreign languages, foreign customs, merchant marine, Army and Navy, law, mathematics and civil service. Besides all this, it gives him a circle of acquaintances, limited only by the earth itself, and teaches him the value of 'fair play'.

To do all these things, we simply move the center of interest from the activities noted in the first paragraph to a radio station. This may cost anywhere from fifty to five thousand dollars, one hundred and fifty or two hundred dollars being a fair average cost and this need not all be spent at one time. Many schools spend this much for a few pieces of apparatus that are used but twice a year. The radio station can be used daily, almost hourly, by as many as twenty pupils.

The pupil must first receive some preliminary training in code work. In the Lansing (Michigan) High School, the pupils practice in pairs with a 'buzzer' until they can 'copy' twelve words a minute. At the same time, they learn the form of messages, operating procedure and radio theory, since they must pass an examination conducted by the federal Supervisor of Radio in order to obtain the operator's license which is required before they can operate the radio station. A certain amount of high school credit is allowed for each grade of license held by the pupil. The only teacher supervision required is to give periodical tests and to check the station 'log' to assure regularity of attendance at code practice. Lesson sheets give the pupil the needed information. Some of these are bulletins of the American Radio Relay League. One class period daily is required and from one to two semesters of code practice are needed to prepare the pupil for operating the station.

When the pupil has obtained his license to operate he is scheduled to operate the radio station at definite periods during the week. This includes keeping the station clean, batteries charged, etc. A station of moderate power is in communication distance with other amateur stations up to 1000 miles in daylight, and with foreign stations at more favorable times. There is no time, day or night, when some of these stations are not working, but contact is not always made.

Messages are easily obtained by soliciting the students in the school. This, by the way, gives everyone a chance to learn how to word a telegram. The student operator must know his geography to route his messages properly. He becomes familiar with the use of the telephone and city directory when delivering messages received. Since the opportunity to communicate with stations of the Army and Navy occasionally arises, he learns more about the branches of national defense; in fact, he becomes a potential part of it, since radio operators are always needed in times of emergency. While listening to, or communicating with, foreign amateurs, he has his interest in foreign countries aroused and incidentally, acquires a few foreign phrases. Weather becomes more than a local phenomenon, it affects the range of his station. It emphasizes itself when, while he gazes at a foot of snow, the man at the other end tells how hot it is in Florida. Explorers in the Arctic have depended on amateur radio for several years past for news and for the forwarding of messages to civilization. What boy handling these messages will not have his interest in explorations fanned to white heat?

Furthermore, he can continue his enjoyment of radio after school days are over. Amateur radio operators include all classes, all ages, and both sexes. It may serve as a means of travel, either in the Navy or merchant marine. It may lead to a lifelong

*KRN, E7F; care Central Senior High School, Lansing, Mich.

(Continued on Page 33)
Building a Wattmeter

By I. Vee Iversen*

HOW many of you fellows have wondered what your power input really was? That question has often been in my mind and would be solved occasionally by borrowing a portable wattmeter from the school. A friend of mine gave me the idea of converting an old watt-hour meter into a direct reading wattmeter. I hope you can make good use of the idea.

To start with, you will have to beg, borrow or steal an old watt-hour meter. The type I have found to be best suited for this purpose is the old round-case type, that sticks out about ten inches from the wall. This type has a round glass window in it—and after getting one the fun starts.

After removing the gear train carrying the dials (which can be used for a revolution counting rig if needed around the shack) one gets at the revolving disk. It is upon this disk that the calibration will be made. For this reason, one of the meters with a flat disk will be found unsuited for the job. In the watt-hour meter referred to above, the revolving member is an Aluminum cylinder upon which a paper strip may be fastened. As it is almost impossible to glue paper to metal, I just wrap the paper around the cylinder and fasten the ends of the strip together with a gummed sticker.

When the paper strip is in place, the cylinder should be free to rotate without sticking. If the paper is very heavy it will jam, for the clearances are not great.

If the disk rotates freely it is useless for your purpose so we must put a load on the cylinder to prevent it turning continuously. This is done by attaching a hair spring to the shaft. This spring should be fairly heavy. The springs out of alarm clocks are too light. The spring in my meter is one from a Chronometer. Most jewelers can supply you with one. If you cannot get one of these you can make your own spring. I fastened my spring to the shaft above the cylinder by soldering it to the shaft; the other end I fastened by attaching it to a short length of copper wire which I had put under a screw to hold it in position. To do this, I bent a loop in the spring and slipped the wire into this loop which holds it tightly. You may fix some kind of a stop so the cylinder will make only one revolution but to do this the hair spring must be extra strong, and then the readings at the lower end of the scale will be crowded pretty close together. So, for that reason, I did not put a stop on the cylinder but let the cylinder return to zero setting by the complete unwinding of the spring. I will admit that this is possibly not so good for the readings below, say, 15 watts, but over that it will make no difference. On my meter I wanted it to read to one Kw. and to do this the cylinder makes one and one half revolutions. I used black India ink on the first revolution and green ink for the half revolution. A piece of copper wire fastened under a screw on the front of the magnet, makes a good pointer.

Now the meter is ready for calibration. I suppose every high school that teaches Physics will have a portable wattmeter and most of you fellows are advanced enough to be allowed the use of the instrument. If you can use one of these so much the

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1. Try Dupont household cement.—Ed.
better; then your meter when it is calibrated will be correct. If you hook the two meters in series the readings will be sufficiently accurate to satisfy most of us. When this point is reached, all we have to do is to hang the old watt-hour meter up and place a load on the line through the two meters. Start with small loads and as the value of a load is found mark it on the paper strip on your meter. A variable choke or resistance will be found handy to make your loads show even watts on the meters. In this way, you can calibrate your meter to one or two Kw. very easily. If you cannot get a portable wattmeter you doubtless know you can use an ammeter and a voltmeter to do the same thing as the product of the readings of the two instruments will be the number of watts at that instant. If none of these are at hand you can approximate the thing by using lamps of different known values to build up your load. When you have completed your meter you will guess no more for it will say, ‘Here are your watts, OM.’ Incidentally, it will show up poor rectifiers for as they go bad they tend to pull the power house into them. Taken all in all, a wattmeter is a necessary addition to the shack.

FIG. 3. IF NO OTHER METER IS AVAILABLE A ROUGH CALIBRATION CAN BE GOTTEN AS SHOWN HERE

All lamps and heating devices are marked with the wattage consumption and by connecting them in parallel the drains can be added. Be dead sure that the voltage is the same as marked on the device, since a 110-volt 600-watt heater will draw quite a lot more at 125 volts and therefore gives a completely wrong reading. This method is a poor one at the best.

The Midwest Division Convention

APRIL showers bring May flowers—but they also brought a large attendance than ever before to Iowa’s Midwest Division Convention at Ames on April 13 and 14. Yes, we had WX, a lot of it, but let’s talk about the convention. The opening gun was fired Friday afternoon by H. P. Westman of HQ, with a short talk on ‘Preparedness for Jan. 1, 1929,’ after which some very enlightening information was given by Prof Jansky of Minnesota U., Menzer of Iowa U., and Knouf of Iowa State College, on broadcast work. Friday p. m. was devoted exclusively to the amateur as a BC station—with great success.

The banquet came at 6:30 that evening, in Hotel Sheldon-Munn. Everyone agreed that it was one of the ‘hottest’ affairs ever put on in Iowa. P. H. Quinby, Midwest’s director, certainly availed himself of the heat to brown the toasts with. Barber and Ham, a farce in one act, was the riot of the evening. Prof. Ben Willis, of I. S. C., at the ‘mike’, kept the gang roaring for twenty minutes with his witty skits on both BCL and Ham, which could have come from many of the Middle West’s BC stations—including WCCO, ‘Pro-esser Yansky’s own.’ A liars’ contest was held, and prizes from QST’s leading advertisers were awarded.

Plowing through the snowdrifts Saturday, a.m., the gang assembled again to hear SCM Kruse describe how Iowa leads the League in traffic. Ex-SCM Huber talked a little about future management of the Section. Quinby analyzed Mr. Average Ham’s condition, and recommended increased diet of newspaper and BC station publicity. SCM Kruse took the key and gave a code contest, which was won by 9BAL. At noon a picture was taken of the whole gang.

In the p.m., SCM Diehl of Nebraska told us about the Army-Amateur Work in the Midwest. Westman followed him with a diagnosis of the good and bad in Frequency Meter construction. ensuing discussion, which lasted until five o’clock, revealed an unusual interest in the technical end of amateur work. Everybody went home with new ideas and a resolution to return for a still better time next year.

—L. R. H., 3DOA.

Strays

Writing from a British Cruiser in the Orient an English ex-amateur, who must be nameless, is enthusiastic in his desire to explain that there are human beings on British war vessels even if they are severely abrupt when in conversation with amateurs. The regulations and restrictions laid down by the Naval Authorities, he explains, are rigorous and unyielding, and the punishment for giving the ship’s QRA, for instance, in response to the inevitable query from an amateur, would be swift and severe.
Notes on Design of the Radio Frequency Choke

By Kendall Clough*

Before attempting the design of a radio frequency choke coil, we must set up certain definitions as to what the choke is and how it is to function in the circuit in which it is to be employed. Many of us have labored under the impression that the choke is necessarily an inductance, following the simple course of reasoning that it is a coil and therefore must be an inductance. This conclusion is far from the truth. As a matter of fact, the closest approach to that statement in practice, is the occasional operation of the choke at its natural period of resonance. In most instances, however, the choke functions as capacity. Whatever qualification this statement may need is supplied in the following.

Let us consider for a moment the circuit of Figure 1, which depicts a conventional tuned-grid tuned-plate oscillator with series battery feed. We employ the choke in the position shown in order to keep the radio frequency currents of the plate circuit from flowing in the battery or supply circuit. This isolation is accomplished if the choke has an impedance that is numerically several times as great as the impedance of the condenser, C, at operating frequency. Note that we spoke of the numerical impedance of the choke. Nothing was said as to whether it was inductive impedance or a capacitive impedance at operating frequency, or the possibility that it might be resonant, for this point is of no import in a series feed circuit. We must note parenthetically, however, that if the choke is of such size as to function inductively, care must be taken that it does not resonate with the condenser, C, or the battery will experience a large circulating radio frequency current and the circuit would be better off from an operational standpoint in the absence of the choke.

Let us now consider the circuit of Figure 2 which is one form of the circuit used in the majority of amateur receivers. The nature of the arrangement requires the use of a shunt battery feed. Here, if the numerical impedance of the choke is higher than the impedance of the condenser, Cp, and the tickler coil, Lp, in series, a current will flow through the latter which will cause the circuit to oscillate, assuming that the other features of the circuit are normal and correct. If the circuit constants are properly proportioned, we will be able to control the degree of oscillation in fine measure by the manipulation of the condenser, Cp, that is if the choke coil is operating below its natural period so as to function as a capacity. Those who believe that it may properly be an inductance may examine that which follows.

Suppose that we let the choke be purely inductive for the moment and isolate it as shown in Figure 3 by the elimination of the plate condenser and tickler. We will also make the inductance of the choke a variable. Now, certain investigations lead us to believe that things will happen as we vary the inductance of the choke about as shown in Figure 4. When the inductance of the choke is zero, the input conductance of the tube is zero; when the inductance of the choke is appreciable the conductance is negative; the tube conductance remains negative until a value of


La is reached for the choke when the conductance becomes and remains positive.

Now, if the tuned circuit L2, C2, is of any service at all, it will have a conductance (positive, indicating losses) that is smaller in magnitude than the line represented by G1. Measuring off this value below the axis, and projecting the points of intersection with the original curve upward we see that the circuit is capable of oscillation with any value of choke inductance between Lb and Ld without the presence of the tickler or plate condenser.

It is unfortunate that, for purposes of illustration we had to vary the inductance of the choke and keep the wavelength of the secondary constant. By keeping the inductance of the choke a constant and altering the tuning, affairs are not changed in any way and there is always grave danger of the tube oscillating, independent of the tickler, unless the curve of Figure 4 is representative of the tube performance at the longest wave to which the circuit L2 C2 can be tuned and the inductance of the choke is greater than the value La.

Experience indicates that it is very difficult to design a choke of the necessary inductance to meet these conditions without having a distributed capacity more than sufficient to resonate the choke to the operating frequency. Hence the choke is operating below its natural period and has the properties of a condenser.

The actual design of a choke will now be considered. Empirical studies indicate that it is possible to construct a choke that will operate effectively throughout the band of 15 to 545 meters. Figure 5 is a curve of the nature of the curve of Figure 4 representing the input conductance of a 201-A tube at detection voltages and at a wavelength of 545 meters. We see from this curve that by choosing a value of 6.8 millihenries for the choke that there will be no possibility of the choke provoking oscillation unless the circuit is tuned to a longer wave than 550 meters.

From this point, the design is empirical throughout. Inasmuch as the coil is operating principally below its natural period we may consider it as a pure inductance and a pure capacity in parallel. The reactance of the inductance is steadily increasing with increase in frequency so that it will be no factor in reducing the parallel impedance at the very high frequencies. The capacity will determine the impedance at the high frequencies so it will be necessary that this be kept at the lowest feasible value.

The best way of keeping the distributed capacity low would be to wind a single layer solenoid but this construction forces us to a consideration of all the phenomena that accompany the treatment of a circuit with uniformly distributed constants. In other words the choke would show alternate periods of extremely high and very low impedances as we sweep the band.

(Continued on Page 34)
Fading on Short Waves at Long Distances

By E. Ghezzi*

An article by the well known amateur, Mr. Leon Deloy, one of the pioneers on short waves, prompts us to describe briefly our impressions, or better, the results that we have obtained after twelve months of systematic listening on the short waves from 20 to 100 meters.

We intend later to prepare a more complete work, but for the present will confine ourselves to replying to the invitation in the article mentioned above.

Our observations have been made mostly on two stations, stations that appealed to us because of their location and also because of the fact that the probable paths of their signals was in darkness. The stations were KEL, San Francisco, on 95 meters and other waves, and IDO, Rome, on 102 meters, 60 meters and 32 meters.

The first station is separated from Zi-ka-wei by the Pacific Ocean; the second, by the Eurasian continent.

We have also listened nightly to various amateurs in Europe and America, as well as Australia, the Philippines, Indo-China and our antipodes (Argentina and Uruguay). For checking and comparison purposes we have throughout had two reliable correspondents and observers at two different points. One, Brother J. Aguinalde, S. J., is located at our astronomical observatory at Zo-se, 25 Km. from Zi-ka-wei; the other, the well-known op1HR (on 36 and 88 meters) is at Ft. McKinley, near Manila, about 2000 Km. from Shanghai.

At times, we have also asked the cooperation of radio officers of Italian and American warships stationed 800 Km. north of Zi-ka-wei in the vicinity of Tientsin and at Tchefou and the south of Canton. These details will help in an understanding of the conclusions which follow.

To begin with, it is indisputable that the phenomenon of fading occurs on all the short waves; 100 meters as well as 40 and 20 meters. In this point, Mr. Deloy is quite right, and we are glad to share his opinion.

Another thing: For a given transmitter (our own on 120, 40 or 50 meters, for instance) there exists, at any given instant, a distance at which fading is imperceptible and another distance at which it is very pronounced. Thus, our d.c. transmissions were steady around Shanghai and varying between R3 and R6 at Tientsin. Our a.c. note was absolutely steady at Tchefou, or in the neighborhood of Zi-ka-wei, and varied slightly at Manila and Canton. Let us remark here that d.c. transmissions are much more unsteady than non-rectified a.c. There is more on this. Although a given station may send with the same amount of power, the constancy of the note at a given receiving station varies from day to day.

Let us now turn to our observations on stations 8000 or 10,000 Km. distant. For these, the established phenomena on our transmissions for much shorter distances, that is to say the alternation of moments of variation and of stability (of note) with distance and time, seem to be practically non-existent. Always, these distant stations have what has aptly been termed a 'twinkling', that is to say, a variation in the intensity.

The reception of these very distant stations, lends itself well to research into the causes of this 'twinkling' in intensity. We have listened to them a great many times with a stopwatch in hand in order to time the variation period. For the greatest accuracy, we have always tried to heterodyne each signal to the same musical note, it being fully realized that the human ear, as well as the telephone diaphragm, does not respond equally to all notes in the scale.

Fully admitting the inherent inaccuracies of the ear as an indicator of increasing and decreasing alternations of intensity, it seems to us well established that this variation has a period of several seconds. On this point we concur with Mr. Deloy.

Now, how can we explain this phenomena of a period of several seconds for intensity variations? This is the matter on which we wish to render an opinion. The solution set forth by Mr. Deloy, basing itself on the frequency of the emitted electro-magnetic waves, is perhaps not contradictory to ours.

Modern meteorologists admit as proved fact that the lower layer of the atmosphere, the troposphere, the seat of all the phenomena of rain, cyclones, anticyclones, etc., consists throughout its depth (which may be between 8 and 11 Km.) of superimposing layers which slide one over the other, mixing together, enveloping each other in cyclonic whirlwinds of more or less violence and 'breaking into foam' as they spread themselves over the surface of the earth.

Briefly, at any given point, especially at certain times, a balloon which in its verti-

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*Observatory at Zi-ka-wei, near Shanghai, China. Translated from the French by A. L. Budlong.

cal rise records the stratigraphy of the atmosphere through which is passes, will find a succession of ethereal layers, heterogeneous from the hygrometrical, thermometrical and electrical points of view.

The thickness of these strata may vary from a few meters to (in large atmospheric disturbances) a number of kilometers.

Let us now turn to our little waves of 30 or 100 meters. Their complete wavelength is easily encompassed within a single one of these atmospheric strata. It is understood that the vector which will measure their 'propagation' in terms of the height above the earth's crust can not follow a regular law, since the electrical conductivity of the medium where these short waves travel varies constantly. This will cause speeding up and slowing down: That is to say, many reflections and refractions will take place before the waves ever strike the upper ionized layer, where electromagnetic waves are reflected or projected almost without loss of power.

In short, the short waves, quite contrary to the waves in which a single oscillation reaches the higher limits of the troposphere (8000 meters to 11,000 meters) will undoubtedly be much more liable to react influences in the lower layers of the troposphere.

All this is, in the main, a function of the frequency of the wave in question, as expounded by Mr. Deloy.

Here is the point we want to add in order to complete our explanation: The entire troposphere oscillates continuously, or almost so, with a period which is a function of its thickness, its density and its mean temperature. As this period of oscillation is of the order of some seconds (10 or 20, we believe, at least in a vertical sense) the short waves will be affected by a 'twinkling' of the same value, for their propagation is effected through these layers. This will cause a variation in intensity at a given receiving point from a given station having constant input and radiation.

That this period of several seconds is actually that of the lower atmospheric layer, can perhaps be shown by the work that we have published elsewhere on the graph readings of our Galitzine seismograph in connection with the study of typhoons in the Chinese and Pacific seas.2

In any case, the oscillations of the vortex of a typhoon when it advances without variation in the friction of the lower spirals (on the surface of the ocean, for instance) are of the order of 4 to 8 seconds. This implies a probable height of the vortex itself in the neighborhood of 5 or 7 kilometers, since cirrus clouds are rarely observed in these spirals, and since

these clouds indicate the upper limit of the troposphere. This would mean that the oscillation period of the entire troposphere is not far from 10 seconds.

Let us resume: These periodic variations of the order of some seconds that are encountered in the reception of short waves, especially at great distances, are due to the characteristic oscillations of the lower layer of the atmosphere, which is called the troposphere. This, because of its composition and other meteorological factors, has a period of vertical oscillation which appears to be of the order of something like ten seconds. As the wavelength of transmissions between 20 and 100 meters is in the limits of the thickness of the various layers of the troposphere, all vertical oscillations of these layers will influence the behavior of the electro-magnetic waves before their arrival at the region of reflection and 'travel'.

At times, of course, upon this oscillation of the troposphere as a whole can be superimposed local and internal oscillations of a single stratum and this might lengthen the period of fading or even, by phase interference, stabilize the reception of a remote signal which would ordinarily undergo intensity variations. It might even happen that with the same atmospheric layer between the two stations (transmitter and receiver) being homogeneous up to the upper limit of the troposphere, we would have exceptional stability of the received signal. For instance, we once were advised that a typhoon was extremely steady, in spite of the presence of a typhoon in our vicinity. If one will concede that the vortex of a typhoon contains only equatorial air,3 this will prove our last statement. However, for very distant stations, this chance of homogeneity or of stabilization of the air through which the signal passes, would be the exception.

The experience of our 12 months of listening appears to us to prove this.

2. Observatoire de Zi-ka-wei—Shanghai—"Notes de Seismologie" No. 5, 1924.

3. It is thus that we have explained the remarkable fact of the almost complete cessation of parasitic atmospheres during the passage of a typhoon's center. When, on the contrary, it is a question of an extra-tropical cyclonic center, there is no break in the polar air mass. It is entirely different, and the noise in the telephone makes for extremely difficult radio reception. In the latter case, there is interference, brushing of two different atmospheric layers, from the electrical point of view. This conception of the movements of the troposphere appears to us, thus, to explain logically many interesting phenomena. We are happy to share the ideas put forth by M. Landry. Our articles "Radiogoniometric Research in the Progress of the Programme L'Onède Electronique" in L'Onède Electronique, December, 1925; "Static and Typhoons" in the Marine Observer, August, 1926. London, Air Ministry.
Lunar Effects on Electro-Magnetic Waves

By C. E. Paulson *

To gain a preliminary idea as to any possible relation between the phase of the moon and radio transmission at short waves a test run was made on station 2XAF (32.77 meters) at Schenectady, N. Y. This station was chosen because of the constancy of its carrier wave. The carrier wave was used as it gave a true reading.

Readings were made and recorded each Monday, Tuesday, Thursday and Saturday night during later April and May, 1927, with the exception of May 16th when interference prevented a useful reading. The readings were taken at intervals of 5 minutes for one half hour and an average taken for the half hour. All readings were taken at approximately the same time of the evening.

The receiving equipment consisted of a shielded receiver using a regenerative detector and one stage of audio amplification insulated the same receiving conditions. These did not vary at all, at least varied so little as to be inconsiderable.

The receiver was untouched as far as any change in the tuning was concerned. Too, the author was the only one who had access to the room.

The graph shows the signal strength was 5.2, and then it declines until at new moon, May 2nd, it has reached a minimum of 2; then again it rose until at full moon, approximately May 14th, it reaches a maximum of 6.2.

In considering these effects I had a number of discussions with Prof. S. W. Hockett, Head of the Department of Physics, Penn College. We considered fully the gravitational effects of the moon upon the earth and a consequent effect on electro-magnetic waves. Since there was no evidence to support the theory in a satisfactory manner we abandoned it and took up the theory of the effect of plane-polarized light on electro-magnetic waves. This theory seemed to be the one that had a more sound basis.

It will be remembered from physics that plane polarized light is light in which the wave-motion is vibrating in only one plane. Reflected light is plane-polarized hence moonlight (being reflected light from the sun) is polarized. As light travels at the same speed and through the same medium as electro-magnetic waves, it is logical to believe that there could be an effect causing an increase in signal intensity.

The experiment that needs to be carried out to check this theory (The author is now doing this) is the study of the effect of plane-polarized light upon electro-magnetic waves both being made in the laboratory. The author would like criticism or suggestions from anyone working along this line.

Some Overlooked Possibilities for the Radio Club

(Continued from Page 25)

occupation or may simply be a pleasant way of spending leisure time. Will any single school subject accomplish more?

Finally, does it actually do all this? Yes, but to do it the teacher must, himself, be an enthusiastic amateur operator, able to go as far as any pupil under him.
The Spaced-Turn Coil
By A. Binneweg, Jr.*

The shield-grid tube has brought about many changes in radio apparatus and circuits. Coils for use in short-wave radio frequency amplifiers must be small in diameter and have limited fields if complete shielding is to be avoided. Smaller diameter coils usually have, also, a better form-factor for the shorter waves, giving, in general, somewhat lower losses, if that is necessary. Various practical methods of short-wave coil construction will be described.

The space-wound coil supported by a thin celluloid cylinder is perhaps the nearest approach to an 'air-supported' coil, but constructional difficulties have prevented their general use. The writer has developed a simple method adapted to the needs of the home constructor. As shown in the diagrams, the coil form consists of a wooden cylinder and two semi-circular pieces of bakelite tubing. A length of the tubing is threaded and then cut into two lengthwise sections. The wooden cylinder is turned down to a size which will exactly fit into this tubing.

The two semi-circular pieces of tubing are placed around the wooden cylinder and thin celluloid is wrapped round the form. The wire is wound over the celluloid and into the threads in the bakelite tubing.

The threads must be of the proper depth and the celluloid should be thin. The coil is rigidly held by applying a thin layer of collodion to the celluloid underneath the wires. The coils are removed from the form by slipping off the bakelite tubing which then 'collapses', leaving the coil free. These coils are sturdy but the wire will unwind unless the ends are made fast by passing these through small holes pierced in the celluloid at the ends.

A small clearance should be allowed in the bakelite tubing so that it can be readily 'collapsed' within the coils and the tubing will slip out. The celluloid used is that so often found on candy and the like. Two layers of this thin material are about right. The collodion is obtained at any drug counter.

Bakelite tubing, 2 inches in diameter, is the proper size for general short-wave use below about 80 meters, and should be threaded with about 10 threads per inch. Any machine shop or well-equipped garage can do the job of threading the bakelite tube. The inductance of the 2 inch coil is somewhat smaller than the larger coils ordinarily used; at 40 meters, about 2 or 3 more turns will be required and similar increases at the other waves. No. 20 wire is about the proper size, these coils having a smaller diameter and gives good rigidity.

The wooden form should be provided with a 'shoulder' against which the pieces of tubing will fit so that the threaded portions may be in their correct positions before winding the coils. A tack, driven into the form, will hold the wire. An entire set of coils can be wound in one operation, if the form is made long. The winding can be cut apart in sizes needed. Due to the accurate spacing obtained, matched coils are made.

A coil form of this type is easily constructed, so coils having good mechanical strength, appearance, and low losses may be made with a minimum of effort and time.

If a lathe is available, the wire may be fed to a similar form which revolves and any number of thread combinations may be employed depending upon the lathe. In this case, somewhat heavier celluloids should be used and this is first cemented around the form with collodion.

(Continued on Page 88)

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Meow r r R R-9
By Ma

WELL I reckon as how this is The Ole Woman back on the job and a preparin' to spread a little philisophic and common boss scents from stashun QST. Now T.O.M. has bin actin' sorta orful lately and has increased his cussin' vocablaray quite cons-trirable but thank guudness ive got shot of his spoutins fer a few hours. When the duck season gets in full blast evry year he gets sorta impashunt and peevish like until he gets whizzin' lizzle all iled up and redy to start and this mornin' about 3 a.m. our alarum clock started beatin' a heck awrful tattoo at the same time that Pa's partner Jonnie McGregor started kickin' the kitchens door in. After pa gets all his junk loded includin' the ole 10-gage smooth boar cannon of hisen and also a bottle of snake bite medicin and sum caugh sirrup they get goin' headed fer the salt marshes. The doo is about 2-inches deep on the grass and pa'll take his death of cold or maybe he'll blow his blamed head off. The huntin bizness is all foolish anyhow; if you don't blow your head off with a gun you blow it off with a cold. Anyhow pa's gone for a while and thers piece in the famby and kitty can take her nap under the stove without no danger frum one of pa's fits and I can set and think and preach without bein bothered non by the head man.

If you get sick you call a doctor an pay out sum jack and then get sickern ever. When you freeze ur feet and you washe em with snow to draw the cold out. When you burn ur hand you put it in hot water and draw the heat out. When your ole man goes on a rampage you feed him on bread an water. When you meet a lyar and he tells you a lye you feel like wringing his pesky kneck but you generally don't, you tell him one bigger. When sum cookoo drowns ur sigs out you goose the old toob till its plate begins to palpitate and ooze red hot perspiration. Yeah there seems to be a cure for any brand of disaeze. Sum fellers always huntin nostrums. Thats a gum word and Webstur set it means a "quack or pattent medicin" an that a quack is a big faker. If you believe in it and swaller a big enuf dose mebbe it will do the bizness. Well lemme see.

Abouten this QRK bizness pa allus had a knickname fer QRK an it wus "Quack Rubbin Kitty" and when he wuz floppin brass wid sum gooseberry out in Calfforny and this bird'd give him a report he wud luk at me over the top of hisn specks an say: "a quack is rubbin' kitty again." Mebbe you fellers have had a cat wunst and no a cat don't mind been rubbed none and in fackt the more you rubbed its back the more it wud pur and the happier it wud be. Paw allus felt he was like kitty and when he wud be rubbed 8 or 9 times he wud almost swell up and bust he wuz so proud and felt so gad even tho he knew it wuz sum quack handin him a big helpin' of apple sauce.

How cum this QRK bizness anyhow? Seems to me that wunst I wuz readin' a copy of Pa's I.R.E. Proceedins about Diurnal and Nocturnal Variashuns of Signal Intensity written by a gent that goes by the handle of Dr. A. Hoit Taylor, the Big little man who is boss at NKF. Doc is purty brite and I think he smokes the same kind a tobaccy that paw does. Doc wuz a perfesser at Uni of north Dacota and wuz chief op at 9XN. Perfesser Blatterman was the old man at 3Y-sumthin-owned by George Washington Uni at Saint Luis wheh no lyres are aroud. These wuz both pre-war stashuns and had a kick like pre-war likker. Doe Taylor and perfesser Blatterman put on sum hi-powered 24 hour boiled owl stuff. I no becuz listenin' to these tests wuz where T.O.M. lerned to burn the midnite ile. These fellers used a contrapshun called an audiobullity meter to find out how loud they wuz and then they did a lotta figgerin to find out how much juice they wuz pickin' up outa the air. After all these tests had been made they wrote that there articel that wuz in the I.R.E. proceedins. It wuz a reglar wow. You'n always tell when somebody has done smethin big becuz a lotta fellows started a criticizin and tryin' to pick it to pieces. If it hadn't been gud it wuz have died without attenshun. A prominent dutchman called Zenneck started a rumpus and sed an audiobullity meter warnt no gud how and he sed a lotta other things as how the personal equashun messed up the works. How a guy wud have to go to an ear spechilast and have his ears bored out with an augger and have his tinnianum tested to see how sensitive his ears wuz to certain sounds. There may be sumthin to this becuze one of pa's frens caint hardly hear anything over 1,000 cycckles while 20 cycckles is his meat. Pa dotes on 1,000 cycckles but 20 cycckles aint there fer him. Then this here dutchman sed the receevin toob wunst accurate an it wud have to have 10,089 elecktron flow per half minit per e.e. and have a certain amplifikashun faker to produce certain results, and that the fractured index of the simonized wave had
to be figured where it dissected the fundamental propagashun line of the heavy lying layer and a big bunch of bunk abouten it didn't mean nuthin but wuz bettern nuthin at that. If it caint be did in a labertery where they have a lotta instru-ments and mathemack tabels to work it all out what cud you speck of a him what don't have no audiobullity meter and what wudnt no what to do with it if he had and even if he did dident mean nuthin very accurate. Well we don't do it this way no more, at least hams don't, but have a tabel with 9 figgers and figger the audiobullity by sayin eney meany miney mo yer R-9 hr OM. Fer mi self a lotta times I don't think them sigs are R-9 when pa sez so but they orter be called assinine and it gives me a pane in my etymology, yet I have to laff at the funny sounds of sum of these here sigs. The fones hop up and down on the ole man's head sum times like they wuz full of Mexikan hoppin' heans an funny sound cums outen 'em like what you can hear down by the hog pen. R-9 mebbe but it don' mean nuthin.

This QRK bizness has got on mi nerves. The big idear wuz by collectin' a flock of QRK reports a stashun cud get a real honust to gudness idear of how loud he wuz at certain parts of the cuntry, etc. This aint accurate but by getting a flock of reports that are honust it works purtly nigh the way it wud with gud apparatuses at the labertery. The wust of it seems to be that you caint trust these here reports. Look at one of Pa's frends who has two audiobullity charts hangin' on the wall of his shack. One fer amerikans and the other fer furiners. The one fer furiners reads like this.

R-1 Caint hear it
R-2 think I can hear it
R-3 know its here
R-4 can hear it by holdin my wind
R-5 can coppy it with struggle
R-6 can coppy it OK but week
R-7 can copy it solid with QSZ
R-8 purty gud sig
R-9 can hear it 3-inches frum fones

Pa axed this bird how cum one day and he laffed and tol pa that he wuz a dnt and outat date and never wud make frens with any furiner. He sez make 'em like you and fill 'em full of audiobULLity. With this chart u can see rite away what to tell 'em and make 'em ur friend fer life. No don't you young fellers laff, this bird is OK on his psickology dope alrite. I no heezu I am a woman. Any woman likes to be told she is purty even if she looks as tuff as an ole mud fence. A fella likes to hear sum body tell him his sigs are R-99 when he is usin' a receivin' toob and cumin' in only an honust R-9. Be crooked and make

frens or be honust and make 'em run frum you. Ain't things got mixed up in a dern awerful shape?

Theres lots of new fresh tender Hams just startin' and they hear this G.E. ur sigs R-8 hr OM and don't know what it means and they think its like sayin' gude evening or sumlin' and things have got to where a feller gives you a goofy QRK report just like sayin' good bye.

Now boys Ma is an ole igerant woman and aint technickal and don't no much abouten how to cure this here runnin' sore that has gumed up the works but one thing is dead right and that is that thers at least 2 ways to cleanin' up house. One is by sum of you technickal men figgerin out a cheep, easy and quick method of findin' out a fairly accurate QRK without depen-dend on ears certified by sum ear speschelust. The other way wud be fer you fellers to reform. Quit hein' a Quack and a Faker and tryin' to make frends by "rubbin' kitty" and maken 'em puff up and feel like they did sum thing when it ain't much after all. If you have a cat rubbin' kitty's back and see what end gets up first and then think what a shape those here hams are in when you don't shook square with 'em on reports. Too if one don't rub ur one back don't get sore and cut one point under them when you know he deserves better.

Now boys The Ole Woman asks you to think a bit and ask urself: Am I a "Quack Rubbin' Kitty"? What's the golden rule anyhow?

A.R.R.L. Technical Information Service Rules

Please help us by observing the following rules:

1. Keep a copy of your questions and diagrams and mention that you did so.
2. Number the questions and make a paragraph of each one.
3. Make diagrams on separate sheets and fasten them to the letter.
4. Print your name and address (not merely your radio call) on your letter. Don't depend on the return address on the envelope as this is destroyed when the letter is opened.
5. Don't ask for a comparison of the various manufacturers' products.
6. Before writing, search your files of QST—the answer probably is there.
7. Address all questions to Information Service, American Radio Relay League, Inc., 1711 Park Street, Hartford, Conn.
8. It is not essential to enclose an envelope as long as you supply postage and PRINT CLEARLY your name and address on your letter.
8CPC
A Year-Old Home-Built Station Active on Three Wave-Bands

About twelve months ago, 8CPC was the typed call on a station license. That's all there was, there wasn't any other thing; with the exception, of course, of the latent enthusiasm of the owner. Today, 8CPC is quite a complete station. There is a separate self-excited transmitter on the 20-, 40- and 80-meter bands, a crystal-control transmitter for the 40-meter band, a couple of receivers, a 'Growler', a grid-meter driver, a wavemeter and three different plate supply systems. With the exception of one receiver all of the equipment has been assembled by the owner-operator who, with all the building and re-building activity, has found time to 'chew the rag' with more than eight hundred stations.

The plate supply equipment can be treated as three separate units. The first of these is a motor-generator rated at 1,000 volts, 300 millamps. The machine is located in the basement and is mounted on a concrete base topped with a three-inch thick cork pad. When first installed, the motor-generator was extremely noisy, electrically, and it was necessary to shut it off when receiving. Various filter schemes were tried and eventually the machine was enclosed by a heavy galvanized iron shield. With this shield and the frame of the machine grounded, the noise was reduced appreciably, but it was found necessary to provide a filter in the power leads to the motor and to ground the centers of the high voltage condensers before satisfaction was obtained. With the arrangement shown in Figure 1 the motor-generator is now practically noiseless and break-in working is not in any way hindered.

A bank of eight 50-watt lamps (to be seen immediately above the iron shield) is connected in series with the high voltage output of the machine in order to protect the transmitting tubes and the machine during adjustment. The lamps introduce only a slight voltage drop during normal operation but serve to hold the load within...
the limits of the machine should anything happen at the station end.

As the station itself is on the second

floor, the supply leads to the motor are taken in conduit to the double pole switch at the operating table. The high voltage, after passing through the filter system, is carried to a box switch in the station with suitably insulated No. 14 gauge wires in conduit. The motor-generator is used chiefly to supply the 50-watt Hartley type transmitters.

The second plate supply unit comprises a 510-volt Acme transformer supplying a single Raytheon BH rectifier tube, the output of which is filtered by a 30-henry choke with a 2-microfarad condenser on the rectifier side and a 4-microfarad condenser on the transmitter side of the choke. This unit supplies the oscillator and intermediate amplifier tube of the crystal-control transmitter, the voltage being reduced to 300 for the oscillator by means of a series resistance in the plate lead to that tube.

The third high-voltage unit employs two of the 510-volt Acme transformers, the primaries being connected in parallel and the secondaries in series. The output of these transformers is rectified by two QRS high voltage rectifier tubes rated at 100 milliamperes and is filtered with 4 microfarads across the line. This unit delivers 900 volts on load and is used to supply the final amplifier of the crystal-control transmitter or, by the use of a switch, the 20-meter transmitter.

A Thordarson transformer with a Radiostat in its primary is used to supply the filaments of the 50-watt tubes and one UX-210 of the 20-meter set while all other filaments are supplied from a 250-watt Acme filament transformer, its primary also being fitted with a Radiostat for voltage adjustment.

FOR DX WORK

Sitting up in a box built outside one of the windows is the 20-meter tuned-grid tuned-plate transmitter employing a single UX-210 supplied with 800 volts, 70 milis without visible heating of the plate. The circuit of this set is given in Figure 2. Copper tubing 1/4" in diameter is used for the inductances, four turns 3" in diameter being used for the grid and plate and eight similar turns for the antenna coil. The radio frequency chokes in both high voltage leads consist of 40 turns of No. 30 gauge d.c.c. wire wound on a one-inch form. The r.f. chokes in all transmitters are provided with 'plug-in' pins.

In speaking of this transmitter 8CPC says, 'I must confess that I am becoming very partial to the 20-meter band. QRM and QRN are practically absent and I have been able to work satisfactorily up until 11 p.m. E.S.T. The idea that 20 meters is unsuited for anything but DX has been found to be unsound since almost all the States have been worked with audibility reports varying from R5 to R9.'

THE CRYSTAL-CONTROL TRANSMITTER

Standing at the left in the general view of the station and illustrated in separate

![Diagram of the crystal-control transmitter]

FIG. 2. THE WIRING OF THE 20-METER TRANSMITTER

A—Antenna ammeter 0-2 amperes.
L1—Eight turns of 1/4" copper tubing 3" diameter.
L2-L3—Four similar turns.
C1—Tuning condensers, 150 μfd.s.
C3—500-volt condensers, 1000 μfd.s.
C4—2000-volt condenser, 250 μfd.s.
R.F.C.—Chokes of 40 turns of 30-gauge d.c.c. wire 1" dia.
R1—Grid leak, 12,000 ohms.
MA—0-200 milliammeter.

photographs is the transmitter which has seen most operation. The final amplifier in this set has been two UX210's in parallel, a UX-250 and a single 210. Strangely, the one 210 has been found more effective than the 250 and at least equal to the two 210's in parallel. This amplifier is excited from an intermediate 210 amplifier which in turn is run from a 210 crystal tube operating at waves of the order of 160 meters. A set of six crystals, each with its own holder, has

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<tr>
<td><strong>C</strong></td>
<td>1—1 μfd, condensers rated at 1000 volts.</td>
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<tr>
<td><strong>C1</strong></td>
<td>2—0.5 μfd, condensers of same rating.</td>
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<tr>
<td><strong>Ch.</strong></td>
<td>10—henry filter choke.</td>
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<tr>
<td><strong>R.F.C.</strong></td>
<td>150 turns of 28 gauge d.c.c. wire 1&quot; diameter.</td>
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been obtained and these permit operation on 37.7, 38.5, 39.0, 40.1, 41.7 or 42.4 meters. The ability to use several waves throughout the band has been found in practice to be of considerable value. The oscillator is arranged with series feed for the 300-volt supply and is operated with heavy negative grid bias in order to accentuate the harmonics. With the 45 volts of bias and the 10,000-ohm series resistor in the grid circuit, the plate current is just 10 m.a., the radio frequency current through the crystal, as measured with a thermo-galvanometer, being also 10 m.a. The latter meter is, of course, not an essential requirement in the transmitter though it is often useful when making adjustments. The plate coil of the crystal tube consists of 40 turns of 14 gauge wire wound on a 3” bakelite tube the turns being spaced almost the diameter of the wire. Tuning is accomplished with a 250-µfd. receiver type variable condenser. It is in the lead from this tube to the grid of the intermediate tube that keying is accomplished.

the scheme being that described on page 33 of the July QST for 1927. In short, the arrangement consists of the two plates of a coupling condenser mounted on a relay in place of the contacts, a piece of .004” thick mica being glued to one plate. The throw of the relay bar (the relay is built from an old sounder) is adjusted so that the variation of capacity caused by its movement is from about 25 µfd. to 400 µfd. The scheme has been found to be a very desirable one. The intermediate amplifier and frequency doubler is supplied with 500 volts, the grid bias being adjusted to a value which drops the plate current to about 20 m.a. The plate coil of this tube is of similar construction to that of the oscillator though only 20 turns are necessary with a tuning condenser of 100 µfd. A 0-3 amp. thermo-couple meter is connected in this oscillatory circuit for adjustment purposes though a shunted Christmas tree lamp would serve almost equally well. The grid of the final amplifier (which is also a frequency doubler) is excited from the intermediate tube through a coupling condenser of 2000 µfd. A 100,000-ohm grid resistor and sufficient bias is used to maintain the normal oper-

FRONT AND REAR VIEWS OF THE CRYSTAL CONTROL SET

The top shelf (including the two upper sections of the panel) is occupied by the final amplifier and its accessories. The three shelves below reading downwards contain the intermediate amplifier, the oscillator and the bias batteries. The lowest shelf houses the plate supply equipment.

Eight turns of ¼” copper tubing 4” in diameter are used in the plate circuit of the output tube, this coil being suspended with simple brass fittings from a glass ‘towel-bar’. The antenna coil, mounted in the same manner, is of six similar turns. The values of all other apparatus can be obtained from the complete circuit given in Figure 3. Particular note should be taken of the fact that radio frequency chokes of different values are used in the circuits of the three tubes on account of the different frequencies being handled by them.

The frame is built from four angle-iron uprights connected together with horizontal pieces of maple which have been soaked in boiling paraffin. Five shelves are provided, these also being of paraffined maple. The lowest shelf contains the plate supply equipment for the oscillator and intermediate tubes. On the second shelf are the bias batteries. The next three shelves are occupied by the oscillator tubes and accessories, the intermediate amplifier and the final amplifier respectively. The panels are of
aluminum each being attached to a sub-shelf in such a manner that each unit can be removed separately for alteration or adjustment. The antenna series condenser, as can be seen in the photograph, is mounted on a glass rod immediately above the top panel.

FOR 80 AND 40 METERS
A single 50-watt tube is used in both of the 'Hartley' transmitters. The set mounted alongside the big crystal job is used for 80 meters and insofar as the circuit arrangement is concerned is completely conventional. The frame is built up from maple soaked in paraffin, as is the frame of the other 50-watt set, but in the 80-meter set (which is the more recent one) the inductances, condensers and meters are all mounted on or suspended from glass 'towel-bars', an arrangement which has been found simple, inexpensive and very effective. In the 80-meter set the inductances are of 1/4" copper tubing, twelve turns 4" in diameter being used for the primary and six for the antenna coil. The tuning condensers are Cardwells of 250 μfd. capacity. The inductances of the 40-meter Hartley set are of R.E.L. manufacture the tuning capacities in this case being 150 μfd. Cardwells. The tubes used are of the 211-D type, the filament current being maintained at a constant value, as suggested by the manufacturers, instead of filament voltage. For this purpose, a 0-3 ampere meter is connected in the filament circuits.

THREE ANTENNA SYSTEMS
Though various schemes were tried for operation of one antenna on the three bands, not a great deal of satisfaction was obtained. Since plenty of space was available, three different antennas were erected and left permanently connected to the various transmitters. With this arrangement, a change can be made from one band to another in just a few moments. Of course, it is not claimed that the duplication of equipment on each band is simple, inexpensive or particularly efficient. The layout is merely the result of the keen desire on the part of the owner to be building apparatus continually and his interest in comparisons of the various wave bands.

For 20 meters, a horizontal fundamental antenna system is used, the total length of the wire being 35 feet. The two halves of this antenna extend from the 'window box' housing the 20-meter set in the form of a very open horizontal 'V' about 24' above ground. A condenser of 100 μfd. is connected in series with the system for tuning. Pyrex bowls are used as lead-in insulators.

A somewhat similar fundamental system is used for 40 meters the wide 'V' in this case extending from another side of the room. The total length of the antenna is 65', tuning being accomplished with a 250-μfd. series condenser. The leads to this antenna are taken through the three foot square plate glass pane in the window to be seen at the left of the general picture of the station. For 80 meters and 'voltage feed' fundamental system is used. This antenna is strung between a short pole on the house and another on the garage and is well clear of the other systems. No. 12 gauge enamelled copper wire is used for all antennas, insulation being provided in all cases with Pyrex glass.

FOR RECEIVING AND TEST WORK
Though a home-buil receiver is also available the Grebe CR 18 is used almost exclusively. The receiving antenna is a 20 foot length of wire strung across the top of the room.

Other equipment includes a General Radio wattmeter, a grid-meter driver, and a "Growler" built from the description in the July, 1927, QST. The latter is used to

(Continued on Page 86)


**Experimenters’ Section Report**

Because of the absence of Mr. Westman at the Ames-Midwest convention it comes to pass that the retiring Tech. Ed. is writing a last brief report for the section.

**REPORT ON PROBLEM T-26 (KEYING)**

This work was done by M. J. Hull, 653 Rozelle St., Memphis, Tenn. Keying was done in grid, plate and filament center tap circuits. The circuit was an inductively coupled Hartley (shunt feed) employing a 7.5-watt tube at a frequency of 7500 Kcs. The plate supply was chemically rectified and then filtered.

Observations:

1. ‘Plate’ keying, that is, keying in the supply to the plate circuit, at first resulted in heavy arcing at the key. No possible adjustment of apparatus would remedy the evil. So a resistance was shunted around the key. Such an arrangement, when the resistance was made low enough to stop arcing, resulted in a very strong ‘back wave’, which caused much interference and trouble at the receiving end. If the resistance was made high enough to give a moderate back wave, arcing at the key resulted.

With no keying resistance, it was found impossible to couple the antenna coil and closed circuit inductance closely, and tune the antenna circuit into resonance with the closed circuit. The less the value of the keying resistance, the closer to resonance the two circuits could be tuned. If too close, it resulted in the circuit’s oscillating erratically and the tube heating up most of the time. That is, if the circuits were too nearly in exact resonance for a given setting of the keying resistance.

2. Grid keying was the most unsatisfactory of the three. Both ways of connecting the grid leak were tried. The diagrams Figs. 1 and 2 will place the keys. They were at points marked ‘X’. The circuit was very unstable, and showed a tendency to keep on oscillating after the key was up. Also, the key was ‘hot’ in Fig. 1.

3. Keying in the filament center tap was the most satisfactory of all. The circuit is shown in Fig. 3. Note that filament bypass condensers C3 (.002 mfd. each) were used, and were connected so that when the key was up they were not in the high voltage path (through the tube). The resistance was 20 ohms. This method was fairly stable but one thing was discovered that should be of interest to all amateurs. In the circuit above, C1 was .002 mfd. and C2 was a homemade mica copper plate condenser with not nearly as large capacity. With such an arrangement, they key arcs badly at times. When C1 and C2 were both made .002 mfd. operation was smoother and keying troubles over.

The important effect noticed though was that the use of a .002 mfd. capacity at C1 and C2 greatly decreased the tendency toward flash-overs in the tube.

4. It was found that overloading the filament sometimes made the tube operate more steadily and the key better. Key thumps were perhaps less with the method of keying in the filament center tap. For a given keying arrangement and coupling arrangement, the tube operated better when the wavelength of the antenna circuit was tuned slightly below the operating wave, rather than above it.

**CONCERNING THOSE SHORT WAVES**

The 10-meter band is being worked on, but frankly it has been quite impossible for these desks to keep track of what is going on amidst the rather complete changing about. The developments seem not startling, however. They lie simply between the normal 20-meter results and the normal 5-meter results and to the present writer, offer nothing of an experimental nature being rather semi-traffic waves.
The DX receptions have been fairly numerous. 6XI has been heard at Livermore Falls, Maine (L. C. Brown of 1AQD) and 2EB has been heard in Europe, likewise much similar and shorter distance work has been done.

Victor Andrew of 4040 Indiana Ave., Chicago, casts the only light or originality into the matter by suggesting that he is quite anxious to work with anyone on "around the world" signals at waves below 20 meters; which is to say work on the 'echo effect'.

—R. S. K.

The New England Division Convention

The 1928 New England Division Convention held at the Elks Hotel, Boston, Mass., on April 20-21 is a thing of the past, but the memory of it will last for a long time to come as having been the best ever held in point of attendance and program given the delegates.

With the largest registration on the first day ever noted, the convention was opened by G. W. Bailey, 1KH, President of the Eastern Massachusetts Amateur Radio Association and General Chairman of the Convention, with an address of welcome that made everybody feel at home. No convention is complete without a Traffic Session and the one held Friday afternoon, under the leadership of Communications Manager Handy, proved most interesting especially when all the Section Managers, with the exception of one, were present and took part in the discussions so valuable to the traffic fellows. The army was well represented by Major Van Horn and Capt. J. P. Ferriter of the first Corps Area and later, Rear Admiral Philip Andrews spoke for the Navy.

The Providence Radio Association again proved its versatility by staging a session of the International Conference much to the amusement of every one. Friday evening was devoted entirely to games and contests and the fellows did not hesitate to participate in view of all the good prizes donated by the manufacturers.


The treat of the convention, however, was the Saturday afternoon session where lectures were so ably given by J. K. Clapp, 1XV, Director Elliott White, Glenn Browning, Director Woodruff of the Atlantic Division and L. B. Root.

The Banquet was one of the best and was enlivened by several popular scores being played on the big organ, by one who knows his 'pedals' (unfortunately we did not get his name), and Bob Emery, 'Big Brother' of WEEI, with his troupe of 'Jazzers'.

Our worthy President, Hiram Percy Maxim, gave us a surprise by showing up for the Banquet and made one of his good inspirational addresses. Treasurer Hebert spoke on what the A.R.R.L. had accomplished over a number of years in its fights for the recognition of the amateurs. When the different states were called upon to stand up it was noted that good delegates came from Vermont, Connecticut, Rhode Island, Maine and Massachusetts (the latter of course was expected) and New Hampshire did well considering the few licensed stations. The real convention 'bounds' were the Utica, N. Y., delegation who travelled 350 miles to see what a New England Division Convention was like; and we must also mention the Hudson Division delegation from New York City which had with them 4KT from Porto Rico.

With the distribution of prizes and the singing of 'Star Spangled Banner' the convention came to a close with every one expressing thanks to the convention committee for the wonderful hospitality shown.

—A. A. H.
Amateur Status

WHAT is the most valuable thing that belongs to us amateurs? Without the least hesitation or doubt, it is our individual status as amateurs. It is the most important, that individually, and as an organization, we must carefully preserve our standing as amateurs by doing nothing to harm that most precious possession, our amateur status.

Last month, a case came to our attention in which a station owner was reported to have accepted a prize (7) for originating a large quantity of messages of a direct advertising nature. The messages were of course, of the ‘rubber stamp’ variety so that they had to be thrown out of the totals in accordance with the A.R.K.L. policy previously expressed in these columns. It would have been considered a violation of the best amateur ethics for an amateur operator and station to assist rigorously in an advertising campaign even when no compensation is passed for the handling of such letters—particularly in character to have they anything to do with experimental work or amateur radio as a hobby. Possibly, it is all right for an amateur to handle such messages as long as he accepts no compensation—a legal opinion probably would substantiate the right of the amateur to handle this business under those circumstances.

No brief can be held for the amateur who accepts direct or indirect compensation for handling specific messages. This is in direct violation of the terms of the amateur license and the regulations of the Federal Radio Commission and the agreements in regard to the use of vacuum tubes and equipment ‘for amateur and experimental use’. Such violations may be responsible for not only bringing individual amateurs into great trouble but may even throw a shadow of disrepute on the good name and record of amateur radio considered as a whole. The penalties are too great and neither the violations or the violators can be tolerated. Accepting compensation of any kind is dangerous business!

It is the purpose of this article to warn amateurs to avoid being ‘used’ by commercial interests in unethical ways. An amateur asked our advice recently on accepting a whole set of fine station equipment from a business house—the only string being that he should consistently try to handle some traffic with a certain foreign point. A hotel on the Pacific (amateur radio club meeting place with free light, power and heat—provided the amateurs would establish an amateur station and relay messages for guests of the hotel). A certain station owner planned to ‘organize an amateur radio club’ and establish a ‘net’ for the collecting of amateur news for the paper. It offered the amateurs a fine and the facilities of a powerful station that it would install as ‘net control station’ in return for the things it could gain by making amateurs violate their amateur status. Not a month goes by without some case of this sort coming to the attention of League Headquarters.

Interests finding difficulty in obtaining limited commercial licenses are trying to find ways to evade the rulings of the Federal Radio Commission and to ‘use’ amateur stations and status to the detriment of the amateur’s own best interests.

There are plenty of legitimate activities in which amateurs may participate. The League approves amateur cooperation with worthy enterprises, sponsors tests to show the utility of short-wave communication, encourages worthwhile service to expeditions in getting their messages from the far parts of the earth. Be assured that there is nothing wrong in accepting trophies and prizes of any sort for legitimate amateur competition in communication contests. Watch carefully and refuse to enter into any agreements or alliances through which you accept anything in the nature of a consideration for services rendered in connection with your amateur radio station. There is no question of the good intentions of the amateurs involved in the several cases cited. Very great damage can be done unless there is strict observance of both the spirit and letter of the regulations involving amateur status. Avoid sugar-coated promises and opportunities which might be construed to be direct or indirect compensation and a violation of amateur status. Seek competent advice before you jump at chances to get something for nothing. Preserve your most valuable possession, your status as an amateur.

—F. E. H.

TRAFFIC BRIEFS

A radiogram from n3A0 via nu1BFPT reports that n3CGI has just made the first contact between a Canadian and England by working on SHS.

na1TE at Anvik, Alaska says that winter mail service to his community is once in two weeks by dog team. Just after the carrier had left on one trip two cases of meningitis were reported from an Indian village 45 miles northeast of Anvik. Through the daily schedule between na1TAY (Latsouche) and na1TE the news was sent out. TADY hooked up with Juneau and before the next arrival of the mail an effective quarantine was established. With the cooperation of the government school agent and by authority of the health commissioner at Juneau. The arrangements were completed by amateur radio in less than one week. Just another example showing the value of short-wave communication in Alaska. Good work TTR!

H. D. Oliver, na1AER, on St. George Island, Bering Sea, is using two complete transmitters and antennas. The 20-meter transmitter uses one UX-210 in T.P.T.G. with 400 volts d. c. from a motor generator using the third harmonic of a Fert antenna. The 40-meter set has two UX-210’s in a full wave self-rectifying T.P.T.G. with 750 volts of 900 cycle a. c. on each tube and the antenna works at its natural period (half-wave). Both alternator and m. g. run from a bank of five EXides charged by a 3. K. Deleo plant. na1AER works numerous OA, AA, BZ, OH, ND and NH stations in addition to eb4RS and eb4ORM. Most of his DX is worked on 20 meters as this wave is found most reliable. TAER is on daily and has most consistent schedules with nu1EKE, nu3CLZ, o45HL and most of the Alaskan stations.

When the elect storm swept the wires away around Omaha, Nebraska, 9MI, made contact with 9DR handling important A. T. & T. traffic and press. A full report of amateur work in the recent emergency in the Eastern and Central part of the country will appear in an early issue. Everybody handled his share FB as usual.

OFFICIAL BROADCASTING STATIONS

(With complete list of Canadian OBS.)

9DRJ, 9EFO, 9CAT, n2BE, n2SEI, n1DQ, vel5AN, n1EI, n1BZ, n1DD, n25AL, n3CS, n3AZ, n3GO, n4CU, n4AF.
6AJM has boosted his message total and climbed to the top of the B.P.L. 7BB and 9EZ also occupy top positions. Every station in the list is noted for its consistent operating and traffic work.

6AMM, 1MK, 8DHT, 9EZ, 7BB and 1IBG are stations responsible for over one hundred DELIVERIES in the message month, FB1. Due to the delaying of official reports from the Philippines and other points some consistent Brass Pounder’s cannot be listed this month. Please call errors or omissions to our attention.

A total of 200 bona fide messages handled and counted in accordance with A.R.R.L. practice or just 50 deliveries will put you on the honor roll. Let's see you there next month, OM.

Ten Meters

A GOOD number of additional ten-meter contacts have been made over medium and long distances. This work coming so far in advance of the 10-meter DX Party, augurs well for the success of our ten-meter tests. 69CFCP (Honolulu, T. H.) reports two-way 10-meter work with nu8BOE. He has also heard 2XBC and KEL, nu6UF since April first has been QSO 8EX, 5ALY, 8S5R, 8AHK and 2/3 A. Reports 5ALY’s signal (in Rochester, N. Y.) the best 10-meter signal on the air; the first to come in and the last to fade out. Using a 210 with 40 watts input, 6UF has been received R9 at 5ALY. They work often. nu2MN was the first real 10-meter station heard at 6UF, nu2ER has been copied R7 though. Both SDQ (Cushing, Okla.) and 908MX (St. Cloud, Minn.) have reported 6UF’s signals several times showing that 10-meter is not a coast-to-coast wavelength.

nu6ANN (Long Beach, Calif.) built new coils for both transmitter and receiver the day he heard the band was open. After trying in vain to work a bunch of 20-meter hoarders, he hooked up 8S84 and on April 15 shortly afterward hearing 2EB, 5AUX and 9DJL all steady and better than R5. 6ANN suggests that the ‘ten meter gang’ sign ‘ten’ after each transmission to avoid being mistaken for 20-meter harmonic stations. 6ANN uses 30 watts input to a UX-210 in a T. P. T. C. circuit with a full wave Hertz voltage fed. His coils are of larger size and of one turn each. Schedules with east coast amateurs are invited. 7A9F (Howiak, Wash.) is experimenting on ten meters and will welcome test schedules with anyone.

Shifting to the East Coast nu2EB (Jamaica, L. I., N. Y.) has been copied locally by 2BEY, 3N, and 2NM. Two-way work has been carried on faithfully between these stations (across 25 miles of the sky-scraper section of N. Y. C.). 2EB has been copied on several Sureide and 6BB, 6W2A (Gironde, France), 2GP (Richmond Hill, N. Y.) has worked 2EB, 2BEV and 2ALQ and heard 2NM, 2JN, 5A0W and 6JST. 2ALQ and 5A0W have been heard 6AOW. 2NM and 2JN have both been QSO'd at 6JST and the latter says between 11 a.m. and 12 E. S. T. is the best time for this. 6CAK is said to have been reported as heard by 2EB. 1A9L (Living Falls, Maine) has twice worked 5HE (San Antonio, Tex.) for considerable periods of time. He has heard 6IFP and 6XLA convenient and tops 12 at 15µw. (max.) tuning condenser. One UX-210 in Ultrasound circuit was used for the work with 5HE. 2BEF (Paterson, N. J.) reports hearing nu3L, 5ANZ and 6XI on April 29 with very good strength from each. 5ALY was worked at various times. He was R9 at 1:30 reaching R8 to R9 at 3:00 p.m. and dropping to R3 at 4:30 p.m. and then back to 4 to 4:30 p.m. well from 2:30 to 6:00 p.m. and 6ANN was FB (7 at 8:30 p.m.) 3AKW (Philadelphia, Pa.) has a ten meter schedule with 5ALY and will be glad to take on some more test schedules.

6R6K (Cambridge, England) reports copying 6MN on Jan. 29th and later arranging a schedule with him. 5ALY says that he believes a half-wave antenna superior to similar antennas worked on harmonics. He first tried a 2 ½ horizontal antenna, but it was not successful and a vertical half wave Zeppelin, the antenna being a copper pipe 15 feet high. This brings in much better reports. 5ALY is planning to try full wave and third harmonic antennas soon to compare with the half-wave antenna and will let us know the result. 6UF has his transmitter fastened to ceiling of shack and uses a quantum of quarter-wave horizontal portion of his half-wave antenna. This is entirely in the clear. Next best results for him seem to have been a half-wave vertical antenna as installed at 6DBO. A horizontal antenna with Zeppelin feed has not worked out as well in his case. 5ALY is using a 210 with 40 watts input, the bridge may be obtained by using four 216's or 2x1's bridge connected and three filament transformers insulated for high voltage, the plate-filament circuits of two of the tubes being used in series to handle the 2000 volts without a breakdown.

1MK

ALTHOUGH local time in Hartford and several other cities has been changed to Daylight Saving Time, 1MK operation and schedules continue as given in April and May QST in Eastern Standard Time as this necessitates fewest changes and inconveniences fewest people.

The list of scheduled stations remains as last month with the exception of the following changes and additions:

WSBS (40) Yacht Carnegie Monday, 10:30 p.m. E.S.T.
1BG (80) Augusta, Maine Tuesday 7:00 p.m. E.S.T.
5FIP (80) Philadelphia, Pa. Mon. and Thurs. 9:45 p.m. E.S.T.
6WHH (40) San Francisco, Tuesday 12:30 a.m. E.S.T.
6CIS (40) Sacramento, Friday 12:30 a.m. E.S.T.
5EY (40) Oakland, Wednesday, 12:30 a.m. E.S.T.
3AAQ (80) Oil City, Pa. Sunday 7:45 p.m. E.S.T.
1NATO (40) Ketchikan, Alaska Friday 1:00 a.m. E.S.T.

Further changes in the line-up will be made. From time to time, eligible stations properly located geographically will be given schedules and stations that are missing schedules for no good reason will be
dropped. It is suggested that when there is any delay in getting hold of 1MK direct that messages be given to any of the stations with which 1MK has schedules for QSOs for individuals or departments at Headquarters is invited from A.R.R.L. members. Foreign members can place traffic with 9DNG, 9ODCA, 9XI, 9ENM, SCJ, nc2B14, 6NX, 6AMM or QSO 1MK directly on Tuesday, Wednesday, Friday or Saturday between 1:00 a.m. and 2:00 a.m. E.S.T. 1928. (20.53 meters).

Official broadcasts to A.R.R.L. Members are sent from 1MK simultaneously on 41.28 and 39.86 meters wavelength at the following times:

Monday and Tuesday at 8 p.m. and midnight E.S.T.

Monday and Friday at 8 p.m. and 10 p.m. E.S.T. or local time, A.R.R.L. Headquarters look for 1MK on 39.86 or 41.28 meters in the ‘general operating periods’ (mentioned in April, QST) and give us a call.

The Roberts’ Cup

In March, 1927, QST, we announced that Lt. Haydn P. Roberts was offering two cups, ‘one for the Philippine amateur station that handles the most traffic with the States, and one for the American station that handles the most traffic with the Philippines, the traffic to be counted from April 1, 1927, to April 1, 1929 inclusive, and A.R.R.L. Headquarters to judge.’

An award committee at A.R.R.L. Headquarters will consider station logs and message files received from Philippine and American stations handled by the Roberts’ Cup Award. All logs and files must be received at League Headquarters in Hartford on or before July 1, 1928, to be entered in the competition for the cups. Philippine stations have been informed of this closing date by radiograms through op1HR and through Section Manager Jiminez, op1AT in early May. Owners of U.S. and Philippine stations wishing to participate are invited to submit their entries in the form of logs and message files to A.R.R.L. Hq. before July 1, 1928. The cup winners will be announced as soon after this date as possible.

The 1927-1928 competition has been a contest between stations according with the advance announcement (March, 1927, QST). As previously stated, the cup award will be continued indefinitely just as long as sufficient interest is shown. The following Roberts’ Cup Award are here-with announced for the 1928-1929 competition. You will note some changes.

The 1928-1929 contest will assume the nature of a competition between individual Philippine and American operators of amateur radio stations. Logs and message files covering the period June 16, 1928, to June 15, 1929, should be submitted to the appropriate station, when possible.

The closing date for receipt of logs and message files (entries) in the 1928-1929 contest is herewith set as Sept. 15, 1929. Any A.R.R.L. member in the Philippine or American continent having an operator’s license and operating an amateur station is eligible to take part. Operators of stations which there are several one must submit a separate count of the messages handled by themselves with an affidavit to that effect. The messages must be handled in accord with good A.R.R.L. practice. These operators should verify that the ‘rubber-stamp’ traffic will not receive full credit but will be thrown out in accordance with recognized A.R.R.L. policy so that only messages completely true to the text received get credit. Credit contest is one of operating skill on the part of the individuals participating more than one of station performance although this will of course enter into the results obtained. While the 1927-1928 contest was a traffic contest in which the station handling most bona fide traffic will be the winner, the 1928-1929 contest, for general interest, will be a traffic and QSO’s contest and QSO’s will count toward the cup.

Effort has been made to place traffic work and QSO’s in a separate column. Separate runs will be given: one to the best operators in the Philippines and one to the best operator in the U.S.A. or Canada. Depending on where your log and message file stands as the announcement of this before the high point man in each classification, you will receive weighted credit in the correct proportion.

Logs and message files will each be rated on two counts when added together will determine which Philippine and American station among those entered will receive the cup award. (1) The operator handling the largest number of words (table count check) will receive 50 points for his work. (4) This means that QSOs will receive 50 points toward the cup. Each QSO up to and including 25 with a particular station counts one but more than 25 points per station shall not be counted. This rule in no way limits the traffic score and each further QSO should help under (1). Only solid contacts involving a communication of thought data. Traffic transmitted between the two operators concerned shall be deemed a QSO. One of the following shall be considered proof of QSO: (a) Formal exchange of messages in at least one direction on both of both stations showing comment exchanged. (c) Evidence in the form of bona fide QSL cards from the station worked confirming the information as above.

Participants here and in the Philippines will all receive this notice and word of the more general nature of the 1928-1929 competition at about the same time. Feel every encouragement’s and OP’s and let’s see those scores and the message totals in the R.P.I.

If you handled any North American-Philippine traffic last year be sure to send in log and message files at once.

Expeditions

A MAZEURS are requested to listen for the Dott–Brazill expedition (GMD) on 20.5 meters between 7 and 9 p.m. E.S.T., and for U.S. stations to keep lookout for 1MK on 41.28 or 39.86 meters wavelength at the following times:

Monday and Friday 8 p.m. and 10 p.m. E.S.T.

Wednesday and Thursday at 8 p.m. and midnight E.S.T.

If you handled any North American-Philippine traffic last year be sure to send in log and message files at once.

QST FOR JUNE, 1928
of the evening was required to get it together again. Schedules with 6ARD were kept with but few interruptions during all the time KDZ was at Fairbanks. Whenever signals were unheard or unreadable, came to the front with a fine signal and this station was the last station worked. 6ASM was the greatest DX worked during the fifteen days the set was in operation. Tests made with the set in the plane proved satisfactory, signals being copied at Seward, Alaska.

WSBS

The Yacht Carnegie of the Department of Terrestrial Magnetism, Carnegie Institute of Washington, sailed May first for a three and one-half year cruise and the waters of the North Atlantic will be visited in the summer of 1928. L. A. Jones, formerly of A.R.R.L. Headquarters is radio operator and observer of the Carnegie, WSBS. "LJ" will work hams from the interest and opportunity from all parts of the earth. The transmitter uses two 250-watt tubes with 500-cycle plate supply and is crystal controlled. WSBS is 221, 33, 45, 65, 68, and 192 meters, the latter wavelength being calling NKF on schedules which will be kept with the Naval Research Laboratory. 5AYL was the first QSO for WSBS. Except for certain hours when operation interferes with certain oceanic work tests can be made with amateur stations. The receiver covers from ten to about 75 meters and "LJ" will look for him on 45, 33, and 22 meters, which will be the main wavelengths for amateur work.

The results of magnetic induction and inclination, of electric potential gradient of the atmosphere, the study of ocean currents and temperatures at different depths and the collection of biological and geophysical specimens and the correlating of these and radio observations with the information obtained on previous cruises is intensely interesting and important. We should continue to look forward to radio reports of WSBS contacts and it will be great to work "LJ" and hear about the strange places visited and the adventures of the crew. In looking toward the future it will be remembered that the Carnegie is a non-magnetic ship completed for the work in 1909. In six cruises she has covered over 200,000 miles.

The Italian Polar Motorship, City of Milan is now in Spitzbergen waters accompanying the dirigible Italia. The City of Milan, IGG, transmits a short news message on a wavelength of 80 meters just preceding each flight of the Italia and to Goose Green daily. All amateurs are requested to copy IGG and to inform newspaper agencies of any news sent broadcast.

Please remember to report work with expeditions to Headquarters so QST may carry a full account of the progress being made and of amateur accomplishment. We shall be pleased to forward QST cards to expeditions. It is sometimes necessary to hold them until the return of the expedition when the expeditions are at inaccessible places.

SRXB tells us that he is installing a short-wave transmitter on the Rockwood-Stockton Island which is expected to leave Rockford, Ill. about June first for the transatlantic hop. It is planned to make a stop in the United Kingdom and to make a long trip built for 20-40 and 80-meter operation and information on the call will be sent out through the O.B.S. as soon as known.

ENGLISH QRP TESTS

The Radio Society of Great Britain has arranged tests for 16 meters, using 23 and 44-46 meters with very low inputs. Dates are June 9 to June 17 inclusive. The follows entering want to effect as many two-way contacts as possible, and we ask SRXB other hams to cooperate with him giving preference to RS contacts during that period. We hope that all the R6G heard then will be using lower power. Also, these fellows want cards confirming the QSOs. Don’t mail them direct, but save cash by mailing them in one bundle to QSL Dept. R. S. G. B., 53 Victoria Street, London, S.W.1. In order to continue the interest to help serve the needs of the society, it is requested that a note be sent to each station to which they wish to make a QSO. By doing this you will be able to concentrate your efforts and be able to use the station to which you have a QSO. This will help you to serve the needs of the society and will be greatly appreciated.

TRAFFIC BRIEF

On April 19 the East Bay Section held a successful traffic and central California hamfest and A.R.R.L. dinner. Rainfall in Oakland, 2CZR presided. Following interesting talks by Director Babcock and Lieutenant White, 6NLX, SA6X, 5C6C, 6DDN, and others, the net was up on 6C6J, 6C6K and 6B6T added their talent to the gathering and the meeting ended with a raffle of radio equipment.

DIVISIONAL REPORTS

ATLANTIC DIVISION

SOUTHERN NEW JERSEY—SCM, M. J. Lottysb. 3CF0.—Seven ORS reported this month. Some show promise of being able to look at some passes. Unless a report or a good reason is forthcoming next month there will be some cancellations of different bands and the collection of biological and geophysical specimens and the correlating of these and radio observations with the information obtained on previous cruises is intensely interesting and important. We should continue to look forward to radio reports of WSBS contacts and it will be great to work "LJ" and hear about the strange places visited and the adventures of the crew. In looking toward the future it will be remembered that the Carnegie is a non-magnetic ship completed for the work in 1909. In six cruises she has covered over 200,000 miles.

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The text contains a mixture of different topics and statements, likely from a newsletter or magazine article. It appears to be discussing various ham radio activities, schedule changes, and technical issues. However, without additional context, it is difficult to accurately summarize or extract meaningful information. The text contains a number of abbreviations, codes, and technical terms related to ham radio operations and communications.
and up again is QVY traffic. 9C7T is now working 80 and 20 and has a new Op on the job also. 8BWY, the Michigan State college station, started out with a look and then their 20 meter transmitter. 9C91 has dropped 20 for an 80 and says he is better than 40. 8AJL comments of YL QRM. 9DSF was silent most of the month but found time to come up and say he will be back. 9C7R reports hard luck working on 20 and doesn’t seem to have the QSO’s lately. 9DKX has been on the air again with an OHX on an indoor Hertz. 9SCAT will be ready soon with 2UX-210’s with DC plate supply. 8CJ has been doing well with the 9CMX receivers, building a homemade receiver. 9A8F has been trying a long time to get the transmitter rebuilt but no time to use it. 9CUT is going to change over to DC and use a UX 256. 9BSR reports hard luck building the station. 9FLX on one of his fifties. 9AED says he will be busy with baseball from now on. 9BED still stays at the top on schedules. 9C4Q has moved and reported via radio. The 7th Michigan convention held at Lansing April 27-28 was well attended and a good time was had by all. Sure was great to see the old timers there and also a lot of new faces which shows that the game will never grow old. Congratulations to the game that put over 1500 members to the convention headquarters, it being his first Michigan convention.

Traffic: 9BRS 5; 8CU 87; SNQ 12; 8A Al 19; 9CM 10; 9109 6; 9C3K 5; 8DK 8; 9C5Q 21; 8AJL 12; 9C5L 6. 8BSR reports 9ham is handling all regulars. 9CMT reports 9ham has a schedule with 9CJR after a trip to South America. 9C1W put in a 10 meter Xtal and is now in the air on 20 and 40 and 70 meter sets. 9AXR is building a new 40 meter Xtal controlled transmitter. 9AYO and 9ABW want skeds on 40. 9C9P and 9DHS waves skeds on 60. 9K3Y is on 40 and 80 using two different Xtals for qso. 9CMQ bought 9CDT’s Xtal and is installing it on 80 and 40 meters. 9CDT was a 200 meter sked on 21 and 42. 9KDC is a new station at Richmond. 9AED is putting in a 10 meter set. 9CNC worked 1LAF on 40 meters and worked a 200 meter sked on 80. 9AEP blew two 210’s and has no more. 9ENX has been knocked out by the YLs. 9AJL was waked by the inspector for not attending the exam. 9DIN blew his plate transformer and is now using a 9KEF plate and is getting along. 9DIII says UX 2810 is on the air after a trip to South America as op, on a passenger ship. 9AA1 is on a station with a 200 as an oscillator, 9AA1 moved from 40 to 80. 9MQN gets out better since he put in his Xtal antenna. 9DEQ is a new Fort Wayne station. At the next club meeting the Fort Wayne club intends to initiate all of the old members taken in since Jan 1st, provided there are enough skeds to get away with it.

Traffic: 9E2Z 424; 9A1N 434; 9CMN 219; 9F9D 208; 9CVR 223; 9AEE 54; 9CQY 190; 9AUB 10; 9DSO 3; 9ABA 25; 9KRW 51; 9TPH 2; 9E9Y 16; 9EX 9; 9FGC 18; 9NCN 24; 9DBA 80; 9AJB 7; 9MKR 7. 9A4W reports 9hams are working up on the air. 9ALX has 20 and 40 meter skeds. 9AN reports his interests in Russia in the Russian language are terrible. 9ANQ is on regularly on 20 meters and is arranging a schedule with 9AM. 9AEG has been working with 9AM on ten meter. 9APX has been rebuilding his transmitter to get away from the VQ YL. 9AAQ is still pounding out lots of traffic. 9A3L has kept a schedule with 9F1W all month. 9AXW reports the Joliet Radio Club is holding regular meetings. 9BMT is going to get the air port in Denver to install a station. 9HLS has been very busy with track and school work. 9BMZ is on in a new QRA in Maywood. 9BN1 is keeping schedules with 9COS, 9A9L, 9DZ, 9BEQ. 9BSF has been off the air recently building the station. 9BRX put up a sepp antenna and it seems to be working. 9B9H is a schedule with oh-oh-H but bad QRM causes it to be dropped and E9-3 takes all the traffic for the west coast stations. 9B9K is still operating on 38 and 76 meters. 9BIZ thinks he worked QD9C and is waiting for a QSL to check. 9CA9 reports DCX on 20 meters and is keeping several schedules. 9C9Z is operating on 80 meters. 9CMC didn’t get any reports on 40 so the station is back on 80 meters again. 9C9Z was on top for two weeks with a burned out generator. 9CN has just returned from a trip to the east. 9CBN continues with good reception and DX. 9CNY says now that summer is here, he will be working in the early morning and also on 20 meters. 9CSB says DX is FB but is busy with school work. 9CUH is handicapped by some unkindness. 9CVO is building a portable transmitter for his Ford. He says 9DWT works the U.S.A. with a 26A1 and a eliminator and is now working a phase transformer. 9CZT is rebuilding his chem rectifier. 9DBI worked a ship near Panama signing MD on 40 meters. 9DCK has evicted all competition with his 210 tube. 9DG9A says nine active stations are in Galesburg. 9FPZ and 9FKO being new ones. 9DOX reports traffic somewhat better. His schedule with o6o is interrupted because the tower was busy painting. 9D9O worked oh-a8AOE for 90 min. the other am. 9D9M is a ham in a school in the play "Penrod." 9DWP was kept off a 50 s or 80 on the air kept on the air with a borrowed 50 after blowing his own. 9D6I moved his station to the high school for a demonstration. 9D6A reported 15 messages by Western Union that he had taken from storm-swept South Dakota. 9DRA ran up a fine message total even though he had no skeds. 9DGR reports nothing new at the station. 9D9K reports "YLA". 9D9O worked OA, OZ, 00, EP, EF, EG, RN, SJ, TVJ, PQ, NQ, Y, AB and FQ on all 40 meters. 9F6F is going to get 85 or 120 on the air soon. 9FPX is moving to Wright City, Mo. 9SERH worked several EF and EG stations. 9S9YA is changing from a Hartley to a MOBA transmitter. 9D9R is a new station on the air. 9FDJ is the only ham in Atlanta, Ill. and finds it hard to learn the ropes without any book. 9FJ is a ham who will have a new book-call hook will be printed in June. 9G9V worked OA stations 45 times during the last month 9G9V is going to try 80 meters. 9G9N worked 20 for the air because of long hours at work. 9KB is trying out a new key clickless transmitting circuit. 9MI dropped down to 20 meters gets out much better. 9IQ has a crystal controlled transmitter, they say it isn’t on due to school but reports to let us know what is going on. 9IZA worked OA-O5A on daylight on 40 meters.

Traffic: 9E9A 204. 9AQ 194. 9RSO 157. 9BKE 155. 9BN 138. 9BMZ 128. 9AMO 116. 9CAR 168. 9A9L 94. 9BSH 83. 9AD 73. 9AFA 73. 9CSB 64. 9F0G 88. 9CIA 59. 9CQY 56. 9DCA 56. 9DVD 56. 9HTX 45. 9DOI 40. 9DGA 36. 9CNM 35. 9PQ 32. 9AFX 56. 9AGG 23. 9ARK 66. 9DMS 23. 9CUQ 18. 9BUL 15. 9E9A 15. 9BUL 11. 9EL 11. 9P9R 10. 9CJH 10. 9DT5 9. 9R9J 9. 9E9R 7. 9RAM 8. 9C9Q 6. 9CEK 7. 9CCX 7. 9C7T 7. 9CN 5. 9B9Q 5. 9MT 4. 9ROO 4. 9ACU 4. 9A9L 4. 9DXG 4. 9CP 3. 9KX 2. 9BLS 1.

DAKOTA DIVISION

NORTHERN MINNESOTA—SCM. Cy L. Barkley, 9BEU. The end of this month official closes our election leave, SCM. We have had a lot of traffic after the tube with "win, vigor and vitality" and he got it. FB and congratulations, OM. 9E9O is in the office this month. 9HSF has been busy lately. 9AKG is to report the fondest one heard in Brazil. 9CWA just got down to 20 meters and worked RJC right off the bat. 9KV reports that navigation is about to open on the
lakes and that means less short wave work for him. 905R has been running with 40 meter and 21.13 meters. 9C1Y finds DX wonderful and works plenty of it. 9DPB built a new transmitter this past month and 9BMX is still working the same old sea and has 24 foreign contacts last month. 9GZ put in a new 552 and wants a schedule with the Twin Cities. 9CF reports QRM fierce on 40 meters, 9EB has operated at 9XI at night, and 9CTW sold most of his transmitter but has enough left for a set on 20 meters. 9HIW has been playing on the 10 meter band and finally got arranged so he can QSY all bands. 9BVH has started to wind crystals and is on irregularly. 9EHJ, a new OHS, is on 20 meters almost exclusively. 9EIO shows up as VDQ and 9BBT says business is almost too good to be on the air. 9DUS is back at his home again, after several successful briefs.

Traffic: 9ABY 144, 9EHO 70, 9EGF 62, 9AOJK 54, 9CWA 49, 9EKY 28, 9EGU 36, 9C1Y 25, 9DPB 25, 9BMX 21, 9GZ 17, 9CFI 11, 9ADS 11, 9CTW 8, 9BUB 7, 9AKM 4, 9BVH 4, 9HIW 2, 710CT 1, 35BBT 1.

SOUTHERN MINNESOTA—SCM, D. F. Cottam, 9BYA—9COS certainly has a busy beatiful of traffic. 9COS has been playing on 10 meters handling a nice bunch of traffic. 9BBH has been running with ops handling a lot of traffic. 9F8K handled oh and 9re on a few. 9FBO, a new reporting station, is doing very nice work. 9FPO is running a new control station for control operators. 9DOP after a change and revamp of the junk is doing some nice work. 9AIR is on 10, 20, 40 and 80 meters and is using a new portable call. 9F7K has been working on a hamfest to be held May 26 as his traffic is low this month. 9KI has a new chief ops who makes things humming. 9BDW was QSO 4x4 for 14, 20, and 40 meters for 50 seconds and 9K8S is out of commission for a few days on account of a blown rectifier tube. 9JDE is on an oil in connection and 9JDI has been working and the silent is has QSY'd to 20 and says there is nothing like it. 9DKA is selling some of his junk as he is moving. 9BXT is on 20 with 4 ops and want to get in touch with other box of stations. Beginning May 1 the Minneapolis Journal will print ham information of the state of Minnesota. Any information you have send to 9BDP, 2515 Irving Ave. South, Minneapolis for publication.

Traffic: 9COS 383, 9BN 75, 9BHZ 57, 9EFG 48, 9BTW 40, 9FBO 25, 9EDF 21, 9DOP 20, 9AIR 17, 9BFW 14, 9XJ 13, 9HDF 11, 9EDL 9, 9BRX 7, 9DGJ 4, 9BHV 2, 9GH 2.

SOUTH DAKOTA—SCM, F. J. Beck 9DRB is keeping the daily sked with OHAGH when weather permits. 9DRB and 9BRI are having fine reports on 20 keeping the NA sked in fine shape. 9DWN worked an "op" on 20 also "GIH". 9KBK is having trouble with his antenna and 9JDI is sked in license. 9DIQ is on 20 except for A.A. skeds. 9DNS sways his 222 R.F. AMP. and is figuring on a M.O. set. 9EUN has fine results with new antenna. 9CJS is on 15 meter mode and building a bunch of new XMTA. 9FAZ is a new station in Bryant. 9DYL is working with the telephone crew. 9APJ reports dx and traffic good. 9AZB handled a bunch of rush death messages for W.U. when lines went down. 9BES is a new station at Platte. 9BBP is working all the dx in sight and is not on 10. 9BTA has been appointed an official observer. A great many of our best traffic stations working on 20 meters complain of QRM on 20.

Traffic: 9DGR 73, 9BOW 37, 9DWN 35, 9BBK 34, 9DUG 34, 9BFL 33, 9JED 19, 9CJS 19, 9DLY 18, 9APJ 11, 9ARX 10, 9BBF 7.

NORTH DAKOTA—Acting SCM, Prof. H. L. Shetlar, 58A9U says 58A9U has no traffic to report but bought a new UX-222 and is building a receiver around it. 9DYA is still trying low power on 160, 9DM is on and off but managed to find time to have the G2XVW blow his 210 and is on with a 201A. 9BRR has been busy with his railroad work but manages to keep a few schedules. By the way he be a housewrecker those cird ORS and those who do not report. It is up to everyone of you to make this Section a line one and that is one way of doing it—to report regularly! 9CDO is busy just now. Ex-9881 at Hickson is back on with a spark coil plate supply. 9AAC is Colfax is on occasion. 9EBB is back again with the call 9DB. He has a real punch, too. 9CAP is not on very much. If any of the new members do not want to be on or if there is some concerning traffic handling or reporting, don't be afraid to

DELTA DIVISION

ARKANSAS—SCM. Wm. Leonard Clippard Jr., 5APIP, ACA—The spring fever may be the cause for several inactive stations this month but 5AXQ turns in the best report we have had for some time. 5AAO is on 10 meters and 10 meter bands and 5JK has been silent this month for some unknown reason. 5SS worked an OZ. 5ABT continues to plug along. 5ABD has a mag. 5IN is winding up for the year. 5APJ has been on a bit. 5CFJ is planning to get back up. Fellows, I have one more month to your SCM before I leave. You and better be looking around for the fellow you want to take my place, because we don't want to drop out in the least. Let's stick to it and all stand by the SCM to be. You can sure help make his task easier by doing a bit more.

Traffic: 5AXQ 66, 5ABI 30, 5SS 12, 5CK 12, 5AVA 5.

LOUISIANA—C, A Flying 5UK—5ARC in on 20 meters with two UX-210 tubes. 5PM is trying hard to get down to 20 meters. 5EB has blown his 203 A tube and is now using an 852 with merc. 5/dist. 5JCI is now 20 and 10 meter bands with good results. 5ML is handicapped by a lack of proper power. 5WY is shut down as is QRM as Ast. Engineer. 5KSB. 5AGB runs Air-Plan Radio Shop and is very QRV. 5ML is using phone on 150 meters; 5FX is at Culver City Military School and is QRT. 5KZ has YL QRM. 5AXA is a new operator. 5FAP is a first grade commercial ticket. 5BNF has a new "OZ" in the gang want a bit of advice or information concern-
NEW YORK CITY & LONG ISLAND—Acting SCM, J. B. Kilpatrick, 2EV—Manhattan: 2KR has handled important tle for NBSAE, 2BBC and 2BU has been logging 5000 meters but not far from one old. Brooklyn: 2PF is doing good work and dx now. 2ABT is being overlapping. 2BAD is also at 700 meters but not far from old. 2AJL is sick but is ok now. 2UI is on 50 meters now and lining up skeds. 2CRB will change his QRA soon. 2BDM is the busy still pounds outlet. Staten Island: 2AJO and 2ALQ are at sea now, also that 2BCY and 2CIS are now in partnership. A ready from 2AEP (WFOE) at San Pedro Go. 2BAD, 2AFD, 2BAD, 2ALQ and 2AJP are all now at sea, also that 2BCY and 2CIS are now in partnership. A card from 2AEP (WFOE) at San Pedro Go. 2BAD, 2AFD, 2BAD, 2ALQ and 2AJP are all now at sea, also that 2BCY and 2CIS are now in partnership. A card from 2AEP (WFOE) at San Pedro Go.

TRAFFIC: MANHATTAN: 2EV 39, 20V 6, 2BUC 8, 2KR 16, 2BCH 5, 2BO 38, 2BNA 21. Brooklyn: 2BZX 3, 2ARZ 1, 2AFD 8, 2BAP 2, 2AEP 2, 2ALZ 1, 2AJP 1, 2AJP 1, 2AJP 1, 2AJP 1. Long Island: 2AJS Y is QSO WNP. 2TY has 2ABE-2ADG as an op now and has several foreign skeds and has handled lots of tle for GMD, 2A2Z kept sked with DCUZ until April was over and is now in QRP. 2TY's keep-alive transmitter for M. A. rectifier broke down but he rewound it and his working FB now and will be 80 on 30 for traffic. 2BO sent his report direct to the SCM instead of to the acting SCM 2EY.

Traffic: NORTHERN NEW JERSEY—SCM, A. G. Western, 2WR—13 stations failed to report which is a very bad showing and a condition which might be improved at once. 2AT had the largest traffic total in our section, 2AT, 2CP came into the BPL this month, 2CP has not been on much due to household duties. 2WR since working a V.F. Hertz has trouble with RCA's 20W. He is keeping Caldwell on the map. 2DX maintained a sked with 6GP to keep in touch with a sick person in Calif. 2EY is back with 2ABZ on the skeds in his new license. 2TAF putting in a new MOPA which keeps that station off. 2KA finds social duties break up his skeds. 2ARF and 2AGB. It is because he is a fireman. HI. 2BDF wants two skeds and a sked with a station in the south and one in the north. 2ANG is installing 2120 in a MOPA. 2MD will have his new crystalmitter on soon. 2CCTQ gets a report of R 7 from NZ on 20. 2CJX is testing on 10 meters. 2BY reports that somebody else is using her call as she received their QSL's Business has kept 2EIR off the air. 2IS is very QRM with YL's and WKB. 2ADR keeps a daily sked with 2ANV for traffic. 2AV and 6GP giving audio with Herbert in Florida. 2AEZ got a report of R 5 in France using a single wire VP Hertz. 2AOS is back on the air and will be on 42 meters.

Traffic: MIDWEST DIVISION

NEBRASKA—SCM, C. B. Dichtl, 9BYG—9QY and 9BQG are very busy right at this season with farm work. 9SEO is doing a little BCL work but says he is going up to 9DVR soon. 9BP recently appointed assistant observer. FB. 9EWW is very QRM with the Civil Engineering gang of the power company. 9OJ reports an H Knot sked to 9FJ 20 and 6GF. 9NEW is a new station at Blue Springs, 9CBT holds several skeds but QRM holds back large traffic totals. 9RBS also holds a few skeds but not much traffic. 9CDB is too busy in his shop for much and says he is still with us. 9BQR wants to know where all the fellows are. Can't raise anybody anywhere. 9AZE report a monthly report from the second sked for the first time. 9EPP also reports this month. 9AEZ turns in a fine total, which we hope happens. 9EOZ reports that 2 new skeds have been set up this month for 9EPP and 9FIPZ are now sked in Omaha at Nebr. 9KZ keeps, on, we will have as many stations as some of our neighbors.

Traffic: 9QY 5, 9EWW 22, 9DVR 24, 9EW 12, 9DZ 16, 9QJ 16, 9CDZ 12, 9BBS 2, 9BQR 2, 9EQJ 17, 9EUT 19, 9EPP 6, 9AEZ 25.

IOWA—SCM, A. W. Kruse, 9HKV—Everybody had a bang-up good time at the Midwest convention held at Ames, Apr. 13th, 14th. Traffic has taken a bad turn due to the kitchen fumes and more or less inactivity throughout the state. 9CS is keeping 4 daily schedules on 40 and leads the section. FB. 9CDM has been sked over the 20 and 40 meters and a mercury are parking fine. 9HKV is too QRM to think much about ham radio. 9CIX says he got snowed under coming home from the convention. HI. 9CIZ is used to being crystal-controlled with the crystal at 9EHN. 9CZG's receiver went on the bum so much traffic. 9BCA is another new ORS, 9DZW is the Traffic Section. 9GKZ reports that the station is operated by remote control. 9HAT is hitting both costs hard and often. 9DTM operates KCK when not pounding brass. 9EQJ is running some 5 meter skeds on Sunday afternoons and he has the dope on results. 9CGY is keeping a few skeds. 9AQH has a 40-meter schedule with 2QYR and 2QYR says he would like to have 9GIL looking for a transformer to feed his 50 watter. 9ASM has an "S" that is pushing out a keen signal. 9DPJ wants to know how many of the fellows are 9CS to BZD a month. 9AEZ turned in a fine total, which we hope happens. 9EPP and most of 9BQG are on 30 meters. 9SHD and 9DNG are only stations keeping any number of skeds 1MK Traffic as well as foreign traffic may be heard via the latter station. 9BPL is doing everything on 20 meters FB boys 9CV is the only station in Topka reporting activity. 9DHH says he hears 'em on 90 meters but can't connect. Too bad OM, 9HL and 9GQM are present but can't. 9DFW's appliance that includes the QRM is an easy to work station. 9BKZ is a new station doing a little QRM work. 9DQZ and 9DQZ are rebuilding. 9DUG is causing power leaks. 9BHL is fairly continuous QRM and needs a sked with skeds with the marine station in Nicaragua.

Traffic: 9DNG 126, 9HL 32; 9CFN 25; 9DHH 21; 9LN 25; 9B1Y 16; 9BPL 14; 9CXW 11; 9CFW 11; 9CVX 11; 9CV 8; 9BLY 7; 9EIM 10.

MISSOURI—SCM, L. B. Lauter, 9RR—9ZK and 9BQG were high on traffic in St. Louis this month. 9AAO received his ORS and is back on 40 meter. A new chapter of the QBP club has been organized in St. Louis, making four chapters now in existence. 9ZKR reports an expected visit to K.C. soon. 9HEU says he cannot keep skeds due to failure of the parties at the other end of the sked to be on the agreed times. 9BBI put in a new Zepo but lost his old 20KA is now in use. 9BFI is still trying to make a rectifier work and went back to 80 meters. 9DLB was called on to do something in a church entertainment and had to QTR for the showmans. 9FQG sent them on sked and was never seen in these parts. 9BVC reported on off-wave hams as usual, logging forty. 9BQS is building a portable for summer work. 9AYZ wants 50 meters skeds and is on every day. 9EBU was reported in EG, worked NN and applied for an ORS. 9FIQ tried to get reports from Jeodin hams for 20 meter SCM by radio but his QSO was broken by some incident at the other end. 9AJW kept skeds with 9EWM. 9LNN, 9ECS and 9BEI. 9DAE had to QTR due to any QRM and was operated on 90 meters. 9CCQ is still QRM due to farm work and QRM. 9CRM received wholesale compliments on the escape of himself and family from the fire in his town which occurred this month and caused the death of forty persons. 9LI visited at 9DVF and plans 20 meter summer work. 9DKG continues his 9EUN sked and handled a fine total. 9ECQ handled important train message for 7CJ and sick messages for Huxley, Iowa. 9DMT worked both noon and evening on 20 meters. 9QHI says he made 9QRH. 9FBB reports 9ERN and 9EIW had an 8 hour QSO. 9JF reports QRV for St. Joseph traffic daily 8:30 to 11 pm on 40 meters. 9EUN worked on OMA stations from 9BEI and 9BEC. 9QHI handled during the blizzard there the first part of the month. 9BBI handled two thousand words of press for the Ozark World-Herald, written from Dea Mofolos and forwarded by W.U. wire. 9DOJ and 9ZD were out of town much of the time and so had no traffic. 9ENU, 9DQN, 9FIO, 9AYL, 9AZH and 9SR pounded brass vigorously when QRM per-
at the Convention and hopes to see you all again soon. Traffic and news are scarce so this month’s report will be rather brief. BPT is first in traffic and got his first class ham ticket while in Boston. 1IP handled a bunch even though he has canceled many QSOs of late. 1AI handled a lot of QSOs in report traffic getting scarce. A report was received from 1AFD. IASR shot some news of the Bremen Conv. in Germany to England. 1ANS shows some interest reporting even though he has a small total. IASR and 1AQ are members of the Naval Radio Net. 1GBK is getting back in Claremont.

Traffic: 1AZS 114, 1ATS 59, 1AOQ 20, 1JN 17, 1ANS 12, 1AFD 5, 1AER 3.

RIODE HURON—SCM D. B. Fancher, 1BVR
Your SCM’s address is now 91/2 Hobart St., instead of 23 Summer in case any drop in for a visit. 1BLS is our star station this month. 1BAT has just returned from Bremen and says it was by far the best of the3. 1BQD is operating on all bands now—20 for DX and 80 for traffic. 1AWE is still in DX and 50 for traffic. 1MO has had trouble with Xmitter this month. 1BJ is still on air, but now on KQDV at sea. 1BDQ is rebuilding his Xmitter. 1BVH is on again and ready for action.

Traffic: 1BLS 105, 1BAT 64, 1BQD 28, 1AWE 22, 1AMU 17, 1CKB 6, 1MO 6, 1BJL 3.

VERMONT—SCM 1AJG, C. T. KERR—1AQO leads the section with 376. Congratulations OM. 1JQ was second with 301. There are more QSOs this month than ever and 1BOE is almost 100 per cent. 1BCK and 1GQX came in next and the SCM thanks you for your real hard work in this race. 1AJG has not gotten over the Convention cold yet and needs a prescription huh? 1AQO is pounding out 77 meters on schedule. 1EZ and 1GQX are new ORS. FB QM’s, 1BD has been appointed Official Observer for the state of Vt is on the air regularly and a nice AA. 1BJP is in house cleaning so not too much. 1FN is our proud papa. Congratulations on the new Jrs.

Traffic: 1FN 4, 1GQX 218, 1BPJ 34, 1BFR 49, 1AOO 376, 1JT 318, 1BCK 216, 1ACQ 32, 1EZ 5, 1AJG 78.

EASTERN MASSACHUSETTS—SCM, E. L. Battey, 1UE—Traffic took a slump this month with only 1JT making the 250. 1JQ and 1KQ are going strong with ten meters. 1BDV is on the inactive list. 1NK has joined the Naval Reserve, 1HN. It was the biggest month for traffic in the past year at IASL. Convention work kept 1JQ’s IOTA’s alive and 1QO was visited by 3CEB. 1BMS is working plenty since building a new rectifier. 1KY expects to get smashed up any day in an old Zenith. 1QD has a new receiver and can now hear answers to his calls. 1ABA is in Naval Radio Net. 1LM had a good time at the Convention. 1AV is working on 20. Comm. Mgr. Handy visited 1LVW during his stay at the convention. 1KK is doing little experimenting on 10 meters. 1NQ received a report from Moscow, Russia in his report he has received his OSA appointment. 1BT is sent in a report, 1ACQ reports a fine schedule with 1AZO and says he is getting out on 80 meters. He reported for 1BKX, 1BBE and 1BOA who, between them, and particularly 1BBK, handled a nice lot of traffic. 1AGL reports everything fine with the Queen City Radio Club and says he is taking the Army-Amateur Radio Course. 1CGM sent in a fine report on of traffic handled in a short time. 1AVG’s school QRM report was heard in Germany on 80. 1BFZ has done some DX work at last and is working on right and left. 1CDX worked a report in spite of having been away most of the month. 1AQD and 1IJ sent in their first reports.

Traffic: 1BIG 225, 1AJC 48, 1UBJ 48, 1AHC 47, 1BTT 50, 1ACV 42, 1BKN 38, 1AQH 28, 1ICM 30, 1ABK 52, 1CDX 9, 1AQD 4, 1BBE 3, 1IJ 9, 1BOA 2.

NEW HAMPSHIRE—SCM, V. W. Hodge, 1ATJ—The SCM was pleased to meet so many of the gang.

QST FOR JUNE, 1928
The Springfield Club has organized a vigilance committee and has taken 5 new members. They are working a 50 watt T.P.T.G. set and building two low power stations in this vicinity to complain about a waning lack of interest with the coming of nice weather and lack of schedules. 1BGM says it was handed out in the afternoons on 40 meters. 1UM says that 10 to 15 hams are attending the Worcester Club meetings on Sunday mornings. 1BVR spends a week at home once in a while and manages to get scheduled calls for a few foreigners. 1IV is QRW with school so has not been on the air much.

Traffic: 1AK4 J, 1AKZ I, 1AMZ 6, IANI 63, 1APL 108, 1BKQ 10, 1BWY 8, 1BVR 4, 1BVR 2, 1EO 7, IIL 50, 1UM 14, 1WQ 5, 1BGM 23.

**NORTHWESTERN DIVISION**

O RegioN—SCM, R. H. Wright. 7PF—7ARK is high traffic man again this month. 7AEC the I B M is heard consistently. 7TN a new ORS on both 40 and 20 is doing splendid work in both dx and traffic. 7VQ is on regularly. QRM from work practice 7EY and KJZ is regular to us and it is heard 7ORS has joined the Navy and will see the world from a port-hole. 7ABE has at last received his WAC certificate. 7EY can only spend this time with his station. 7IV is using rectifier tubes. 7ALK is still looking for the “Condenser Bearing Filter Tree”. 7PL is putting in a 20DA for 40 and 20 meter work.

Traffic: 7AKK 204, 7AEC 125, 7JN 96, 7VQ 61, 7EO 60, 7AGC 29, 7TO 15, 7DE 6, 7ALK 5, 7ABH 2, 7THV 2.

MONTANA—SCM, O. W. Viers. 7AAT-QT—CHP is running off with the whole section in traffic work. 7HT takes second place this month. 7DD says crystal control is tricky stuff but the new set’s amplifier output will be 15 kw. 7JZU has been playing around on 852 for 10 meters, and reports a new 40-80 meter transmitter. 7AAW has been in the hospital but is out now and will soon be ready to go again. 7JFL had a little mishap on his motorcycle and hurt his leg pretty badly. 7CC, a non-ORS, sent in a nice report to let us know that Kalspell is “up and coming.” He reports 7ADI is all ready to go on the air and promises to be a good traffic man. 7ABT is on with three operators. 7CC will soon be on with more power. 7AAT-QT has been QSO OA consistently on the 852 and the 210.

Traffic: 7HP 98, 7HT 50, 7DD 12, 7AAT 42.

WASHINGTON—SCM, Otto Johnsson. 7PD Traffic takes the lead having taken a decisive jump due to two factors. The Engineer’s show at the U. of W. and better cooperation from ORS and others. All ORS have shown an up swing in operation and it is hoped that the ORS organization can be built up. Many new stations are coming along with traffic and DX improving. A get-together banquet was held at Bellevue, with the Seattle hams as hosts to hams from Tacoma and Everett. Plans for the coming 7th District Convention were discussed. 7TBE takes traffic honors for much traffic from the U. of W. show. 7TEK rates a high place with both traffic and DX. Several new hams are on at Everett and Bell Helga Smith has been hearing DX on 852. 7TAG is on with the new QRA. 7TG keeps 40 meter skeds with 7NR and 7AJR. 7MX has been on more than usual. 7TBE is on new ORS. 7DI also wants to be one. The Tacoma gang are building a new shack. Active stations desiring of ORS appointments are invited to QSO the SCM.

Traffic: 7BB 637, 7AKU 91, 7TEK 67, 7QG 45, 7ACA 40, 7MX 83, 7AEV 58, 7BR 29, 7TX 9, 7FD 6.

IDAHO—SCM, H. H. Fletcher, 7ST—ALD—Only one report from the Idaho gang this month but that is to the effect that they have been falling on new calls for two months. Certainly sorry about that gang, but have been QRW work 7TACN-JL has just about closed down for the season. He is opening a picture studio so has more time for some made up spots for 7CP, 7CW-CU and 7TPJ have all gone out for comm. brass pounding. 7YA is gradually getting back on the air with 50 watts 7GDP. 7GL is still puming 852 skids into the ether. 7ABJ is still wv prophet. 7AGU doesn’t know whether to use a 250 or a 75 watt. 7HCR is on with a flyer. 7JW operates week-ends.

Traffic: TACN 10.

ALASKA—SCM, W. B. Wilson—We are trying to get the Section reorganized just now and it takes quite a lot of time. Let’s all help the SCM to build up a new Section. 7AER, 7ABE, 7TO and others of the ORS in the Section. If you have business for Alaska, get in touch with one of them. 7NN has a new receiver and will soon put it on the air with some short wave transmissions and it is hoped that more will do likewise. 7TO reports the following: 7HL, Taku Harbor, has just put up with an 852 and 500 cycle. 7ABE and 7DG are going. 7ALQ has a 100 watt DC supply 40 meter transmitter. 7ADY and 7TE are also on the air.

Traffic: 7AER 66, 7ABE 67, 7ALQ 14, 7TO 20.

PACIFIC DIVISION

EAST BAY—SCM, J. Walter Kraft—4CZR—The Section is coming up rapidly in traffic work and fellows deserve to be complimented for their fine showing this month. 6CGR again hit the BPL on two of the SCM’s 8 watters for highest totals during March and April. 6DIP also makes the BPL this month. 6CCT, 6DDQ-6CTX are new RMs. 6CCT, a consistent DX man, came back into traffic with a real solid total. 6DFM has a new one on 20. 6DR is building a backyard hotel for visiting delegates to the Pacific Division Convention. 6EDK is putting in his Xmtr on 20, 40, and 80, under reconstruction but working into PB job under care of 6BJW. 6IT is so busy with work as chief that he has no time for ORS. 6BZU says that he has eliminated his key clicks by means of an artificial center tap, using a 200-ohm potentiometer, 6HDX reports DX getting good. 6QRY is at sea, but reports he will be back by 6. 6DHG has account of illness. 6AWM works traffic on 40 meters now when not playing with a new on 40. 6BRR is working traffic on 852. 6DAD is working at 6. 6OOZ, 6QO, 6AZ and 6AC on 30 meters. 6BW1 worked OA and 6AZ for a change. 6AM1 reports traffic took a flop since he dropped out of the ORS. 6CZT is back on the air with a split Colpiets. 6CLL burnt out MG and using a.c. while it is getting fixed. 6DQD is getting PB reports with voltage feed Herz. 6IM is working QBW fixing automobiles to such bhm much dB or traffic. 6FSB says UX-226 tubes PB for receiving DX. 6CCK is very QRM with coming convention. 6DUX getting very short on electricity due to closing. 6EY expects to put in an 852 soon. 6FPC still rebuilding for 250-watt T.P.T.G. set. 6CDA has got much time but 6DAD is going to be around. Operator on S.S. Arctic of Alaska Packers in Alaska, has been operating a “lunch box” transmitter with two seven and a half watts from Bareen bay, Sitka island, with much success under call of 6ZZE.

Traffic: 6CCM 276, 6IP 189, 6CCT 95, 6DTM 68, 6RJ 53, 6EDK 39, 6BZU 39, 6CTX 36, 6BRY 36, 6ALX 25, 6AWM 23, 6BVM 23, 6COL 22, 6DEO 22, 6DIW 21, 6AMI 18, 6CZT 13, 6CLZ 12, 6DQQ 10, 6IM 7, 6BSB 3, 6CCK 2, 6BUX 2, 6CDA 2.

SAN FRANCISCO SECTION, J. W. Patterson—6VR SCM—Due to a change in the SCM’s qrs, the reports did not get through. See new address on page 3 QST. Lets go, gang! 6AAY is back on the air and is getting world wide reports on his signs. 6RH is the other half of this station which hopes to get the first S.E. WAC certificate. A former 6CIX, has a midget receiver that sure brings the old DX in. 6DMM has two 201’s in parallel and gets r7 in besides the locking all that can be heard in his neighborhood. 6KW is still knocking holes in the other with a 250 watt. 6CXI has at last got his smitter working. 6DIN is orw, convention coming to work and rebuilding.

Traffic: 6AWA 81, 6AWN 67, 6DBM 39, 6CIX 30, 6KW 32.

SANTA CLARA VALLEY SECTION—SCM, F. J. Quemont 6NX—Nearly all traffic seems to be running through stations working on schedules. A new route was formed this month for east coast—Philippine island traffic. The route is 1MK-6NX and 6AMM-1HR.

Q S T FOR JUN, 1928
This will greatly assist 6AMM in clearing some of his east coast traffic as well as speed up replies. 6AMM handled 419 over his sked with op1HR. 6AMM copied 15 by 18 over one minute. 6AMM has promised to keep us up to date to help in this case, if it is of these occasions. Philippine Island Traffic sent to 6NXX will be promptly turned over to 6AMM to be forwarded on his daily sked 6BMW the RM and OD will be 6ALW, 6CRG, 6BYG, 6BOQ, dropping out to sea. 6ALW has come back on the air and has been appointed OBS. 6AZS was QSO 6JY, 6ICG, 6AEC. 6AEC has now worked on 20 meters and has decided to put in a 75 Watter. 6AZS joined the USNR this month. 6BYY kept his 9CP9 sked hot.

ARIZONA—SCM, D. B. Lamb, ANO. This report from Arizona is trying to get organized in the USNR with 6CPX in charge of this Section. Write 6CPX if interested. Address W. M. Bannister, Box 172, University Station. This is the exciting Sunday, at 5pm on 417 meters. Anyone having traffic please give us a call. 6AZM has a mercury arc and will soon have it going. 6CRG is new appointed OBS wkg mostly on 20 meters, 6BJF is unable to locate 10 meters. 6BCJ works on 20 mostly now. 6ANO popped the 50 and had it rebuilt again. 6BWS is using Kenotron in half wave. 6DU is going to give the skid a complete overhauling including grading valves on gas engine. 6CAA is a new ham in Phoenix quite portable until today. He shows up. 6WDQ has packed up and is going back to Michigan where he is 8BB. Good luck OM. 6CAP has bought a new car and seems to be feeling better. Radio don’t go so results another gud ham gone wrong. 6DTU is using 210-A’s on 20 meters a.e. 6EBR is a new station. 6DIK is going to leave his 6DIA is in the Brooklin. 6BBX is QRQ business as usual 6BHC has a new 852 on 40. 6BWS 6BJF report again not making an ORS report since being issued a year and a half ago.

Traffic: 6CDU 61, 6BWS 167, 6CPX 52, 6AZM 1, 6ANO 40, 6CRA 10, 6BJF 52, 6BCJ 8.

SAN DIEGO SECTION—G. A. Sears, 6BQ, SCM—6AJM lends the section traffic in handled, and will probably lead the entire country, his schedule with op1LA is responsible for the bulk of this traffic. 6AKQ made the brass pounders this month most of his traffic from oh6DJU, with whom he maintains a regular schedule. Most of 6AMG’s schedules were on 40. 6BCJ is in 6BWS is a new QA. 6DAC has installed a new tuned plate-tuned grid transmitter on 21 meters. 6RAG is a new station reporting this month. 6DCC’s sked was just been given a special call 6XE to facilitate handling traffic from the Marine Corp at nn1NIC. 6DNS works plenty of 6ALM and sends in 40 meter ORS report from this month from Essendon. 6DGW and 6BFE report regularly. 6AKZ reports traffic this month. 6CNK hope to have a better total next month. 6DE recently picked up the New York American plane 2XBK and rebroadcast over K5FD. He was assisted by 6AKZ.

Traffic: 6AJM 1016, 6BKS 222, 6RAM 200, 6BWO 48, 6BCJ 181, 6BAG 55, 6EC 76, 6DNS 44, 6BOL 32, 6DGW 11, 6BFE 5, 6AKZ 4, 6CNK 2.

LOS ANGELES—SCM, Don C. Wallace, 6AM—6ALH. 6BZJ and 6BNS make the BPL this month. 6ALH has moved to Pasadena and has become a professional purist. 6BZJ is keeping some good schedules with 6DNS and 6BNS are known in all over on 40 meters. 6CQ8 delivered a message for 7A and returned answer in ten minutes. 6C QT tried 20 meters and found it very good for UX, and many interested in communication. 6CQ8 going to night school to study telegraphy, and expects to have a pink ticket soon. 6CMQ is now on with an 852 again and working every DX. 6AMN made a new DX sked on 20 meters. 6AMX took his small portable on a trip North and was QSO Mrs. 6AM7 seven times from San Francisco and 6AEC, using an antenna out of hotel room 6BOY reports that on April 2nd during a severe storm near Owens Lake, three towers on the Southern Sierras Power Company transmission line were blown down and all service interrupted for 2 hours. During that time all load dispatching, switching orders and reports were handled by Radio thru 6HVO, 6COQ and 6DXS. Perfect service was given throughout that time 6BGC had a sked with students on science class expedition into Death Valley 3BP was one of the last to hit Larkey but is T.F.T.G. 100% now. 6GL has sked with AJ4BR and asks that any NU working to send him to plan for this. 6GLQ. 6APW had Manager of Globe Mills, Honolulu at his station talking to four of the directors at Honolulu through oh6ADH. 6DGT is making some changes in his new transmitter and says DX is better. 6ABK just put up third harmonic antenna for 40 and it sure is FB. 6DW reports that the "Eagle Rock Eye Splitter" 6PK, 6BDD, 6BDD, 6DNZ, 6DHQ, 6DNZ, has been tested and 6DOW went on a trip into the mountains during Easter week and took a portable along using spark coil supply and worked 675 fellow stations dropped from 40 to 20, and finds it FB. 6DKH keeps a reliable schedule. 6CHA a new ORS sends in a good report. 6DMG would like to have some skeds with East and North for about 17 midnights, this night. 6CQ always tries to get ham to qr’s while he phones and gets answer providing qr’s not had. 6ANN has worked three stations on 10 and thinks it FB. 6BFX is still waiting for Henry to come thru with his new driver, so he can go on his vacation. 6BVM put a little more soup on his 74 this month. 6DEG wants skeds on 50 meter band also a sked on 40 and 80 with a SP ORS. 6BZC finds the OA, AJ and AC stations very easy to raise. 6CHT is still very busy operating KFRF. 6DKX just erected a new 2ZFF antenna. 6AKW reports qr’s very bad on desert now. 6CZT sends in a good report. 6FPY tried for three weeks to get AJ4BK and got hit on April 24th. 6ALR with several ham visitors. 6AKD had a nearby new ham coming rushing over saying he could hear 6AKD on his set. 6CAG is in a new location that is much steadier and better tone. 6AEC just arranged sked and hopes to have regular traffic. 6BR is going to get a couple of 6EX Receivers back in the west. 6BRH has been having trouble at his station. 6UIH build a new shield grid tube receiver. 6PY, 6DX, 6BRO, all call. report 12 midnights, this night.

Traffic: 6BZJ 223, 6BNS 150, 6CQ6 86, 6COT 61, 6CZQ 52, 6DGM 48, 6AGR 48, 6GRO 45, 6BGC 42, 6BFP 41, 6QL 42, 6DGT 42, 6ABR 30, 6DIK 22, 6AEC 22, 6ACS 5, 6DEY 3, 6BDO 1. 6AN 18, 6BJS 17, 6VM 15, 6DEG 18, 6ADC 13, 6DKX 13, 6AKW 12, 6DZT 8, 6DPY 7, 6AKD 6, 6DRH 3, 6CLK 3, 6BVT 2, 6AEC 2, 6BZE 2, 6DIU 2, 6BHR 1, 6AM 41, 6CAG 4, 6ALR 6, 6BR 22, 6APW 35.

PHILIPPINES—SCM, J. F. Jimenez, op1AT—This report by radio from op1DR and op1AD via 6AMM, 6N, 6AJM and 1MK. op1DR is maintaining an hourly day schedule with op1AH. op1AD keeps a schedule with 6AJM of daily which is very reliable.

Traffic: op1DR 344, op1AD 306.

HAWAII—SCM, F. L. Fowles, oh0CFO—6DJU kept his word and made the BPL this month. 6ADH says that a LCH and Zep can’t be beat for QSO. 6DQ4 blew a tube but borrowed one and came back on. 6CH has skeds with 2B2H and 1DK, 6AMM is working a fifty on a 260 meter antenna. He has given 10 meters a try but has antenna trouble. 6DLR is working out on manceuvers soon so will be off for a time. 6DB still works 6KS. 6DLH has a 222 going and says it seems good. 6ALM says 20 is FB. 6DCU and 6CFO are combining stations at 6BFR. 6DQ4 worked 6DOQ on 10 meters. 6DOQ sends QSO’d EP on 10.

Traffic: 6DJO 370, 6ADH 174, 6DQ4 89, 6CH 72, 6DEY 59, 6DLR 39, 6DB 33, 6CFQ 21, 6BDL 15, 6ALM 14, 6DCU 11.

SACRAMENTO VALLEY SECTION—SCM, C. P. Melgar, 6GCS—6KSO reports the condition of being sick, 6CH ought to make a fine station. The regular monthly meeting of the Sacramento Amateur Radio Club was held on March 29 with 38 members present.

Traffic: 6CIS 70, 6CIS 350, 6DON 82, 6AYT 5, 6ER 52.

ROANOKE DIVISION

VIRGINIA—SCM, J. F. Wohlford, 3OA—3KJ says QRM ran him off down to 20 meters. 3OA and 3CT are also on 20 meters. 3JT has QRM from
the junior op which keeps him QRT. 3I1 QRBW YLS. 3WD is again coming back on the air. 3CEB has gone on air and the station is off air temporarily. 3OA and 3RQ (3TU-A tube) is still doing a good job for the summer. 3MB says QST needs a new type set—it bails out his call too often. 3AG is also suffering from YLS and has QRN from school work. 3AKL and 3AOI is waiting for a new station at Harmon. 3BGs and 3KG are still waiting for power line. 3AAA will open up for the summer on return from sea. 3ALW wants some DX but if the MG will stop all the noise he will be on the air again. 3CA chased an auto with license tag bearing "QB QQ" for fifteen miles—thought it was "OB and QQ." 3CKL continues to reach out, with their gang of operators.

Traffic: 3KU 46, 3ASC 11, 3AG 1, 3RL 6, 3BGs 8, 3ANV 26, 3CKL 122.

WEST VIRGINIA—SCM, C. S. Hoffmann, Jr., 3HD—6A CZ had schedules with a half-dozen stations handling the highest number of messages. 8VZ sent a message around the world and made a hit in the Fairmont newspaper. 8CLQ getting R-7 from Ohio with a 310 tube! 8PDO is still working DX, 8DGM got the big set going and getting all kinds of feedback. 8DWD working end of August 8JHJ is building a 852. Several of the gang are planning to go to the Atlantic Division Convention. 8JCM is testing 8AGM, 9GQ and 9EEX were visitors at 8DCM during the month.

Traffic: 8AQCZ 170, 8SCQ 28, 8DPO 18, DCM 6, 8BBM 2, 8SBJ 2, 8SPA 2.

NORTH CAROLINA—SCM, B. S. Morris 4JR—4SJ is back strong again. He reports 4A 4FV and 4A 4FM are doing some DX. He is planning on handling traffic from Miami Shrine Convention via 4CK. 4AB is still heading the list for traffic handling, 4ATV is in a new 250 tube in a Mo-PA set. 4TO is applying for ORS appointment. He reports 4AEC and 4AEM new stations at Asheville. 4JR has been on very little, 40C has a schedule with EQ-PM Supers. The entire section join in extending sympathy to 4ADJ in the loss of his mother. 4ACI is thinking of applying for ORS appointment. 4AGC has been tried 10 times but reports no luck. 40H has installed two 251's as plate supply for his fifty.

Traffic: 4AB 84, 4GJ 44, 4AC 29, 4TO 15, 40C 13, 4VH 6, 4JR 2, 4OH 4.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, C. R. Stedman, 9CAA—9EAM, 9DQD and 9ENM made the BFL this month. The latter two made it on messages Delivered, while 9EAM needs a good sized total to qualify for the 6th month in September. 9EAM also did some good work in getting emergency traffic to the South fighting the dust storms recently. 9ENM has been doing good consistent work. 9DQD rebuilt his transmitter, but says he didn't miss any schedules on account of it. 9CAA just got his Mercury. 

Traffic: 9FAM 284, 9ENM 189, 9DQD 95, 9CAA 49, 9CAW 132, 9CSR 18, 9ERN 14, 9CDE 10, 9EEA 6.

SOUTHEASTERN DIVISION

FLORIDA, SCM C. F., Foulkes, 4LK.—The SCM is very sorry to lose 4RK from the Miami gang. We wish you luck OM. 4CK is forgiving the front again this time with a large bunch of traffic. 4ADB sure worked a flock of DX this time. The Bryant Bros. of 4BL are leaving this month for the Great Lakes. Both of luck! 4DL is a tube. 4BL is on the air at a station 1MX. 4CC is moving to Tampa and will make things hum from there. 40B is still eating those Aussies for breakfast. 4LK is rebuilding the shack and the mobile. He took it to Long Beach for the local paper during the storm over that way. 4TK is back with a new receiver, 4HY is very QRB on a new receiver. 4CRE (KUCJ) has been busy this time and the SCM enjoyed meeting him very much.

Traffic: 4CK 120, 4ADB 73, 4BL 160; 4IR 29; 4ACC 27; 4OR 11; 4LK 7; 400 6.

ALABAMA—SCM, A. D. Trum, 5AJP—We have a new embryo to emerge from our midst in the person of 5CJ. Kipling and 5AJP is going to make some noise. He is going to do his share of the traffic routine. 5NJ is moving to Birmingham and we hope he organizes that bunch into as fine a gathering of hams that the town is worthy of. 5AJP works on the seashore so much that he blew all his tubes working Aussies. 5ADA is always on time with his report. 5AJP is still dormant on account of pressing business. 5NL still hopes to be back on the air. 5ATJ is trying his best for DX and more traffic. 5AWL is getting enthusiastic and makes all kinds of apologies for the small showing this month. 5JN is also going fine. 5UV went over big this month with traffic most everywhere. 5AIL bought a good deal of new apparatus this month and reports that he is doing very well. 5AST gives us a splendid report on the Auburn stations. 5FY, the school station, has some trouble with their MG. 5JB is a new man this month and reports that old 5AYW. 5AWY is off the air and says that he will not be heard from until next year. 5AGA has a lot of traffic to try to handle on his own. He is busy with his MG. 5OA is quite busy too, raising a flock on 20 meters but not much. 5OA is rather disappointed that he was not able to raise Asia this year. Auburn has developed two new hams—6AJI and Paul Brake who is doing some DX work with his call letters. 5AOW-5AST is temporarily off the air, the pair of 7/8 watters died a natural death. 5AXN is on with a 200 watt Tele-Comm. 5YW had to leave school on account of the serious illness of his mother.

Traffic: 5ATS 16, 5YH 71, 5ADA 14, 5AWL 4, 5UV 24, 5AYL 15, 5JB 11, 5AGA 7, 5OA 11.

WEST GULF DIVISION

OKLAHOMA—SCM, K. M. Ehret, 5APG—5AGH reports losing his mast. 5ANI says QRN prevents regular schedules and that he will probably be off the air until fall. 5AFX is installed in his new location with a 72 foot stick. 5AVD did some good DX work until his chemical rectifier went bad. 5AIR lost his mast but is putting up an 80 foot new one. 5AMO has worked all continents and is listed up for WAC certificate. 5AMO seems to be doing well with traffic this month. 5M0 has been experimenting on 20 meters. 5QL has the big bottle controlled and is getting out fine. 5APG holding regular 80 meter schedules in naval reserve work. 5AGM operates occasionally.

Traffic: 5APG 43, 5AGN 1, 5ANL 17, 5BAG 9, 5AYO 27, 5AIR 13, 5AMO 237, 5VH 24, 5AFX 30, 5AAV 18.

NORTHERN TEXAS—SCM, J. H. Robinson, Jr., 5AKN-BG—Please send your station reports to the new SCM now. See address on page 3 of Ö. 

Traffic: 5AMS 20, 5ANL 20, 5AEG 12, 5AMO 11, 5ACL 6, 5AAV 8.

SOUTHERN TEXAS—SCM, E. A. Salm, 5KY—A story is still very good. He says the heat and lack of summer seems not to daunt the gang. 5ATM says his antenna came down but he has a good message total. 5AMG is on regularly now and sends a good message total. 5AJP has been on a vacation but handled some traffic. R. E. Franklin is recovering from his recent accident and will be on
the air again soon. 50X is one of our old standbys 
at Houston. 5HS blew a fuse this month but is up 
again in a fine report. 5SE sends in his usual 
interesting report. We have two newcomers, J. H. 
Burney of Bishop and 5ASY of El Campo. We are 
glad to have you with us. 5HD has just been 
received that the San Antonio Radio Club will have 
their annual Hamfest about the middle of July. Let 
as many members as possible attend. J. H. D. 
Beckelman of 215 Glenwood Court, San Antonio is 
the secretary of the club. Get in touch with him if 
you can attend. We also have a report from our old 
friend 4SS over here. He has just returned from 
the far East and is sailing 
for South America.

Traffic: 3SE 20, 5LP 48, 5ATM 24, 5HS 8, 
5AMG 5, 5AHF 7.

CANADA

MARITIME DIVISION

PRINCE EDWARD ISLAND—SCM, F. W. Hyndman, 
19ZC. 1CO reports 1BD and 1BY actively working 
on 40 and 20. 1CO works mostly on 20 and 52.5 
and has been QSO WNP, Europe and oz.

Traffic: 1CO 4.

ONTARIO DIVISION

ONTARIO—SCM, W. Y. Sloan, 9BJ—Central 
Dist. 3AZ and 3 BL are on 52.6 meters. 3BC 
has been trying the water and has been 52.6 and 40. 
3DY is working on 20 and 52.5 with fine results. 
3CJ has rebuilt his transmitter to a very efficient 
form and is using 20.6 and 52.5 meters. 3DIQ is on 
52.6 meters, crystal controlled, every night. 3AI 
is experimenting with transmitting circuits. 3BT 
works everything on 19.5 meters. 3AY mourns the 
lack of DX. 3PC has been in action on 19.8, 21.3 
and 52.5. 9BJ confines his efforts to 52.6 and has 
lots of fun and traffic. 9AL is a mighty busy man 
but he still finds time to work, and has been 52.6 and 50 
meters. Southern Dist.: 3CS now has a second 
operator in 3DU. 3AQ is steaming along FB with 
his 210. 3DG is bothered by power leak QRM. 3IA 
is rebuilding and away goes his 222 receiver, off 
splo jars for life. Eastern Dist.: 9CC is sending time 
signals at 8 p.m. daily on 52.6 meters. 3AFF has been assigned his 
new call 5AN, 5AF will be on again by the 
time this is in print. 3MD is rebuilding bigger and 
better. 3XQ's tube passed out on Fri. the 15th but 
a larger one took its place. 3XQ's schedule every 
minute. 40 later using low power. Northern Dist.: 3ET 
and 3ART are operating consistently at Parry Sound. 
2NI operates on schedule every night on 52.5. 3EP has been 
done for the moment.

Traffic: 3AZ 38, 3CJ 34, 9BJ 26, 9AL 24, 3CS 20, 
3AY 19, 3HP 30, 3IC 12, 3AI 11, 3DY 7, 3DC 6, 
3CH 6, 3AQ 5, 3BL 10, 3FC 7, 3AR 6, 3BT 2.

QUEBEC DIVISION

QUEBEC—SCM, Alex Reid, 2BD—The gang 
is already preparing for this summer's picnic and the 
SCM will be glad to receive comments on the most 
suitable place and date for the picnic to be held. 
There was no hamfest this month but we hope to 
have one about the first week of May. This division 
has been made itself known around the globe, 
between 2BE, 2AL and 2AX over 150 foreign stations 
have been worked. 2BS worked his 84th country this 
month and has rebuilt a nice 52.5 meter. 2BB besides 
turning in a fine traffic report had his 
realistic first QL. 2BG is just waiting for 
confirmation from Cuba. 2AY has had a fine 
month. 2BV using only a 201-A turns in a very 
fine traffic report. 2AC leads in traffic handled this 
month. 2CA has a new 522 and getting well out. 
2GQ is on 20 and likes it much better than 40. 2AN 
and 2CD joined forces over the Easter holidays and 
worked a number of stations. 2BM is moving to a 
new QRA.

Traffic: 2AC 38, 2BW 26, 2BR 23, 2AL 8, 2BB 
13, 2BG 9.

QST FOR JUNE, 1928

VANALTA DIVISION

ALBERTA—SCM, E. J. Taylor, 4AH—Due to 
business pressure, 4CT has found it necessary to 
return Good luck to you. Our SCM has been elected 
SCM and we hope for the same support as given Mr. 
Aasmussen. 4AH leads the message crew again. 4BV 
is in town—hope to see you started soon. 4HM is 
leaving on a 3 month's visit to EG and has some 
skeds here. 4CU is getting down on 20, experimenting 
with aerial. 4BC is going East to live. 4AF and 
our banquet April 4. 4CC has grabbed some Aussies on 
20 and 40. 4CC is off at present but will resume activity soon. 4AG is on the job as long as he has tubes but CTD has changed 
his location after working Hawaii. 4AF has resumed 
activity.

Traffic: 4AH 31, 4CU 18, 4CT 4, 4HA 4, 4HM 11, 
4BC 3.

BRITISH COLUMBIA—SCM, E. S. Brooks, 5BJ— 
Spring has come, gang, but how about some monthly 
reports? This Section is going to keep you posted and 
if you don't send in some news, 5AL is working 
nights now and has cancelled all his schedules. 5CJ 
is blessed with a junior op. Congrats. 5OU, 5CO, 
5FO will use a 250 watt on 506 and 472 paid a visit to 
the Victoria gang.

Traffic: 5CO 41, 5AD 40, 5GO 12, 5AL 12, 5CF 6.

PRAIRIE DIVISION

MANITOBA—SCM, D. B. Sinclair, 4FY—The 
following stations are now on the air pending receipt 
of their licences: 4RM, 4SS, 4ST, 4JJL, 4LB and 4NB. 
4GJ has a new job so found little time for his usual 
work. 4GJ is now working 4013 and will be on 20 as long 
as his tubes last. 4GL has changed 
groups 20 on and 40. 4GL is now working 4GJ has a 
certainly correct and is putting out much power on the 
air at 4DU. 4HT's new rectifier put too much 
voltage on the plate of his crystal oscillator! 4GJ 
was obliged to go to California to get one! 4DM is 
back with us again and going strong with his 250 
A rumor has it that 4HP is back on the air again. 
4DW and 4DF are both pounding brass up north now 
and claim DX is great. Several local reports QSO 
with nedJH B on Point du Bobs. 4PS and 4AR are 
still being heard but do not report. The press of Univ. 
work has kept 4FW off the air all month except for 
a daily sked with nedDW.

Traffic: 4EK 28, 4RM 25, 4BT 23, 4DW 20, 4GG 5, 
4DU 3, 4GQ 2, JGL 2.

SASKATCHEWAN—SCM, W. J. Pickering, 4PC— 
4EJ expects that he will be on Sundays during the 
summer. 4HM has only the 1st Can. Dist. to work 
now. 4AO has moved to a new location and will be 
on soon with a 250 watt. 4AO's control station is 
regularly in Regina and ex4PV is installing a set. 
4AJ and 4CE will be on soon while home from U. 
4AQ has his 1st class ticket now. 4HL is on regularly at noon and says that the 
Saskatoon gang wants to link up with other-nc's. 
4CD and 4EF will be on soon. 4GR has been heard 
in Germany. 4CB says that local QSO's on 40 and 
52.51 are possible now at night.

Traffic: 4HS 47, 4HH 30, 4CM 25, 4BM 23, 4FR 22, 
4AC 19, 4BL 19, 4FC 8, 4CB 5.

LATE AND ADDITIONAL REPORTS

SCAE handled a few this month. SAYH worked 
KDUW on 80 meters. 5BME handled quite a few 
messages. 5GQ handled a few messages. 5EB, 5GD 
reports direct to HQ. 9BNW handled some press to 
Omaha when the wires were down. 9EJN in QRV with 
school work just now. 9QW in QRV with school work just 
now. 9QW in QRV with school work just now. 9QW in QRV with school work just now. 9QW in QRV with school work just now. 9QW in QRV with school work just now.
DENMARK

"During the last few months our society, the E.D.R., "Experimenting Danish Radio-amateurs" has been growing very fast. We have now about fifty active transmitters, but most of them are QRP stations which use powers of from ten to fifteen watts input. Only a very few are able to do real DX work.

'We would appreciate very much reports from DX stations on our signals. All QSL cards should be sent to QSL Section, E.D.R., Radioposten, 10, Snaregade, Copenhagen, K., Denmark. Our amateurs are generally using the 45-meter band, but now a few ES's are doing regular work in the 20-meter band. We expect to do a lot of work in this latter band in the coming summer months.

'Conditions for NU work have been fairly good on the 40-meter band: on the 20-meter band it is not so good, and as far as is known only ed7CZ has worked the United States. 7BL has worked a few NU's on 10 watts input. 7FR is without doubt our star QRP station; he has worked NU 1st, 2d, 3rd, 4th and 8th districts, NP and oz2AE several times, using 15 watts input, getting R6 to R7 from oz2AE. FB!

"7HP has succeeded in working oz2GA. 7JO (Faeroe Island) is often QSO with the U.S. on 30 watts. 7MT has rebuilt his whole station and is now working with two transmitters, a QRP and a QRO; he is on 85, 45, 35 and 21 meters and will appreciate reports on his 21 m. signals very much. He is now lacking only oz in order to be a WAC member. On 20 meters he is using the 10th harmonic of the aerial. Hi!

"7ZG has worked various districts in NU.

'We shall always be pleased to publish any letters concerning tests, etc., in our journal.'

—E. L. Poulsen, Communications Mgr., E.D.R., ed7MT.

CHILE

"Winter is coming in fast now and with this the appearance of the first European stations, some of which are heard QSA. Also, QRN has begun to slacken, to the joy of SC hams.

'The twenty-meter band is getting FB again, and many foreign stations are being heard.

'February's international contest was a great success and thoroughly enjoyed by the SC gang. sc2AS obtained the highest score with 239 points.

'sc7AA located at Punta Arenas is the most southern amateur station in the work, and is doing plenty of DX work. He is on 33.5 meters with a fine steady d.c. note.

'Australia and North America have been worked for the first time on phone, oa5LG and oa4NW having held long rag chews with sc2AS recently.

'sc2AH and sc2AR are waiting for their WAC certificates, having worked all the continents.'

—L. S. Pettit, sc2AS

SOUTH AFRICA

'DX conditions are still favorable, although we are approaching winter. QSO as a instance has varied from seven to two during a period of a few mornings. The 20-meter band seems to be the most useful at present.

'foA5L has been doing some tests with a2KT on 20 meters with great success. A local HAM has been QSO nrCto, and I think this is the first NR-FO QSO. FO hams have been doing good work with low power.

'Certain tests have been made here with regard to the local Government Radio Defence Scheme, and the work has been greatly appreciated by our P.M.G.

'Tests are now being carried out to determine the best band for local conditions.'

—F. P. Marks, foA5F

U.S.S.R.

'We are quite proud of the fact that the number of transmitters in the U.S.S.R. is constantly growing. There are now 150 duly licensed amateurs, with about 120

(Continued on Page 96)
Correspondence

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

Those Cards!

S.S. Minneakahda,
At Sea.

Editor, QST:

Have just been reading in QST another letter yelling on behalf of the QSL card. Misogosh, is amateur radio going to progress in everything but the craze for cards?

Personally, I think that a law should be passed making it a cardinal offense for a ham with any sort of station at all, to ask, or more correctly demand, cards from stations less than 5,000 miles away. Any peanut tube can work that far now. Why yell because one doesn't get fifty cards from fifty-five QSOs made with stations in the next state? What useful purpose do they serve? Skip distances and the various effects of light and darkness make them almost useless as reports.

A decent station with a good operator hooks up with so many stations in a week that exchanging cards with all of them would require the services of a paid secretary. Uncle Sam is the only one who benefits and I'm waiting to hear that his income has been improved by a squeal for 'QSL card by Air Mail.' That will surely be next!

I was a Ham for many years before going to sea and remember vividly the work that QSLing by card for every QSO made. Let's forget the QSL card. It went out of date the minute an amateur c.w. peep got out of the U.S.A.

—Roger W. Bunce, ex2BKL
815 Stewart Dv.
Dallas, Texas.

Editor, QST:

Like many other Hams who are on the air daily and have a sizeable postal expense, I have been forced to stop replying to any report cards from within the United States. Every day cards arrive from Kansas, Nebraska and points still nearer home requesting a card in return and reporting my signals.

Back in 1921, the 'heard' card had some meaning. Then it was DX to work a Canadian and even Pacific Coast stations. A card from New York or Los Angeles was assured the best spot on the wall. These present day QSL fiends should realize that their cards are no earthly help to the Ham who has several foreign cards arrive in the same mail. And yet there are few stations that don't.

And now let's talk about the commercial stations with which the amateur bands are at present blessed. Much is written about the amateur who allows his wave to slip outside the bands; and it is all quite in order, for the amateur is often careless. But how about the commercial with ten or twenty kilowatts who thinks that 40.5 meters is his private playground (with R5 harmonics in our 20-meter band)? Almost any evening, several commercials may be found in our bands with the most terrible notes. It is a puny commercial indeed that cannot be heard for several degrees on the dial each side of what is supposed to be his wave. Even WIK, who is usually very clean, has been heard so out of adjustment that he has had a weak wave for about each degree of the dial from nineteen to twenty three meters; a sort of smoke screen through which signals arrive with a decided mince-meat effect. The same is true of 6XI except that that station thoughtfully climbs right into our band before starting these cunning little barrages.

However, every cloud has a silver lining. In 1929 we will not have to tune for 63AG behind LP1 or eg5BY under HJG! Interference with amateur signals probably will be from amateur signals and they won't be backed with as many kilowatts as are the commercials. Also, their operators will not have the engineering knowledge necessary to design those cute little compensating waves and flivver exhaust effects for their transmitters.

—M. E. Lawson, 5ACL
Fort Madison,
Iowa.

Editor, QST:

The splendid letter from nu7AAT in the March, QST inspires the writer to add a word to the QSLL discussion.

Certainly, there is something radically wrong with the operator who ceases to QSLL as soon as he gets all the cards he wants; and the situation amounts to that, more or less. In the year that the writer has been on the air with this low powered rig he has sent over 600 cards and the return has been about 60%—which seems mighty poor. Does this show the real ham spirit? Certainly not. Why can't we all have the courtesy and decency at least
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All parts of a Stromberg-Carlson are built on a rigid framework. No part is stinted of necessary material. Wiring is firmly located. Shipping, installing or operating strains will not unbalance the circuits or disturb the electrical properties of the Receiver.

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One inferior or old tube may be crippling your set and causing poor reception.

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Cunningham
RADIO TUBES

to answer all cards received? We must keep the ball rolling. We can’t all sit and wait for the other fellow to send his card or the old custom would die a speedy death.

Let’s have a little less selfishness, indifference and carelessness in the matter of QSLL fellows. The other man wants cards even if you have outgrown the desire.

—Frank E. Dailey, 9CKQ

Obliterating Off-Wave Operation

Editor, QST:

The Asst. Technical Editor’s note under the letter of 9ACS in the April QST hits a hot spot. I for one would like to see a ‘Calls Heard Below the Band’ section in QST.

Lately, it has been possible to find half a dozen stations out of their band in as many minutes. I have been sending warnings to two or three every day. Some of them are newcomers to the ranks but what is to be said of the old-timers who permit their signals to wander down to 36 or 37 meters?

Yes, let’s have some calls heard out of the band for a few months and see if it won’t have a little influence on those amateurs who haven’t enough sporting blood in them to take their chances with the rest of us in the rich QRM to be found nightly in the 40-meter band.

—Roy L. Gule, 1BD

Editor, QST:

The suggestion that a list of ‘Calls Heard Outside the Band’ be published has merit to it; but I believe that a more direct way to handle the matter is for the station who observes a violation to drop a card promptly to the violator calling his attention to the error. This is only common courtesy. I do not believe that these ‘outlaws’ are wilful in their outlawing. Notification by card will undoubtedly have the desired effect without subjecting the guilty one to embarrassment by the publication of his call in QST.

It might be well for each station to keep a log of these violators, notify them by card as suggested, and then forward the log monthly to the SCM to be placed on record. Then, if a station appears on the list too often a warning directly from Headquarters could be used to bring the matter to issue.

I am not in favor of calling the guilty station by radio because I am of the opinion that a man who QSO’s an ‘outlaw’ is just as guilty as the ‘outlaw’ himself.

—Bradford Hearn, SANC

(For more than a year A.R.R.L. Official Observers have been notifying off-wave
Modern telephone and telegraph transmitters

THE REL Cat. No. 186 set is a complete, comparatively low power short wave Radio Telephone and Telegraph Transmitter designed for Amateur and Experimental purposes. A rugged, compact set, ideal for portable work. Operates direct from 110 volt, 50 to 60 cycle electric light socket at low cost.

Simple to install and operate. Simplified instructions supplied with units easily grasped by the beginner. Compiles with the new Amateur Bands effective Jan. 1929. Three plug-in coils supplied covering the popular bands. Employs two UX-210 tubes in the Transmitter and one UX-281 Rectifier tube in the power unit. Phone communications have carried 300 miles—telegraph signals, several thousand miles.

An efficient, moderately priced Transmitter and Power Supply Unit that demands your attention. Write for Bulletin No. 45.

REL No. 135 set placed in Bellona plane. Complete S.W. combined Receiver and Transmitter for Telephone and Telegraph transmission. Employs two tubes for transmission and two for reception. Completely shielded. Operates in almost any frequency band. Similar to No. 186 but battery operated. Type of tubes govern battery supply. Weight only 22 lbs. without batteries. Write for Bulletin No. 77.

Radio Engineering Laboratories
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Long Island City
N. Y.

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We’ve had hundreds tell us that they knew radio backwards and forwards. Yet they enrolled in our courses. And a few weeks after they started to learn radio the RIGHT way these same men told us that they never realized how much they had been missing right along.

Maybe you too have sufficient radio knowledge to build a radio. But it isn’t enough to make a real commercial success. What you really need is a course that takes you from the first elements of radio right through the most complex stages and gives you the practical knowledge you need for commercial work.

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stations by card. Though the number of Observers has been rather limited, the work has been splendidly successful. In some cases the Observers are rewarded for their sincere desire to help the game by a reply, ‘There’s a liar somewhere in your station; maybe it’s the wavemeter; but usually the off-wave operator is fully appreciative and keen to cooperate.—Assoc. Tech. Ed.)

1801 Avenue ‘A’
Flint, Mich.

Editor, QST:

After reading my April issue over for the seventeenth time the letter of 9ACS struck home and I began listening above and below the bands (40 and 30) to see how nearly he was right. I found that I had listed over fifty off-wave stations in the hour that I had listened.

It would seem that the condition is due almost entirely to carelessness. If we could make a practice of checking our waves more often the stations heard outside the band would soon be nil.

As for the proposed list of ‘Calls Heard Outside the Band’, let’s have it as soon as possible.

—H. Walker, 8BJQ

Klemme, Iowa.

Editor, QST:

I heartily agree that there are too many amateurs outside of their bands. 9ACS implies that one reason for stations getting off-wave is inaccuracy of their wavemeters. If, then, 9ACS attempts, along with all other amateurs, to police the air, hard feeling is certain to arise if lists of ‘Calls Heard Outside the Band’ are printed. Many stations just inside the bands would be named as the result of this same inaccuracy in wavemeters.

—Andrew J. Wellenmeyer, 9DSG

Grinding Crystals

1024 Southwest Ninth St.,
Miami, Florida.

Editor, QST:

I would like to correct a statement in my article ‘The Grinding of Quartz Plates’ in the January QST. It was stated that the ‘Y’ axis produced a wavelength of 117 meters per millimeter. I did not have the facilities to make my own determinations, and based this statement on those of Crossley (Proc. I.R.E., Jan., 1927). There appears to be a lack of accurate information on the subject. At any rate, it is quite certain that the true ‘Y’ axis produces from 140 to 170 meters per millimeter, and that the 117 meter relation is result of a combination between the thickness and another dimension, probably the ‘Z’ or optical axis, which has been known not to be entirely neutral. Thus, the frequency shifts spoken of in my article are not due to a changing
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Established 1907

Faradon

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4. Separates stations—increases selectivity.
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If all these "too good to be true" claims can be proved, think what Pre-Amplifier means to the thousands of sets in use. Your test will prove every claim.

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UX 222 Screen Grid Tube ........................ 6.50

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PRE-AMPLIFIER

Amateurs: You need these Sterling Testers:
Universal AC Tube and Set Tester R-512 $35.00
Junior Short Checker for AC and DC Tubes R-514 ........................ $13.50

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CLEVELAND, OHIO

between the axes, and it is not likely that a sharply defined point for this change exists, as previously supposed.

The 117-meter relation is present in all plates having the 'X' axis, or 104-meter per millimeter relation, sometimes on the same order of intensity. I have not been able to conduct an investigation into the factors involved and hope that some one engaged in the work will come forth with the particulars.

It has also been noticed that if a plate is ground slightly concave, i.e., with the center slightly thinner than the edges, improved operation will result in some cases. This is to be expected from the theory according to which the center of the plate vibrates, and the edges support the electrodes. Hand grinding usually produces a concave plate, even though efforts are made to keep the faces flat. But it is well known that it is difficult, if not impossible, to produce a plane surface by ordinary methods.

—E. G. Watts Jr., 4FM

Five Continents in 3 Hours

39 Sussex St.,
Victoria Park,
Western Australia.

Editor, QST:

In the I.A.R.U. News in the February, QST I notice that sh1AO worked five Continents in ten hours. It is also to be remembered that sz2SE (now amlAB) did the same thing in five hours.

I can go one better by quoting from my log for February 24th which shows five Continents worked in under three hours.

South America is my stumbling block and without it I still cannot claim W. A. C. A single UX-210 is used at this station.

—S. C. Austin, aa6SA

Why QSZ?

Lawrence,
Kansas.

Editor, QST:

It would seem that there are not many amateurs able or willing to take a straight twenty words per and really receive it. Nine out of ten of the fellows on the 40-meter band are QSZing whether they are asked to or not. This is not a desirable condition as it doubles the interference problem. If all amateurs used more judgment in the length of their calls, QSZed only when asked to and sent at a reasonable speed the QRM problem would be relatively insignificant.

When giving a report on the other fellow's note remember that "r.a.c. means even less than 'QSA' meant in the old days. Don't be afraid to use a few descriptive adjectives.

May the A.R.R.L. be blessed for its great guidance, without which we would be utterly helpless.

—F. S. McKeever, ßDNG
THE AMATEUR'S BOOKSHELF

Readers of QST appreciate the need for good radio books. What we consider to be the best standard text books are handled by A. R. R. L. Headquarters for the convenience of members of the League and readers of QST. Those listed below pretty well cover the requirements of the average amateur or experimenter.


Radio Telephony For Amateurs, by Stuart Ballantine. One of the most valuable books we know of for the amateur. Theory, construction, practice. Not particularly about telephony. Heartily recommended for every amateur. 296 pp., 6¼ x 8¼ .................. 2.00

Manual of Radio Telegraphy and Telegraphy, by Commander (now Admiral) S. S. Robison, U. S. N., published by the Naval Institute. "Ranks with the very best of all published radio matter . . . Not only worth its cost but is perhaps the best radio book that ever came to this desk."—QST Book Review. 385 pp., 6¾ x 10 .................. 5.50

Experimental Radio, by Prof. R. R. Ramsey, Revised Edition. The book for the experimenter. A laboratory manual, describing 85 excellent experiments that help in understanding radio work .................. 2.75

Principles of Radio Communication, by Prof. J. H. Morecroft. An elaborate general textbook. 935 pp., 5¾ x 9 .................. 7.50


Practical Radio Telegraphy, by Nilson & Hornung. 380 pages, 223 illustrations. A text for prospective commercial radio operators .................. 3.00

Wireless Pictures and Television, by T. Thorne Baker. 188 pages, 99 illustrations. Completely and clearly presents the whole subject .................. 2.50

Thermionic Vacuum Tube, by H. J. Van der Bijl .................. 5.00

Radio Frequency Measurements, by Moulin .................. 10.00

Prepared Radio Measurements, by R. R. Batcher .................. 2.00

Elements of Radio Communication, by Ellery W. Stone .................. 3.00

Radio Questions and Answers, on Government Examination for Operators, by A. R. Nilson .................. 1.00

Radio Simplified, by Kendall & Koepler, revised by J. M. Clayton .................. 1.00

Ideas For The Radio Experimenter's Laboratory, by M. B. Sleeper .................. .25

Prices include postage

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I have a Radiophone with out KEY and I Want to use it on short Distance Where there is no code or Ameture Stations and I Have no use for The KEY and I do not Want to go to the Expen of Putting a KEY and Brushing up on Code and after I get it I will Have no use For it in my Buisness and I can See no Reason to Compell me to get KEY and learn Code when there is no Code Stations in Ten Sleep or Worland Wyoming but Plenty of Receivers that I can call up and tell Them What I Want So Please See if I cannot get a license with out the Expen of the KEY and Brushing up on Code I Have not used the Code For 5 years and Canot Use it in Worland or Ten Sleep Wyo and it will be no good to me After I get it and I Donot See why I Should get Something that I do not need Please See what you can do my Distance of Use is 25 miles.

—U. S. Hubbell

I. A. R. U. News

(Continued from Page 56)

more licenses belong to governmental, scientific and allied stations. There are about 50 amateurs waiting for licenses and temporarily working under illegal call letters. A good total of 300! Registered receivers number more than 700.

'Activity has been good lately, and many contacts have been effected between European and Asiatic stations. One schedule was established between Moscow and Vladivostok (Far East). Good traffic routes at present have been established on 40 meters between Nijni-Novgorod and Leningrad, and Nijni-Novgorod and Moscow in daylight. There is a night schedule from Moscow to Siberia. An interesting feat lately was the transmission of a long letter from Tomsk to Moscow via Tomsk, Nijni-Novgorod, Leningrad and finally Moscow. This was also forwarded by mail and took 6 days; the radiogram took only 48 hours, and was delivered without errors. This success for our amateurs has much significance.

'Some good DX contacts were established with South and North America, but this kind of work has not yet reached the point where it may be called consistent. Many of our stations listened in on the February international tests. Several QSO's were established, but I do not know of any that might be called satisfactory.

'During January, a test with Spanish amateurs was put across and gave quite satisfactory results, proving the possibility of consistent two-way communication between the south-western and north-eastern extremities of the European continent.'

—W. Grzybowski, eu3RA

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I. A. R. U. News

(Continued from Page 56)
ARE YOU ALL SET
For 1929?
Can you tune your transmitter properly?
Have you a desirable 'sharp' wave?
Can you QSY all bands quickly?
Is your antenna efficient for your conditions?
Is your wavemeter calibrated accurately?
Have you a highly selective receiver?

Can you answer 'Yes' to all these questions? If not you need the

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(To be continued in July, QST)

Our Cover

THE arrangement of apparatus at amateur radio station 1MK which is operated by A.R.R.L. Headquarters is shown in the photograph reproduced on our cover this month.

The operating position is at the right end of the table. Power supply to the two transmitters shown on the left is obtained from motor-generator and mercury-arc rectified alternating current and brought in through the three conduits shown in the center of the photograph, together with battery power for operating receiver filaments and control relays. At the right of the receiver are the keys and switches which control the power supply equipment installed in another room of the same building. Left of the receiver is the message file box with compartments holding traffic handled and that destined for different parts of the country. The station wavemeter is shown atop the receiver. The receiver itself is built on the ‘traffic tuner’ principle spreading the amateur bands over about eighty eight degrees. Complete shielding and tube-base coils are used. From left to right are the tuning condenser, ‘beat note’ condenser, resistance control of regeneration, volume control across second stage a.f. transformer secondary.

The main transmitter unit is in the foreground and is a 500-watt T.P.T.G. transmitter with interchangeable coils for changing wavelength to the different amateur frequency bands. The coils are of tubing with compression-type threaded brass couplings making it easy to change coils. The auxiliary transmitter under the table is a 250-watt Hartley always kept tuned to the same point in the forty-meter band. Both transmitters are keyed simultaneously in sending Official Broadcasts to A.R.R.L. Members on 40 and 80 meters.

Full-wave and half-wave horizontal

(Continued on Page 72)

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REFERENCES and BOOK REVIEWS

By R. S. Kruse

EXPERIMENTAL Radio, by Prof. R. R. Ramsey. Published by R. R. Ramsey, Bloomington, Indiana. 230 pages, 152 line drawings, price $2.75 postpaid.

"Experimental Radio" in its mimeographed form is well known to our reader-members. In its new and much more convenient form it covers 117 radio operations in such a manner that they may be used for experimental learning (which is to say the book can be used as a text) or for reference in connection with other problems. What is to be admired about the book is that the various problems are discussed very briefly and to the point—but an opportunity is provided for further reading by giving good modern references under each discussion.

In general, Ramsey manages to provide that missing fact which seems to be hidden in other books.

Universal Frequency Standardization


This reprint is made as a contribution from the well-known Col. E. R. G. (soon to retire) for radio and brings to light a very interesting method that should have had more publicity before this. In brief the method is to employ a crystal oscillator and two multivibrators (tuneless oscillators rich in harmonics) with a wavemeter and a heterodyne, setting them up so that the crystal locks on one of the harmonics of the first multivibrator, which in turn locks the second so that the whole system acquires a stability akin to that of the crystal. By an ingenious method the harmonics of this stable system are identified and transferred to the wavemeter.


The title of this paper describes its contents excellently. The transformers are all of the normal cylindrical form and vacuum tube voltmeter measurements are made to determine the effect on r. f. gain of the transformer-with-tube. The selectivity and the ease of neutralization for a wide variety of primary windings. In each case the measurements are made across the width of the broadcast band, the transformer-and-tube being operated under proper normal conditions.


Since most of us are not fully conversant with the methods of the physicist it is well to explain that Maxwell's method (so-called) is a refinement of the crude "commutator method" of measuring capacity, such that the result is obtained from the solution of an equation in which there enter only resistances and the frequency of the commutating device. The paper states, "Maxwell's capacitance bridge is a Wheatstone network in which one resistance arm is replaced by an apparatus for charging and discharging a condenser at a known rate," and proceeds to solve the bridge mathematically, including all the apparatus required and describe suitable means, including those for "ranging" the tuning fork on which one variation of the method depends.

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<th>PRODUCT</th>
<th>RESISTANCE</th>
<th>DISSIPATION</th>
<th>CURRENT</th>
<th>MAX. TUBE RATING</th>
<th>PRICE</th>
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<tr>
<td>507-2</td>
<td>Grid Leak*</td>
<td>5000 ohms</td>
<td>44 watts</td>
<td>90 m.a.</td>
<td>100 watts</td>
<td>$2.00</td>
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<td>507-3</td>
<td>Grid Leak*</td>
<td>5000 ohms</td>
<td>200 watts</td>
<td>200 m.a.</td>
<td>1000 watts</td>
<td>2.80</td>
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<td>507-4</td>
<td>Grid Leak†</td>
<td>50,000 ohms</td>
<td>200 watts</td>
<td>60 m.a.</td>
<td>1000 watts</td>
<td>6.50</td>
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<td>507-5</td>
<td>Grid Leak†</td>
<td>20,000 ohms</td>
<td>200 watts</td>
<td>100 m.a.</td>
<td>1000 watts</td>
<td>4.25</td>
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<td>507-51</td>
<td>Grid Leak*</td>
<td>10,000 ohms</td>
<td>200 watts</td>
<td>135 m.a.</td>
<td>1000 watts</td>
<td>4.00</td>
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<tr>
<td>507-66</td>
<td>Grid Leak**</td>
<td>15,000 ohms</td>
<td>200 watts</td>
<td>120 m.a.</td>
<td>1000 watts</td>
<td>6.00</td>
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<td>507-63</td>
<td>Rheostat†*</td>
<td>50 ohms</td>
<td>50 watts</td>
<td>1 amp.</td>
<td></td>
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<tr>
<td>507-59</td>
<td>Rheostat††</td>
<td>20 ohms</td>
<td>80 watts</td>
<td>2 amp.</td>
<td></td>
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<tr>
<td>507-83</td>
<td>Rheostat††</td>
<td>12.5 ohms</td>
<td>60 watts</td>
<td>2.2 amp.</td>
<td></td>
<td>5.50</td>
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† DeForest P or R. C. A. 852 Tube
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QST

1711 Park St. Hartford, Ct.

SAY YOU SAW IT IN QST—it identifies you and helps QST.

Extremely well worth reading, despite the rather fearsome title. The text style is both lucid and interesting, which is difficult enough with such a subject in hand.


Though not of the sort of material that is usually reviewed this circular is so wholly cumulative that it deserves the most friendly mention. It is heartily recommended to anyone who has occasion to feed speech into a transmitter—either amateur or professional. The subject matter is not the devices themselves but their uses, which is characteristic of the Samson circulars.


What has been said above may be repeated here with suitable variation to make the comment apply to coil winding rather than the construction of speech-input systems.


Just why a reducing device may safely be called an amplifier is not too clear, but the suggested applications are extremely intriguing. To the laboratory man the oscillograph application will be most useful while for the man operating a transmitter the use of the "inverted" tube with a voltmeter will be both useful and economical.


If this paper serves no other purpose it is perhaps justified as one of those contributions which cause the engineers to reconsider his convictions in order to find whether they are based on fact or hearsay.


Coming from such an authoritative source as the laboratory which developed the UX-222 tube this article should be read by all with the closest attention. An excellent reference list is supplied.


Here are set down clearly and briefly all the principal conclusions arrived at by the conference. Wisely, the Chief of the Radio Section of the Department of Commerce has refrained from mention of the many tiresome arguments and the baseless opinions they discussed. None the less, to us who know the inside story there is much in the statement that, "The allocation to amateur service of four exclusive bands and two non-exclusive bands was secured through the efforts of the American Delegation with the support of the delegates from Canada and New Zealand." Certainly this recalls afresh that incredible stupidity of sheer unlighted ignorance and fear with which many of the delegations regarded the question. Perhaps even now it would do no harm to the cause in several countries a little education of those governmental authorities who so fully displayed their need of information.

Aluminum for Radio, Aluminum Co. of America.

This is another of those trade booklets that is so nicely put up and so informative that one must comment on it favorably.


The purpose of this booklet is well suggested by its title. It is evidently, and well, aimed
This will acknowledge receipt of yours 15th inst.
and we are pleased to say that the ESCO motor-generator sets
used by us at WDAQ, our broadcasting station, have given the
best of service.

While we have never attempted to overload any of
our apparatus we find that the ESCO machines working right
at their limit have given excellent satisfaction and take
pleasure in recommending them to anyone in need of such
machines.

Trusting we will find it possible to assist you
in placing machines in the future, we are

Yours truly

THE NATIONAL CYCLE COMPANY

By
Radio operator and engineer of WDAQ

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Prices for grinding power crystals at random frequencies which fall within the bands described below are as follows: 1715 Kcs. to 1825 Kcs., $15.00. 1750 Kcs. to 2000 Kcs., $20.00. 2000 Kcs. to 2500 Kcs., $22.00. 2500 Kcs. to 3000 Kcs., $25.00. 3500 Kcs. to 4000 Kcs., $27.00. 6000 Kcs. to 7000 Kcs., $40.00. The frequency of the crystal will be given accurate to better than a tenth of one per-cent immediate delivery.

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This crystal is our usual FLOWER type. Crystal ground to any frequency between 40 and 14,000 Kcs. Let us quote prices for your particular requirement.

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to diap soe at tnat very complete lack of understand ing which the British delegation to the Wash-ington conferences displayed so thoroughly—and which we must therefore assume to represent at least some portion of the public mind in Great Britain. It is a great European countries are not taking similar steps—their dele-
gations are fully as indicative of the need.

The Arcturus Manual, Arcturus Radio Co., Newark, N. J.
The Arcturus manual explains itself very well in saying that it has been "prepared principally for the information and use of Army men—dealers, and individual experts engaged in rewiring receivers for Arcturus A-C tubes." The job is done much more nicely than the unhappy one of the hackneyed word "expert" would cause one to suppose, either the tube itself will be found to do some very pleasant things which are not at first suggested by its cheerful lighting of several of the stupendous important con-
siderations in heater or "thimble" tubes—such as using a 15-volt heater and connecting one end thereof to the emitter.

Gerichte Korte-Golf-Antennen te Koot-

It is most unfortunate that so petty an article should have appeared only in one of the somewhat unpopular languages.

The Hysterical Background of Radio.

Too many people seem to have the idea that radio communication sprang full-armored, as it were, from the brain of Marconi in 1894. Tscherdanzev and show that radio, like every other modern de-
velopment, is a product of the painstaking investi-
gation and experiment of many men over many more years is the object of Mr. Clarkson, and his book is eminently satisfactory in this respect.

It is not a text-book. It is quite obviously in-
tended for popular rather than professional con-
sumption. The facts, therefore, are set down with little exposition of the technical phases, but are sur-
rounded instead with human details, human interest sidelines and anecdotes. Beneath this, however, is a wealth of actual historical detail which makes the book an adjunct to any amateur's book-
shelf. We enjoyed reading it. Reviewed by A. L. Budlong.

Cathode-Ray Tube for General Alter-
Nating-Current Measurements.
Mrs Z. Tscherdanzev, Elektrotechnik u. Maschin-
bau., Jan. 15, 1928.

Briefly this is one of those highly praiseworthy articles in which a tool well-known to one branch of the electrical art is introduced to another branch which has not properly utilized it.

Is Fading Caused by the Motion of the
Earth, Raymond A. Heising, Popular
Radio, Feb., 1928.

Now You Can Be a "Looker-In." Bennett

A rather incomplete account of the recent General Electric publicity "stunt" as to television. The im-
portance of the thing is hard to classify light.
It seems to be a mere simplification of the very
precise Western Electric demonstration but may rep-
resent the beginning of popularisation.

The Dufour Cathode-Ray Oscillograph,
by I. E. Cole, Bell Laboratories Record, Jan., 1928.

Another of the many modifications of the Braun
tube, this time one which stays on the pump while work-
ing.

The 5-A Audiometer, by L. G. Hoyt, Bell
Telephone Laboratories Record.
A simplified audiometer in which the frequency
is not variable but consists of a deformed 80-cycle
wave drawn from a saturated transformer in such
a manner that it arrives at the ear with many
One of the Trio

Amateur transmitting history is still being made with the famous Jewell Trio of transmitting instruments of which the Pattern No. 64, radio frequency ammeter, is a member.

The Pattern No. 64 is a thermo couple type instrument whose qualities of accuracy and higher overload capacity are well known. The thermo couples used are made from special alloys of non-oxidizing nature and are worked at a low temperature to give a high overload capacity. The loss in the instrument is less than one-half of the minimum required by the Navy, and the instrument is guaranteed to stand an overload of 30%.

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This new filter can be attached to any good two ampere charger as shown, for completely eliminating the A Battery. Without a charger, only a rectifier and step down transformer are needed to assemble this eliminator in a few moments as the principal wiring is done inside of the TOBE A FILTER.

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We will state the frequency of each crystal to within a tenth of one percent.

Crystals ground to your specified frequency between forty and six hundred meters, forty-five dollars.

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harmonics present and therefore representing a content of a wide variety of harmonics.

The Design of Choke Coils and Transformers Which Carry Direct Current, G. W. O. Howe, Editorially in Experimental Wireless and the Wireless Engineer, Feb., 1928.


A most interesting article on a special form of vacuum tube voltmeter.


A system perhaps not applicable to radiophone but desirable for radiotelegraphy or wherever the unequal amplification of strong and weak signals does not matter.

The Accuracy and Calibration Permanency of Variable Air Condensers for Precision Wavemeters. Griffiths, Jan. & Feb., E. W. & W. E.

A quite extended consideration of the sources of error in wavemeter condensers.


The use of the push-pull detector to suppress undesired harmonics and thereby to permit the use of a lower plate voltage for a given signal strength.

There is included brief suggestion as to the usefulness of the harmonic-cancelling feature in the case where the detector feeds into an i. f. amplifier.

Valve Current From A. C. Mains, by J. K. Jennings, Feb., E. W. & W. E.

Constructional and design details for the transformer and accessories.

8CPC
(Continued from Page 49)

check the note and keying at all times when adjustments are in progress.

'Of course, the station will never be completed,' explains Dr. Burton T. Simpson, its owner. It will always be subject to changes of some sort. But now that the installation has assumed some sort of shape there is time to keep it "on the air" frequently.

The crystal set usually is operated before dinner and during the early evening when interference with BCL's might be a consideration. The sharp wave is found rather a handicap for DX work and consequently the self-excited job is started up for an hour or so before bed time. Whenever QRM is very heavy and I feel like some DX the 20-meter set is taken in hand.'

—R. A. H.

The amateurs of Portland, Oregon, are thankful that TAJC is employed at the local Post Office. QSL cards arriving with insufficient address are never allowed to get into the 'dead letter' department in that city.
Bradley Leak, absolutely noiseless and stepless, 2000 to 30,000 ohm resistance. List $5, special $2.95.

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Dublicher cond. .5 mfd. 1,000v D.C. working voltage 1.35
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Dublicher Duration R. F. transformer 1.95
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Dublicher cond. 1.7 mfd. 1,000v D.C. test; 650v. working voltage 1.35
Dublicher cond. .5 mfd. 1,000v D.C. working voltage 1.35
R.C.A. U-V, 1716 Super Het. transformer 2.55
Dublicher Duration R. F. transformer 1.95
Ward Leonard Resistances; file standard base receptacles; sizes 300—500—600—1000 and 2000 ohms .95
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Dublicher condenser 100v. working. 4 mfd. 6.95
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The convenience of variable resistance has never been questioned. It provides the exact resistance, but reliability—well, that's another matter. Many variable resistors are noisy, short-lived, troublesome, tricky, and generally not dependable.

But in the CLAROSTAT, you have reliability. Silent. Hold its adjustment. Foolproof. Handles current safely within rated wattage. And it lasts, lasts, and lasts.

There is a CLAROSTAT for every "ham" purpose—from the Grid Leak CLAROSTAT (0-10 megohms) and Volume Control CLAROSTAT (200-500,000 ohms) for that short-wave project, to the Standard, Power and Duplex Clarostat for power unit and transmitter.

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Centralab Power Rheostat

This new unit is a knock-out for warp-proof, test-proof performance. Its construction permits continuous operation at temperatures of 482 F. and beyond. Resistance wire is wound on metal core, asbestos-insulated; core expands with wire, insuring smooth action. Narrow resistance strips give small resistance jumps per turn, further assurance of equal regulation. Compact 2" diameter. Ohms—500, 250, 150, 60, 15, 6, 3, 2, 1—price $1.25. Can also be furnished as a potentiometer. At dealer's, or C. O. D. You need this new Power Rheostat. Send postal for new circuit literature.

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Genuine Bakelite Panels

3/16" Thick, Color Black
38x3" reg. price $29.00, Special at $9.75 per panel
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G. K. DODGE, MAMARONECK, NEW YORK.

Notes on Design of R. F. Choke

(Continued from Page 80)

with the tuner. Possibly the best way of surmounting this is to break up the uniformity of the winding by a winding of

FIG. 6. A CHOKE OF THE 'RECEIVING' TYPE HERE DISCUSSED

the random type, such as is shown in Figure 6. It will be noted, also, that this winding has been broken up into three sections, an effective manner of keeping the distributed capacity at a low value. Such a subdivision of the winding allows a sufficiently low capacity as to render the choke effective at 15 meters.

The Spaced-Turn Coil

(Continued from Page 54)

Other methods make use of cardboard tubing so arranged that the tubing is destroyed after the coil is wound on, thus leaving the coil free. Accurate spacing of the wire cannot usually be obtained. One can use 3 strips of celluloid, about 1/4 inch wide, evenly spaced around the circumference and cemented in place, with forms of this type. Measurements on coils of this type are not available, but extremely low-loss construction is not an all-important consideration, especially when radio-frequency amplification is possible, as it now is.

'Greeting of the Moonbeams and the Rose Buds. May you enjoy never-ending prosperity and your union be blest with seven sons. Goodbye, hello, and have you any messages for my station.' This intriguing message was sent, according to the New York Sun, from a Chinese station to a trans-Pacific liner en route from Shanghai. Rather a nifty way to say QTC, eh wat?

TRANSFORMERS

Guaranteed—Mounted—Complete

Add $2.00 for fil. winding

250 watt 550—700 each side .................................................. $10.25
700 watt 1000—1500 each side ........................................... 14.25
1 Kw 2000—2500 each side ........................................... 36.00

Or any size voltage wanted

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Being genuinely interested in Amateur Radio, I hereby apply for membership in the American Radio Relay League, and enclose $2.50 ($3 in foreign countries) in payment of one year’s dues. This entitles me to receive 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.

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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? ..........................  

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Thanks!

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BULLETIN 66-E Lists the Ensell Radio Laboratory RECEIVERS, transmitters, wavemeters, etc., Item No. 69 and 69-A type receivers are the modern types for amateur reception. Four and eight tubes respectively. We also make all types of apparatus for any radio purpose, including inductances, power transformers, rectifier units, filter condensers, condenser re-actors, etc. We build to order any apparatus using your parts if desired. Kit and blue print service on any power amateur station. Write for copy of Bulletin 66-E. Thos. Ensell, 1228 Grandview Ave., Warren, Ohio, 8BDN.


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FOR sale: Two complete radio transmitters, one 500 watt master oscillator power amplifier, one 800 or 750 watt crystal control power amplifier. UY204, UY304A, UX823 tubes, numerous small parts and other equipment. Write for list and prices, 98G, Paul Harris, Grand Rapids, Michigan.

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