QST
DEVOTED ENTIRELY TO
AMATEUR RADIO
PUBLISHED SINCE 1915 BY THE AMERICAN RADIO RELAY LEAGUE INC.

New Short-Wave Receivers for 1929

Full Details IN THIS ISSUE

NOV. 1928 25¢
The General Radio Company has always been identified with audio-frequency transformer design. It was the first Company to supply closed core audio-frequency transformers. The new Type 585 and Type 541 groups represent the latest efforts of this Company and are intended for those desiring the utmost in quality reproduction.

Type 585 Amplifier Transformer
Price . . . $7.00

The Type 585 Amplifier Transformers are designed particularly for those desiring the best in transformer design. Due to the use of adequate quantities of silicon steel as a core material precautions against overload are no longer necessary as in the case of nickel alloy cores. The electrical characteristics of the Type 585 Transformers are listed below.

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Type 585-D</th>
<th>Type 585-H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Inductance</td>
<td>77 Henrys</td>
<td>77 Henrys</td>
</tr>
<tr>
<td>Primary D.C. Resistance</td>
<td>200 ohms</td>
<td>200 ohms</td>
</tr>
<tr>
<td>Secondary Inductance</td>
<td>516 Henrys</td>
<td>516 Henrys</td>
</tr>
<tr>
<td>Secondary D.C. Resistance</td>
<td>3000 ohms</td>
<td>11,000 ohms</td>
</tr>
<tr>
<td>Amplification Ratio</td>
<td>1:1</td>
<td>1:2.5</td>
</tr>
<tr>
<td>Permissible Primary Current</td>
<td>5 MA</td>
<td>5 MA</td>
</tr>
</tbody>
</table>

Type 541-B Push-Pull Transformer

In the Type 541 Push-Pull Transformers three types are supplied. The Type 541-A Push-Pull Input Transformer has a flat frequency characteristic from 100 to 10,000-cycles, dropping to about 75% of the maximum at 30-cycles. The Type 541-B and Type 541-C are output transformers for use with magnetic and dynamic speakers respectively. The Type 541-A and Type 541-C Transformers are similar in appearance to the Type 585 Amplifier Transformer. Sold in pairs only.

<table>
<thead>
<tr>
<th>Transformer Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 541-A and Type 541-B Push-Pull Amplifier Transformers (for Standard Speaker)</td>
<td>$25.00</td>
</tr>
<tr>
<td>Type 541-A and Type 541-C Push-Pull Amplifier Transformers (for Dynamic Speaker)</td>
<td>$25.00</td>
</tr>
</tbody>
</table>

General Radio Co.
30 State St., . . Cambridge, Mass.
274 Brannan St., San Francisco, Cal.

Bulletin No. 931 will be sent on request.
In the Sets Designed by Leading Engineers

Faradon Capacitors are specified as standard equipment where electrostatic condenser long life and durability is essential.

We will be pleased to cooperate with you on your condenser problems. Faradon engineers gladly supply data on special capacitor problems not covered by our more than 200 types of Faradon units ready for prompt delivery.

WIRELESS SPECIALTY APPARATUS CO.
JAMAICA PLAIN
Established 1907

Electrostatic Condensers for All Purposes
STANDING guard at the door of tone, Thordarson audio and power transformers do their part in making real musical instruments of hundreds of thousands of radio receivers annually.

Leading receiver manufacturers are well aware of the important relationship between the choice of transformers and the musical characteristics of their instruments. No wonder, then, that the majority of manufacturers of quality radio receivers have turned to Thordarson as the logical transformer source.

When buying your receiver, insist on Thordarson amplification and power supply. The set manufacturer who uses Thordarson transformers can be depended upon to have the balance of his receiver in keeping with this high standard of performance.

*Custom set builders will find Thordarson transformers to meet every radio need at their nearest parts dealer.*

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Handsome in cabinet work—a beautifully grained American Walnut; extremely sensitive; highly selective and producing fine volume over the entire tuning range from 200 meters to 550 meters it provides a remarkable instrument at a very reasonable price.

As in other Stromberg-Carlsons provision is made for reproduction of phonograph records. It is totally shielded, tunes with a single selector [illuminated], is entirely self contained and operates from any 60-cycle A.C. house lighting circuit, using no batteries or liquids.

Listen to the Stromberg-Carlson Sextette Tuesday evenings at 8 o'clock Eastern Daylight Time, through the NBC and Associated Stations: WIZ, WBZ-WBZA, WJR, WSB, WBAL, WHAM, KDKA, WRE, WTMJ, WCCO, KYW, KWK, KOA, WBT, KVOO, WFAA, WOAL, WMC, WHAS, KFRC.

Other Stromberg-Carlson Models available for A.C. or D.C. current areas, as well as models operated by batteries.

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ROCHESTER, N.Y.

Stromberg-Carlson

MAKERS OF VOICE TRANSMISSION AND VOICE RECEPTION APPARATUS FOR MORE THAN THIRTY YEARS
Say You Saw It In Q S T — It Identifies You and Helps Q S T
Editorials

Standard Frequency Transmissions from W9XL

High Frequency Receivers for the Coming Year

WXJX

Frequency Stability by Magnetostriction Oscillators

Some Suggestions for 1929

A 28-Megacycle Crystal-Controlled Transmitter

"Now We're in the Air"

Odd Jobs

160-Meter Low-Power Transmitter

Experiencing With Bypass Condensers

Experimenter's Section Report

The Northwestern Division Convention

Another Way of Playing an Old Prank

Some Radio Uses of Lamp Banks

Standard Frequency Transmissions of WWV

Calls Heard

L.A.R.U. News

Correspondence Department

Official Frequency Stations

Statement of Ownership

A New Condenser

Transmitting Hints

Ham radio

QRAS

Index of Advertisers


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F. Chevney Beeckley, Managing Editor and Advertising Manager

Harold P. Westman, Ross A. Hull, Technical Editor, Associate Technical Editor

David H. Houghton, Circulation Manager

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 ALL GENERAL CORRESPONDENCE TO THE EXECUTIVE HEADQUARTERS AT HARTFORD, CONN.
TIMES of community disaster, as from hurricane or flood, offer the radio amateur his great opportunity for service. He has never been found wanting. In many years no community in distress in this country has been without valiant assistance from amateur radio. The recent West Indian hurricane was no exception.

When this storm hit Porto Rico and the Virgin Islands, ham radio was on the job. The normal communication of these people with the mainland is by navy radio but the navy stations went out with the storm. Amateur radio to the fore! The San Juan naval station got on the air with improvised apparatus, operating in the amateur band for quick contact, and got it in a hurry—amateurs promptly tied them up with the Navy Department at Washington. The naval station at St Thomas, in the Virgin Islands, similarly was wrecked by the hurricane, but one of the operators there was an amateur and promptly got on the air with his ham station, np4AAN (now K4AAaN), and in short order, through the assistance of numerous amateurs, was in direct communication with NAA. Not only that, but this humble amateur station then proceeded to change to a naval frequency and became NBB, succeeding to the call as well as the duties of the wrecked naval station. Up to a few short months ago amateur operation was not permitted in the Virgin Islands. Here was ample demonstration of its worth, with the Governor of the Islands in direct communication with official Washington at a time when it was most important. The amateurs concerned in these activities have received letters of thanks and public commendation by the Navy Department.

With ample warning, this hurricane found the amateurs of unhappy Florida mobilized to receive it. Most of the amateur stations of Florida were on the job, with spare batteries laid by and everything set for a long vigil. Innumerable stations share the honors of that black week. Many of them kept their communities informed on the progress of the hurricane and supplied them with news when wires went out. Much public message traffic was handled. Other amateur stations, in the region where the storm struck, had more serious duties, for they were the only links between cities filled with death and suffering and a nation waiting to help. Of these stations, 4AFC at Palm Beach was the star performer, and it discharged its duties in full keeping with the traditions of amateur radio and in a way to make the old heart well up in admiration. The station was operated by Ralph Hollis, and Forrest Dana of 4AGR. Dana is a civil engineer, Hollis a driver for the Fire Department, where his station was located. When there were definite signs that the hurricane would hit Palm Beach, these two men went out at 1:30 a.m., hunted up a dealer and bought a set of "B" batteries for emergency power and borrowed some storage batteries, and prepared themselves for the worst. It came. The antenna went, and it seemed the building would too. Risky as it was to go outside, they had to abandon their station; but during a short lull they returned and retrieved the apparatus, found another location at the other end of the building, and under the most adverse and dangerous conditions managed to get an antenna up and signals on the air. From Monday to Thursday of that eventful week that station was continuously on the air. It did a noble job exchanging vital messages with many amateur stations and reporting the scene at Palm Beach to the outside world. The War Department net control station, WVA at Washington, was on the air looking for Florida stations, and with the assistance of other amateurs was hooked up with 4AFC. By this means the first reports to the American Red Cross were made, starting the relief machinery of that organization, and by the same channel the word was conveyed that brought Army blankets, cots and supplies for the stricken area from Atlanta.

The Red cross and the town of Palm Beach have expressed their thanks for the amateur service. The Army, Navy, and our government directly concerned with relief measures in emergencies (the basic idea of the Army-Amateur Affiliation) issued a public statement from which the following is quoted:

"Means. Hollis and Dana realized the urgent need for outside communication and established it, clinging to their self-imposed task with a purposeful tenacity worth of highest praise. For three days these two men stayed at their instruments, disregarding personal safety and interests until the regular channels of electrical communication with the outside world were restored. Mr. Dana lost his home, his automobile and all personal effects in the storm. Both men ate what food there and when it could be received and neither slept in a bed during their self-appointed vigil."
And General Gibbs, Chief Signal Officer of the Army, sent them the following message via WVA at the conclusion of the job:

"It has indeed been a pleasure for the Army radio station WVA to work a schedule with your station during the recent emergency in Florida and it is with regret that we discontinue this schedule. Regulations now controlling the operation of the War Department radio station WVA prevent us from competing with commercial companies. Reports from Western Union Telegraph Company and subsequent messages received here show that the Western Union Telegraph Company is now able to handle your traffic. This being the case the Army must sign off and say good-bye to you two men. You are to be commended for your untiring effort and loyal devotion to duty which you have so well expressed during the last three days and we shall always remember this worthy duty well performed."

This West Indian hurricane is "one more for the book". It has brought the amateur very forcibly to the attention of the public, resulting in newspaper editorials of praise and an increased recognition of amateur value by many agencies of importance in our national existence. In such tragedies of American life as the Vermont and Mississippi River floods, the two Florida hurricanes, the Illinois tornado, the Santa Barbara earthquake, amateur radio has fully demonstrated that it is of the highest utilitarian service to the community and the country at large. We amateurs are now expected to render this service when other agencies fail. A.R.R.L. Headquarters knows that A.R.R.L. members will regard this as a sacred trust: that, without rules and formal organization, every man can be counted upon to get on the air when his neighborhood needs him and do a clean-cut job in the good old A.R.R.L. way—to the continued glory of amateur radio!

K. B. W.

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Standard Frequency Transmissions from W9XL

STATION W9XL is a special station comprising one of three portions of the "Gold Medal Station," WCCO-W9XL-W9WI at Anoka, Minnesota. WCCO is operated as a broadcast station, W9XL purely as a standard frequency station and W9WI as a general amateur station. The three transmitters have independent equipment and antennas but a common power supply. Through arrangements made by K. V. R. Lansing of the Official Frequency Station Committee of the Experimenters' Section, A.R.R.L., W9XL is operated on schedules regularly announced in QST. The work of operating the station is done without charge by Assistant Chief Engineer Hugh S. McCartney, with the assistance of Lyall K. Smith and Ivan H. Anderson also of the staff of WCCO.

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 frequency meters. The frequencies are measured by means of standards which have been especially standardized for this purpose by the Bureau of Standards.

A small percentage of tone modulation is employed so that the signal is distinctive and more quickly recognizable.

The fact that this service has been rendered in the past is no guarantee of its continuation indefinitely in the future. It depends upon whether the response received seems to warrant the amount of work and expense involved in maintaining this service to all amateurs. If you take advantage of this service, please acknowledge that you are doing so by notifying the Experimenters' Section, A.R.R.L., 1711 Park Street, Hartford, Conn. You may use ordinary stationery or special blanks may be obtained from the above address. A 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.

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Schedules for November</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>7,000</td>
</tr>
<tr>
<td>8:12</td>
<td>7,225</td>
</tr>
<tr>
<td>8:24</td>
<td>7,150</td>
</tr>
<tr>
<td>8:36</td>
<td>7,075</td>
</tr>
<tr>
<td>8:48</td>
<td>7,000</td>
</tr>
<tr>
<td>9:00</td>
<td>4,600</td>
</tr>
<tr>
<td>9:12</td>
<td>3,750</td>
</tr>
<tr>
<td>9:24</td>
<td>3,500</td>
</tr>
</tbody>
</table>

Division of time:
- 4 minutes—QST QST QST QST de W9XL W9XL W9XL
- 3 Minutes—Series of letter "d" with the dash about 5 seconds long and broken every half minute for station call letters.
- 1 minute—Freq ———— kc.
- 4 minutes—Time allowed to change to next frequency.

Dates of transmission:

<table>
<thead>
<tr>
<th>November Schedule</th>
<th>December Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd</td>
<td>30th</td>
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<tr>
<td>11th</td>
<td>14th</td>
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<tr>
<td>16th</td>
<td>24th</td>
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<tr>
<td>30th</td>
<td>30th</td>
</tr>
</tbody>
</table>

All O.F.S. should use these transmissions to keep their frequency meter calibrations within the required limits of accuracy. It will be appreciated if you will send us a report on your reception of these signals.

—H. P. W.
High-Frequency Receivers for the Coming Year

Incorporating Thoroughly Practical and Satisfying Selectivity, Open Scales, and a New Ease in Handling

By Ross A. Hull*

The A.R.R.L. Technical Development Program has now turned its attention to the question of receivers, and in this article Mr. Hull reports the very gratifying results which have been attained. Practical selectivity for 1929 has been secured; it is within the reach of every amateur. In tests of the 4-tube model described in this article, in the 7000-kc band in the early evening hours, when on this coast the activity is great and the interference most intense, we have not found a case where we were willing to admit without reluctance that the signals were exactly "on top of each other". Its sensitivity has been equally pleasing, practically every American signal heard has been of loud speaker strength; most Australian signals twenty feet from the phones and reduced to comfortable head-phone volume only by disconnecting antenna and setting volume-control at minimum. It is, we honestly believe, a real "bang-out".

Mr. Hull has now covered the fields of transmitting, receiving and measuring. His articles enable every amateur to prepare for 1929 with minimum effort. Further developments will be reported soon.

—Editor

The short-wave receiver has always been a subject on which two or more amateurs could argue for indefinite periods. Indeed the subject has such potentialities for discussion that the individual amateur, unaided, can readily stir up a debate within himself and cogitate into the night upon the details of his next outfit. The receiver, unlike the other more inert apparatus, being so constantly under the demand of a knob-twisting operator, is a splendid convenience. If it works well, or a great curse if it operates poorly. There are few half-measures. It is, perhaps, for this reason that the amateur, as a general rule, is so fixed in his ideas on the subject and so willing to argue until the bitter end in the interests of the


THE FOUR-TUBE RECEIVER

Being provided with plug-in variable tuning condensers to give full-scale coverage on any band and a screen-grid audio amplifier highly peaked at 1000 cycles to improve selectivity, the receiver is particularly suited for the requirements of next year. To the right of the drum dial the screen-grid antenna coupling tube, the detector and the plug-in coil can be seen grouped near the tuned tuning condenser. To the left of the drum dial the two audio tubes and the 1000-cycle tuned coupling circuit are grouped in somewhat similar fashion. The Ford ignition coil secondary used in this coupling circuit is enclosed in a tube shield immediately in front of it in the bank of fixed condensers used to tune it to the required audio frequency.

November, 1928
ideals and requirements of the present and those of the future are to differ widely in many respects. It will be well, perhaps, to make a brief review of them.

For the last few years the successful receiver has been one in which an oscillating detector fed an audio-frequency amplifier of one or two tubes. For the tuner some simple arrangement of plug-in coils has been required, together with a tuning condenser of sufficiently low capacity to enable the various bands to be fairly well spread across the dial. Since the edges of the bands have been harmonically related, a tuning condenser which gave full scale coverage for any one band has been satisfactory for all others. No particular demands have been made on the circuits of the detector tube except that they be so arranged as to avoid “hand-capacity” effects and permit the adjustment of regeneration without the accompaniment of too serious a variation of tuning. Though some slight interest has been shown in the use of audio-frequency amplifiers “peaked” at some audio frequency, the amplifier usually considered most successful has been that which provided the greatest gain. Since the advent of the UX-222, radio-frequency amplification has been exploited to some extent, but in most of the equipment described so far the constructional complications and the addition of a second major tuning control have barred the scheme from general adoption. Further, it has not been evident in practice that radio frequency amplification provides perceptible improvement in the range of the short-wave telegraph receiver, or in the ratio of signal to “background” noises.

THE NEW REQUIREMENTS

The reduction in the widths of our future bands and the addition of most foreign stations to them, make it clear at once that selectivity is likely to be one of the most important requirements of next year’s receivers. It is certain that there will be many stations within a few hundred cycles of each other which, unseparable with present equipment, must be individually readable with the new receivers. Then, the odd widths of our various bands will introduce another requirement—that of adjusting the range of the tuning unit so that each band is spread across a wide segment of the dial. As has already been explained in the October QST, an ordinary variable condenser which tunes the new 2,500-ke, band across most of its dial would be unsuited for work on the higher-frequency bands since their entire territory would be crammed into some impossibly small slice of the condenser range. With open tuning scales will come another desirability—something approaching permanence of calibration. It will be a decided disadvantage if the tuning circuit, fitted with a suitably small variable capacity to place the limits of the band between 15 and 85 degrees of the dial, is influenced by the antenna to the extent common in most existing receivers, for it would then probably be necessary to wind and adjust the coils for the particular antenna available and amend them for use with any antenna of other dimensions. In present-day receivers where relatively large tuning capacities are used and in which the bands are rarely spread across the entire dial, the importance of this consideration has not been evident. And while we are remodelling our receivers we might well add to the purely “1929” requirements the existing (but rarely attained) desirabilities of freedom from microphonic and tuning noises, and smooth regeneration control without “dead areas” or appreciable influence on tuning. Then, along at the tail end we will mention the obvious requirement that sufficient sensitivity be maintained to enable the receiver to respond audibly to all signals which are not completely buried under the “background” of static and miscellaneous electrical “noises”.

In examining the practicalities involved in the attainment of these desirabilities in the 1929 receiver it becomes clear at once that the prime requisite, high selectivity, is a concern of the audio-frequency amplifier. Unlike the broadcast receiver, the oscillating receiver has the selectivity of its audio-
frequency end set by the very heterodyne principle used in its operation. If it is oscillating at a frequency 500 cycles different from that of a c.w. transmitter within its range, a 500-cycle beat frequency will appear in the plate circuit of the detector; and no practicable amount of radio-frequency amplification would eliminate that signal or any undesired signal if its frequency differed from that of the oscillating receiver by a frequency within the limits of audibility. If, however, the audio-frequency amplifier was so arranged or so equipped as to make it pass a band of frequencies only two hundred cycles wide at say 1,000 cycles, then all transmitters whose frequency differed from that of the receiver by more than 1,100 or less than 900 cycles would fail to produce signals in the output of the receiver. In other words, just so long as a group of transmitters had their frequencies separated by 200 or more cycles they could be tuned in individually at the receiver to give a beat note within the pass band of the audio amplifier, and interference between them would not result.

There are few difficulties in equipping the audio-frequency end of the receiver to provide such a condition, as has been shown by Bourne in his treatment of Acoustic Wave Filters, and, as far as the field of reception is concerned, a complete solution to the problem of selectivity is available. In the specific field of amateur communication, however, the solution is not nearly as complete. If the majority of amateur transmitters were 200 or more cycles apart, if their frequencies were constant and if they did not flutter, wobble and creep across territory measurable only in thousands of cycles, we could sit back and laugh at our problem. But such is not the case. Experiment has indicated that a receiver fitted with a band-pass filter to give it the selectivity available would cause a large percentage of present signals to be unreadable unless they were "followed" continuously with a precise vernier tuning control. An almost equal number of signals probably would be entirely unreadable on account of rapid frequency wobbles and keying chirps which would, in accordance with such frequency changes, intermittently wipe the signal out of audibility. Careful observation and estimation has caused us to decide that even with the vast improvement in signal character expected in 1929 it will not be practical to carry the selectivity of the receiver to the extremes possible. Rather will it be desirable, it seems to us, to limit the selectivity to something of the order of that provided by the four- or three-tube receivers described, an approximate idea of which can be obtained from the response curve given in Figure 1. In such an amplifier the necessary constructional work and expense are far below those necessary for the acoustic or electric band-pass filters necessary to obtain the highest possible degree of selectivity, yet the simple amplifier provided will contribute greatly to the solution of the interference problem of the immediate future. It will be particularly suited also for operation with the highly selective band-pass arrangements which undoubtedly are to be used generally in the intermediate future.

"PEAKED" AMPLIFIERS

The method used to obtain the degree of selectivity considered desirable is none other than the ancient "peaked" or tuned amplifier which has been used for so long in some commercial and amateur stations. The scheme has been made much more effective and more useful, however, by utilizing those characteristics of the screen-grid tube which have so limited its use as an audio frequency amplifier for the broadcast receiver. Unlike the three-electrode tube the voltage amplification of the screen-grid tube is dependent almost entirely upon the load impedance, and whereas there is an optimum practical value of load impedance for maximum voltage amplifica-

In practice the amplifier operates splendidly, proving a high degree of amplification when the signal is tuned to the resonant frequency of the Ford coil-condenser combination (as can be seen from Figure 1) and dropping other beat notes of appreciably different frequencies to very low values of audibility. This selection of signals of one particular frequency makes it difficult and sometimes impossible to read stations with chirpy or wobbly signals but in the case of the rapidly increasing army of steady clean-cut signals the improvement in readability through interference is at once obvious.

THE TUNER PROBLEM

To continue this examination of the requirements into the field of tuning systems we find that many solutions are available for the problem of providing a different order of tuning-capacity variation for the various band widths. The method which we have found most practical so far is that built into the four-tube receiver shown. It consists merely in the provision for plug-in midgrid condensers, of which there are three, each adjusted by the removal of plates to give the capacity range found necessary for the bands on which they are to be used.

The condensers used in this particular receiver are Pilot midgits, chosen on account of their satisfactory design and their particular adaptability for the process of plate removing. In order to provide the plug-in connections, G. R. pins are fitted in the manner shown in the photograph of the coils and condensers. For the rotor connection a complete G. R. pin replaces the short machine screw holding the spring contact to the end plate. For the stator connection a G.R. pin, the threaded portion of which has been sawed off, is inserted to the head of one of the machine screws supporting the stator assembly. To provide a mounting for the sockets into which the condenser is plugged, and to provide a readily accessible collar and set screw for the condenser shaft, a National drum dial was chosen. The exact arrangement of the hard rubber socket mounting on the frame of the dial can be seen in the photograph.

The under surface of the wooden base-board is covered with thin sheet copper to which all the "ground" leads are run. This construction is preferable to placing the copper on the upper surface where it introduces difficulties in the insulation of components from it.

C1—Plug-in midgrid tuning condenser.
C2—500-pf, fixed condenser.
C3—250-pf, grid condenser.
C4—2,000-pf, by-pass condenser.
C5—5,000-pf, audio grid condenser.
C6—50-pf, audio by-pass condenser.
R1—10,000-ohm grid-leak type resistor.
R2—5-ohm Yarzley fixed filament re resistor.
R3—0.5 megohm grid-leak.
R4—50,000-ohm Frost variable resistor.
R5—50,000-ohm Frost variable resistor for volume control.
R6—0.5 megohm grid-leak.
R7—Filament ballast resistor for 75 amperes.
L1, L2—Inductance and tickler winding on plug-in coil form.
L3—The secondary winding of a Ford ignition coil—core and primary removed.
R.F.C.—Receiver-type short-wave choke.

Some difficulty may be had in adjusting the tickler turns due to "dead-spots". It is suggested that the capacity of C2 be varied if any such trouble is experienced. The use of a filament rheostat is made unnecessary by the incorporation of a ballast resistor. It is, of course, possible to use a fixed resistor or a rheostat in its place. Though a number of "ground" are indicated on the diagram it should not be thought that these are "grounds" of the water-pipe variety. They merely indicate connections to the panel or copper sub-plate. Ordinarily, no external ground is used.
It should be pointed out, perhaps, that this is just one possible arrangement. It is to be expected that the very successful amateur will soon evolve an alternative rig more suited to his own ideas and the apparatus at his disposal. The expected difficulties of movement of the condenser in its mountings and destruction of the calibration upon removal and replacement of the condensers have not been found in practice. With accurate spacing of the sockets, the G. R. pins hold the condenser with splendid rigidity, while calibration is restored, when the condenser is replaced, by the simple process of adjusting the condenser to its maximum setting (by pressing the fingers on the edges of the rotor and stator plates) and inserting it in the collar of the dial shaft with the dial set at 100 degrees. The six-plate condenser in its original form has been found satisfactory for the 1,750- and 3,500-kc. bands. For the 7,000-kc. band, two rotor and one stator plates are used, while for the 14,000- and 23,000 kc. bands a single rotor and stator have been found to give satisfactory coverage.

In the three-tube receiver the sliding rotor-condenser, which was described on page 13 of the October QST, is employed to illustrate an alternative scheme. The six-plate condenser is in its original form, but is also been found to be a thoroughly practical solution for the problem. On account of the existence of a description of the construction of the condenser and the method of adjusting it, no further details should be necessary.

A THIRD METHOD

In the two-tube receiver yet another alternative solution is incorporated for the purpose of illustration. In this case the usual tuning condenser of about 50 µfd. is used as the tuning control with a 28-plate PEP midget condenser connected in series with it and this as an adjustable series capacity to reduce to predetermined values the capacity range of the tuning condenser proper. With the midget set at its minimum capacity the range of the tuning condenser is reduced to the point where its maximum capacity is equal to the extremely small value of the two condensers in series (possible about 5 µfd.). As the capacity of the adjustable midget is increased the capacity range of the tuning condenser is increased to the point where the midget is at its maximum. At this point the capacity range of the main condenser will be such that the resultant maximum capacity is of the order of 33 µfd.

In operation the arrangement is beautifully flexible since the tuning range is continually and readily adjustable to any of the values required for the work.

It is, perhaps, unnecessary to mention that this particular method is particularly useful in cases where it is not desired to rebuild an existing receiver entirely, the simple process of fitting a midget condenser being all that is necessary to adapt a receiver suited for the present bands for operation in the coming year. The one slight disadvantage of the scheme is that the tuning curve of the condenser, be it straight-line-frequency or capacity, is disturbed. The straight-line-frequency condenser in the receiver illustrated, for instance, gives a curve somewhat similar to that of a straight-line-capacity condenser when the smaller values of series condenser are used. With the larger values of series condenser the curve departs only slightly from that of the tuning condenser alone.

In conjunction with these variable capacity systems, plug-in coils of the usual type are employed. In the four-tube receiver Silver-Marshall coil forms are used. On account of the small values of tuning condenser across the coils it will be found that their values differ somewhat from those with which we have become familiar. Also, on account of the small frequency range to be covered, and the desirability of placing this range between 15 and 85 degrees on the dial, it will be found that the number of turns is quite critical. It is for this reason that ready-wound coils are not likely to be suitable for the work without the addi-
tion of turns. In order to facilitate the work of adjusting the coils it has been found worth-while first to wind them so that the condenser at 85 degrees tunes them slightly below the lowest frequency required for the particular band. Final adjustment is then made by spacing one or two of the end turns until the edge of the band is brought to about the 85-degree setting of the condenser. This scheme is preferable to that of removing turns since it is often found that a fraction of a turn only could be removed from the coil without spoiling its coverage.

One splendid advantage of all three tuning systems used in these receivers is that while they give “full coverage” for the amateur bands they are still useful for reception in any special bands and on any particular frequencies between them. If it is necessary to receive some station half way between the 14,000- and 7,000-kc. bands, for instance, the midget condenser normally used for 3,500-kc. work, in the four-tube receiver, would be plugged into place and used with the 14,000-kc. coil. In the three-tube affair the midget series condenser would merely be placed at the setting normally used for work on one of the two lower-frequency bands.

CONSTRUCTIONAL DETAILS

And now let us proceed to a description of each receiver in turn with the idea of detailing the features which have been incorporated to fulfill some of the minor requirements mentioned earlier in this article.

In the four-tube outfit, as can be seen in Figure 2, a UX-222 is used as a coupling tube between the antenna and the detector. In order to avoid the necessity for a second tuning control the tube is arranged to operate from the drop across a resistor of 10,000 ohms connected between the antenna and the filament circuit of the receiver. A radio-frequency choke, such as that built for the purpose by National, can be used in place of this resistor if desired. To drop the filament voltage to the required 3.3 volts for both this UX-222 and that used as audio-frequency amplifier, 5- and 10-ohm Yaxley resistors are connected in series. A suitable negative grid bias is then obtained in each case by connecting the grid return to the junction between the two resistors. The coupling tube in this particular receiver is found to justify its existence completely. In the first place it eliminates the influence of the antenna over the tuning of the receiver, so permitting the receiver to be calibrated for the approximate estimation of frequency and for convenience in locating known stations. In addition to this, even with its simple untuned grid circuit, it affords quite an appreciable radio frequency gain which undoubtedly is worthwhile, particularly in the reception of phone, or in the reception, non-oscillating, of r.a.c. signals which ordinarily would be buried under heavier d.c. signals. Further, the coupling tube reduces radiation from the receiver to a practical minimum.

The output of the UX-222 is connected directly to the grid tuning circuit of the detector, which is so provided with a fixed condenser in series with the filament condenser, as to isolate the coil from the filament circuit in order that it may carry the plate supply to the UX-222. For the same reason the detector grid leak is not connected across the grid condenser but is carried directly to the positive filament lead. The detector circuit is otherwise arranged in quite the normal fashion, resistance control of regeneration being provided on account of the manner in which it operates without influencing the tuning to any appreciable degree. In connection with this arrangement it might be pointed out that the usual half-scale setting of a 50,000-ohm variable resistor results in quite a drastic drop in voltage. With the detector operated from the 22½-volt battery tap, the ac-
ual voltage reaching the detector under such conditions is usually of the order of 8-10 volts. If the detector is to be operated at its rated voltage it is obvious that the 45-volt battery lead be used and the ticklers wound accordingly to give oscillation at the mid-point of the variable resistor range.

THE AUDIO SYSTEM

The output of the detector is fed to the grid circuit of the UX-222 audio amplifier through an audio transformer of the usual type. Although a broadcast-receiver transformer with a particularly flat frequency characteristic is not necessary, the use of an American or equally high-grade transformer will be found justified on account of the excellent gain provided by it. This does not mean, however, that the transformer used in any existing receiver would not be equally effective in this one.

In the plate circuit of the UX-222 audio tube is the tuned circuit, resonating at 1,000 cycles or some other convenient frequency, which is responsible for the peaked amplification and the improved selectivity of the receiver. The degree of amplification to be obtained with this tube and the sharpness of the peak are matters governed almost entirely by the impedance provided by the tuned plate circuit at the resonant frequency. The value of this impedance, in turn, is limited by the resistance of the circuit. To obtain the greatest peak and amplification, therefore, it would be necessary to use the lowest-loss inductance and condenser possible. Experiment with various forms of inductance (the characteristics of the capacity being somewhat set by the types of condensers available) has shown that an inductance of reasonably low reactance can well provide a peak much in excess of that considered desirable for practical purposes in the immediate future. The characteristic shown in Figure 1 is that obtained with a Ford coil secondary as the inductance, used for the definite purpose of broadening the peak and because of its general availability to the amateurs of any country. Most of the coils tried tuned to about 1,000 cycles by the connection of about .01 μf across them. In the four-tube receiver the bank of Sangamo condensers comprising this tuning capacity is mounted on two threaded rods to facilitate experiment with capacities of different values. The Ford coil is mounted by inserting a wooden dowel in the space left by the removal of the core and primary winding, and by attaching this dowel to the base-board with a wood-screw inserted through the base. In this receiv-

er an aluminum tube shield is inverted over the coil for the purpose of shielding. Its use, however, was not found to be essential.

Should it be desired to produce a sharper peak than that provided by the Ford coil it would be necessary merely to use an inductance of lower resistance. One inductance used in our work (which incidentally gave a peak far too sharp to be practicable for general reception) consisted of

3,000 turns of 30 gauge s.s.c. wire "scramble"—wound in five %”—square slots turned in a wooden former 2” outside diameter. About .07 μf was found necessary to tune this to 1000 cycles. Ex-

\[ \text{FIG. 1. THE SIMPLE WIRING OF THE TWO-TUBE SET} \]

- C1—1-μfd. by-pass condenser.
- C2—8-plate (approx. 100 μfd). Pilot midget.
- C3—100-μfd. grid condenser.
- C4—Antenna coupling condenser—two % square plates about ½" apart.
- C5—3,000-μfd. by-pass condenser.
- R — Half-ampere ballast resistor.
- L1—Grid leak, 2 to 4 megohms.
- L2—50,000-ohm variable resistor.
- L3—0.1-megohm resistor.
- L4, L5—Coils similar to those used in three-tube set.

ANOTHER VIEW OF THE THREE-TUBE RECEIVER

The simple and conventional practice of screwing all apparatus to the base and connecting everything with bus bar has been adhered to.
experiment with other forms of inductance will be found of great interest and value.

The fourth tube of this receiver is a 201-A arranged in the normal fashion. This tube is not necessary to provide amplification additional to that already available, but is essential to provide a satisfactory output circuit since the phones could not be operated in the plate circuit of the UX-222. The enormous amplification provided by the two audio tubes makes the use of a volume control essential.

The UX-type socket and UY tube base to be seen at the extreme left rear corner of the base are used to make all battery connections. An ordinary battery cable is led into the tube base through a hole in one side and the leads soldered to the various pins. The arrangement has been found surprisingly convenient from every possible aspect, and never again will we be guilty of using a string of binding posts unnecessarily monopolizing a long strip of bakelite.

We hesitate to make any mention of the performance of these receivers on account of the many factors which influence it, and because of the possibility of arousing expectations which may be beyond fulfillment in individual cases. We do believe, however, that these four tubes are truly worth while and that the available sensitivity, selectivity and amplification are equal to any reasonable demands that could ever be made on them. In addition, we think that the receiver is particularly suited for the requirements of the future, having provision for tuning range adjustment which would adapt it to any desired frequency band, and having an amplifier which, with simple amendment, could be given any increased selectivity which may be made practicable by wide improvement in the emissions of amateur stations.

THE THREE-TUBE SET

In the three-tube receiver, as can be seen in Figure 3, the antenna coupling tube has been eliminated and the usual capacity coupling scheme incorporated. This means the sacrifice of some sensitivity and an increase in the influence of the antenna over tuning calibration. The latter can, however, be reduced greatly by mounting the antenna coupling condenser as close as possible to the ground of the detector tube, and by reducing its capacity to the lowest value consistent with reasonable signal strength. The importance of the placement of this condenser is not, we believe, fully appreciated. Experiment has shown that the connection of the condenser in the antenna lead about six inches from the tube grid terminal can result in serious "hand-capacity" effects and a pronounced increase in the reaction of antenna changes on calibration.

The tuning circuit comprises the "sliding rotor" type of condenser mentioned previously, and "tube base" coils, while the audio amplifier consists of two tubes—a UX-222 and a UX-201-A arranged in the same circuit as that employed in the
four-tube set. The differences in the mechanical arrangement of the apparatus can be seen from the photographs.

FOR PHONE WORK

The two-tube receiver is presented chiefly to illustrate the use of adjustable series capacity to vary the capacity range of the tuning condenser. It is also intended to illustrate the single stage of flat-frequency-characteristic audio amplification which will still be desirable for the reception of amateur phone or short-wave broadcasting. The circuit is shown in Figure 4. The series midget condenser is controlled by the knob in the center of the panel. Its positions for the various bands being determined by experiment and marked on the panel. The adjustment of this condenser will be found quite critical if it is desired to restore the calibration of the main tuning condenser when a change is made from one band to another, but this process is simplified very greatly by noting the dial readings for the commercial crystal-controlled stations at one edge of each band. Then, when the coil has been changed in moving from one band to another, it is merely necessary to set the tuning dial at the place where the "marker" station should appear and adjust the midget until it does. At this position the calibration will have been restored.

In all three receivers the panels were cut from %" thick aluminum sheet. A pleasing finish was obtained by stripping the surface in a strong solution of washing soda and brushing it with a very thin coat of Duco clear lacquer.

In the construction of these three receivers no attempt was made to break away from the conventional method of screwing all the gadgets on a base and connecting them together, for we have the idea that there are very few departures from this standard amateur practice which warrant the complications involved by them. In fact, in all the work a definite effort was made to avoid any departure from the simple methods of the present day unless they possessed a definite practical value. We have had at our disposal scores of unusual circuits and arrangements, the merit of which was in their novelty. They were unused, however, because it is our opinion that the practicality of any scheme, in amateur radio, is at once questionable if it involves a sacrifice of simplicity.

THE TUBE-BASE COILS USED IN THE THREE-AND TWO-TUBE RECEIVERS

Both grid coils and ticklers in these coils are wound with 24-gauge d.c. wire. The numbers of turns and are as follows:

<table>
<thead>
<tr>
<th>Band</th>
<th>Grid Turns</th>
<th>Tickler Turns</th>
</tr>
</thead>
<tbody>
<tr>
<td>411.</td>
<td>1,750 kc.</td>
<td>3.</td>
</tr>
<tr>
<td>8,500 kc.</td>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>7,000 kc.</td>
<td>3.</td>
</tr>
<tr>
<td>14,000 kc.</td>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8,000 kc.</td>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

No spacing is used between turns except in the grid coil for 8,000 kc., where the spacing is 1-8". As can be seen, the 1715-kc. coil is wound on a 3" diameter bakelite tube mounted on a tube base.

One of the snootiest methods of mounting the League Auto Emblem we've run across is that of cementing the emblem to the inside of the wind-shield or rear window. The scheme is to remove the eyelets from the emblem, smearing it evenly with DuPont or some other good glass cement, and, when the cement has become tacky, press it firmly to the cleaned glass surface. Considerations of visibility make it desirable that the emblem be located on the passenger side of the wind-shield at the lower corner though a position at the lower center of the shield also might be practical. The genius behind the scheme is Meserve of 1PL.

August McCollom, 9BQW-9HS, though blind, is an ardent and successful amateur. Since 1925 he has been on the air, during the summer at his home station 9BQW at Dodge City, Kansas and during the remainder of the year from 9HS at the State School for the Blind at Kansas City, Kansas. A CX-310 supplied from a storage battery-driven 400-volt dynamotor is used at the latter station, while at 9QW an 852 does the oscillating. R7 signals have been put into Australia with it. McCollom is able to copy signals with a typewriter but, being unable to read the typing, all traffic is handled in Braille. In this manner he has been able to QSR as many as forty-five messages in a week. "Taking it all round there is nothing unusual about my amateur activities," says McCollom. "I build my sets and blow my tubes just as you fellows do."
HERE, you fellows who were so curious about sj5BX, the mystery station of last winter, here's your dope. His feet are now back on the soil of U.S.A. and it's safe to tell it. He had literally to shoot his way out; but he's out.

In November, 1927, I received a long letter with a Central American stamp from a chap named Haskell Watson. That's his real name. He was on an expedition. The letter was accompanied by photos and sketches depicting his location at the bottom of an extinct volcano. This old crater was narrow in both directions and the walls in most places were sheer 3000 feet. The letter contained also a list of the radio parts he had on hand. He had built one short-wave transmitter; but he hadn't been able to work anybody and had about come to the conclusion that he had been trying to transmit out of the bottom of a well 3000 feet deep and that it just couldn't be done.

He had other troubles, believe me. He was in a brigand-infested district. It was cold then up on the mountains and some of the brigands used to stick around his camp where it was warmer. He had reason to believe that some of his own helpers belonged to the gang. A guy came in on him one day while he was building his transmitter, and surmised that it had something to do with this radio stuff that the natives had been hearing about. This didn't look so good to a gentleman who didn't desire his whereabouts to be broadcast, so he ordered Haskell to smash it up. Haskell finally convinced him that he knew nothing about radio, that this was a scheme he was experimenting with for assaying minerals. This placated the old boy; but thereafter Haskell kept a sharper watch through the telescope he had trained on the only entrance to the crater.

There was only one way to get down; and after anyone was seen coming over the rim Haskell had an hour to hide his stuff. After finishing the set and after trying for many days to work somebody, he decided that what he had told the brigand was no lie.

I had never heard of Haskell before the receipt of his letter. He had been in the war, overseas, from Texas. He had been a ham before the war but out of the game since. Three of his friends in Texas had wired him up considerably on short-wave apparatus. In the use of a .45 pistol he needed no instruction; all he needed was practice, and he got plenty of that down in the volcano. The natives engaged in the chief industry of the district packed plenty of hardware, but, cartridges costing a dollar apiece in their money, they did no practicing—a circumstance that saved Haskell's life on more than one occasion. He and his friend, and the only other white man in the party, had plenty of ammunition. They shot wolves on the run and eagles in the air, partly for practice, largely to keep the natives in a proper frame of mind. On the whole, from things I have since learned and from things he himself has let slip, I gather that sj5BX is pretty hard-boiled.

Now back to that letter. It came while Ralph Heintz, 6XBB, was spending a weekend at 6HM. If you don't know Ralph from his accomplishments let it be said here that he is as far on the plus side of radio as your Uncle Dudley is to the negative. That implies a world of wisdom. Haskell's material was passed across the table to Ralph. Ole Ralph spit on his pencil and commenced forthwith to scatter Haskell's apparatus over a sheet of paper, doubling up on some parts to get the required values and adapting others. When he had arrived at the best he could do with the parts Haskell had on hand he drew out a radiating system and specified how far it must be located from a side wall of the crater. "Now," he said, "send your friend this dope and I think he'll get his signals out of that hole." I hadn't told him that Watson was a stranger to me, or that in advising him we might be guilty of compounding a felony. In that country no one is allowed to transmit and you can't even get permission to listen.

Haskell had said that he was signing the call DON. I told Paul, the only one if possible a little below LP1, down among the Australians. In about three weeks I commenced to watch for this DON, with a d.c. note from a 60-watter and dynamotor. And about that time I had to go to San Francisco. Fred Roebuck, (old KFUH), there at 6ARD, said, "Say, have you heard a station signing sj5BX? Where the dickens would that be? There isn't any such intermediate." Herbert Breuer, 6JN, was with us, and we all did a lot of surmising. The next day, just as I was about to leave the

*W6HM—W3QW, Carmel, California.
hotel for home. Herbert called up with, "Hi! I worked that sJ5BX last night! And guess where he is. On Pablo Island, at 90 degrees West and 6 degrees South of the equator.") And told me where to look for him. When I reached home I soon found sJ5BX, working a Six and giving that same QRA. Also telling the Six, "Not much use sending a card, Old Man, because ships come here only about once a year. Will QSL later." I couldn't find any Pablo Island, or any other kind of an island, at the position named—which would be about 500 miles off the coast of Peru. Then down at our village post-office I met a man who had just been living in Peru. He had never heard of such an island. I explained what the intermediates were for, and that there was no such intermediate as SJ in use. "Oh," he exclaimed, "now I think I can straighten you out on that. The old name for Peru was Juinan." (I leave the pronunciation to those of you who are familiar with Spanish. Those who are not would better leave it alone. It starts with a noise like blowing your soup. Or if you plead not guilty, try, it with the first note of the hoot-owl.) This man said that many of the old-timers refused to use any but the old name, and that this sJ5BX was doubtless of one of the old aristocracy of Peru. So that straightened me out fine. And I was just pluming myself over being able to show the boys the breadth of my knowledge when I noticed among the letters I was holding in my hand one with a foreign stamp. These a ham always opens first. "I was afraid of that DON call. It sounded suspicious. So I decided to use a ham-sounding call with an intermediate that nobody could locate." And then the mystery of Pablo Island really was solved. But after that I told many a feller why this old moss-backed Peruvian insisted upon using SJ instead of SP.

Some of you who worked this station will recall that frequently there was a YL at the key. Haskell had taught her the game, and had refused to let her operate the set until she had become letter-perfect. He had done such a fine job with this pupil that he broke his own nose, for she was a dandy operator—better than Haskell. She is a relative of his by marriage, being his wife. And how she did like to bawl a feller out for sending double, or for sending slowly when he could go faster. She was the Helen Willis of the key and you didn't have to soften your game for her! You fellers who worked sJ5BX when she was operating will be sorry that you didn't QSO oftener when I tell you that she is as fine looking as she is fine. It is too bad that the foto I have of her and Haskell is not sharp enough to reproduce with this story. They are both well worth looking at.

Aside from the purely radio features of this tale there is enough of the dramatic and human interest in the doings at sJ5BX to fill a book. Goodness knows, it is interesting enough to think of transmitting from the bottom of a hole 3000 feet deep. They came near to working all continents.

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**THE QSL CARD OF sJ5BX**

_Home-made, photographically, with a snap of the YL on the left and of the OM on the right._ Haskell made only ten of these cards because he says, "Each one we made took about half an hour, and besides that's enough for one for each district and for a special friend or two."

They would have done so with a little more time. For example, they would have if foA5V had been able to get them thru his QRN the night I had him on Haskell's trail. The story of Haskell's trip out of the crater for some dynamite that he bought from brigands who had taken it in the hold-up of a mine, and the things that happened on his return with this stuff loaded on three burros (there were three when he started) would make a thrilling tale all by itself. Or an account of the time when two bad eggs started to shoot up him and Paul one dark night just outside their camp, and ended by going to—wherever it is that assassins go. Or the time when another of these gentry tried to kill the house-servant, and had to be dissuaded permanently. Or the time when Donna and Haskell were all alone and were pounced upon by nine. This last fracas I think I must tell you about, because it is this one that ended the career of sJ5BX, and you will want to know how the finish came about.
The Watsons had a parrot from which they were only semi-detachable. I think it was a YL parrot, because it used to sit on Haskell's knee and pull the buttons off his coat. She was devoted to amateur radio—all same QST. Just couldn't keep away from the shack, even when nobody else was there. There were so many nice coils and dials to chew on. That's why you seldom found sj5BX twice in exactly the same spot. And while operating was going on she was doing Babe Ruths around the table and over the operator's shoulders. Once while QSO I got a hurry call to QRX while the parrot was being revived. She had got against the plate coil (TG&P, series feed) and hit for a three-bagger. The air was full of blue language and green feathers.

Well, one bright afternoon of a lazy June, Haskell and this YL parrot were sitting peacefully on the porch of their little camp at the bottom of this extinct volcano, telling one another whom they were going to work that night, when all of a sudden it didn't seem quite so darned extinct. Nine gentlemen, dark-completed on the outside and all the way through, appeared suddenly with their hardware erupting in the general direction of the Watson family. Watson et Ux, always living a life of preparedness, got into action, Donna acting as gunbearer and passing the loaded pistols while Haskell did the shooting. When the smoke finally cleared away two of the dark-completed gentlemen were dead, others were wounded, and the two Watsons were overpowered. As to the YL parrot I am not informed. I think she fainted.

Donna and Haskell were roped up too tight for comfort and cached temporarily in an adobe hut to ponder on the vicissitudes of ham radio. The one thing that they seemed surest of was that after nightfall they would be taken out and shot. But, just to show that you can't keep a good ham down, what happened when darkness came was that a faithful servant—the one who had been rescued when the bad egg was going to kill him—cut the prisoners loose and guided them out into the bush where he had saddled and hidden their horses. They spent seven days getting out to the nearest town over a bandit-ridden trail, riding and walking hours on end in the pitch dark to avoid being seen. They saved nothing except what they had on and enough money to buy two cans of sardines from a native. These sardines and three quail that Haskell shot with a pistol were all the food they had on this ride. And from what I've seen of the amount of stuff that hams can put away at a hamfest I'll say that this picture hits you fellows in a tender spot. At this town they had thought they would be safe, but they found that the news of the rumpus had preceded them and that they were being accused of murdering these men in cold blood. The prospect of being thrown into a filthy jail to await the decision of the law of a lawless land didn't appeal. A stranger, a fellow American, gave them some money and then brought it out of town himself. They hired a Chevrolet truck and an armed guard of eight men. With these they slipped out in the night, headed for a larger town. Most of the eighteen hours of that journey was spent in pushing the Chevrolet over a trail that a jackrabbit couldn't have traversed under his own power.

Having had to bribe so many "officials," they arrived in this town again broke. But another good American came to the rescue and they reached the coast and a ship. Eventually they landed where a ham gets a square deal from his government; where 16,000 amateurs were dispossessed of their earned and rightful place on the air by the adroit maneuvering of foreign governments and a comparatively small number of money-seeking commercial interests, but at any rate a country where a ham need not fear going to jail.

Now as to the ethics of the situation; as to the conduct of Haskell's ham friends who were in the know and who had kept his expedition in touch with the outside world: The American Radio Relay League will doubtless disagree with us, for A.R.R.L. is a stickler for the niceties of ham behavior. But this was not just a case of hamming for amusement. Many vital omissions were executed for sj5BX that could not have been handled thru a telegraph station and post-office six hazardous days' ride from him; where all mail and messages were scrutinized, and even their delivery at times denied thru the ignorance and suspicion of officials. I'll say that, when two fellows and the game wife of one of them, go on an expedition that has a perfectly legitimate and laudable aim, into a country where the laws are hand-made from day to day by whatsoever brigand or grafter happens for the time being to be in control, a country so ignorant of the uses of radio that its purposes are regarded as wholly sinister, where large murders for small gains are the rule—I'll say that the ham who had refrained from doing his utmost to aid these people should be read out of any society where there exists a consciousness of right.

Adios, sj5BX. You are a fine guy and a brave gentleman. And so's your OW.
Frequency Stability by Magnetostriction Oscillators

By Harold P. Westman, Technical Editor

PROF. G. W. PIERCE of Crust Laboratory at Harvard University has published a paper entitled "Magnetostriction Oscillators" which deals with the magnetostrictive characteristics of certain materials and their application to the stabilization of the frequency of oscillations generated by a triod. This article is based upon the material appearing in that paper.

Like quartz plates, magnetostriction oscillators are dependent upon a mechanical vibration for their stability and although it is not possible to obtain satisfactory output at extremely high frequencies such as may be obtained with the piezo-electric oscillator, it is possible that with the development of suitable frequency multipliers that magnetostriction oscillators may some day be of extreme value in amateur work. Magnetostriction deals with mechanical deformation of certain materials when they are subjected to magnetic fields either of constant or varying strength. If, for instance, we take a rod of nickel and subject it to a constant magnetic field of 1 gauss, we find that its length has been shortened by about one millionth. This change is extremely small because it must take place against the enormous elastic force of the material. If, however, the magnetic field is not constant but is made to vary in an oscillatory manner at a frequency equivalent to the resonant period of the rod, the deformation of the rod will be much greater because it does not then take place against the elastic force of the body but is opposed only by its viscosity or ability to yield continually when under stress. Under the varying magnetic field, the mechanical lengthening and shortening of the rod may reach a value as great as 100 times that observed with the field constant.

This effect, as one would suspect, works two ways and if we stretch or compress a magnetized rod, we will find that its magnetic field has been altered. The deformation of a rod under a magnetic field may be considered as the direct effect while the change in the magnetic field due to a mechanical deformation may be considered as the inverse effect.

In order to take advantage of these small effects, it is necessary to use a vacuum tube and thus obtain enough amplification to allow sustained oscillations to be produced. Figure 1 gives a schematic diagram of the circuit employed. The rod is placed within two coils and rests at its center on a blunt pivot. It does not have to be critically balanced and may even be tightly clamped at the center if that is desired for any reason.

One of the coils is in the grid circuit while the other is in the plate circuit, much as in the split-coil Hartley arrangement. However, one of the coils is reversed so that feedback from the plate coil to the grid coil without the aid of the rod is not in the proper direction to cause oscillations to be produced. It is possible, though, under certain conditions to cause such a system to oscillate without the use of the rod and as this is not damaging to the stability of the arrangement, it is unnecessary to take precautions to avoid such conditions. A condenser is shunted across both the coils so that the circuit may be adjusted to have a frequency of oscillation equivalent to the period of the rod employed.

Let us assume that the electrical circuit is so adjusted that it is not oscillating of its own accord (without the rod) but that if it did oscillate, it would do so at the same period as the rod. The rod is placed within the coils and the filament of the tube lighted. The plate current will increase as the filament emission becomes greater and this current flowing through the plate coil will cause a magnetic field to be set up about the coil. This magnetic field will act upon the rod and
cause it to be deformed (either lengthened or shortened). The deformation will not occur instantaneously along the entire rod but will travel along the rod at a definite speed depending upon the hardness of the material of which it is composed. When the deformation reaches the end of the rod that is within the grid coil, the inverse effect will take place and the magnetic field surrounding the rod will be varied because the physical dimensions of the rod have been altered. This change in magnetic field will effect the grid coil and induce a voltage therein which will be applied to the grid of the tube. This voltage applied to the grid will be amplified and will result in a change in the plate current which will start the cycle again by causing a change in the magnetic field around the plate coil through which it flows. In this fashion the circuit is made to oscillate at a frequency that is dependent upon a longitudinal or lengthwise vibration of the rod, the frequency of which will be controlled by two factors, namely: the length of the rod and the speed at which the deformation is propagated along the rod. This last mentioned factor may be controlled by the choice of the material employed and varies with the velocity of sound in the material. In general, the harder the material, the higher will be the velocity of sound through it and the higher will be its natural period of vibration.

In order that oscillations be produced, the rod must be magnetized and the varying magnetic field is superimposed upon the steady one. This will result in an increase in the magnetization of the rod when the varying field is in one direction and a decrease when it is in the reverse direction. If the rod were not magnetized to start with, the varying field would not cause an increase and decrease but would result in only an increase (or decrease) which means that the length of the rod would increase (or decrease) twice for each cycle rather than give both an increase and a decrease for each cycle which is desirable.

The rods may be permanently magnetized by inserting them into a solenoid and passing a heavy direct current through it. The field due to the direct plate current will aid in keeping the rods permanently magnetized and when in this condition the rods should be marked so that they are always inserted in the same direction. It should be unnecessary to have to remagnetize them as most materials will hold their magnetization in spite of the effect of the varying field in which they are operated. At all times, the steady field should be greater than the varying field.

In materials that have but little ability to hold their magnetism, the steady field may be obtained from a small permanent horseshoe magnet which is placed near the rod. It is not necessary or desirable to have the permanent magnet touch the rod and it may be located several inches from it.

In Figure 2, some experimental curves taken on a rod of Nichrome are illustrated in the circuit arrangement shown in Figure 1. The upper curve shows the change in wavelength obtained for a given rotation of the tuning condenser shunted across the coils. The rod was first held to prevent it from vibrating and the curve ABCDE was obtained which indicates a change in wavelength of from 16,000 meters at 19 degrees of the condenser dial to 19,400 meters at 30 degrees or a change of 3,400 meters for a dial rotation of 11 degrees.

Next, the rod was allowed to be free to vibrate and the condenser rotated from a low reading towards maximum. The curve ABCDE was then obtained and it will be noted that over portion indicated by D' there is no readable change in wavelength. The condenser was then rotated from maximum towards minimum and the curve EDCB'A' resulted. This shows a constant wavelength along the portion of the curve B'. After the rod has started to vibrate it is possible to vary the condenser from 18 to 30 degrees without shifting the wavelength. Thus, over a range of the condenser that gives a wavelength shift of 3,400 meters without the rod, there is no readable wavelength change when the rod is in vibration.

It was impossible to read any shift of wavelength along the stabilized portion of the curve when a precision wavemeter was employed as the measuring device and so some other method must be used to show how much the frequency does vary. Another magnetostriction oscillator was set up and a rod having a frequency of about seven times that of the rod under test was set vibrating. The seventh harmonic of the rod under test would then beat with the fundamental of the second oscillator and a change of one cycle in the test oscillator would cause a change in the beat note of seven cycles. The beat note could be measured to about one cycle which would be equivalent to a shift of but one seventh of a cycle of the rod under test. As will be seen by the second curve of Figure 2, a change of the condenser from 19 to 30 degrees with the rod vibrating causes frequency change of only 1.5 parts in 17,000.

The lower curve of Figure 2 indicates the change in plate current as the capacity across the coils is varied. As the capacity is increased from a low value, the current follows the solid line and when the reverse rotation takes place the current varies as shown by the dotted line. The jump in current of two to four milliamperes takes place as the rod starts to vibrate and the smooth tapering of current as the condenser...
ser is reduced towards 18 degrees is due to the fact that the particular circuit conditions caused the electrical oscillations (those not due to the rod but to the electrical circuit alone) to stop when the value of the condenser was less than 18 degrees. Otherwise, the characteristics shown at the higher capacity setting portion of the solid line curve would be duplicated at the lower capacity end of the dotted line.

It must be remembered that in the measurements just cited, the capacity across the coils was varied over a wide range to cause as large a change in frequency as possible and that in actual use, the capacity will always be set at a value that gives the highest plate current. It will, therefore, be possible to obtain a much higher degree of precision in the resetting of the equipment than the possible error shown by the curves might indicate.

We may regard the operation of this system over that portion of its range where frequency stabilization takes place as being equivalent to an inductance-capacitance circuit in which the inductance varies enormously with a change in frequency. We may represent the wavelength-against-capacity curves of Figure 2 by the following equations:

\[ \frac{T_a}{T_d} = \frac{L_a}{L_d} \]

\[ \frac{T_s}{T_f} = \frac{L_s}{L_f} \]

Figure 3 gives the values of this ratio plotted against frequency from which it appears that the change in inductance of the coil and free rod is about 50% for a change in frequency of less than 1/100 of 1% over that range in which the stabilizing action is operative. We may, therefore, consider that if the capacity across the coil is reduced, the shift in frequency causes an increase in the inductance of the rod and coil so that the product of the inductance and capacity is almost the same as it was before the change was made. Likewise, any increase in capacity will cause a decrease in inductance to an amount that will still compensate and the product of \( L \times C \) will be nearly constant. Thus, if the rod is not used, a change in capacity of 50% will result in a frequency change of 25% whereas with the particular rod under test, this change of capacity results in a frequency change of but 1/100 of 1%.

The comparison was made between the rod and a quartz crystal mounted in a vacuum and held in an accurately designed and carefully machined mounting. Repeated measurements indicated that when this crystal was operated under constant conditions, which must be very carefully checked, that an accuracy of frequency of 1/500 of 1% could be maintained. However, when the circuit conditions for the crystal are changed over as great a range as indicated for the rod, the frequency of

![Figure 2. The Upper Curve Shows the Stabilizing Effect of the Vibrating Rod When the Electrical Circuit is Detuned as Compared with the Electrical Circuit Alone. The second curve shows just how much the frequency does change when the electrical circuit is detuned and the rod is vibrating. This curve is equivalent to the horizontal portion of the upper curve very greatly amplified. The lower curve shows the behavior of the plate current of the tube as the rod starts to vibrate.](image)
used and the main requirements are that they have large magnetostrictive effects, that their frequency of vibration stay constant in spite of varying temperature and magnetizing force and that changes in the condenser settings, tube characteristics and plate and filament currents shall cause but small change of frequency.

Pure iron and irons with various carbon contents are not suitable because the magnetostrictive effect is very small. Pure nickel is a very active vibrator but its period of vibration will change when the electrical circuit is detuned.

**FIGURE 3. THE RATIO OF THE CHANGE OF INDUCTANCE PLOTTED AGAINST FREQUENCY.**

Certain alloys of nickel and iron are good vibrators and those having about 36 percent nickel and 64 percent iron, which is about the constitution of invar and stoe metal, are good. Unfortunately, though, their change of frequency with a change of temperature is rather high.

Nichrome and other alloys of chromium, nickel and iron are good vibrators. Perhaps commercial Nichrome is one of the best of the more easily available materials for many purposes.

Monel metal containing 68 percent of nickel, 28 percent of copper and small amounts of iron, silicon, manganese and carbon is a very powerful oscillator but usually requires an auxiliary polarizing device because of the small residual magnetism.

Alloys of cobalt and iron are strong vibrators.

Tubes of nickel may be used for qualitative work, demonstration purposes and for sources of sound and while they are good oscillators they are not so constant in frequency as might be desirable. Such tubes may be wholly or partly filled with lead or type metal which will result in their period of vibration being materially lowered. This is due to the fact that the velocity of sound in lead is low. By this means it is possible to obtain rods of low frequency without the use of an excessive length.

Composite rods may be used in order to reduce the effect of temperature upon the frequency of vibration. If a tube of nickel which has a negative temperature coefficient has inserted within it a tightly fitting core of a material such as stoe metal which has a positive temperature coefficient, the resultant rod may be made to be practically independent of temperature. These rods are concentrically composite.

Another type of composite rod consists of three rods soldered end to end. The center section is of a material having a coefficient of one sign while the end sections are of a material, the coefficient of which is of the opposite sign. These rods are longitudinally composite.

The frequency at which the rod will vibrate depends upon its length and upon the material of which it is composed. The following table gives the length and frequency of some stoe metal rods which are 0.79 cm. in diameter. The temperature is 20 degrees Centigrade.

<table>
<thead>
<tr>
<th>Frequency in Cycles</th>
<th>Length in cm.</th>
<th>Length in Meters</th>
<th>N Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>100015</td>
<td>20.815</td>
<td>0.20815</td>
<td>20003.7</td>
</tr>
<tr>
<td>14981</td>
<td>13.87</td>
<td>0.1387</td>
<td>2077.8</td>
</tr>
<tr>
<td>20003</td>
<td>16.40</td>
<td>0.1640</td>
<td>2000.3</td>
</tr>
<tr>
<td>24992</td>
<td>8.53</td>
<td>0.0853</td>
<td>2081.8</td>
</tr>
<tr>
<td>22981</td>
<td>6.58</td>
<td>0.0658</td>
<td>2077.7</td>
</tr>
</tbody>
</table>

The frequency values given in the above table are accurate to within 1/100 of 1%. Because the ends of the rods are not absolutely true, errors in their measurement may be as great as 0.1 mm, which amounts to more than 1/10 of 1% for the shorter rods. If the length of the rod is multiplied by the frequency of vibration, the constants which appear in the third column are obtained. The variations in these figures are not greater than the allowable inaccuracy in the measurement of the length of the rods. If the constant is doubled, the vel-

**FIGURE 4. THE ROD CONSISTS OF FIVE BEADS CONNECTED BY SECTIONS OF HALF THEIR DIAMETERS. All sections are of equal width. This rod vibrates at 280,480 cycles per second. The rod may also be made to vibrate with one of the beads between the two coils and the thinner sections within the coils.
ocity of sound in the material is obtained which for stolc metal is:

\[ V = \text{stoic} = 4160 \text{ cm/sec at 20° C.} \]

The diameter of the rods is approximately the same and as there is no progressive change in the constant it indicates that there is no appreciable end correction for the determination of velocity.

Accordingly, the length of a rod to give a definite frequency can be computed closely enough so that after having been cut in a lathe the final adjustment may be made with but a slight amount of grinding. If the grinding is carried too far so that the frequency of the rod becomes higher than the desired value, it is possible to correct this by grinding away some of the girth of the rod at its center.

This next table gives the values for a series of Nichrome rods 0.96 cm. in diameter at 20° C.

<table>
<thead>
<tr>
<th>Frequency in Cycles</th>
<th>Length in Cm.</th>
<th>Length in Meters</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>29992</td>
<td>8.27</td>
<td>2493.8</td>
<td></td>
</tr>
<tr>
<td>35002</td>
<td>7.18</td>
<td>2495.8</td>
<td></td>
</tr>
<tr>
<td>40004</td>
<td>6.23</td>
<td>2497.2</td>
<td></td>
</tr>
<tr>
<td>45008</td>
<td>5.53</td>
<td>2498.8</td>
<td></td>
</tr>
<tr>
<td>49996</td>
<td>4.99</td>
<td>2499.8</td>
<td></td>
</tr>
<tr>
<td>55014</td>
<td>4.58</td>
<td>2501.4</td>
<td></td>
</tr>
</tbody>
</table>

The magnetostriction oscillator is most valuable at frequencies below 25,000 cycles per second particularly in view of the fact that the quartz crystal is extremely expensive at these frequencies. Between 25,000 and 300,000 cycles the oscillators have a common field of usefulness. The crystal oscillator has more value at frequencies above 300,000 cycles because although the magnetostriction oscillator is active up to 2,000,000 cycles per second, its output is extremely feeble and it is more desirable to employ harmonics of lower frequency rods if points in this range are desired. Frequencies up to several millions per second may be obtained by means of such harmonics.

The higher frequencies (300,000 cycles) may be obtained by three different types of rods. One method is to place very short cylinders within the plate coil with their axes parallel to the magnetic field of this coil. A second method is to use flat sheets or strips of material which are placed between the plate and grid coils and a third method is the use of a beaded rod.

Fig. 4 gives some idea of the shape and position of the rod. The rod was originally 1.26 cm. in diameter and 9 cm. long. Four grooves that are \( \frac{1}{2} \) the radius deep are cut. They are 1 cm. wide and 1 cm. apart. The vibrator then consists of 5 beads, each of which is 1 cm. long and is separated from each other by 1 cm. When the rod was placed so that one bead was within one coil and the adjacent bead within the other coil or when one bead was between the two coils, the rod vibrated at a frequency of 295,480 cycles per second. The rod is of stainless steel, the velocity of sound through it being 5,430 meters per second and the length of a vibrator to give this frequency is:

\[ \text{Length} = \frac{543,000}{2} \times 295,480 = .918 \text{ cm.} \]

This is about 10% less than the computed value of one of the beads standing alone when regarded as a linear vibrator. The system is resonant at other frequencies, the strongest indication being at 19,888 cycles per second.

It is interesting to note that rods of large diameters may be made to vibrate at high frequencies. A thin disc 1.5 cm. in diameter and only about 2 mm. long can be made to oscillate at a frequency of about 1,500,000 cycles per second. The disc is mounted between corks in a glass tube. Its oscillations are very feeble and are in-
dicated only by the clicks heard in the telephone receivers when the tuning condenser causes the electrical circuit to pass through the resonant period of the rod.

There are many uses to which these standards may be put and it is possible by means of one rod to obtain points over an extreme range of frequency. These are obtained by the use of a second oscillator, the frequency of which may be varied over wide limits. When higher frequencies than the fundamental of the rod are desired, a harmonic of the second oscillator may be made to beat with the fundamental of the magnetostriction oscillator and if additional points are desired they may be obtained by beating harmonics of the electrical oscillator against harmonics of the rod oscillator.

When calibrating a frequency meter from a rod, the meter is short-circuited and placed near the electric oscillator coil. The electric oscillator is adjusted so that its fundamental (or harmonic) is at zero beat with the harmonic (or fundamental) of the rod oscillator. The frequency meter short-circuiting switch is then opened and as resonance is approached by rotating the dial of the meter, audible beats will be heard which rise in frequency and fall to zero beat again. A further rotation will cause audible beats to hear again which once more drop to zero. When the frequency meter is adjusted to that position giving zero beat upon each side of which audible beats are obtained, all three units are in resonance (either at their fundamental or a harmonic frequency).

Rods may be calibrated in the following manner. A rod vibrating at the rate of 1000 cycles per second is employed to drive a synchronous clock. By means of weights which may be clamped to it and moved nearer together or further apart, the frequency of the rod can be accurately set. The frequency of one such rod could be varied over a range of about 7 cycles by this means.

A pair of circuit-making contacts are closed for a short period of time each second by the synchronous clock. Electrical impulses supplied each second by a standard clock are passed through these contacts to a loud speaker and when the ticks are heard in the loud speaker it indicates that the standard clock and the synchronous clock are in step. The number of seconds in which the two clocks are out of step indicates the difference between the length of the second of the standard clock and the length of the second of the motor driven clock. Several successive intervals may be timed and an average taken from which the rate of vibration of the rod may be obtained.

The timing of the 1000-cycle rod could be made directly because the synchronous clock was designed to be driven by a 1000-cycle wave. However, if a higher frequency rod is to be calibrated it will be necessary to beat a harmonic of it against the 1000-cycle rod. The 1000-cycle rod is adjusted to zero beat with the nearest harmonic of the rod to be calibrated and the vibrations of the 1000-cycle rod checked against the standard clock. The exact frequency of the 1000-cycle rod may be obtained from which can be computed the frequency of vibration of the smaller rod. It is not necessary to depend upon the beats as heard in the telephone receiver because a d.c. milliammeter made be connected into the circuit and a visual indication obtained.

Fig. 5 shows the circuit arrangement for comparing the two rods. The motor-driven clock takes the place of the choke that would be used for coupling between the first and second amplifier stages. The second stage is used for amplifying the higher frequency harmonic of the 1000-cycle rod circuit and the small coupling condenser between its grid and the plate of the first stage tends to reduce the amplification obtained on the fundamental frequency. A radio frequency choke connected across the input of the grid circuit of the second stage also aids in reducing the amplification of the 1000-cycle fundamental frequency, still allowing the high frequency harmonic to be amplified. The two output circuits are coupled by means of the coils L5 and L6 and as the beat frequency approaches zero it will be indicated visually on the milliammeter. The motor-driven clock may therefore be used to standardize both rods at the same time.

While magnetostriction oscillators may not be directly applicable for the stabilization of transmitter frequencies in the amateur bands, this does not indicate that they are of little or no use to the amateur. Their use in the calibration of frequency meters is extremely valuable particularly when one realizes how much cheaper it is to obtain a series of rods as compared to the cost of an equal number of quartz plates.

We have already accepted frequency doublers in our crystal-controlled transmitters and there is no reason why we may not find it to our advantage to pick off a more remote harmonic of a magnetostriction oscillator for the stabilization of our emitted frequency. The rod is inexpensive and extremely rugged; two factors which are decidedly important from the amateur viewpoint.
Some Suggestions For 1929

By H. M. Walleze*

MAYBE you have built that new 1929 transmitter and find that the wave is not as steady as the book says it should be, or you have just revamped your plate supply to get a good clean-cut smooth tone but have found that it has a rattle in it. Since my daily grind takes in locating and fixing all kinds of such troubles in about all kinds of transmitters, it is natural that I have learned some of the kinks. Not having seen many such stunts described I want to pass a few suggestions along to add to the many excellent articles that have appeared in QST designed to take the hay-wire out of amateur radio for 1929.

At the last Atlantic Division Convention at 8XE I made a remark at a general argument session to the effect that 1929 signals should be strictly pure d. c. I wonder now how I got home alive and in operating condition! I was almost hauled down and only one brave lad backed me up—after the meeting. The cry was the hardship it would work on the amateur existing on the plunder from kid brother's nickel bank. One already had a 30-henry choke and 6 miles and still no sign of d. c. and wanted to know how he was going to get the required 150 henrys and 300 miles more. The answer is that either the filter or the rectifier is badly overloaded or the set very poorly adjusted. Considering the tons of good information already printed on circuit adjustment, the trouble must lie in one or both of the two items first mentioned.

We have heard considerable about brute filters but little on common sense filters, as some one put it. The fellow who hangs a 30-henry choke and 10 miles on a motor generator has more money that horse sense. I have yet to see a machine, built for radio work, that required over 2 to 5 microfarads in conjunction with a good choke of from 2 to 5 henrys providing many other things the life will usually be increased. The same thing applies to the plate transformer which should be capable of delivering considerably more power than it is called upon for. If you want good regulation the chokes and transformers must be husky and it is only by good regulation that one can hope to have a signal that is not full of key chirps. Running power tubes underrated has been greatly stressed but it must be remembered that the same applies to every piece of equipment in the set. One way to check the quality of your equipment is to put a brick on the key, just as you have been running everything, and then take in a good show. When you come home, three hours later, the set most probably won't be running. Something burnt up. Throw that something out and get another that will stand up to that treatment or else cut the input until your toy "something" can handle it. Any set that can't run half a day full tilt is hay-wire, somewhere.

Perhaps you have cooked the set overnight without a fire, have everthing underloaded and have spent much time in making fine adjustments according to the information given in QST and you still find that the would-be pde note is fine a. c. Well, quite likely you have your rectifier and filter crammed within 3" of the r. f. circuits thereby pumping plenty of r. f. into these units. Besides losing good r.f. you lose a good note because no filter and rectifier can operate properly with a lot of r.f. floating around in it. Even though nothing blows up, the filtration will be poor. Moving this equipment well away from the set and inserting an r.f. choke (plenty of turns on a small diameter tubing) in each supply lead may fix it. If not, quite likely your filament heating transformer is set on the same shelf as the r. f. equipment and the core iron is a little loose and hums quite a bit. The transformer is then just bouncing around at about 120 j.p.m. (jumps per minute), the tube element jumping along with it at the same rate, especially the filament, if it is a little aged and stretched, a lead or so right in phase with them helping matters along. The result is a modulation of the radio frequency wave at 120 cycles plus a few high kicks thrown in for good measure by the keying relay which is probably stuck up on the frame somewhere. Set these units up on sponge rubber after firmly clamping the core of the transformer or, better still, move them out where they can't shimmy the r.f. parts.

If you are using a motor generator with-

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out a bag or two of cement under it, the same thing probably happens. The machine vibrates, the floor ditto, and the set and signals as well. Even though heavy rigid wiring may be used in the set the chance of vibration is good and it does not take a great deal to spoil an otherwise good note. If the machine is not too large, a bundle of paper towels under each end will fix both the rattle and the signal as well as the rumble down in the OM's bedroom which will help some on midnight work.

The generator may be stirring up a grand hash at the commutator which finds its way to the set via high voltage leads or, more likely, by direct radiation from the machine itself. Move it away or put it in a tin can but don't forget to cut some air-holes which should be covered with copper screening. The can, motor generator frame and the negative lead, should all be connected to a good ground. This may also quiet the BCL across the street.

Perhaps a couple of pointers regarding the crystal-controlled transmitter might not be amiss. Unless you are looking for trouble, the r.f. choke in the grid circuit of the crystal tube should not be so constructed that its natural period falls near that of the crystal. If it does, the circuit will tend to oscillate without the aid of the crystal; being simply an Armstrong circuit. While with proper adjustment, the crystal will control the frequency and the output may be materially better, the increase in the r.f. voltage applied to the grid and consequently across the crystal, may be great enough to rupture the plate. It should be possible to remove the voltage from the amplifier tubes and the quartz plate from its holder and then when the oscillator tank condenser is rotated through its entire range there should be no tendency for the circuit to break into oscillation. If it does oscillate, add some more turns to the r.f. choke until the proper condition can be obtained.

While we are on the question of chokes, why not operate the transmitter with series plate feed so as to reduce the amount of work which the choke is being called upon to perform. If there is any difference in performance between the series and parallel methods of feeding, it is so slight that in actual practice it is negligible.

The same thing applies to the use of biasing batteries as compared with the use of resistors. If variable resistors are used the results obtained will approach so closely to those obtained with the use of biasing batteries that one would have to sit up about 400 nights a year to hear the difference, granting both are properly adjusted. The use of resistors means a lot to the slim bank account as well as in the amount of constructional work necessary. Of course, if the voltage regulation is not good, the bias may vary considerably but that cannot be blamed on anything but the power supply system.

As far as the receiver is concerned, it should not be considered a disgrace or even a luxury to put a cabinet around it. The "box" won't affect the signal providing it is constructed of good dry lumber and well treated with high grade clear varnish. Don't smear it up with pole paint or something worse.

While many claim that resistance control of regeneration does not give as good signal strength as some other method. If it is built correctly, it will do just as well and perhaps better. Instead of trying to work with a small diameter tickler coil stuck a foot from the secondary, make it the same diameter as the secondary and put it not more than ½" away from it. Cut the tickler turns down to 2 or 3 for the higher frequency bands and run the detector plate voltage up to 30 or 35, if necessary. If your tuning condenser is as small as it should be and has a good vernier dial you will then have an ideal receiver with but one tuning control. The regeneration control won't change the note and you can work the detector tube at the point where greatest sensitivity is obtained. There will be no necessity for "edging" up on the regeneration control in order to hold your signal. If you insist upon two tuning controls put in a stage of tuned radio frequency—then sit up some more nights and figure out how much necessary gain you have obtained against all the fuss and cost.

3AJC had some grid leaks of the coated glass filament variety which were getting noisy after about a year's use. Upon chemical investigation, it was found that the resistance material was germanium, a material which tends to crystallize at the end of about twelve months.

The Radio Division, Department of Commerce, has appointed seven new Assistant Radio Inspectors, with four more contemplated. The new men are receiving training at the District Supervisors' offices and will then be placed at new branch offices which the Department is opening at Buffalo, Dallas, Denver, Los Angeles, Minneapolis and Omaha.

7OK tells us that he was using the condensers out of Ford coils for filters. The first batch he had blew at 860 volts and the second batch has been working on 750 without any sign of going West.
A 28-Megacycle Crystal-Controlled Transmitter

By Howard Allan Chinn

DURING the past few months nu1XM maintained automatic transmissions on 28 megacycles during certain periods on Saturdays and Sundays in an effort to obtain data relating to wave propagation in this high frequency band recently opened to amateurs, and to provide those hearing the transmissions with a definite point in the frequency spectrum. The transmitter was crystal controlled and the frequency known to be 28 megacycles, within .1 of 1%. This article, describing the transmitter used, is presented not because of any new or radically different features involved but rather to oratory experimentation, is not especially compact, as a permanent installation could undoubtedly be. The crystal used has a fundamental frequency of 1.75 megacycles and therefore four frequency doublers were necessary. From the circuit diagram we see that the crystal oscillator tube and the first three frequency doublers are UX-201-A tubes. Somewhat greater output can be obtained by using UX-112-A tubes in these positions, but in this particular case the UX-201-A tubes were found entirely satisfactory. The fourth frequency doubler is a UX-210 tube which provides the 28 megacycle voltage to excite the grids of the two show the straightforward arrangement of a 28-megacycle crystal controlled transmitter. The procedure and circuit arrangements are not limited to 28 mc. operation but can be modified for operation in any waveband.

The transmitter was assembled of units that were available at the time and as can be seen from the photo, is half panel and half breadboard in construction. The apparatus, being primarily designed for lab-

*Contribution from the Round Hills Shortwave Radio Research.
†Electrical Communication Laboratory, Massachusetts Institute of Technology, Cambridge A. Massachusetts.

UX-852 tubes which are operating as straight amplifiers.

The reason for operating the last stage as a straight amplifier and therefore necessitating some form of neutralization was because it was found that when tubes were used as frequency doublers they operated rather inefficiently. Thus, to obtain a given output from a tube it is necessary to operate it with a considerably higher plate dissipation when used as a frequency doubler as compared with that when used as a straight amplifier. Since most of us run our tubes at a maximum safe plate dissipation anyway, it follows that the logical way
to obtain most output from a given tube under normal operating conditions is to use it as a straight amplifier rather than as a frequency doubler. The apparatus as originally set up employed the last tubes as frequency doublers (one of the UX-201-A stages being omitted) but the output was far from satisfactory and the tubes ran too hot. By the addition of one UX-201-A the last stage converted into a straight amplifier the output increased many times with the same input power.

The neutralization arrangement used in the last stage is of interest and its operation is readily seen from consideration of Fig. 2.

Figure 2a shows the last stage amplifier schematically without the power supply, by-pass condensers, etc., and with the grid-plate inter-electrode tube capacitances indicated. It is because of feed back through these capacities that the circuit will oscillate. Figure 2b shows the equivalent circuit involving these tubes and the neutralizing condensers. The points P₁ and G₁ can be thought of as representing the grid and plate terminals of tube 1. Likewise G₂₁ represents the grid-plate capacity of tube 1. The circuit can be further unscrambled as shown in Figure 2c. Here we see we have an ordinary capacity bridge, the points being lettered the same as in Figure 2b. Thus we see that if the two neutralizing capacities are equal to each other and to the grid-plate capacity of the tubes being used, the bridge will be balanced and any voltage introduced between the points G₁ and G₂ will have no effect upon the bridge points P₁ and P₂. Thus we see that in adjustment of the circuit we will expect to find the two neutralizing capacities about alike and equal to the grid-plate capacity of the tubes plus any stray capacity due to sockets and wiring. The average grid-plate capacitances of the more common tubes are as follows:

<table>
<thead>
<tr>
<th>Tube</th>
<th>Grid to Plate Capacity (based tube)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UX-201-A</td>
<td>10.1</td>
</tr>
<tr>
<td>UX-112-A</td>
<td>11.0</td>
</tr>
<tr>
<td>UX-216</td>
<td>8.0</td>
</tr>
<tr>
<td>UV-208-A</td>
<td>22.5</td>
</tr>
<tr>
<td>UV-211</td>
<td>18.6</td>
</tr>
<tr>
<td>UV-201-A</td>
<td>19.0</td>
</tr>
<tr>
<td>UV-851</td>
<td>17.1</td>
</tr>
<tr>
<td>UX-252</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Besides lending itself to easy neutralization the balanced circuit used for the last stage amplifier has the further advantage that when properly adjusted, practically no radio frequency flows down the center tap leads to the filament or plate supply circuits. The proper point for the center-tap leads (those going to the C minus and B plus) would be to the exact center of the grid and plate inductances if everything were balanced and symmetrical. Different

Figure 2a shows somewhat more clearly the input circuit to the pair of 152's and the two neutralizing condensers. The breadboard on the right holds the antenna tuning equipment as well as the meter.
up, as actually used, a switching arrangement was included to cut out or by-pass as many of the frequency doublers as was desired in order to make the apparatus as flexible as possible. This is shown in Fig. 3.

The coil and condenser values used are given in Figure 1. The values for C1, C2, C3, and C4 are the approximate capacitance values actually used. The condensers were all National 500-µfd. receiving condensers, adjusted to these values. C5 and C7 were National 150-µfd. transmitting condensers adjusted to the values indicated in the figure. C8 and C9 were General Radio 16-

A tubes was approximately 200 volts. This was obtained from the 500-volt plate supply to the UX-210 by suitable resistors R8 and R9. It was necessary to use two resistors, and not one common one, since it was desired to key in the plate circuit of the last UX-201-A frequency doubler. If

\[ \text{FIG. 3} \]

The complete circuit diagram. The constants are as given below.

L1—31 turns of No. 18 d.c.c. wire on 3 inch form.
L2—14 turns of No. 18 d.c.c wire on 3 inch form.
L5 and L7—2 turns of spaced edgewound copper ribbon.
L9—8 turns same as L5.
L8—4 turns same as L5.
L9 and L10—G.R. choke No. 879-T.
RFC—Samuel choke No. 32.
C1 and C2—125 µfdas.
C3—250 µfdas.
C4—90 µfdas.
C6 and C7—75 µfdas.
C8—18 µfdas.
C9—30 µfdas.
C10, 11, 12, 13, 16 and 21—0.001 µfdas.
C14, 18, 19 and 27—0.006 µfdas.
C60—and C70—0.01 µfdas.
R1, R2 and R3—5 megohms.
R5—0.000 ohms.
R6—10,000 ohms.
R7—15,000 ohms.
R8—4 ohms.

µfd. midget variable condensers, the latter being doubly spaced.

The plate voltage applied to the UX-201-A tubes was approximately 200 volts. This was obtained from the 500-volt plate supply to the UX-210 by suitable resistors R8 and R9. It was necessary to use two resistors, and not one common one, since it was desired to key in the plate circuit of the last UX-201-A frequency doubler. If

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The filaments of the 852's and the 210 were fed from a ten volt a.c. source while the 201-A's happened to be lighted from a storage battery although they might just as well have been arranged for operation on a.c. The filament voltage for the 210 tube is dropped from ten volts to seven and one-half by the series resistors $R_s$, two being used, one in each side of the line in order that the center tap would not be unbalanced. Small resistors of various values suitable for such purposes may be obtained from several manufacturers.

In order to facilitate tuning of the transmitter, a 125-milliampere thermo-couple meter or thermo-galvanometer, shorted with a single three-inch turn of wire was used. The single turn is first coupled to the inductance in the plate circuit of the crystal oscillator tube and the condenser varied until the indication is at maximum. The coupling should be kept as loose as possible in order that the effect of the meter and coupling coil on the tuning of the circuit is a minimum. The meter is next coupled to the coil in the plate circuit of the first frequency doubler and this circuit is tuned until a maximum indication is again obtained. In order to make certain that this tank circuit is tuned to the second harmonic of the crystal a frequency-meter should be coupled to the coil and the frequency checked. It is quite possible with suitable coils to tune this tank circuit to the third or fourth harmonic and to obtain rather weak tank circuit current. This procedure is repeated until all the frequency doublers are in tune, including the 210 stage. With the meter coupled to the coil in the plate circuit of the UX-210 all the condensers can then be slightly readjusted for a maximum current in this tank circuit. If desired, the antenna can be coupled to this plate circuit and the apparatus used as a low-power transmitter.

The bias on the 210 tube and the 852's is such that when the key is up no excitation voltage is being fed to the grids of these tubes, thus their plate current is practically zero. As the r.f. grid excitation voltage is increased, the plate current increases and this also serves as an indication of optimum adjustment. Thus if we watch the plate current of the 210 tube as the first four condensers are adjusted we find it to be at maximum (the key being down) when they are all in tune. This value, incidentally, will be in the order of 50 milliamperes with the grid and plate voltages indicated.

The plate voltage is now supplied to the 852's. The neutralizing condensers are then adjusted with the key up (no r.f. excitation voltage on the grids of the 852's) until there is no self-oscillation of the tubes when the plate and grid circuits are in tune. The key is then closed and with the thermo-couple meter coupled very loosely to the plate inductance of the last stage, the circuit is adjusted to resonance. The antenna is then coupled and the antenna condensers adjusted for maximum antenna current. Readjustments should then be made throughout the entire circuit in order to secure maximum antenna current.

The antenna employed for these tests was a horizontal half-wave antenna with a 6/4 wavelength feeder, the construction and operation of which has been mentioned. See Fig. 4.

The actual length of the antenna flat-top was 17 feet and the feeder length 42.5 feet. The antenna current with this particular installation was .8 ampere with 500 watts input to the last stage of the amplifier.

To adopt the transmitter for operation with crystals of other fundamental frequencies or in other wave-bands it is merely necessary to eliminate or add frequency doublers as necessary, by switching, choose the proper coils and adjust the condensers.
“Now We’re in the Air!”

By Wallace S. Wiggins

THE title of this story is not intended to refer to a movie of some months ago, but rather to the rapidly growing “air-mindedness” of amateur radio. Taking a brief squint over our glorious past, we see the real “ham” radio, as it really is, taking part in various enterprises of world note, from Greenland’s icy shores to the South Pole with Byrd. We’ve been in the air before, you understand, but not to such a degree that we could be called members of the air family. We won’t forget WNP as a starter for giving the explorer confidence in ham radio. And we remember with a heartache our old friend NERK, the Shenandoah. She was the first to give “wings” to the ham. From then on, ham radio began to get acclimated to its angelic element by means of various notable flights, all the way up to KTHAB, the Southern Cross, which winged its way from Oakland, California, to Australia.

Of course, radio, technically speaking, has been “in the air” for some time, but much of it wasn’t ham radio. They’ve used sets in planes for army and navy tactics for quite a while. Many other civilian installations have been made in planes, but most of them smacked of the “commercial.” The others were ham sets from either an engineering standpoint (good ones, we mean!), or they involved the cooperation of the “gang” to such an extent that it was almost strictly a ham undertaking.

The latest stunt by the Knights (for short) of the A. R. R. L., was one in connection with the 1928 National Air Races, at the municipal airport in Los Angeles, from September 8th to 16th inclusive. The Amateur Radio Research Club of the “City of the Angels,” affiliated with the A. R. R. L., provided the star performers, for the circuit, and even though it was a “ground job,” it rated as high in importance as any other official function during the races. It was a great success, it gained favor and friends galore, and above all it paved the way for the “bigger and better” chances for amateur radio to continue to prove its worth.

It’s about time I told you about the stunt. I am not following the style of the news story, with the important facts in the first paragraph or “lead,” for the simple reason that the technicalities involved are familiar to every amateur operator with any experience at all, and because it is the significance of the thing rather than the thing itself that is important.

It started this way. During the air meet, which consisted of the finishes of transcontinental races, army and navy demonstrations of airplane tactics, hundreds of stunts by civilians in planes and ‘chutes, a mammoth airplane exposition, and other things too numerous even to remember, there were several local races each day. The races were around five- and ten-mile courses marked by pylons, or steel towers, with checkerboard sides and a “wind sock” flying at the top. Pylon Number 1 was on the field, near the judges’ stand. Pylons Numbers 2, 3, and 4 were located at distances of one, two, and three miles from Pylon Number 1. The first three pylons marked the five-mile course, while all pylons were used in the ten-mile course.

Observers were stationed at each pylon. It was their duty to see that contestants did not “cut corners,” or take parts of the pylon along with them, or drop souvenirs of the plane along the course, or do a hundred other things they might do and maybe some things nobody had ever thought of before. Then the judges had to know, at any instant, just where any plane was and how many laps it had completed. You’ve guessed it—reliable communication between pylons and the judges’ stand was necessary. Enter our hero, with a vacuum tube in one hand and a key in the other. His pockets are filled with spare parts.

The Junior Chamber of Commerce of Los Angeles had charge of the Committee on Communications. Our western friend, M. E. McCreevy, W6LJ, was on the committee. Whenever something big is happening or

(Continued on Page 34)
Odd Jobs

G. F. Lampkin*

THE job of cutting a circle in a panel requires, for decent results, some sort of a special tool. Certainly the method of drilling and filing around the circumference of the circle is both laborious and productive of indifferent results. For holes from one to ten inches in diameter, in panelling of thicknesses up to one half inch, the device depicted in Figure 1 will give clean-cut results. It was first put together in order to cut an eight-inch by three-eighths inch disc for a sync rectifier as no lathe was available for the job. Later, it was used to cut the circular commutator segments and slip rings from three thirtyseconds inch sheet brass.

The tool requires, in the way of raw material, one foot of 3/8" square brass, or iron bar; five inches of 1/2" round brass, or iron rod; a 3/16" square lathe cutting-off tool and half a dozen 6-32 machine screws. The cutting-off tool may be the hardest item to obtain, though it only costs around a dime. It is a short, approximately three-inch, bar of hardened tool steel, used for making lathe tools. The hardware store should have it.

1. A pan of water into which the tool may be dipped occasionally will speed up the grinding process by allowing the heat generated in the tool to be quickly dissipated.—Tech. Ed.

6. The central shaft is 3 1/2" long, and the shaft for the knob is 1 1/2" long. Both are clamped under 3/4" pieces at each end of the main bar. The holes for these round shafts are bored with a 1/4" drill. The two pieces of bar are clamped together, with a piece of cardboard between. Then, when the shafts are inserted, after the removal of the cardboard, they may be clamped down tightly. The 3/4" central shaft was used because fairly heavy work was contemplated for the tool. Of course, a 1/4" hole must first be bored in the panel before the circle cutter can be used. If the cutter is to be used for light work, and the 1/4" hole is objectionable, the central-shaft size may be cut down. The handle used was a glass knob from a drawer pull the likeliest thing at hand.

In cutting, the point of the tool should always ride behind the center line of the two shafts. If a smooth edge to the circle is desired on both sides of the panel, the cut

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should be taken through about halfway from the one side, and then finished from the other. The work bench, or a box, should be bored for the central shaft of the cutter. The panel should lie perfectly flat on the bench or box. A strip of wood or iron, bored and fitted below the bench and over the lower locknut on the central shaft, can be used handily as a lever to put a slight pressure on the cutting point. Of course some elbow grease is necessary to operate the tool, but even an eight-inch circle can be taken through a panel in a surprisingly short time.

**KEYING RELAY**

Although making a keying relay from a telegraph sounder is no new job, perhaps a little variety will make another description of such, excusable. The parts of the sounder were removed from the original iron base and remounted, for insulation's sake, on an identically drilled piece of 1/4" formica. The hard rubber extension on the sounder arm and the contact posts were added as in Fig. 3. The contact screw in the hard rubber extension was connected to the sounder arm, and the two were used as the blade of a single pole, double-throw switch. The contact post and the back contact were used as the points of the switch. The connections for keying in the plate circuit of the transmitter were made as in the diagram Fig 4. The resistance load was used to keep a current drain on the transmitter plate supply at all times, so that the voltage would not flicker with keying. The regulation of the supply, like that of most transmitter supplies, was very poor, around 30%. The approximate value of the resistance load was calculated from

\[
\text{Ohms} = \frac{\text{Plate Volts}}{\text{Plate Amps}}
\]

and this value in wire-wound resistors used. A bit of experimenting should give a water rheostat, or a lamp bank, that would fulfill the purpose. The brass contacts of the relay burned away at a rate of about an eighth of an inch a month, so 3/16" tungsten contacts were obtained¹ and fitted to the relay. After breaking .4 of an amp at 1000 volts for some four months, the tungsten surfaces were still as good as new. If the arc tends to hold after the contacts have opened, condensers should be shunted across the breaks. If possible, the relay should be placed in the negative, or grounded, plate lead. When the sounder arm is connected to the plate circuit, as above, the iron armature on the sounder arm should be kept as far away from the magnets as possible. If the contact screw is used alone, without the resistance load scheme, the hard rubber extension is ample insulation.

**AMMETERS**

With the half-ampere, radio-frequency ammeters prevalent nowadays for measuring antenna currents, the amateur is sometimes hard put to measure larger radio-frequency currents—for instance, the current in the oscillating circuit of the transmitter, or in the tank circuit of the crystal-oscillator, power amplifier. A shunt of No. 12 tinned bus placed across the terminals of a half-amp Jewell thermo couple meter cut the deflection approximately in half. As this was not enough in some cases, a clip was arranged as in the diagram of Fig. 5. By sliding the clip to the left, the length of the shunt was decreased, while, correspondingly, more wire was added in the meter circuit, so that no matter how large the current flowing in the circuit, the deflection on the meter could be brought to any desired value. No attempt was made at calibration of the meter and shunt, for various clip positions, for only relative readings.

¹ Tungsten contacts may be obtained from The Kodel Radio Corp., 507 East Pearl Street, Cincinnati, Ohio.
were desired. Such calibration would undoubtedly be useful, however, if the shunt were used extensively on the meter—and providing the clip settings were accurately marked.

**STopping Condensors**

It is a commonly noticed fault of many amateur transmitters that the wave climbs slowly during the first few minutes of transmission—not to mention bona fide wave swinging. At high frequencies the tube condenser is needed with higher plate voltages. For the sake of safety in either latter cases the .022 µfd. mica condenser should be left in the plate lead, so that a direct short would not be had on the plate supply should the variable condenser spark over. Figure 6 gives a schematic transmitter diagram using the variable stopping condensers. The beat note from a 150-watt transmitter, using three ribbon-filament W.E. tubes, would start inaudible at one side of zero beat, pass through zero, and go out on the other side, when keying the set, with the .002 µfd. condensers in circuit. Replacing these capacities with approximately 100 µfd.s, reduced the maximum beat-note shift to 150 or 200 cycles.

![FIG 5 VARIABLE SHUNTED R.F. AMMETER](image)

Capacities across the helix have appreciable effect on the tuning of the transmitter, and change in the tube capacities, because of heating, or other things, causes wave shifting. When condensers are placed in series the resultant capacity is always less than 100 µfd.s, reduced the maximum beat-note shift to 150 or 200 cycles.

![FIG 6 VARIABLE STOPPING CONDENSERS ON TRANSMITTER](image)

that of the smallest condenser in the group. Variable condensers may be placed in the grid and plate leads of a transmitter, instead of the usual .002 mica stopping condensers. These capacities should be made as small as possible without losing an appreciable amount of output from the transmitter. By careful jockeying, they may be cut down to around 100 µfd.s. each, depending on the wave band in which the transmitter is used, and a much steadier wave will be had. The grid stopping condenser for even high-powered sets may be a receiving condenser. A receiving condenser in the plate lead will stand up with 800 or 1000 volts on the plate, but a transmitting condenser would be destroyed.

QST with deep regret must report the death at Seattle in middle August of Mr. O. R. Redfern, Supervisor of Radio for the Seventh District. For the last several years a splendid friend of the amateur, his passing must be regretted by all members. With the exception of war-time service as a Lieutenant, U. S. Navy, Mr. Redfern was continuously with the Department of Commerce since October, 1916. Before becoming Supervisor at Seattle he was attached to the Second District office at New York.

The new Supervisor at Seattle is Mr. Edwin W. Lovejoy, well known on the Coast from his long service as a Radio Inspector in the western offices of the Radio Division. In extending A.R.R.L. congratulations on his promotion we must also express our pleasure that the new Supervisor is one who knows and understands us as well as Mr. Lovejoy does.

The paper entitled “Receiver Characteristics and Their Measurements” that appeared on page 23 of the October issue was originally delivered before the Atlantic Division A.R.R.L. Convention held at State College, Pa., on June 15, 1928. We are indebted to that Convention committee for this most excellent paper and our thanks are tendered herewith.

Horace Wilbert, W6EX and the National Radio Tube Company, takes exception to the omission of his rectifier tubes from Ross Hull’s mention, on page 23 of the September issue, of a “truly practical” rectifier for 1929 use with high-power tubes. Hull did not mean that a mercury arc was the only rectifier capable of operating a high-power tube, but that for various reasons he believes it most practical. Of course, Hull is a purist in matters radio, and other individual preferences and conditions may dictate the use of some other rectifier such as Rectobuls, Kenotrons or chemical.
160-Meter Low-Power Transmitter

By George B. Hart*

When the average broadcast amateur becomes interested in two-way communication, he looks with disfavor upon the 1,750-kc. band, because of the fact that he usually thinks that it is impossible to use high power and expensive apparatus if effective results are to be obtained. While he is pondering over a catalogue of expensive transmitting goods, or, as is more likely, building a low power set for use on the already over-crowded high frequencies, he little dreams that a low power, yet efficient, c. w. set may be constructed from receiving parts. Two 201-A tubes are used as the oscillators in this simple full-wave self-rectifying Hartley transmitter. The 110-volt a.c. line is used to supply both plate and filament through suitable transformers. The entire outfit cost me $10.06.

Such a transmitter should especially appeal to men interested in the 1,750-kc. (160-meter) code practice and rag chewers, which has recently been inaugurated. It has been used here for several months and in addition to working several locals, stations located as far as 300 miles away have been communicated with. Reports ranged from R4 to R9.

The circuit of the transmitter is shown in Figure 1. The antenna and oscillatory circuits are tuned by 500-µfd. variable condensers, which in my case were obtained at the local "five and ten." All keying is done in the primary of the plate supply transformer. The 25-watt lamp in series with the power transformer is used to indicate resonance. When the antenna is in resonance with the primary the lamp will burn at about medium brilliancy.

Coils L1 and L2 are wound in the same direction on a 3-inch cardboard tube with No. 18 d.c.c. wire. The coils are spaced 1½ inch. Wind the coils as tightly as possible.

L1 consists of 25 turns tapped at the 12th turn for the filament return L2 is also wound with 25 turns, but tapped every 5 turns.

The leads should be made as short as possible. The wire may be the usual bus bar such as is used in receiving sets. The entire outfit may be mounted on a 7x12 panel and 10x12 baseboard, or may be mounted in breadboard style without a panel. If a cabinet is used, the outfit may be placed in a cabinet.

The radio frequency choke consists of 350 turns of No. 30 d.c.c. wire on a 2-inch card-

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*SDK, 3267 N. 33rd St., Cincinnati, Ohio.

1. The most convenient antenna will probably be a grounded one which should be about approximately 120 feet in length. This includes the lead-in and ground lead as well as the horizontal portion.—Tech. Ed.

2. It is possible to get the polarity of one of the secondaries reversed if the markings are not observed or if by chance one of the windings is reversed. This may be checked by listening to the transmitter with the receiver. When the windings are properly poled, the note will be smoother than when one winding is reversed.—Tech. Ed.
Experimenting With Bypass Condensers

By John F. Rider*

In a recent series of experiments conducted in our laboratory, some very interesting light was thrown upon the subject of detector plate circuit bypass condensers. This information is of utmost importance to the radio fan constructor, who is desirous of obtaining the best quality of reproduction.

The experiments conducted were divided into two groups. In the first group, the objective was to determine how effectively the bypass condenser located in the plate circuit of the detector tube, across the coupling unit, from the plate of the detector tube to the negative filament circuit, bypassed the radio frequency component remaining after rectification. In the second group, the objective was to determine the effect of various values of bypassing capacity upon the audio frequency signal remaining after the process of rectification has been completed.

Every radio fan realizes the need for a bypass condenser in the detector plate circuit, connected as mentioned in the previous paragraph, across the first coupling unit primary circuit. But, apparently, every one does not agree upon the correct capacity; values ranging from .00025 μfd. to .006 μfd. being recommended. The figures ascertained in this series of tests will no doubt be of interest to the constructively inclined class of radio fans.

In view of the fact that the greatest interest is devoted to the audio frequency response, the experiments pertaining to the audio frequency signal bypassing were conducted first. The bypass capacities under test ranged from .0005 μfd. to .006 μfd. The method of testing was as follows: An audio signal of known frequency was passed into a vacuum tube to which was coupled an audio frequency transformer with a high primary inductance. The bypassing capacity was connected across the primary inductance, from the plate of the tube to the negative filament. The output circuit of the audio frequency transformer was connected to a calibrated cathode ray oscillograph tube; that is, the deflections on the screen are calibrated in volts. With uniform input on the various audio frequencies and known values of bypass capacity, the variance in the output as shown on the oscillograph screen, when different values of bypassing capacity are used, is indicative of the bypassing of the audio frequency through the condenser.

The frequencies considered were 3,000, 4,000 and 5,000 cycles. The following figures the various condensers, expressed in the form of a fraction of the original tube output:

<table>
<thead>
<tr>
<th></th>
<th>3000 cycles</th>
<th>5000 cycles</th>
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<tbody>
<tr>
<td>μfd.</td>
<td>Percent</td>
<td>Percent</td>
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<tr>
<td>.0005</td>
<td>.05</td>
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<tr>
<td>.001</td>
<td>3.00</td>
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<td>8.00</td>
<td>11.80</td>
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<td>16.00</td>
<td>20.75</td>
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<tr>
<td>.006</td>
<td>19.00</td>
<td>23.50</td>
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</tbody>
</table>

The disadvantages accruing through the use of excessively large bypass capacities in the position mentioned are very evident in the table. For example, the .004 μfd. condenser bypasses 31 per cent of the total output of the tube on 5000 cycles; 23.50 per cent on 4000 cycles and 19 per cent on 3000 cycles. The .0005 μfd. condenser on the other hand bypasses only 1.75 per cent on 5000 cycles; 5 per cent on 4000 cycles and .05 per cent on 3000 cycles. The figures shown apply to the specific case mentioned, but apply approximately to many similar arrangements where a good grade of transformer is coupled to the detector circuit, or where a fairly high value of inductance is used as the plate load in the detector circuit. Summarizing, we find that as far as audio frequency signals are concerned, the bypassing capacity in the detector plate circuit should never be more than .0005 μfd. or at the highest .002 μfd. A .0005 μfd. is preferable, however.

The selection of the bypass condenser does not rest solely upon audio frequency considerations. It is also necessary to determine how effectively the bypass condenser will bypass all radio frequency signals remaining in the circuit after rectification. It is essential that the radio frequency component in the detector plate circuit remaining after rectification be bypassed to the negative filament, and so kept out of the audio circuits. If a certain value of bypass condenser will bypass the correct amount of radio frequency current in the detector plate circuit, and at the

*Acervo Wireless Corp., 70 Washington St., Brooklyn, N. Y.
Experimenters’ Section Report

In the past, these columns have been devoted to the use of the members of this Section only. It is believed that there are many, who though they may not have enough time at their disposal to warrant their taking part in the general program, have time for short experiments that result in interesting information of value to the rest of us. In many cases these men feel that the results of small experiments are not important enough for separate presentation in the form of short articles nor that their results may be written in condensed enough form to allow of their use as “strays.” The result is that such information remains unknown to the rest as far as that particular incident is concerned. We, therefore, feel that in justice to all, these columns should be opened to all experimenters regardless of whether or not they are definitely engaged in working out the answer to those problems presented to the members of the Section.

We are also aware of the tendency on the part of various members to refrain from reporting the results of their experiments, chiefly because they feel that the experiment is not complete in that the entire answer to the outlined problem has not been obtained. Unfortunately, very few of us have the equipment and time to completely cover and solve the major problems listed and the result of this reasoning appears in what apparently seems to be lack of interest in the problem. We know that such is not the case and if you are working on a problem and find that although the entire answer may not be at hand that you have increased the information of interest let us know about it so that it may be reported in QST. In this fashion others who may be working on the same problem will have the benefit of your findings and the time necessary to obtain the answer to the problem as a whole materially shortened.

If you have run across some interesting subject that requires further investigation or if you have learned of a new use for some old equipment or if you have found a new kink which will help the other experimenters along, write in and let us know of it so that others may get some benefit from your work. Information that is not distributed among those to whom it will be of value is certainly not being used efficiently.

SPECIAL PROBLEM 66

This problem concerns the electrolytic rectifier and has been held in abeyance many months due to various reasons. The Aluminum Company of America has been kind enough to supply us with a limited number of aluminum electrodes to be used in the construction of electrolytic rectifiers. Due to various reasons some of those who were originally interested in taking part in these experiments are now unable to do so and we can enroll a limited number of additional men in this problem.

We are particularly interested in enrolling men who do a considerable amount of operating so that the rectifier will be in operation as many hours per month as possible. The aluminum for the rectifiers will be supplied through the courtesy of the Aluminum Company of America while the lead electrodes and the chemicals are to be obtained locally. Two types of electrolytes will be employed in each rectifier; one half of the jars will use a borax solution and the rest will use a solution of ammonium phosphate. A monthly report covering the action of the rectifier must be made up and submitted so that the performance can be charted. It is absolutely necessary that the drain on the rectifier and the voltage being rectified remain substantially constant throughout the length of the test as any considerable changes in these values would render the results worthless. If you are in a position to run a satisfactory test upon such a rectifier and have the time to fill out and return to us the report blanks which will be sent you each month we would be pleased to hear from you. In your letter give a brief description of the transmitter you are using, telling the type of...
tube employed, the plate voltage and plate current together with an estimate of the approximate number of hours the transmitter is in operation each week. A plate milliammeter is essential in order that one may know the amount of current being rectified. It is not necessary that a plate voltmeter be available although this is desirable.

If you have used chemical rectifiers in the past, give a brief outline of their construction and the amount of success had with them. Also state the number of jars to be used so that the correct number of electrodes will be supplied.

BARCLAY CHARTS
Some time ago we distributed a number of Inductance-Capacity-Wavelength charts which were supplied by Mr. R. H. Barclay. For some time after our supply of these was exhausted we received requests for them. We were under the impression that the supply had been completely exhausted but we have recently received about 500 additional copies which Mr. Barclay ran across. If those of you who were disappointed in the past will drop us a card, we shall be pleased to mail a copy of this chart to you. A word of thanks to Mr. Barclay, c/o Stone & Webster, 19 Federal St., Boston, Mass., in appreciation would not be amiss.

KEYING
H. M. Walleze has supplied the following suggestions for keying the amplifier of a mo-pa set. He states that with this system W8WJ and W8BQ who are less than three blocks apart can work within a few kilocycles of each other without the least sign of key thump.

The by-pass condenser may be of almost any capacity and the chokes will stand quite a wide variation without affecting the results materially.

R. F. CHOKEs
Clyde C. Anderson of W7JF and K7AD brings to our attention once more the use of the tunable radio frequency choke. The idea is to make a rigging so that a ring of copper or brass which is connected to the plate supply side of the choke may be adjusted along the length of the choke. A Neon lamp may be run along the choke and the ring adjusted so that there is no r.f. at the plate supply end of the choke. Such chokes may be used over a wide band of frequencies and the position of the ring may be marked and thus returned to the proper position when the set is being adjusted to a new frequency.

REPORTS
Don’t forget to let us have reports on your work as soon as you have arrived at some information that is of interest to all. In this way others will obtain some benefit from your work which probably would not be obtained if one waits until the complete answer to the entire problem has been arrived at. It is the object of these reports to keep others interested in the same problem in contact with the work that is being done so that the least amount of waste effort will be used.

—H. P. W.

The Northwestern Division Convention

HOTEL BERGONIAN actually accommodated the enthusiastic bunch of hams who gathered there from the Northwestern and Pacific Divisions on August 31st. After registration was finished the program commenced with an informal luncheon. At this, talks were given by prominent amateurs.

The afternoon was spent touring the Seattle Times press plant and W7FD, W7TX, W7LZ, W7ACB, W7AEV and W7HO, incidentally taking in a lot of Seattle’s “pine mast” scenery along the way.

In the evening a technical meeting was held at the Bergonian. Lieutenants Street and Burleigh of the Naval Reserve, and Louie Huber of A.R.R.L. headquarters gave short talks. Then Dave Sloan took the chalk in hand for the next five hours, explaining antennas, transmitting circuits, feed systems, and—well, was there anything he had not explained by one o’clock the next morning?

The undersized Leviathan that John Waskey chartered for the trip on Puget Sound did not sink (it’s a wonder) when the gang trod up the plank Saturday morning. Our first port of call was NPC, the Naval Radio Station at Keyport. Chief Radioman Thomas had the transmitter all shined up for us, and gave out blown 500-watt tubes for souvenirs. The large number of V’s sent from NPC’s high frequency set that morning were occasioned by the enthusiastic group of admirers whose proximity detuned it!!! Nobody got seasick on the return to Seattle, even though we did collide with a drifting plank.

The banquet, of course, was the best of all. Seattle’s two YL’s, Doroles (W7OH) and Louise (W7AEV-AGA), sang some songs for us. With Waskey as toastmaster, the gang heard from ‘most everyone. Acting Supervisor of Radio, Clark was there, and His Majesty, J. King Cavalsky, represented the Vancouver bunch, who were there in goodly numbers. For the rest of the evening (and next morning) the brass was pounded clear flat at local ham stations.

—L. R. H.
Another Way of Playing an Old Prank
By Rufus P. Turner*

IT APPEARS that the practice of connecting a microphone in with one of the audio frequency stages of one's radio receiver, and speaking into that instrument so that the voice issues forth from the loud-speaker, has become almost universal at radio parties. The stunt came into vogue somewhat less than a year ago, subsequent to the appearance of a magazine article which depicted the amusement afforded a group of callers when one amateur incorporated an ordinary telephone microphone in the circuit of his receiver, and made his guests believe they were listening to broadcasting from the Antipodes.

The microphone had easily been included in the primary of one of the audio frequency transformers, having previously been connected with a concealed pair of wires extending from the room, some distance down the hall, in which it was located. Between selections, one confederate obligingly opened the outdoor antenna switch, in order that the real announcer would not be heard, while the second confederate announced some Australian station.

The writer recalls a perfect enaction of the prank at a radio party, where both the confederates were equipped with small, portable receivers in order that they might know exactly when the antenna switch was to come open and the fake announcement made. Also, confederate number two, who had charge of the microphone, knew precisely what selection was to follow and made his announcement accordingly.

The guests, grouped before the loud-speaker, were amazed, to say the least, upon learning so unceremoniously that their host's radio receiver could "pick up programs from across the seas." Not one of them suspected the whole affair to be a practical joke, so nobody consulted a newspaper to see if the program was not being broadcast by one of the local stations.

The affair was such a success that the writer determined to "pull off the stunt" at a coming meeting of other radio men at his amateur station. But the fact presented itself that radio men couldn't be fooled by the microphone prank. They would surely examine the set, discovering the wires connected at the other end to the remotely located microphone.

The difficulty was soon overcome when the writer hit upon the idea of connecting the microphone with the receiver, not di-rectly, but through the medium of inductive coupling. The concealed wires connecting with the distant microphone were made to terminate in a loop of a few turns. (The number of turns and the proper diameter, it was found, vary with the type of radio set and both must be determined by experiment.) The loop was made of number twenty-two cotton-covered wire, and was carefully placed beneath the cloth cover, upon the table that held the set, in such a way that inductive relation was established between the turns of the coils of the receiver and the turns of the loop.

The loop is similar in performance to that employed by transmitting amateurs in the so-called "loop modulation." It is only necessary to turn on the receiver and, when the loop and one of the coils in the receiver are in inductive relation, speak into the microphone. When the coils of the set and the loop are near enough to each other and the wires connecting the loop and microphone are not too long, the results are quite pleasing. The writer has met with success both with regenerative and radio frequency broadcast receivers.

The prank went over big at the writer's party, providing no little entertainment. The guests, all radio men, searched the set for telltale wires, without success, and appeared quite non compos mentis when the secret was subsequently revealed.

The O. W. says she can't see why they call them short waves unless it's because there aren't enough to go around.

Dr. Lawrence J. Dunn, Director of the Hudson Division, announces the dates for the Hudson Division A.R.R.L. meetings of the 1928-29 winter season. The dates fall on the first Monday of each month: October 8th, November 5th, December 3d, January 7th, February 4th, March 4th and April 1st. The meetings are held at the Army Building, 29 Whitehall St., New York City, with room for about 300. Interesting programs, with technical talks and discussions of amateur problems, will be provided. There is no charge whatsoever. Members and their friends are invited.

The Y. L. thinks that all political speeches should be broadcast on short waves only—the shorter the better.

* 604 East 51st St., Chicago.
HERE are a few uses for a lamp bank. These things are really handy to have around. I have just completed a master oscillator outfit and in it have found the use of lamp banks a great help. To start with, I am using W.E. oxide-filament tubes, in which the filaments must be kept warm even when not operating. Watt lamps gives me the voltage for the VT-2 plate.

By changing the size of the lamp supplying C-bias the value of bias may be changed. With a 25-watt lamp and the VT-2 drawing 40 mills and the 211-D drawing 180 mills, the drop across these lamps is about 105 or 110 volts, which makes the set work satisfactorily. To my notion, the use of lamp banks should be increased. Since I have gotten used to using lamp banks a new use suggests itself almost every day. For a fellow using a mercury arc for power supply, the above will furnish an admirable keep alive load besides the other uses and at the same time makes a good fuse—on excessive plate currents the C-bias lamp will go west. The C-voltage then goes up, blocks the plate current and saves the tube.

A lamp bank solves this nicely as shown in Fig. 1. I use one 40- and one 100-watt lamp in the primary of the filament transformer. These take care of the VT-2 and the WES211-D. For a VT-2 and a UV-203, it is necessary to use one 40-watt and two 100-watt lamps to give the rated voltage on the tubes. When I give the "ga" to the other fellow, throwing this toggle cuts the filament voltage in half but keeps the tubes hot.

As you know, the VT-2 will not take the same plate voltage as the 50 watters. Figure 2 shows my way of getting around that. I have a bank of 12 lamps (in series) across the plate supply. Eleven of these lamps are rated at 10 watts and 1 at 25 watts. The voltage drop across the 25-watt lamp is the negative grid bias on the 50-watt amplifier. This eliminates the purchasing of batteries for this purpose and the voltage drop across 6 of the 10-

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**Standard Frequency Transmissions of WWV**

The Bureau of Standards announces a new schedule of radio signals of standard frequencies for use by the public in calibrating frequency standards and transmitting and receiving apparatus. This schedule includes many of the border frequencies between services as set forth in the allocation of the International Radio Convention of Washington which goes into effect January 1, 1929. The signals are transmitted from the Bureau's station WWV, Washington, D. C. They can be heard and utilized by stations equipped for continuous wave reception within a radius of 500 or 1,000 miles from the transmitting station.

The transmissions are by continuous wave radio telegraphy. The signals have a slight modulation of high pitch which aids in their identification. A complete frequency transmission includes a "general call", and "standard frequency" signal, and "announcements". The "general call" is given at the beginning of the eight-minute period and continues for about two minutes. This includes a statement of the frequency. The "standard frequency signal" is a series of very long dashes with the call letters (WWV) intervening. This signal continues for about four minutes. The "announcements" are on the same frequency as the "standard frequency signal" just transmitted and contain a statement of the frequency. An announcement of the next fre-
THERE has been a gratifying response to the request that National Sections appoint official I.A.R.U. correspondents, and see to it that regular reports on amateur activity are sent in to this department for publication. Due to the cumulative lags of distance and the month-and-a-half-in-advance publication factor, it will be several months before several new countries become regularly represented here, but the point is that they will be here.

We want to make this a department where, each month, you can be sure of finding the latest advices on changes in legislation or regulations in other countries of the world, future plans and policies of the individual national amateur organizations, and amateur happenings. The cooperation of every national section is necessary in order to accomplish this. Please do your part.

DR. CURT LAMM, EK4CL, VISITS HEADQUARTERS

It was a great pleasure, on September 27, to welcome to A.R.R.L. Headquarters, Dr. Curt Lamm, a member of the Executive Headquarters of the D.A.S.D., the German amateur society, a prominent amateur, and the operator and owner of ek4CL. Dr. Lamm is in this country for six months to conduct chemical research work at Cornell University, and hopes at the same time to become thoroughly acquainted with American amateur methods.

His visit to Hartford is greatly appreciated, for the Doctor has to report to Cornell the first of October, and Hartford is not on the way to Cornell.

During the day we looked over the Headquarters office, talked about the I.A.R.U., and cleared up many points which had been hazy in this editor's mind regarding the National Section in Germany.

That evening a dinner was held at a local hotel at which we had Dr. Lamm, Mr. Maxim, Col. Foster, W6HM, Marshall Wilder, of Boston, and the Headquarters Staff of the A.R.R.L. It was a most informal and pleasant evening, and will be remembered by all of us for some time to come. After the dinner there were short speeches by Mr. Maxim and Col. Foster, and a most gracious one by Dr. Lamm. Following this, the affair turned into a thoroughly delightful hamfest. About 10:30 P.M. everyone adjourned to the main dining room of the hotel for coffee and sandwiches, and the hamfest was resumed, to be continued until the management closed up the place at midnight.

We hope Dr. Lamm has a pleasant stay in this country, that he will have time to attend some conventions, and that he will make many NU QSOs. This last fact seems assured, since the Doctor has expressed the intention of taking out an operator's license and getting on the air as soon as possible. For the benefit of American hams, we might say that Dr. Lamm speaks excellent English, that he can receive up to thirty words a minute, and that his sending (as we heard it at 2ALU's the night ek4CL landed) sounds like machine sending at twenty-five words a minute—with a straight key, too!

FRANCE

In a recent issue we chronicled the fact that an election had been held in the Reseau Emetteurs Francais, and listed the name of the new president. Mr. Robert Audureau has now supplied us with the names of all the new officers, which are as follows:

President: J. Reyt, SFD.
Vice-Presidents: R. Desgrouas, SLH; J. Bastide, SJD.
Secretaries: R. Audureau, SCA; R. Martin, SDI.
Treasurer: R. Larcher, ROIO.
Honorary Presidents: Leon Deloy, SAB; Pierre Louis, SBF.
President-Founder: Jack Lefebvre, SGL.
Mr. Audureau also advises us that the only address to which communications for the R.E.F. should be addressed is:
Larcher, B. P. 11, Boulogne-Billancourt, Seine, France.
We offer our sincere congratulations to the new officers of the French section. The R.E.F. now has more than 800 members, indicating a steady and healthy growth. This is splendid.

GREAT BRITAIN

Great Britain is one of the countries maintaining an official correspondent for this department, and it is a source of much gratification to receive a report each month. The latest one follows:

"What with holidays, bad conditions and fine weather resulting in QRM from cricket and tennis, there does not seem to have been very much DX done during August. Certainly conditions were pretty bad; as 2XY put it, fancy wanting a DX report when first district Yanks, even, are rare as roses, in January! 2XY, however, is running a schedule with oa7CH on 23 meters. 2NH too, worked OA every morning for a month on that band. 2CX keeps a sked with oa5HG and also raised several NUs, including a nine.

"BBZ raised the first, second, third and eighth districts, NC, OZ, OA and SB and needs only to get an Asian station for his WAC, wherefore he finds life good. 5BY says ND, with only about three dozen Yanks, SB and SA. If that's ND, OM, let's have a real report. HI! 5YK worked SU on 23, but is very busy with ten-meter work. 6SM hooked on 6MS. 2AX means about conditions in January! 2XY, however, is working every band but not much else. 6CI exercised his Morse on the long-wave commercials. FB OM! HI! 6BY worked some NU's SB and SC.

"6BB worked sc3AC with 4 watts on 23 and NU 6, NC 5 and OA with 8 watts. Good work, OM, and more like the old 20-meter stuff. 5LS ran a nightly sked with NU while un11II was at his shack. 5BQ found things good on 45 and worked several nines. 5YU had a stab on that band, too. Long waves these days, OM's! Several hams have had the pleasure of meeting un11II, both at their shacks and also at the keys of some of those he visited. nu6BJI also called on 5BZ and 5BY, to their great pleasure."

NORTHERN IRELAND

With this report, the series of interesting articles contributed to this department by Mr. Megaw will come to a close. Mr. Megaw is leaving Ireland to conduct research work in London for two years. We congratulate him most heartily on this appointment, but at the same time we regret very much that his good fortune deprives us of such a satisfactory correspondent. We hope that the R.T.U. will immediately appoint some one to take up the work which Mr. Megaw must now leave to other hands. The report follows, and contains a most interesting resume of amateur progress in Northern Ireland:

"As this is the last time these notes will be penned by the present writer, perhaps a few words in retrospect will not be out of place.

"It is now something over three years since the first amateur transmitting licenses were issued in Ireland. At that time, there came into being a few isolated transmitters, all using very low power and operating under somewhat irksome restrictions, and this represented the result of several years of effort on the part of some of those amateurs. (It will be remembered that the unsettled political state of the country was the cause of this prolonged delay.)

"After about a year, the numbers had increased sufficiently to warrant the formation, in September, 1926, of the Radio Transmitters' Union (Northern Ireland), an organization which is run on rather unusual lines and which has been a great success and a considerable factor in the development of amateur radio in this province during the last two years. It now enjoys the recognition of the Post Office and broadcasting authorities. Its membership includes almost all the transmitting amateurs in Northern Ireland and membership of the (Continued on page 54)
Our New Calls

Editor, QST:

I notice some of the gang are already having their cards printed in this manner: W5NW or W-5NW.

If I understand this new call business correctly they should be printed in this manner: W5NW. In other words, all U.S.A. calls start with the letter W instead of a numeral as theretofore. And the W is as much a part of the call as the numeral and the rest of the letters, and should be given as much prominence on the QSL card. In calling I notice some do not use the letter W every time they send their call. A call should be made in the following way: CQ CQ CQ de W5NW W5NW W5NW.

—Wayland M. Grove, W5NW

Editor's Note: Mr. Groves is dead right. Just as commercial stations have calls beginning with W or K, like W1Z and KWE, so do amateur calls now begin with these letters, like W5NW and K5CFQ. Similarly in other countries where calls are being changed, like G2NM, G1SMU, VEBA, ZL2AC—the initial letter or letters are part of the call, not to be separated, and to be printed in caps. See our October editorial on this subject. We recommend, however, that for calling purposes we use the old "international intermediate" until such time as governments change their amateur calls, and that in written references to such calls we use lower-case letters, that is: 16HIP, 16PM—to avoid confusion with calls legitimately beginning with those letters.

The Extra First Grade

2631 Garfield St. N. W.,
Washington, D. C.

Editor, QST:

Your editorial on the amateur extra first grade license, in the September issue, was read with great interest by myself, and, I know, many other "hams". I feel, as you have said that we never really appreciated this class of license until it was taken from us.

It may interest you to know that, having read your editorial, I decided to take time by the forelock, and accordingly, was issued yesterday amateur extra first class license number one of the new series. Now that the ball has been started rolling, here's hoping more amateurs will take out this license.

—Willard R. Burton, 3NR

Undelivered Messages

Editor, QST:

On September 14 and 15 the Blackstone Valley Radio Association held a booth at the Uxbridge Fair and accepted messages from the patrons of the Fair. At the end we had 138 messages both 1COS at his station in Milford and 1BZJ operating the Assn's station 1JB were at the key for two days getting off the messages of the hook, some stations they QSO reported them R7 good note very steady but when asked to take traffic all they say was, "lot QRM or QRN gld to QSO u OM, 73," and they would go for somebody else without waiting for any reply from our stations. According to the reports made by some patrons only about 50% of the messages that were sent from our station were ever delivered to the addressee. I think that this is a very low mark, and that it gives our organization a bad name from those whose messages were not delivered. The officers of the association wish to thank those who did take traffic from 1COS, 1BZJ and 1JB and relayed or delivered it. 1AJK of Worcester deserves the credit for the way he stood by for those two days giving us all help in getting the traffic off in his direction. I hope that next year when we have a booth we will be able to hit the 100% mark, and we can do it with the cooperation of the gang. Again I wish to take my hat off to the few but "royal hams" who did cooperate with us this time.

—Walter H. Koszczko, Sec'y, Blackstone Valley Radio Assn

The Splatter System?

Syracuse, N. Y.

Editor, QST:

Are we to gather from E. O. Hurlburt's letter in September QST, that an ideal 10-meter beam transmitter can be had by arranging a sea water tank atop the house and allowing the water to spray down behind our 10-meter vertical antenna?

Would you suggest a pyrex pump to return the water to the tank?

—Alfred R. Marcy, Chief Engineer, WFBL
EFFICIENCY AND DX
ABILITY NEVER EQUALED

Announcements of radical new apparatus are not daily occurrences at REL. So when they come, you sit up and look alive; for experience has taught you that REL is pioneering for the good of the amateur radio; that they are developing equipment to meet the needs of changed operating conditions. These condensers are what you've been waiting for. They solve the riddle of the narrow bands and afford satisfaction heretofore only hoped for. Nothing has been spared in order to make these condensers THE BEST. The results are gratifying; and after all, only results can substantiate our story.

NEW CONDENSERS SHOWN FOR FIRST TIME--
EXPERTS SAY "SENSATION OF YEAR!"

CONSTRUCTION EXPLAINED
FACTS SPEAK FOR SELVES

The new Variable Receiving Condensers are shown here for the first time. These condensers will be an absolute necessity in 1929, when the wave bands are narrowed causing great congestion. Using either of the new condensers will allow the operator to spread each waveband over the entire tuning scale of his receiver; several outstanding features are: die-cast aluminum end supports, giving extreme ruggedness. Large single conical bearing, which prevents end play or side thrust. Insulated stand-off bushings, enable these condensers to be mounted on metal panels. The rotor tension is maintained by a large three finger bronze spring, assuring positive, even action during the complete rotation of the rotor. A patented rotor plate contact assures absolutely noiseless action. The rotor shaft revolves in a pool of mercury, making a perfect constant contact. Both the Stator and Rotor plates are of extra hard, heavy sheet brass and the shaft is standard ¼" allowing the use of any dial.

REL Catalogue No. 181 is a two plate variable condenser, so arranged that the stator plate may be moved permitting any desired maximum capacity to be obtained. This condenser adapts itself to frequency meters and high frequency receivers and is offered by Mr. Hall of the American Radio Relay League on page 24 of the October ISBT.

REL Catalogue No. 187 is a combination semi-fixed and continuously variable center condenser. This model is so arranged that a perfectly large semi-variable all-surfaced condenser is shunted by a continuously variable two plate condenser. The tank portion of this condenser may be set at a certain desired capacity and the variable element can be used to cover only the exact frequency band desired. A special feature of this condenser is that a pre-determined setting of the tank circuit may be indicated on a dial on the tank rotor shaft enabling remote re-setting to any desired capacity. This condenser may be wirelessly used in a low power transmitter where a "Thim" circuit is desired as on page 28 of September ISBT exceptionally available for receivers where a fixed "Thim" capacity is needed for each coil so that the continuously variable vernier will spread each band over its entire tuning wave.

The ideal condenser for Wootman's Traffic Tuner. (September ISBT)

NEW! NEW! NEW!
1929 Receivers and Transmitters
How to Build and Use Them

A booklet which describes the construction and operation of two modern high frequency receivers is now ready. Included among these are the well-known Standard Regenerative receiver, a circuit employing the Screen Grid tube, a special Super-Heterodyne, etc. A companion book on 1929 transmitters and circuits will be ready next month. Before contemplating reconstruction, secure this new REL data. It's Free.

RADIO ENGINEERING LABORATORIES, 100 Wilbur Ave., Long Island City, N.Y.
Editor, QST:

Here is something that has been on my chest for some time, yes years in fact. Mr. Brown's letter in the July QST prompts me to unload it. First and foremost, get me right. I certainly agree with Mr. Brown that we should all have patience with the new hams and give them a slow and good QSO when they call us or when we answer their call. If they ask us to QTA or QRS, do so and be a good scout and not a snob. We were all beginners and well do I remember my own feeble attempts some years ago to get the other fellow's drift.

Now for the load! A number of times, I have had the following happen and only recently was it brought back to me with force. I worked a chap who asked me to send slowly as he was a beginner. I, at once, changed to ten per with QSZ. He gave me a report good enough for any conditions of the air but asked me to send slower. I cut the speed to about six per with QSZ and still he was unable to get what I said. About this time, I realized I was in for a long session and rather than cut it short, repeated the dope all over again and still nd. Now, what would you old timers do in my case when he came back and said he was sorry but would I please send slower? This time I went down to nearly zero per and got "rr ok". Well, that was better, but I saw that there were no signs of my getting away so I reconciled myself to my fate. Now, fellows, it became necessary about this time to call it off so I did but was out of luck as he did not get me. Wasn't I justified in giving him my 73?

Well, I am perfectly willing to spend some time with anyone but if he is not able to copy ten per or anywhere near it, he has obtained his license in some incorrect manner and whoever signed his papers is responsible for his being on the air before his time. If a fellow can't copy the required speed, he must expect a little rough treatment. No one should be on the air who can't copy ten per with signal strength and atmospheres considered.

—Clarence J. Green, 1ASU-I8CO.

(Continued on Page 78)
New Transmitters in Metal Cabinets
Shielded and Stable--Best for 1929

Extremely Compact Equipment
Comprises the Best of New, Improved Parts

The new REL shielded transmitter is a radical departure from all other kits on the market. The advantage of shielding is universally acknowledged. The black crystalline finish metal cabinet presents a most pleasing appearance not usually found in a transmitter. New REL equipment specially designed for the 1929 bands is employed throughout. The construction is remarkably rugged and employs standard circuits.

Who Uses REL Apparatus:
REL equipment is utilized by the leaders of the radio world. In far flung corners of the Globe, you will find REL kits and products. Here's a partial list of REL users.

U. S. Army
U. S. Navy
U. S. Marine Corps
U. S. Coast Guard
General Electric
Radio Corporation of America
Westinghouse
Firestone Tire & Rubber Co.
WOR—Newark

REL Shielded Kits may be used for any 7½ or 75 watt Hartley, tuned plate, tuned grid circuit or any variation of them.

The cabinets are electrically welded, insuring absolute contact on all sides. The panel of aluminum uses a wood base board and the panel and base board slide into the cabinet. These cabinets are of uniform height and are exceptionally well adapted for M.O.P.A. circuits using a 7½ watt oscillator with a 75 watt amplifier. Two cabinets side by side present a very neat appearance besides affording complete shielding. The top is detachable affording easy access to the interior. The sides are ventilated so there is no danger of the equipment heating. THESE KITS ARE THE ONLY ONES IN THE MARKET, WHICH ARE CONTAINED IN A METAL CABINET.

The 7½ watt kit is furnished with a new type No. 187 variable condenser and the new type No. 182 interchangeable plug-in coil.

The 75 watt kit uses the large type No. 149 condensers and the old reliable type No. 127 inductors. Weston meters are used in both kits, with other quality apparatus.

WRITE FOR FREE DATA

Radio Engineering Laboratories
100 Wilbur Ave., Long Island City, New York

Say You Saw It In Q S T — It Identifies You and Helps Q S T
Showing New Receiving-Xmitting Coils for 1929
More About Frequency Meters

Frequency Precision
Obtained With This Meter

The findings of the A.R.R.L. Technical Development Staff are to the effect that a certain, single capacity cannot be shunted by various coils, and give complete coverage of each amateur band. The new REL Frequency Meters provide a separate coil and condenser for each band. Each meter is accurately calibrated to 1/10 of 1% of the measured frequency by means of a crystal standard.

These frequency meters utilize one of the most accurate resonance indicating systems known. Extremely sensitive and permitting of very loose coupling between transmitter and meter. These meters should be the most important piece of equipment in every "ham" station.

Precision equipment will be an absolute necessity for all stations that are operating after January 1, 1929, because of the narrowed bands and because of the drastic consequences if a station operates "off wave."

The REL Precision Frequency meters

The New Plug-in Coil

Efficient operation is assured by the use of these plug-in coils wound on one piece bakelite forms. Threaded ribs allow accurate space winding. Construction embodying three windings on one form permit quick changing. Special Spring contacts to take the coil plugs. Employing heavy copper enameled wire they are suitable for high frequency receivers and 210 type low power transmitters.

The coils are used with the new condensers described in Bulletin No. 2. Together they make a working combination that will set new standards for Short Wave performance.

The plain bakelite forms may be obtained to wind your own coils or they may be obtained complete and wound for transmitting and receiving work. They are also used in combinations of three or four to make kits for the popular circuits.

Radio Engineering Laboratories, 100 Wilbur Ave., Long Island City

Say You Saw It In Q S T — It Identifies You and Helps Q S T
The Choice of Millions

Tireless Sentinels

Cunningham RADIO TUBES

are ever alert. They respond to every radio wave and give you clear, natural tone reproduction. Ask for them by name

E. T. CUNNINGHAM, Inc.
New York Chicago San Francisco

Manufactured and sold under rights, patents and inventions owned and/or controlled by Radio Corporation of America

Say You Saw It In QST — It Identifies You and Helps QST
10,000 Inductances Now in Use. New Transmitting Condensers Going Fast

Now Famous REL Transmitting Inductances. Peerless For Years.

REL inductances need no introduction to the thousands of Amateurs who have been using them for years. Here is one piece of apparatus that has won the acclaim of all who know that a transmitter needs inductances. Flatwise wound copper nickel plated wire mounted on crystal glass spacers. They should be used in all circuits using 1-1000 Watts.

There are two types, "L" for 40, 80 and 150 meters wave lengths and "S" for 20 meters and less. Single and Double Units are obtainable in either type. Single Unit includes three clips and the Double Unit has six clips and two glass coupling rods.

If you have not yet used these inductances, don't wait any longer. Join the ever increasing ranks of those who use the best—REL Products.

The Transmitting Condenser That Has Caused a Sensation in Short Wave Field.

Introduced as a Super Condenser for the Super-Set, it won immediate attention and popularity. It is used in all the famous REL higher powered transmitting kits and is in increasing demand by set builders. It is a job that is built to stand the gaff. It will prove its true worth under severest service conditions. To say that the construction is Sturdy is but to scratch the surface. Heavy brass plates—cast aluminum end plates—husky steel rotor shaft—conical adjustable bearings. Best possible insulation assured by the use of heavy isolantine blocks—accurate spacing and over all strength carried to an access. That is an outline sketch of one of the finest Condensers designed for Short Wave Transmission. Specifications on request. They may now be found in leading Amateur Stations, U. S. Army and Navy, Commercial Stations and by others who know the best.

WRITE TODAY FOR YOUR DATA ON 1929 NARROW BAND RULES
Allen-Bradley Resistors

for
Experimental Work
in Television

Bradleyunit-B

If you are doing experimental work in television, use Allen-Bradley resistors, both fixed and variable. Bradleyunit-B is the ideal fixed resistor for resistance-coupled amplifiers as plate-coupling resistors and grid leaks because:

1. Resistance values are constant irrespective of voltage drop across resistors. Distortion is thus avoided.
2. Absolutely noiseless.
3. No aging after long use.
4. Adequate current capacity.
5. Rugged, solid-molded construction.

Radiostat

This remarkable graphite compression rheostat, and other types of Allen-Bradley graphite disc rheostats provide stepless, velvet-smooth control for scanning disc motors.

Laboratory Rheostat


Write for Bulletins!

Allen-Bradley Co., 727 Greenfield Ave., Milwaukee, Wis.

Allen-Bradley Resistors

I. A. R. U. News

(Continued from Page 47)

Radio Society of Great Britain is a necessary condition for membership of the Union, though there is no official connection between the two organizations. Up to the time of writing, 29 transmitting licenses have been issued in Northern Ireland, the majority of these being for a maximum input power of ten watts. In the past, most of the operating has been on 45 meters, 23 meters being used by about 6 station and 32 meters by about 4. The 90-meter wave has only been used rarely in the last few years.

"I shall now mention very briefly some of the achievements of the GI stations. "In the summer of 1925, 5NJ established the first amateur contact between Ireland and U.S.A., and a few months later the first direct communication of any sort between Ireland and Australia was established by 6MU. Some time later, 6YW made a contact with Porto Rico, using 2 watts input, which was probably at the time a record for low-power DX. Since then, several distant countries, among them Indo-China and Jamaica, have had their first contact with the British Isles through GI stations, and we now have three members of the W. A. C. class (2IT, 5NJ and 6MU).

"In the R.S.G.B. QRP Tests of November, 1926, several GIs were near the top of the list, 6YW achieving the honor of being first in the British Isles. Special mention should also be made of 6TB, to whose painstaking the success of our Union is mainly due, and also of 6YW's recent work as honorary organizer of the R.S.G.B. Contact Bureau, an experimental organization whose work is already beginning to bear practical fruit.

"So much for the past. As regards the future, it is rather early to say much about the probable effects of the changes resulting from the Washington Conference. The conditions of operation will be as set out in the memorandum recently issued by the G. P. O. in London, except that the addition of the letter I to the British prefix G has been sanctioned for stations in Northern Ireland. gI2BX becomes G12BX, and so on. The general opinion seems to be that the new conditions are not at all bad, and it is likely that a good proportion of the GI stations could operate under 1929 conditions with only slight improvements. It is probable that most of the operating will be in the 7 m c. and 14 m . bands, though several stations intend to try 28 m c. in the near future.

"—E. Megaw, GI8MU, cOCP"

The many American and foreign amateurs who have worked this station will no doubt be glad to have some words from the chief operator regarding the origin and development of the outfit. We are sorry that "under cover" operation makes it impossible
**Performance that Challenges the World!**

**Remarkable Federal Feats**

A Federal Radio operated by an amateur in the crowded New Jersey broadcasting area established a world's record for DX reception when verification from 607 stations in all parts of the world were received.

FEDERAL'S engineering accomplishment, in producing the F11, has won the recognition and commendation of radio experts everywhere. Without question it out performs any radio receiver ever before placed on the market.

Antenna and ground operation with four stages of tuned radio frequency, detector, and two stages of amplification brings in the weakest of radio impulses picked up by the antenna and provides phenomenal distance range. Every part of the set bespeaks itself of precise standards of engineering and skilled workmanship. Every unit, including the individual tubes, is fully shielded. The chassis is all metal—the cabinet genuine mahogany.

Prices, without tubes, for battery operation $145; for light socket operation with Federal's power-tube coupler, 60 cycle, $220; 25 cycle $245. (Slightly higher West of Rockies.)

*Ask the nearest Federal Retailer for demonstration or write for complete specifications.*

FEDERAL RADIO CORPORATION, BUFFALO, N. Y.

OPERATING BROADCAST STATION WGR AT BUFFALO

Federal Ortho-sonic Radio, Ltd., Bridgeburg, Ont.
Detection with the Screen-Grid Tube

Because progress has been slow very little data have been released on the use of the screen-grid tube as a detector, in which place it functions very efficiently.

In the October issue of Radio Engineering the latest first-hand laboratory information on the screen-grid tube's detector qualifications will be found.

The construction and use of a constant-frequency laboratory oscillator will be found also, as well as "The Engineering Rise in Radio." "Mathematics of Radio," etc.

Radio Engineering Is Not Sold on Newsstands

Radio Engineering,
52 Vanderbilt Ave., New York City.
Enclosed find
$2.00 for 1-year subscription; $3.00 for 2-year subscription; 20¢ for sample copy.
PLease print name and address

Name
Address

(Please check classification)
☐ Manufacturer  ☐ Professional Set Builder
☐ Dealer  ☐ Technician
☐ Engineer  Anything else

to give the name of the ship or operator, but as stated, cards and reports may be addressed through the Dutch Section of the I.A.R.U., or through the A.R.R.L.

"For over one year's time now, with more or less regularity, xenOCP has been on the air and much pleasure has been derived by working many amateur stations. The op also pounds brass on a 2 kw. 500-cycle quenched-gap spark set on 600 and more meters.

"The works were started with the most friendly cooperation of three New Orleans amateurs, 5QJ, 5HR and 5UK, to whom xenOCP had been introduced by the Communications Department of the A.R.R.L. For the plate supply, a baby motor-generator was chosen, and the first tube was a one-dollar receiving tube, one of the items secured in your famous 5- and 10-cent stores! However, it soon became fed-up with its transmitting duties and retired.

"Back in Holland, the ship was exchanged for one circling Africa and a Philips 10-watt came on duty. In its present form, the set consists of a loosely-coupled Hartley circuit, housed in a small cabinet, with the coils, mounted on glass rods, on the top of it. It is grounded to the ship's earth and the aerial of spark set is used for the short waves also. This aerial is an inverted L type, two wires of about 80 meters each. The wavelengths in use are 32 and 19.6 meters, with optional 34 ½ and 44 meters, of which the 32-meter has proven to be the best. The m. g. gives about 300 volts, while the Philips 10-watt tube takes 60 milliams. The receiver is a conventional O-V-1 (detector and one-step—A.L.B.) in shielded cabinet, to which a Telefunken screened-grid valve will soon be added.

"Along the east African coast, western NU stations can be heard best from 1330 to 1430 GMT, eastern NUs at about 0400, and most of them averaging R3-4. QRN, however, is very troublesome. After 2000, many Europeans are coming in ok on the 32-meter band, especially the EFs and EBs. eb4PT is the most consistent of all.

"In Durban the writer met with a very kind reception on the part of many FO hams, who attended the yearly convention of the S.A.R.R.L. "xenOCP, whose QSL address is: Dutch Section, I.A.R.U., Noordwijk aan Zee, Holland, is always anxious to work amateur stations and glad to arrange schedules and tests, when these do not in any way interfere with his professional duties."

GERMANY

Germany is one of our national sections which is on the "honor list" by reason of having appointed an official correspondent and forwarding reports regularly each month.

"The most important event during September was our meeting during the holding of the annual Radio Show in Berlin (Announced in last month's issue—A.L.B.). Among the many hams who attended we had the pleasure of being host to eg6FI,
THE AMAZING NEW 5000 HOUR 
ELKON RECTIFIER 
FOR "B" 
ELIMINATORS

ONLY 200,000 AVAILABLE 
THIS SEASON

J U S T as the Elkon dry, low-voltage rectifier revolutionized the design of chargers and "A" Eliminators, the new Elkon "B" type Rectifier will revolutionize the design of "B" Eliminators.

The Elkon EBH Rectifier plugs into any Eliminator using the former standard "B" rectifier tube. Simply take out the fragile 1,000 hour tube—plug in the husky Elkon EBH and the change is made. No changes in wiring—no adjustments.

It is sturdy, solid, dry—has none of the frailties of a tube—not affected by accidental overloads or line surges. It is self healing. The power is smoother, quieter.

From the orders already received from dealers and jobbers in all parts of the country, we know that we will be tremendously oversold this season—only 200,000 of these revolutionary rectifiers will be available.

The elaborate manufacturing, testing and aging equipment necessary to produce the Elkon EBH Rectifier precludes any greater production the first year.

Look for the Red and Yellow display carton on your dealer's shelves. The new EBH is packed in a metal can.

Buy one from your dealer today! Plug it into your "B" Eliminator—Trouble free for at least 5,000 hours!

ELKON, INC.
Division of
P. R. Mallory & Co., Inc.
359 MADISON AVE.
NEW YORK CITY

Say You Saw It In Q S T — It Identifies You and Helps Q S T
Dubilier

TRANSMITTING

CONDENSERS

DUBILIER type 686 condensers have the usual Dubilier high-safety factors for use in transmitter filter net works. 1000 volt DC rating. May be connected in series where the working voltage exceeds 1000. Through series parallel connections practically any working voltage and capacity can be obtained.

DC voltage must not exceed 1000; or in A.C. supply filter circuits the transformer voltage must not exceed 750 volts per rectifier plate.

1 mfd. condenser $5.00
2 " " $8.00

Write Dept. 40
for free catalog

Dubilier

CONDENSER CORPORATION

10 E. 43rd St.
New York City

from London, c2UA, from Riga, and ekDCZ, Herr Johnse, the operator of Count Luckner's Vaterland on its visit to America. (And well-known as Fritz' to many West Coast U.S.A. hams, too A.L.B.).

"Since last month, DX conditions have not changed very much, and there is little to report in this direction.

"We are pleased to state that eg6PP and eg6FY have become members of our society, the D.A.S.D., their licenses being DEq831 and DEq852. We welcome them heartily and hope that others will follow their example.

"There seems little doubt that after January, 1929, we will be given new intermediates. We regret highly that it is necessary to give up our old and better system of intermediates. With them it has been very easy to identify the continent and country of the identify the continent and country of the transmitter. We also regret that it is not possible to get private transmitting licenses, and hope that when the end of the year we shall have good and favorable regulations to this end. 78's to all.

"E. Reiffen, Sec'y, D. A. S. D."

Standard Frequency Transmissions From WWV

(Continued from Page 42)

Frequency to be transmitted is then given. There is then a four-minute interval while the transmitting set is adjusted for the following frequency.

Information on how to receive and utilize the signals is given in the Bureau of Standards Letter Circular No. 171, which may be obtained by applying to the Bureau of Standards, Washington, D. C. Even though only a few frequency points are received, persons can obtain as complete a frequency meter calibration as desired by the method of generator harmonics, information on which is given in the letter circular. The schedule of standard frequency signals is as follows:

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<td>10:00-10:08</td>
<td>1000</td>
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<td>125</td>
<td>590</td>
<td>1500</td>
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<td>10:12-10:20</td>
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<td>10:24-10:32</td>
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<td>250</td>
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<td>10:48-10:56</td>
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<td>11:00-11:08</td>
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<td>11:12-11:20</td>
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<td>11:24-11:32</td>
<td>4000</td>
<td>6000</td>
<td>550</td>
<td>1800</td>
<td>4000</td>
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The figures given above are frequencies in kilocycles.

Experimenting With Bypass Condensers

(Continued from Page 42)

same time not bypass excessively the upper audio register, that value of capacity is best for the purpose. The following figures show the degree of bypass of radio frequency signals using the same audio fre-
Last Chance for Special Low Price!

The Radio Manual is about to be published. The special advance of publication price of $4.95 must be definitely withdrawn on November 15th—after which the regular price of $6.00 will be in force. Order immediately to take advantage of this unusual saving.

Radio Operators! Are you prepared to use the new International “Q” signals which go into effect January 1, 1929? Do you know the correct procedure for obtaining a radio compass bearing as prescribed by the terms of the International Radio Telegraphic Convention, effective January 1, 1929?—the right procedure when distress communications are ended and silence is no longer necessary?—what to do when you hear from a radiotelephone station the spoken expression Mayday?

These Questions and Thousands More Are Answered In

THE RADIO MANUAL

A Complete Handbook of Principles, Methods, Apparatus for Students, Amateur and Commercial Operators, Inspectors

By G. E. STERLING, Radio Inspector and Examining Officer, Radio Division, U. S. Dept. of Commerce.
Edited by ROBERT S. KRUSE, for five years Technical Editor of QST.

Complete Preparation for Government License. 16 Chapters Covering

1. Elementary Electricity and Magnetism
2. Motors and Generators
3. Storage Batteries and Charging Circuits
4. Theory and Application of the Vacuum Tube
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You will be constantly referring to the series of articles by Ross Hull on the work of the A.R.R.L. Technical Development Program. There will be a textbook for 1929 construction and operation. These issues, along with the others, should be preserved in a

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QST
1711 Park St., Hartford, Conn.

Frequency transformer, but bypass capacities ranging from .005 μfd. to .002 μfd. and carrier frequencies of 15, 33, 100 and 1000 kilocycles.

<table>
<thead>
<tr>
<th>Frequency (Kc)</th>
<th>Percent</th>
<th>15 Kc</th>
<th>33 Kc</th>
<th>100 Kc</th>
<th>1000 Kc</th>
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<tr>
<td>.00025 μfd.</td>
<td>92</td>
<td>98</td>
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<td>.0005 μfd.</td>
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<td>.00075 μfd.</td>
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<td>.0009 μfd.</td>
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<td>.001 μfd.</td>
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<td>.002 μfd.</td>
<td>60</td>
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<td>100</td>
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</table>

From the above, we glean the information that the .001-μfd. capacity is quite satisfactory for bypassing the radio frequency component remaining in the detector plate circuit after rectification. Since the frequency spectrum encountered in radio broadcast reception lies within the 550- to 1500-Kc. band, the values obtaining on 100 Kc. can be considered as criterion. As to the extent of audio frequency bypassing, this value of capacity bypasses only 6 percent on 5000 cycles. Consequently, the selection and use of a .001 μfd. bypass condenser in the plate circuit is consistent with sound engineering principles.

Now We're in the Air

(Continued from Page 83)

is about to happen, "Mac" may be counted upon to be there with the proverbial bells (or buzzers) on. He sized the thing up and got into action.

Telephone and telegraph were out of the question as they were too expensive. Beside the expense, the installation of lines would take too long. Radio was the only solution but even that seemed rather costly—if they were to buy equipment and hire operators!

"Mac" got in touch with Robert B. Parrish, W6QF-W6PS, president of the Amateur Radio Research Club of L. A. and manager of the Pacific Engineering Laboratory Company, and explained the idea. "Bob" took to the idea like a small ham to a big bottle and put it up to the members of the A. R. R. C. They gave evidence of their hearty approval and made "Bob" master of ceremonies and installations but told him not to get too swell-headed about it because they expected to have much installation and few ceremonies and that he was also expected to do his share of the work. He did.

The stunt called for five complete stations with their separate sources of power, as there was no power at the pylons. This meant sets, tubes, and batteries, for the most practical operation. Now radio clubs are not usually overstocked with any of these things, especially tubes and batteries, so "Bob" sent out a QRR via land-line to various friends. George Walters, western representative of the French Battery Company, came forward with "B" batteries for all transmitters and receivers, with each transmitter using 350 volts. The Durkee-
For fifteen years Formica has been furnished in changing forms to suit the convenience of the radio engineer and producer. In the early days it was sold in whole sheets and whole lengths of tubing and fabricated largely by hand by the radio builders. Then there were decorated front panels printed in gold and silver. Now there are sanded or threaded tubes punched and cut to length; washers; shelves; sub panels and terminal strips most of them shipped all ready to assemble.

At large expense Formica equipment has been changed from year to year to provide production in quantity at all times of insulating parts that would meet the requirements of the moment. And the quality and uniformity of the material has also steadily advanced.

The Formica Insulation Company
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Cincinnati, Ohio

FORMICA
American Radio Relay League,
Hartford, Conn., U. S. A.

I hereby apply for membership in the American Radio Relay League, and enclose $2.50 ($5. 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.

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

Thanks

Thomas Corporation sent two “Western” 6-volt storage batteries per set to the field each day, freshly charged. The Western Auto Supply Co. donated a whole flock of tubes of various sizes. All of these people said they would take Christmas cards in payment. How's that for cooperation.

“Bob” supplied the main transmitters from his laboratory, and most of the receivers and the other transmitters came from the membership of the club. A period of feverish installation ensued, which began a short time before the races and ended a shorter time before the same. Licenses were finally obtained and calls assigned and most of the hard work was over.

We are sorry to say, maybe, that some of the sets at the pylons would hardly take the Hoover Cup for looks. They made up for their appearance, however, by their performance. GEMH, for instance, at Pylon Number 2, was a first class replica of my idea of what the first set looked like that belonged to the O. M. himself. The coating of dust was so thick that it actually was necessary to blow some off the meters to read them. But the set worked like a charm, as did the others in more-to-be-desired and less dusty locations.

Tuned-plate, tuned-grid was used in all transmitters. At the pylons a short projecting stick at the top served as a support for the antenna of No. 20 or No. 22 wire, while the counterpoise was run out to a nearby post or tree. Nails and tacks driven into dry boards were the only insulators. Receiving antennas were supported by trees, posts, and sticks stuck into the ground, and ground connections were made to the pylon frame. Pictures of these installations are not furnished herewith because they didn't turn out good anyway, and because they would be a source of too much pleasure for the opponents of the “lo-loss” postulates. However, it would not be fair to fail to give due credit to the very snappy job at 6EMP, the control station in the grandstand. This good-looking and efficient transmitter was a panel-mounted affair, artistically and mechanically balanced. Suitable engraving enhanced the glistening black panels but, above all, the evidence of skilled workmanship stood out like a shining jewel. The only visible parts of the set were the specially-wound plate and grid coils, two good-looking chokes, and the tube—in this case a 71½-watter. All other parts were hidden behind panels.

Visualize a busy afternoon. There are 50,000 people in the grandstands. A veritable hill of humanity is gazing at the immense field before it, listening to brief announcements, paging, wise-cracks and what-not, from the announcer over the public-address system. A huge array of Army planes is just over to our right, lined up near the fence, waiting to go on duty. On our far left the Navy is well represented by a detachment of planes and their detailed crews, seemingly always active. Far
This four-inch solid German silver National Velvet Vernier Dial, type N has been developed for use in amateur and other radio equipment requiring the utmost precision of logging. It is equipped with a real Vernier making accurate reading possible to one-tenth of a division. The mechanism is the original and unexcelled National Velvet Vernier design, approved and used by transmitting and receiving amateurs all over the world.

The tuning knob is of Bakelite and when desired, a Bakelite apron will be furnished at slight additional cost for protection against high frequency burns when the dial is used on high power appliances. Dial attaches to the face of panel at three points making accurate mounting exceedingly easy and simple. The type N dial is made with 3 different styles of division, 100-0, 150-0 or 200-0. List Price $6.50.

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Gentlemen:

I've been wanting a better bound copy of the Handbook for a long time. Here are my two dollars.

across the field, in a direct line with our little box on top of the grandstand, are the civilian hangars for visiting planes and non-contestants. Directly in front of the grandstand is a large white circle on the runway. This is used for parachute jumping contests, exhibitions of bombing and numerous other stunts. Running out to the circle from the fence is a connecting white line, used for the "dead stick landing" contests, up to which the winner, making a landing with a "dead" motor, came within three feet.

Over to the left again, in front of the Navy planes, is another white line. Six planes are lined up along the line with motors idling, waiting expectantly. Adjoining our "box seat" in the radio shack are two observers who tell us that Event Number 3 is about to start and is a "free for all," open to all types of ships powered with motors of 720 cu. in. displacement or less, but open to civilians only. The distance will be fifty miles—ten laps of the five-mile course—and prizes will total $1,500. The operator at the headquarters station (6EMF) at our elbow sends out the following:

"QST QST EVENT NR 3 ABOUT START FREE FOR ALL QRX RACE 6EMF."

He turns the dial between two points, about four "degrees" apart. He finds 6EMH, Pylon Number 1, at 54 on the dial. 6EMH says: "QST OK DE 6EMH AR." He turns the dial to 49.5 and he hears 6EMI at Pylon Number 3 say "QST OK DE 6EMI AR." He would find 6EME, Pylon Number 4, at 45.5, but they are not using this pylon in the five-mile race.

Suddenly the starter twitches his flag and the racers roar toward 6EMH at ten second intervals. 6EMF sends another QST to all pylons: "THEY'RE OFF."

Let's drive out to 6EMI and watch this race from there. The watchman at Pylon Number 3 has a big jar of ice water and there's not so much dust here. Here they come! You'll have to look sharply because...Good nite! He's coming right at us! Let me get out of here...here...No, you see he suddenly makes a vertical bank and roars around the pylon and is gone. Whew! That seemed close, though, especially from our lookout in the pylon. They travel comparatively close to the ground, only a few feet above it, and they appear to be attacking us. But we soon get used to that. Here comes a bunch. In four zooms and a sputtering roar they appear, roll over on their sides, make a ninety-degree turn, roll back again and are gone. We get so used to it that we don't watch them any more, and we see that the watchman, relieved during the race, has gone to sleep in his car.

Suddenly an observer calls: "Operator! Plane Number 159 fouled pylon! Sixth lap."

Say You Saw It In Q S T — It Identifies You and Helps Q S T
ONE quality is an elusive thing—yet all-important. We think you want to know the truth about it—the whole truth. That is why S-M, in spite of having so much to talk about in the way of selectivity and distance range, keeps "harping" on tone quality. We can prove, by laboratory-measurements and curves, that the new S-M Clough system audio transformers come closer to doing that than any others we have ever been able to find, at any price. But then, any advertiser can make big claims, draw curves and publish them—so that doesn’t necessarily prove anything to you.

But IT’S TRUE, nevertheless. One by one we are getting reports of tests—made by impartial engineers for manufacturers and others who employ them—agreeing with our own findings that there is nothing on the market to match the tone quality that you build into an S-M set—or into any other good set, if you so desire—by the use of S-M Clough system audio transformers. That’s what the engineers in the world’s largest telephone laboratories said. It’s what the professors of an old New England engineering school decided.

To the radio-wise public—those who decide, in the end, every question of comparative merit in manufacturers’ claims—we offer to prove the absolute superiority of S-M tone quality in any fair way you can suggest. Here are, for instance, the two fairest ways we know of—and we’re taking both of them:

FIRST: We are building, and operating in the most public places we can find—the big radio shows, hotels, dealers’ show rooms—comparison amplifiers which interchange instantly in a circuit, on throwing switches, a set of S-M transformers and a set of any other make desired. We are so well satisfied with the sales of S-M audios resulting from this “hard-boiled” method that we printed and distributed 35,000 copies of an article telling dealers and setbuilders how to build such a “comparator”. Do you know of any other transformer manufacturer who is doing that? If not, why is S-M the only one who is?

SECOND: We are giving an absolute guarantee that the S-M Clough System transformers you buy at $6.00 (list) cannot be surpassed by any transformers of the conventional type—not utilizing the Clough invention with its practical elimination of hysteretic distortion—at any price whatsoever.

If you have a laboratory, with a good audio frequency oscillator and sensitive high-frequency milliammeters—by all means verify for yourself the sweeping claims we make. If you haven’t—then listen to one of the public S-M comparator tests. If you can’t do that—just try a pair. Ask your own ears!

We think you ought to know.

In the chart below, E is the two-stage curve for the large-size transformers (S-M 225, 1st stage and 226, 2nd stage, $9.80 each); D is that of the smaller ones (S-M 235 and 256, $6.00 each). Note the marked advantage over A, B, and C—all standard eight and ten dollar transformers under equal conditions.

Are you receiving “The Radiobuilder” regularly? No. 5 (Sept.) described a Comparison Amplifier for comparing audio transformers. No. 6 (Oct.) tells about the new “PA” Public Address System. To S-M Authorized Service Stations, it comes free of charge, with all new constructional Data Sheets. If you build professionally, write us about the Service Station franchise.

Use your S-M ROUND THE WORLD FOUR on the broadcast band with these new S-M five-prong plug-in coils—131X for 190 to 350 meters, $1.25; and 131Y for 360-650 meters, $1.50.

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Here is where you need absolute dependability and you get it with Yaxley Resistance Units. Run true to rating. Convenient screw eye and soldering lug terminals for easy mounting. Filament and grid type: one to 3000 ohms. 15c to 40c each.

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20 ohm rheo -1000 ohm pot.
30 ohm 100-3000 ohm pot.
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10% Must Accompany All Orders

Say You Saw It In QST — It Identifies You and Helps QST
Official Frequency Stations

One cannot have read QST during the past few months without realizing that there are many changes to be made in amateur conditions when the effects of the International Radiotelegraph Conference is felt after the first of January, 1929. Under these new conditions it will be impossible for us to go along with our old opinions concerning the amount of accuracy that is necessary as far as the position of any signal in the frequency spectrum is concerned.

We have in the past been speaking in terms of wavelength and in accuracies of 2% in our Official Wavelength Station work. These will not do for 1929 and some major changes must be made in the requirements which these stations must approach.

QST has contained sufficient material on the reasons for referring to the position of a station in frequency rather than in wavelength to make a further discussion of this subject unnecessary. We, therefore, immediately find that we must give all reports in frequencies and the operators of these stations should make a distinct attempt, particularly during the next few months, to not only give official reports in frequencies but to adopt it as their unit of measurement and to learn to actually think in frequencies. About the quickest way in which this can be accomplished is to calibrate your present meter in frequencies and to put the wavelength calibration at the bottom of the biggest pile in the darkest corner of the shack—better still, destroy it.

When we change to the use of frequency the name which this service has borne becomes incongruous and even though sentiment may prompt us to hold on to an old friend, these echoes of the past are dangerous to our future and we will be much better off by starting from scratch. In accordance with this, stations in this service will hereafter be known as Official Frequency Stations or O.F.S.

Our new bands will be materially narrower than are our present ones and an accuracy of 2% as has been demanded in the past is entirely inadequate. Our old 40-meter band, for instance, will extend from 7000 to 7300 kilocycles and 2% of this band amounts to 140 kilocycles. There is, therefore, a band of only 20 kilocycles in the center of this band in which a report indicates that the signal is within the official limits of the band. In other words, if a report on a signal is given that it is not between 7,140 and 7,160 kilocycles, the operator receiving the report is not sure but that he may actually be outside the limits of the band. What is worse than this is the fact that with a 2% accuracy, no report can be given which indicates definitely that a signal is within the 14,000-kc. band as it will be in 1929.

It is impossible for us to obtain with this type of service a degree of accuracy which would be desirable and so it remains for us...
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This is the world’s lowest priced AC Electric power speaker radio.

Here is a radio designed exactly as the most costly receiver. New features that have marked radio advancement this year are incorporated in this 1929 set. The improved AC tubes! Shielding! Low voltage that promises long life to tubes! Volume control! Illuminated dial! Power speaker operation! And Crosley manufacturing methods have kept the price LOWEST of any genuine electrically operated radio. Crosley economies in production and marketing are directly responsible for the unmatchable price of $65. Crosley radios are outselling any others in every market. Sales nearly four times as great as last year’s record breaking year, indicate the VALUE the public is finding in this latest Crosley success.

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Say You Saw It In Q S T — It Identifies You and Helps Q S T

to endeavor to maintain as high a degree of accuracy as can be obtained with the equipment that is available to the Official Frequency Stations. Our Standard Frequency Transmissions carry an accuracy of 1/10 of 1% and when one begins to realize the many problems involved in maintaining this accuracy over long periods of time, it is obvious that we cannot expect such precision from the O.F.S. As a result of much discussion, a figure of ½ of 1% has been decided upon as being a satisfactory compromise between the desirable accuracy and that which can be obtained without involving any considerable expense or work on the part of the operators of Official Frequency Stations.

Meters that are good to an accuracy of ¼ of 1% and better are available on the market at prices that should be within the reach of the O.F.S. It is possible for the amateur to construct his own instrument and calibrate it from the Standard Frequency Transmissions from W9XL and WWV. It is extremely desirable that frequency meters be checked at least once every two months to be sure that their calibration is still within the necessary limits. (Please let us know when you have taken advantage of these transmissions and if you have not already obtained report blanks we would be glad to send you a supply.)

Many operators prefer the use of megacycles when referring to the various bands. Unfortunately, it is impossible to specify a frequency in megacycles to an accuracy of ¼ of 1% without the use of figures to the right side of a decimal point. That is, unless one is referring to a round number of thousands of kilocycles which may be satisfactory for designating bands but which is decidedly unsatisfactory when referring to frequencies within bands. This same thing applies to the use of wavelength in meters. It is possible to refer to any frequency within the amateur bands with an accuracy of ½ of 1% by using a full number of kilocycles. This means in practice that all reports may be given in figures of four or five digits without the use of a decimal point and still maintain the accuracy demanded of this service. This, then, constitutes an excellent reason for the use of kilocycles when the matter is viewed purely from a point of convenience.

This is not the only reason for its use, though. The International Radiotelegraph Conference made the kilocycle its standard unit in allocating all bands and our own Radio Division of the Department of Commerce has also adopted this standard. Our licenses specify our bands in kilocycles. Although the limits are also given in wavelength, this is only an approximate value. In view of these factors, we feel justified in employing the kilocycle for our standard unit and all reports should be given in kilocycles. Therefore, in transmissions no commas, periods or other punctuation are
"We are Depending on your product," writes the Radio Engineer of the Byrd Antarctic Expedition.

On the Antarctic Expedition led by Commander Byrd, as on his Arctic Expedition and Trans-Atlantic Flight—*PYREX Insulators will again be depended on for unfailing radio insulation.

These seasoned explorers dare not entrust the success of their expedition—and possibly their lives—to any equipment which had not proven its complete ability to withstand the extreme conditions to be met. Their complete confidence in them is ringingly expressed by M. P. Hanson, Byrd's Radio Engineer.

"We have every confidence," writes Engineer Hanson, "that your products will render good service under the extreme conditions to be met, as they have done in the past."

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UNIFORMITY ECONOMY

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amplifier equipped with Potter Condensers.
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for use in the finest radio sets, making it safe to follow
their good judgement.

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Radio broadcast programs no longer need be spoiled by
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etc.
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fering device is connected and enjoy your radio set.

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1929 Catalog

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speakers, kits, PARTS,
eliminators and accessories
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necessary to break up the group of four
or five digits.

At the present time there are two factors
that are used in converting from kilocycles
to meters or vice-versa. The more exact
one is 299,820 and the more convenient is
300,000. The more exact value differs from
the other by 18 parts in 30,000 or 6/100 of
1%. This inaccuracy is insignificant in
view of the 1/2 of 1% requirement and the
conversion of wavelength-to-frequency is so
much more convenient when using 300,000
that once more we can adopt a unit which
simplifies calculations without, at the same
time, sacrificing anything of importance.
We also find that the Radio Division of the
Department of Commerce has adopted this
factor and that it was used by the Confer-
ence. A conversion chart for wavelengths
or frequencies between 10 and 30,000 based
on this figure has been issued by the Super-
intendent of Documents of the Government
Printing Office at Washington, D. C., at the
request of the Radio Division. Copies of
this chart may be obtained at 5 cents each
from the Government Printing Office. To
assist the O.F.S. in changing over to kilo-
cycles, we are having a copy of the chart
sent to each one of them with our com-
pliments.

The chairman of the committee handling
Official Frequency Stations is Don C. Wal-
lace, W8AM, and if you are already an
O.F.S. but feel that you cannot meet the
requirements specified above, please notify
the Chairman so that your call may be de-
leted from the list. If you are not an O.F.S.
and feel that you can meet the requirements
satisfactorily we would be glad to have your
call on the list. Communicate with the
Chairman. The chief duties of an O.F.S.
are to indicate the frequency of his trans-
mision at the end of each transmission,
to check the frequency of other transmitters
when requested and to aid in the general
work of keeping all amateurs within their
assigned bands. This is done in the course
of their general amateur operation. O.F.S.
do not send Standard Frequency Transmis-
sions.

The following stations are members at
this time: W6XAO-W6ZV, W6MN, VE3PC,
oz-2AC, W6AM, W1CK, W1AWW, W8EQ,
W4XE, W5ZAV, W9EGU, W8ZH, W2MU,
W4BY, W5SP, W7CQ, W2DS, W1BZQ,
W6BGM-W6CVO, W9LG, W1ZL-W1AVV,
W2CLA, W8GZ-W8ZG, W9BGK, G2NM,
VE9AL, W8APZ, W50X, W1AC, W8BZT,
VE3CO, G2OD, W6CAE, W9AXQ, W9CPM,
W5EW, W1AXA, W8BGH, G82Z, W6BR,
V8DAJ, W9AUG, VE2BE, W2RRB, VE4BT,
oa-5BG, W4LK, G1SNJ, W1CWW, W8BAU,
W9UZ, W2EF, W6AKW, W6CDY-W6CPR,
W6AHC, W6BRO, W6WN, W6BMW,
W6CMQ.

72
Say You Saw It In Q S T — It Identifies You and Helps Q S T
The breathy: et of the rv Nut on one lost veterans enjoyed living.

Tired, al thin, oft times often still aver the country.

Phillips Carlin brokering at one of the big football games.

The Big Game Comes Over--
BETTER--CLEARER

Millions of enthusiastic football fans are listening this fall to the play by play broadcasts of America’s greatest games. They are experiencing almost as keen enjoyment as if they were sitting in the stands. The voice of the announcer comes to them clearly and distinctly because their receiving sets are Aluminum equipped.

Leading radio manufacturers are using Aluminum extensively for shielding, for condenser blades and frames, for chasses, sub-panels, front panels and for many other parts—because Aluminum so ideally meets the varied conditions that radio design presents.

It combines remarkable shielding properties, high electrical conductivity, great strength and extreme lightness.

Examine the set you contemplate buying. If it is Aluminum equipped you may rest assured that the manufacturer has done everything in his power to give you the finest possible reception.

And if you are building a receiving set use Aluminum for finest results.

We will gladly send you the booklet, “Aluminum For Radio,” which explains the varied radio uses to which Aluminum is adapted.

ALUMINUM COMPANY OF AMERICA
ALUMINUM IN EVERY COMMERCIAL FORM

2439 Oliver Building Pittsburgh, Pa.

ALUMINUM
The mark of Quality in Radio

Say You Saw It In QST — It Identifies You and Helps QST
REMLER "20"


different

Remler has designed a new circuit. It is different, and a long step ahead in radio research. Let us tell you all about it and why it will out perform any factory built receiver. Sign and mail the coupon. We will forward an eight-page, two-color folder and set-builders' bulletin.

Q-10
Remler Division, Cray & Danielson Mfg. Co., 200 First Street, San Francisco, California.

Gentlemen: Please send me:
☑ All the "dope" on the "29".
☑ Bulletin service for professional set builders.

Name ........................................
Address ......................................
City ...........................................
State .........................................

PRESENTING
The New SRL
Spreadband and Frequency Meter

Type 108-S

10-20-40-80 Meter Bands. Each band covers the whole dial and we don't mean perhaps!

Don't Check Out January 1st.
The type 108-S is the solution to your frequency-measuring problem. The low price of $21 is an introductory offer. Orders will be filled in rotation. Order yours now and save delay.

Fall Bulletins Out — Write for Them
(LIVE DEALERS WRITE FOR FULL INFORMATION)
SEATTLE RADIO LABORATORY
3335 33d Avenue, South Seattle, Wash.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

Of QST, published monthly at Hartford, Conn., for October 1, 1928.

State of Connecticut |
County of Hartford |

Before me, a Notary Public in and for the State and county aforesaid, personally appeared E. B. Warner, who, having been duly sworn according to law, deposes and says that he is the business manager of QST and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:


2. That the owners are: (Give names and addresses of the individual owners, or if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent. or more of the total amount of stock) The American Radio Relay League, Inc., an association without capital stock, incorporated under the laws of the State of Connecticut, President, Hiram Percy Maxim, Hartford, Conn.; Vice-President, Charles H. Stewart, St. David's, Pa.; Treasurer, A. A. Hebert, Hartford, Conn.; Communications Manager, E. F. Handy, Hartford, Conn.; Secretary, K. B. Warner, Hartford, Conn.

3. That the known bondholders, mortgage holders, and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear on the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements, either the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct, or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication, sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is 

__________________________________________________________________________

(The information is required from daily publications only.)

K. B. WARNER.

Sworn to and subscribed before me this 22nd day of September, 1928.

Caroline S. Cramsell.

(My commission expires February, 1931.)

Calls Heard
(Continued from Page 61)


(20 meters)

-----------

Say You Saw It In Q S T — It Identifies You and Helps Q S T
A NEW CATALOG
JUST OFF THE PRESS

Wholesale Prices

THIS big new catalog heralds a new era in radio. Never before have you been offered such variety—such quality—such sterling value in radio as you are now offered in this large new catalog. In it, wholesale prices are not a myth—but actual reality. You will marvel that such merchandise, comprising everything that is new and worthwhile in radio can be offered at such prices. Here you will find high quality that is not high priced. If you are interested in radio you cannot afford to be without the Allied Catalog.

SET BUILDERS!
Set Builders, Amateurs and so called "Hams" will delight in the unusual variety—and remarkable values that are offered in standard kits and parts. Tremendous stocks—real organization—prompt shipping service all combine to make Allied your ideal source of supply.

RADIO DEALERS!
The live radio dealer—the man who keeps pace with the rapid advance of radio will find much of real interest in the Allied Catalog. New A-C Sets, D-C Sets, Dynamic and Magnetic Speakers, television equipment, in fact everything that an impatient radio public is demanding.

WHAT ALLIED OFFERS YOU!
Allied Service will prove a revelation to you in what radio service can really be. Allied Executives backed by years of training in radio are practical men. They know radio. Their vast experience has built up around them an organization trained to serve. Months of effort have built up here a tremendous reserve of stock that makes for prompt shipments; and this stock is new stock comprising the seasons pick of such prominent manufacturers as Silver-Marshall, Tyrman, Aero, Hammerlund-Roberts, etc.

You Profit When You Buy Right
Buying right is half the battle. From the small set builder to the large dealer, your success depends upon gauging the public pulse of radio and in buying right. Everything that is new in radio—the items the radio public is now demanding are here, ready for your call. Write now—the catalog is free for the asking.

Write for Catalog Now

Allied Radio Corporation
711 W. LAKE ST., Dept. P, CHICAGO, ILL.
Neutralization Means—
More Power From Any Set

Science has proven that neutralization is the only satisfactory method of controlling oscillation in a Tuned Radio Frequency Circuit and that it increases the actual power per stage of amplification to 300%.

The Vario-densers principle can be applied to practically every set by the simple installation of X-L Vario-densers. The result is an amazing increase in the efficiency and power of the receiver. Send for interesting facts about the construction of circuits and picture diagrams showing the use of the Vario-denser.

MODEL "N"
VARIO-DENSER

Has variable capacity, adjustable from 1.8 to 20 micro-

microfarads, which is .000018 to .0002 microfarads.

Price each $1.00.

X-L RADIO LABORATORIES
Dept. D
1124 Belmont Ave., Chicago, Ill.

New Western Electric, Navy Transmitting and Receiving Set, 10 watt. 1 Receiver & Transmitter C. W. 1055, 1 BC No. T
1 Breast plate microphone, 1-1 A Helmet with 164 W. head-
phones. 1 Westinghouse Dynamotor 12-50 volts D. C., 1 CW
1057 Searleplanes Interphone control box and necessary cables with plug connectors. Set is equipped with 3 VRT tubes and
1 CW 1059 Ballast lamp, outfits for $75.00. Largest
stock of Government Radio Transmitting and Receiving material in U. S. Send free sample for our new and latest reduced price list. Stop anywhere WEIL'S CURIOSITY SHOP, 20
South 2nd St., Philadelphia, Pa.
EVERY TRANSMITTING AMATEUR USES THESE FORMS

—a reminder that your supply may be low—

Members' Correspondence Stationery
Write your radio letters on League letter-heads—it identifies you with the biggest radio organization in the world. Lithographed on 8½ x 11 heavy bond paper, 100 sheets postpaid for 75c or 250 sheets for $1.70. Sold to members only.

A.R.R.L. Log Sheets
Designed by hams for hams. 8½ x 11 bond paper, punched for standard three-ring loose-leaf binder. 125 sheets postpaid for $1.00 or 500 for $3.50.

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

Message Delivery Cards
Neatest, simplest way to deliver a message to a near-by town. On U.S. stamped postals 2c each. On plain cards (for Canada, etc.) 1c each postpaid.

American Radio Relay League
1711 Park Street
Hartford, Conn.
TELLEX CO., 74-76 Cortlandt St., New York, N.Y.

Expert Radio Operator

This amazing instrument teaches you to read code like an expert in half the usual time. Reproduces actual sending of expert operators. Sends you messages, radiograms, etc. at any speed. Provides practice anywhere, anytime. Complete instructions recorded on strong, waxed-tape records make everything simple and clear. You'll be amazed when you hear it send. Just like having an expert operator in your home. Why delay when you can get this simple, practical and efficient code sender with lessons for only $3.50 or with high-frequency key and buzzer for $5.50? Satisfaction guaranteed. Money back if not delighted. Send in day.

ROBERT S. KRUSE
Consultant for Shortwave Devices
203 Meadowbrook Road,
West Hartford, Conn.

Telephone Hartford 45327

W1WYV, W. W. Smith, 300 Edgell Road, Framingham Center, Mass.
(20-meter band)

WB4HN EF-5CF EF-DMF EF-8DF EF-GBG EF-81X

W4GP 1025 Fairmount Ave., Anniston, Alabama

wondo wond wond wond in yon in yon in yon in yon in yon

A Ghost of the Past

Glen Avenue, Arlington, P. O., Baltimore, Md.

Editor, QST:

Last night I happened across an old file that used to repose on the shelf in the radio shack that nestled under the "old back porch". My thoughts ran back to those hectic days of "nineteen sixteen" when the non-sync spark crashed its "merry" way over the receptive ether.

Perhaps, a few of the "Old Timers" will get a real thrill over something that I found in the box. The "find" bears the stamp of old 3RD at Bancroft Park, Baltimore, Maryland; and the following is self-explanatory.

PRESIDENTIAL RELAY, 1916

For the first time in the history of this grand Republic, the amateurs will demonstrate to the public that they can be relied upon to help the Government. We all feel highly honored to be given the chance by President Wilson to demonstrate how well we can pass around this country a message from the white house.

PURPOSE OF THE RELAY

First, to get you interested in perfecting your station. Secondly, as the air will be perfectly quiet on the night of this relay, you will have a chance to check up on your receiving outfit. Thirdly, to get a number of good receiving conditions that can hear NAA and NAJ, at all times. This list will be turned over to the Government authorities. Fourthly, to satisfy the curiosity of the President of the United States as to our real worth, and assist the Department of Commerce, all of whom have rendered the amateurs valuable assistance. Fifthly, to give prizes to the most successful amateurs.

The message will start from station 9XE, in Davenport, Iowa, and will be relayed through the following stations, on the night

Correspondence Department
(Continued from Page 78)
It IS Good!

38,500 Copies of the

Radio Amateur's Handbook

Are Referred to Daily for Guidance and Information

Order Now


These chapters each occupy from ten to forty pages—indicating that each subject is treated in a thorough manner. In addition there is an appendix containing a fund of useful data. Then there is an index, occupying six pages, by which the valuable information contained in the book is made available. This in a particularly important point and has been compiled and cross-indexed with great care and thought. Altogether the Book contains 256 pages of the most valuable radio information ever found between two covers.

The Radio Amateur's Handbook starts at the beginning and tells what an amateur is, what the League is, what amateur radio is, how to become an amateur, how to learn the code, how to understand what you hear, how to get your licenses, how to build a simple station, how to build a better station, how to operate your station, how the A.R.R.L. works, how to handle traffic, how to conduct experiments and make measurements, and a multitude of other things too numerous to mention.

Anyone who is at all interested in the technical side of radio can ill afford to be without The Radio Amateur's Handbook.

Regular Cover $1.00 Postpaid Anywhere Bound in Leather Cloth $2.00

If you haven't a copy of The Radio Amateur's Handbook you are missing the greatest value in radio today.

DO IT NOW

AMERICAN RADIO RELAY LEAGUE, HARTFORD, CONN.

Dear Sirs:

Enclosed find my $ ....... Please send me postpaid (any where in the world) my .......... copy of the Handbook.

Name ..................................

Address ..................................
of the 27th of October at 10:00 P.M., Central Time. . . . Starting from 9XE on low power, the message will be relayed automatically by Dr. Hall's famous Recording Relay at station 9XR.

INSTRUCTIONS

Keep yourself quiet until sending stations have finished. Then, by previous arrangements, which you must make, relay this message to all parts of your state. You have until the night of the general election to land this message anywhere, but don't forget the mistakes . . .

PRIZES

To the amateur, school, wireless club, or association that delivers the message to Mr. Hughes and gets his receipt for it, we will give a 1-Kw. Thorardson transformer.

To the one getting the greatest number of signatures from citizens of the United States, attached to a copy of the message, so that they must read it, we will give a Tubular Audion Panel, mounted and ready for use.

Changed Times

1229 Chandler Avenue
Evansville, Ind.

Editor, QST:

Until recently, I considered the dusting of cobwebs from a ham transmitter a huge joke. I have, however, gone through that experience and find it one of the essentials in staging a comeback.

A sorrowful surprise unexpectedly awaited me. Upon getting on the air, I found not the old-time pleasure I once collected from the heap. The conversations seemed mechanical and without the zest of personal feeling. The operators all seem to be rookies instead of the good, steady operators of the past.

I began speculating as to the cause of these conditions. Is it possible that it is only I that feel so because I am not as well acquainted on the air as I formerly was? Could it be that short waves have shortened our vocabularies when on the air? Have these waves impaired our operating and caused it to be carried on in this nervous manner? Has the spirit of amateur comradeship and cooperation, that medium which made amateur radio, been lost in this maze of high frequency and lower power?

If, in the course of time, this letter should take up space in QST, the real amateur's testament, perhaps some amateurs who feel as I do on the subject, would endorse my remarks and present their views.

—Charles A. Luisi, 9EBW.

Rotten Fists

336 Burns Street
Forest Hills,
Long Island, N. Y.

Editor, QST:

1BFX hits a very important point in his letter headed “Help” on page 70 of the July issue.

Say You Saw It In QST — It Identifies You and Helps QST
VITROHM Transmitting Grid Leaks and Rheostats now cover the entire line of transmitting tube circuits. The prices on these amateur products are reduced materially. Your dealer should stock Vitrohm Transmitting Products. If you have difficulty in obtaining them, write us direct.

<table>
<thead>
<tr>
<th>CATALOGUE NUMBER</th>
<th>PRODUCT</th>
<th>RESISTANCE</th>
<th>DISSIPATION</th>
<th>CURRENT</th>
<th>MAX. TUBE RATING</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<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>
</tr>
<tr>
<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>
</tr>
<tr>
<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>
</tr>
<tr>
<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>
</tr>
<tr>
<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>
</tr>
<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>
</tr>
<tr>
<td>507-63</td>
<td>Rheostat‡</td>
<td>50 ohms</td>
<td>50 watts</td>
<td>1 amp.</td>
<td></td>
<td>5.50</td>
</tr>
<tr>
<td>507-59</td>
<td>Rheostat‡</td>
<td>20 ohms</td>
<td>80 watts</td>
<td>2 amp.</td>
<td></td>
<td>5.50</td>
</tr>
<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>
</tr>
</tbody>
</table>

* Center-tapped
† DeForest P or R. C. A. 852 Tube
‡ De Forest H Tube

Ward Leonard Electric Company
37-41 South Street
Mount Vernon, N. Y.

Synchronous Motors for Television

In addition to building reliable and satisfactory motor generators, “Esco” has had many years of experience in building electric motors for a great variety of applications.

Synchronous motors, small, compact, reliable, self starting are now offered for Television equipment. They require no direct current for excitation, are quiet running and fully guaranteed.

Other types of motors suitable for Television may also be supplied.

Write us about your requirements.

ELECTRIC SPECIALTY CO.
225 South St.  Trade “ESCO” Mark  Stamford, Conn

Say You Saw It In Q S T — It Identifies You and Helps Q S T
One of the Most successful Develop-
ments of 1928

Power Amplifiers Built Around
UX 250 Tubes

The following are Approved Dongan Parts
for use with UX 250 Tubes:
758—Transformer for full wave rectification
using 2-UX251 tubes to supply B and C
power to receiver and power for UX 250
Tubes .................................. $13.50
852—Transformer similar to 758 with the
addition of 2 low voltage windings, one for
226 tubes and the other for 327 tubes so
that you can build a power amplifier for
either radio receiver or phonograph pick-
up ........................................ $16.50
6551—Double Choke, for use with above trans-
formers ................................ $15.00
D-600—Power Amplifier Condenser Unit . $16.50
D-307—A Condenser Block used in connection
with D-600 ................................ $10.00
1177—Straight Power Amplifier Output Trans-
former .................................. $12.00
1176—Same as 1177 but of Push Pull type $12.00

Custom Set Builder can secure any of these items di-
rect from factory at trade discounts. Set Manufacturers
are offered the full cooperation of Dongan Engineering depart-
ment for their individual requirements.

Dongan Electric Manufacturing Co.
2999-3001 Franklin St., Detroit, Mich.

TELEVISION

although still in an experimental
stage, has now advanced sufficiently
to enable amateurs to build outfits
that will give edifying results.

Write today for our price list of
Television apparatus.

Photo Electric Devices, Inc.
594 Fifth Avenue  Brooklyn, N.Y.

RADIO

SCHOOL

Earn $35 to $50 Per Week

The rapid expansion of RADIO has created
many new positions on land and sea. En-
roll now. New term begins September
10th in both day and evening class. Send
for free catalogue.

MASS. RADIO SCHOOL
18 Boylston Street, Boston
Tel. Hancock 8184  Established 1905

It is true that fellows do not try to work
some of the new gang. I have cut, myself,
at times, and so would any man with any
respect for the rest of humanity. I do not
mind QSZ, and will repeat as often as a
chap wishes. I don't mind sending at eight
or ten per but I sure can't stand having
good Continental murdered the way some
of these boys are murdering it today.
They are not all newcomers, either. Pos-
sibly the chap who can rarely get QSO has
such a rotten style or QSC that very few
can read him. I tell them and then they
get mad, so the only thing to do is to QRT.

Personally, I will not answer a sloppy
CQ or call and if others felt the same way,
things would sound better on the air. Even
the commercial operators are getting sloppy
of late and I think it is due to ham
influence. Could we not have some incentive
supplied by the League which would promote
better, cleaner operating? Honest, it's
aufull.

—A. Adair Leonard, "Id at ex 1AYZ—
1ABC—IXAK—WPA—KNU—KFZQ.

Alpha Lambda Chi

108 Homer Avenue
Buffalo, N. Y.

Editor, QST:

Much has been said and written con-
cerning the nuisance of long continued CQs
but with apparently little effect in cor-
recting this evil. There seems to be a well-
established convictions among many hams
that in order to be successful in establish-
ing QSO it is necessary to send a long CQ.
I have counted as many as sixty. It is evi-
dent that I could have answered after the
first three. QST suggests nine, which
ought to be adequate. It is my opinion that
long CQs are only answered to get the
nuisance off the air.

At the recent Atlantic Division Conven-
tion, I observed great activity in initiat-
ing delegates into various "Greek letter
fraternities". As far as I could ascer-
tain, the chief activity of these societies is
the initiation. Now, why not add one more
and make it a universal one. Call it the
Alpha Lambda Chi (meaning "Against Long
Calls") and hold an initiation at each con-
vention, the qualifications being only two,
viz. (1) Promise not to send long CQs. (2)
Promise not to answer long CQs.

I believe that if more of us would ignore
long CQs, the practice would soon become
obsolete.

—Burton C. Simpson, 3CPC.

G B A

117 North Sixth Street
La Crosse, Wis.

Editor, QST:

As a suggestion as to why so many of
the QSL cards sent out never receive a
reply to the sender in the form of a re-
Still the Standard

Jewell thermo couple ammeters for high frequency work are still the standard of the amateur fraternity for making current measurements at radio frequency, for they completely fulfill the requirements of accuracy, low loss and high overload.

The thermo couples of these ammeters, which are available in various ranges, are made from special electric furnace alloys of non-oxidizing nature. A guaranteed overload capacity of 50% is an indication of their ruggedness. The loss in the instrument is held to less than half of the minimum required by the Navy.

The Pattern No. 64 high frequency ammeter has a three inch, black enameled case. Scales are silvered with black characters and movement parts are silver plated. All Jewell instruments have zero adjusters.

Jewell radio frequency ammeters are described and listed in Radio Instrument Catalog No. 15-C. Write for a copy.

Jewell Electrical Instrument Co.
1650 Walnut St., Chicago, Ill.
"28 YEARS MAKING GOOD INSTRUMENTS"

New Transmitting Tubes
We expect to have available in a short time the most complete line of transmitting tubes ever sold in this country. Output ratings from 5 to 1000 watts, with prices far below tubes now offered. Particularly adapted to short wave use. If interested, send your name for full details when ready to release.

Quartz Crystals, guaranteed. 160 meter band, $10.00; 80 meters $17.00; 40 meters $25.00.

Public Address Equipment
Starting with our well known and widely used Two Button Broadcast Type Microphone at only $40.00, we can supply any equipment for public address work and similar uses. T820 Microphone Transformer, $10.00. "Trumpet" Horns, as used in Public Address Equipment, complete with unit, $35.00.

E. F. JOHNSON COMPANY, Waseca, Minn.

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When in Brasil, apply to M. BARROS & CIA for anything you need in connection with radio.
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70 sob. Rua S. José 70 sob.
Postal Box 89
Rio de Janeiro
Telegraph address, Radioparte, Rio de Janeiro
Branch: Avenida S. João 4, S. Paulo, Brasil

The Best That Money Can Buy
goes into Har-field Resistors. Best both in brains and materials. That's why Har-Field Resistors are so uniformly accurate — why they bear our unqualified guarantee for one year — why more and more of the leading manufacturers are buying them in large quantities for use with their own apparatus. A few of the more prominent we list below:

- Stromberg-Carlson Tel. Mfg. Company
- Kollert Radio Corporation
- American Transformer Co.
- Panated Products Co.*
- Zenith Radio Company
- Croxley Radio Corporation
- Western Union Telegraph Co.
- A. H. Grebe & Company
- Solidite Electric Co.
- Magnavox Corporation
- Electrical Research Lab's
- Saxon Electric Co.
- Philadelphia Electric Storage Battery Company

Tell us about the resistor you want. If we can't supply you from our standard range of sizes, we shall be glad to make up samples for you with prices. Write to

HARDWICK, FIELD, INC.
SALES OFFICE
100 Fifth Avenue
New York
FACTORY
216 Snowden St.
Newark, N. J.

Say You Saw It In Q S T — It Identifies You and Helps Q S T
Television Simplified

Controlling the receiver scanning disk—that's the big problem in television. Yet there is nothing to it when you have the SPEED CONTROL CLAROSTAT. You can bring the scanning disk to speed and hold the image on the screen as easily as you steer your car down the center of the road.

A Handsome and Useful Device
SPEED CONTROL
CLAROSTAT
REG. U.S. PAT. OFF.
Controls any variable speed motor of 1/8 h.p. or less, from standing still to practically full speed in several turns of knob. Pulsation for quick starts and for momentary acceleration. Heavy metal case. Properly ventilated. Protected against terminals to 50000 current range, 30-watt rating. Readily mounted. Convenient. And it sells for $5.00.
Ideal for television. But that's only half the story. THE SPEED CONTROL CLAROSTAT has no end of applications in radio and electrical work where a variable or fixed heavy-duty resistance is required.

DODGE RADIO SHORTKUT
With Appendix and Hints for Better Key Work. Fixes Signals in mind to stick—Kills Hesitation. Cultivates Speed and Good Flat—Produces Results. New Hams report made this gain in few evenings. Previous Failures qualify and pass exam quickly. Beginners master code and pass in ten days.

DODGE HIGH SPEED METHOD
(Intensive Speed Practice)
Quickly puts 25 per Hams in 25-45 per class. Five Hams report made this gain in few evenings. One of them by 70 minutes total practice in ten days.

DODGE MORSE SHORTKUT
Easily mastered by Radio One—Kills tendency to mix up or confusion. Either code used as desired.

REPORTS FROM USERS
G. K. DODGE, MANHATTAN, NEW YORK.

1929 RADIO BOOK
KARAS ELECTRIC COMPANY
4030-LI-N. Rockwell St., Chicago, Ill.
Please send me your free book
Name______________________________
Address____________________________
City________________________State__________
4030-LI

Say You Saw It In Q S T — It Identifies You and Helps Q S T

Information
Montrose, Iowa.

For some time you have been telling about the help the beginner is getting from the old timer. They should, no doubt, receive this assistance but there is one phase of the subject that has not been given enough attention.

Since you published my report on 20-meter work in the April issue of QST, I have been getting letters from beginners asking all sorts of questions.

First of all, most of them imagine there is some big "hocus pocus Indian Medicine Man" stuff that we say to a set to make the wave do its stuff. The only time that I ever said anything was when a tube blew.

In the second place, they don't even tell you what they want to know. Several have said that they had built low power transmitters that didn't work the way they should and, "What's the matter?" How can any answer be made to that question? If they don't ask any specific questions, they should, at least, enclose a complete diagram of the set giving constants.

Last, but not least, a whole lot of them sealed the letter and forgot to enclose a two cent stamp. To be sure, they ran after the postman but couldn't catch him. In most stations, correspondence is a big item of expense and if we must pay postage as part of the accommodation of answering questions, there will be fewer tubes bought. The questioner should bear his share of it.

To work 20-meters or any other wave, the chief things necessary are a steady note and a good radiating system. This is old stuff. QST has been preaching it for years, but it seems that lots of fellows have missed it or else, were in such a hurry while reading it that they don't know what its all about.

Please don't take it from this that I don't like to help a beginner. I sure do. However, I don't want to answer fool questions like, "Can I work so-and-so on 20-meters with my set?" And then, tell me nothing about the set. Neither will I pay the postage or read their minds!

—Bob Heine, 3AWB

This applies to a still greater extent in the handling of the Information Service at Headquarters.—A.T.E.
Now! Sangamo Transformers at a new low price. And push-pull transformers to match new power tubes and dynamic loud speakers.

A small expenditure and you can have one of these modern amplifiers with plenty of capacity to handle the low notes. Nothing equals the full toned beauty of an amplifier built according to the diagram shown at right.

Write for descriptive circulars.

SANGAMO ELECTRIC CO.
Springfield, Illinois

<table>
<thead>
<tr>
<th>TRANSFORMERS</th>
<th>Guaranteed—Mounted—Complete</th>
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<tr>
<td>250 watt 550—700 each side</td>
<td>$10.50</td>
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<tr>
<td>700 watt 1000—1500 each side</td>
<td>14.50</td>
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<tr>
<td>700 watt 2000—2500 each side</td>
<td>21.00</td>
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<tr>
<td>Also Polyphase and 25-cycle Transformers</td>
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<tr>
<td>Add $2.00 for fil. winding</td>
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SCES F. GREN
1927 So. Peerla Street, Pilsen Sta., Chicago, Illinois

More Profits To Set Builders

Elections, football games, big National events will boost radio business this year. Set builders will reap a rich harvest. Barsik service will make you money. Everything in A-C set, short wave, television, parts, supplies. World's largest radio stock on hand. Orders shipped same day. Lowest rock-bottom wholesale prices.

Write for Free Radio Catalog
SARAWIK CO. CHICAGO, U. S. A.

PACENT DUO-LATERAL COILS

For laboratories, experimenters, engineers and for special circuits, Pacent Duo-Lateral Coils are the accepted standard.

A complete line of all standard turn ratios are always in stock.

Write for information and prices
Pacent Electric Co., Inc.
91 Seventh Avenue, New York

The finest receiver can be improved with Televocal Quality Tubes. All standard types. Ask for them at your dealers.

TELEVOCAL CORPORATION
Televocal Building
Dept. R-5, 508 12th Street
West New York, N. J.

Say You Saw It In QST — It Identifies You and Helps QST
The Art of Tuning Is More Than Just Turning a Dial

Mere reception of a radio signal is not enough. It has ceased to be, "How many stations did you get?" The thing of importance today is, "How well did you get them?"

There are two major operations in tuning a set: tuning the station—and modulating it so as to obtain the best quality of tone.

The Centralab Modu Plug is the perfect volume and modulation control. With it, all the true beauty of tone and naturalness of speech reproduction can be obtained.

It is attached to any set in a moment without additional wiring or complicated connections. Equally as adaptable for volume control on phonograph pick-ups and speakers remote from the set.

An interesting book full of picture and wiring diagrams showing the use of Centralab Volume Controls and Resistors is yours for the asking.

CENTRAL RADIO LABORATORIES
18 Keefe Avenue Milwaukee, Wis.

Off the Press September 1

"RADIO THEORY and OPERATING"

By Mary Texanna Loomis
Lecturer on radio, Loomis Radio College; Member Institute of Radio Engineers.
992 pages; 800 illustrations. Thoroughly revised; right down to date; contains new "Q" signals and laws and regulations for 1929. Used by hundreds of colleges and all Government radio schools. Sale by booksellers, or sent, postage paid, on receipt of $3.50 check or money order.

LOOMIS PUBLISHING CO., Dept 5, Washington, D. C.

A New Condenser

The amateur will have to keep on his toes if he is to keep up with the fast-growing crop of new equipment which is appearing on the market to meet his needs in the new year. Changed frequency bands, more limited territory and the consequent need for a higher standard of performance is to result in the production of much new apparatus designed to fulfill the more stringent requirements. Falling in this category, the new variable condensers of the Radio Engineering Laboratories are worthy of study.

Departing from normal practice the condensers are fitted with a rugged die cast "Y" shaped end plate in which is mounted the double conical bearing. An unusual

and commendable feature of this bearing is that the shaft runs in a pool of mercury and so is free from the electrically noisy contact which has been such a bug-bear in tuning elements.

Several types of condenser are provided, each with this end plate assembly as a foundation. In one of these, which is fitted with a single stator and single rotor plate, the capacity range is made adjustable by provision for the movement longitudinally of the stator plate. In a second type the capacity range can be varied by adjustment of a lumped adjustable capacity built into the condenser.

In all of the models the plates are of heavy brass, the construction, in general, being splendidly substantial.

GIMME KISS

HIGH RESISTANCE.
**SUPERIOR CONDENSERS**

A COMPLETE LINE OF HIGH GRADE TRANSMITTING CONDENSERS

<table>
<thead>
<tr>
<th>Type T for 1500 V D.C.</th>
<th>Type TH for 2000 V D.C.</th>
<th>Type HP for 3000 V D.C.</th>
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<tr>
<td>1 Mfd. $4.50</td>
<td>1 Mfd. $8.75</td>
<td>1 Mfd. $20.00</td>
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<tr>
<td>2 Mfd. $8.50</td>
<td>2 Mfd. $13.50</td>
<td>2 Mfd. $32.50</td>
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<tr>
<td>4 Mfd. $14.50</td>
<td>4 Mfd. $22.00</td>
<td>4 Mfd. $60.00</td>
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PLATE BLOCKING AND GRID CONDENSERS

For 2000 V D.C.

- 0.00025—$3.00
- 0.001—$3.25
- 0.002—$8.50

LIST PRICES

For 1500 V D.C.

- 0.0025—$3.00
- 0.001—$3.25
- 0.002—$8.50

A More Effective and Dependable Condenser

FOR LESS MONEY

That's the unanimous opinion of "hams" everywhere. They stood up for W2APD—the amateur who handled traffic from storm-swept and devastated PORTO RICO. (W2APD was personally commended for his excellent work by the U.S. Navy) and, there are W2ALU and W2KR, the amateur stations that are handling a large amount of the traffic from the BYRD EXPEDITION—WPBT. Of COURSE, THESE FELLOWS USE FLECHTHEIM! YOU, TOO, SHOULD USE THEM.

(sig)

73's W2afs, Chief Engineer

Write for New Catalog X

A. M. FLECHTHEIM & CO., Inc., 136 Liberty St., New York City, Dept. QT

**IT HURTS**

To back off your coupling and lose 15%. It cuts even deeper to detune for a total loss of 30%. What'll I do??? Put in a mercury arc and raise your output an easy 30%—same radiation as before—and a 1929 note. Ask 3PF, 5AP0, 9DL0, 9SS, 9EGU, 8CKG, 8DBQ, 1DL, 9PU. Follow the gang, and your rectifier problems are solved.

RECTIFIER ENGINEERING SERVICE

4837 ROCKWOOD RD. RADIO 8 ML CLEVELAND, OHIO

**UNI-RECTRON POWER AMPLIFIER**

(IDEAL FOR USE WITH DYNAMIC SPEAKERS)

As the Uni-Rectron stands it is a super power amplifier, which can be used in connection with any radio set and loud speaker. Binding posts are provided for input to the Uni-Rectron and output to the speaker. Requires no batteries for its operation. It obtains its power from the 110 Volt, 60 Cycle alternating current lighting circuit of your house.

The UX-210 super power amplifying tube and the UX-216B or 2S1 rectifying tube are used with this amplifier, which cannot overload. From the faintest whisper to the loudest crash of sound—R.C.A. Uni-Rectron amplifies each note at its true value. High and low notes are all treated alike.

The volume and quality delivered will be a revelation.

Also by removing the input and output transformers it can be used a source of power for an oscillating, or transmitting tube, furnishing power for all circuits, grid, plate and filament and is the cheapest form of Power Supply for Amateur Transmitting purposes ever offered. New.

MODEL AP-935

LIST PRICE $68.50

(Special $19.75 EA.)

AMERICAN SALES CO.

19-21 Warren St., New York City
ARE YOU HANDICAPPED

By A Weak Arm or Other Weakness?

You simply can’t be a FIRST-CLASS operator handicapped by a weak arm. This is the SPEED age. Would you place yourself in the hands of an expert and follow his easy instructions if you thought his methods would remove your handicap? If you knew positively that his system would make you a FASTER, MORE ACCURATE operator? Then write CANDLER your troubles, and get from him the advice of a man who has developed many of the world’s fastest operators. Write now! No obligation.

THE CANDLER SYSTEM CO.
Dept. AR
6343 S. Kedzie Ave.
Chicago, Ill.

ALWAYS UP-TO-DATE

Issued quarterly, March, June, September and December. Single copies U.S. and Canada $1.00 (Foreign $1.10). Yearly subscription $3.25 (Foreign $3.50.)

Amateur and Commercial Stations from 83 different countries.

Radio Amateur Call Book
508 So. Dearborn St., Chicago, Ill., U.S.A.

TRANSMITTING HINTS

WHY NOT SERIES GENERATORS

M. William O’Neill of Downers Grove, Ill., suggests that plate supply generators would give a better output from the tube transmitter standpoint if built so that at least a part of the field winding was in series with the armature so that it could act as a filter choke. Since the ordinary shunt generator has no series winding at all but is connected as shown in Fig. 1 it is necessary to use a freakish circuit to take advantage of the idea. In Fig. 2 the field has been put in series with the load and as this would mean that there is no field whenever the load is off an extra load R has been connected in parallel with the regular load. When the key is up and the load disconnected this extra load provides enough current so the machine voltage does not disappear. The trouble with these schemes is of course that the machine voltage changes when the load goes off and on. Therefore the final arrangement is that of Fig. 3 in which the key connects the load R to the circuit whenever the set is not connected. The load R should of course draw about the same current as the set. The scheme was tried on a 1/4-kilowatt 1000-volt Western Elec. machine running at 2250 r.p.m. This machine had a slot ripple of 712 cycles and a weak commutator ripple of 3562 cycles. When connected as shown the ripple was almost completely removed with no filter but a 1 microfarad condenser.

The real way out would appear to be to design machines compound instead of shunt when they are to be used for telegraphing which is a service quite different from broadcast work.
ORDINARILY you don’t consider price when you buy parts for short wave sets, but when you discover the low cost of PILOT PRECISION PARTS, and then consider that all A.R.R.L. traffic at the New York Radio Show was handled on all-PILOT receivers, that Byrd’s experts built their airplane sets around PILOT coils, that Ft. Wood has chosen an all-PILOT S. W. Set, in preference to the many other types, for handling Army traffic—Then you realize that you better send 4c in stamps for the PILOT catalogue listing 200 parts.

NEWEST S. W. SETS

RADIO DESIGN QUARTERLY, edited by M. H. Sleeper, contains exclusive articles by R. S. Kruse and other S. W. experts. Also articles on shield grid sets, A. C. Sets, airplane radio. Send 25c. for four issues—over 200 pages of the finest construction articles. Send stamps or coin.

25c.—200 PAGES

PILOT ELECTRIC MFG. CO. INC.
322-Q Berry Street, Brooklyn, N. Y.

LAST MINUTE SPECIALS


AMERICAN SALES CO., 19-21 WARREN ST., NEW YORK CITY

QST OSCILLATING CRYSTALS

NOTICE—New Prices Effective November 1st, 1928

AMATEUR BANDS.

1715 to 2000 Kilo-cycle band. $20.00. $27.50. $52.50. $75.00.
2500 to 4000 Kilo-cycle band. $27.50. $35.00. $65.00. $95.00.
5000 to 7000 Kilo-cycle band. $45.00. $65.00. $125.00. $175.00.

The above prices are for grinding a crystal at a random frequency, said crystal to be of the POWER type, and its frequency will be stated accurate to better than a tenth of 1%. All crystals are absolutely guaranteed, and immediate deliveries. Add $10.00 to the above prices if crystal is to be mounted in our POWER type of Holder.

BROADCAST BANDS.

We desire to announce that we can make prompt delivery of crystals ground to your assigned frequency accurate to PLUS OR MINUS 100 CYCLES for $4.50 Unmounted or $5.00 Mounted. In ordering please mention plate voltage and type of tube used. These crystals are absolutely guaranteed.

We are at your service to grind for you, crystals other than mentioned above. We will be glad to quote prices for your particular requirement. Crystals ground to any frequency between 60 and 10,000 Kilo-cycles.

SCIENTIFIC RADIO SERVICE

The Crystals Specialists
P.O. Box 86, Dept. ZC, Mt. Rainier, Md.
THE USEFUL MAZDA LAMP

Mr. F. A. Lidbury of Niagara Falls contributes an idea that most of us should have thought of but did not. It is given here-with.

"Though the idea is an obvious one, I have never seen a note on the usefulness of the ordinary incandescent lamp as a protective resistance in the plate supply of transmitting tubes. In adjusting my 60-watt power amplifier recently, I found a bank of these things invaluable. I have 8-125 volt, 60-watt Mazdas mounted in series on a strip of hard rubber in my 1000-volt plate supply. On a short circuit or its equivalent these limit the current to 400 m.a.; on the other hand, with a normal drain of 100 m.a. the voltage drop over the bank of Mazdas is only about 60; and this 6% loss is low pay for the protection obtained. Of course a short circuiting switch, after adjustment, will get rid of this loss, but I prefer to take it myself on account of the protection obtained should anything unexpected happen in the course of operation. It is not generally realized that this type would be better for this purpose on when lightly loaded. If it were, I am certain that this very simple device would be more used. Below are tabulated some very rough measurements of the present common form of 60 watt lamp. Column 1 gives the current in milliamperes; column 2 the voltage drop per lamp, and column 3 the voltage drop over the bank of eight lamps described above. This will be sufficient I think, to give an indication of what they will do. The lamps in question are, I believe, gas filled, and the older evacuated type would be better for this purpose on account of the possibility of internal arcing over in case of a filament breakage; but I didn’t happen to have any handy at the time, and one usually has to order them specially now. I don’t think there would be any essential difference in the use, though the resistance curves are probably different somewhat.

Mazda Type A 50 Watt 125 Volt

<table>
<thead>
<tr>
<th>CURRENT IN M.A.</th>
<th>VOLTS PER LAMP</th>
<th>VOLT DROP OF 8 LAMPS IN SERIES</th>
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<tbody>
<tr>
<td>50</td>
<td>1.4</td>
<td>11</td>
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<tr>
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<td>8</td>
<td>64</td>
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<td>19</td>
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<td>800</td>
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<tr>
<td>400</td>
<td>125</td>
<td>1000</td>
</tr>
</tbody>
</table>

I am sending this to you because I found it is useful myself; of course smaller and fewer lamps would be used for a 210, larger and more (or higher voltage lamps) for a 204. I daresay this has been suggested time and time again; but I haven’t happened to see it, and I daresay a lot of other fellows haven’t. I am told that the vacuum type is what is sold as “rough service”; I believe these were actually the ones referred to above.”
H A M - A D S

EFFECTIVE with the October issue of QST the following changes were made in the rules of this department. The Ham-Ad rate is now 15¢ per word. The restriction which has limited use of this column to members of the American Radio Relay League is removed and advertising may be signed either by company name or by an individual. A special rate of 7¢ per word applies to advertising which is obviously non-commercial in nature and which is placed and signed by an individual member of the American Radio Relay League. Please read carefully the following conditions under which advertising in these columns will be accepted.

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.
(2) No display of any character shall be accepted, nor any special typographical arrangement, such as all or part capital letters, or text which would tend to make an advertisement stand out from the others.
(3) The Ham-Ad rate is 15¢ per word, except as noted in paragraph (6) below.
(4) Remittance in full must accompany copy. No copy will be returned.
(5) Closing date for Ham-Ad is the 25th of the second month preceding publication date.
(6) A special rate of 7¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and which is placed and signed by an individual member of the American Radio Relay League.

PLATE POWER for your set, the very heart of its performance. For quietness, DX ability, life-long permanence, absolute dependability, lowest ultimate cost, no other plate type can match the achievement of an Edison steel-alkaline storage B battery. Built painstakingly every joint pure nickel, upset-electrically welded; Our Electrolyte Just Dated complete batteries, construction parts, enamelled aerial wire, silicon steel. Rectifier engineering service, radio UML, 4887 Rockwood Blvd., Cleveland, Ohio.

HAWLEY Edison element battery and parts standard for Edison, an ideal pentode at any price—no thin wire to drop off—contains 20 times more metal than regularly used. Heavy shock proof cells, fibre holders, etc. Everything for a rapid-fire "B" supply. Complete assembled 100 volt "B" $10.00. Knockdown kits at still lower prices. Chargers that will charge in series up to 160 volts $2.75 to $6.00. "Trickle B Charger" for 90 to 180 volt $4.75. Special transmitter "T" batteries up to 6,000 milli-amp capacity, any voltage. Write for interesting literature, testimonials, etc. B. Hawley Smith, 560 Washington Ave., Danbury, Conn.


DULHILL 204 transmitting condensers wanted. Radio, 180 West 22nd New York.

OMNIGRAPHs, Teleplex, Natrometers, transmitters, receiver, chokes, meters, 60 watters, S tubes, motor generators, synchronic, electric receivers, portable receiver, Vibrollexes, condensers, dynamos. Bought, sold, exchanged. L. J. RYAN, 9CNS, Hannibal, Mo.

ARRL sweater emblems should be worn by all League members. They are yellow and black 8"x8" diamond, felt letters and embroidered symbol. Only $1.00. Money order or currency only accepted. Eric Robinson, 156 Michigan Road, Weehawken, New Jersey.

MOTORS for television experimenters. 150 volt universal with rheostat. Variable speed from 500 to 5000 revolutions. $7.50 prepaid. Remittance with order. Samara, 41 South St., New York City.

TRANSFORMER-exchange—plate and filament supply transformers exchanged. What have you and what do you want? 26, 40, 50, 60 and 500 cycle transformers and filter chokes to order. Nat G. Scott, New Albany, Miss.

COMMERCIAL operator with amateur experience and sales ability, Federal Railway Institute, 817 Wells Street, Milwaukee, Wisc.

CANADIANS—24-1500 volt dynamo motor centre tapped, with extension shaft and pulley for driving $40.00. E. 211-D special short-wave 50-watt $22.00. 500 Jewell millimeter and 15 volt A. C. meter each $6.00, crystal ground to 167.1 meters $10. Ward-Leonard leak for fifty $1. All above new, not used. VESMB, 15 Churchill Ave., Toronto 3, Ontario.

ENSALL Radio Laboratory receivers and Transmitters are of the most modern designs and are supplied to meet any particular requirements of the radio art, Transmitters for forward and broadcast, also r.f. amplifiers. Experience in the designing of special apparatus is your guarantee of quality and efficient apparatus. We also build to order any items desired. Literature on any apparatus forwarded on request. Edward E. Ensell, Radio Laboratory, 1508 Grandview Ave., Warren, Ohio.

MOTOR generator bargains. 1000 Volt, 300 Watt, Two Commutator new General Electric Motor Generators. Direct connected to 110 Volt, 60 Cycle, 8500 R. F. M., single phase A.C. motors, motors price each 75.00. 750 and 200 Volt. Two Commutator new General Electric motor generators direct connected to 110 Volt, 60 Cycle, 8500 R.P.M., single phase A.C. motors. 150 volt 1000 watt new General Electric motor generators direct connected to 110 Volt, 60 Cycle, 3500 R.P.M., single phase A.C. motors, with field resistance, each $275.00. New H. R. C. General Electric Electric energizing transformer 3750 R.P.M., A.C. motors $5.75 each. New television variable speed motors for 110 Volt, Alternating Current, $6.00 each. A limited number of each of the above items. Also many others meeting users needs. Electrical surplus Company, 1911 Chicago Ave., Chicago, III.


TWO 60 watt tubes and sockets, $11.00, motor-generator set 750 volt 500 mills. 110 volt A.C. $85.00. Cardwell transmitter combined new $10.00. Deforest H. tube used $8.00. General Radio modulation transformer used some 2.50. Weston 150 volt D.C. voltometer $18.00. 43 plate signal condenser $18.00, 1½ henry 675 volt $50.00, 10 henry 675 volt $50.00, 13 henry 675 volt $50.00, 10 core 550 volt $50.00, or wires 4.60, 1½ "c" choke 150 mills. 200.00, three VT14 tubes 5 watt $1.00, filament transformer 75 watt $5.00, 0.25 Jewell thermo ammeter $7.00, 2BOR.


RECIPTER elements, pure aluminum-lead: 1"x4", 15 cents; 1"x6" 15 cents; pair complete. Sheets aluminum-lead. $1.00 square foot. Short wave coils edgewise copper ribbon or tubing. 18 diameter, 1 pound weight. Best Silicon steel cut out to order 25-35 cents pound. Send for list. Geo. Schulz, Calumet, Mich.


SELL or trade—complete accountability for station equipment. Best offer gets it. Edward J. Daugherty, Frederick, Maryland.

Say You Saw It In Q S T — It Identifies You and Helps Q S T
FOR sale or trade—both transmitting and receiving supplies, receiving sets and tubes. Want guns. What have you? M. E. Eaton, Olney, Texas.

GAUB selling complete U203A 50 watt transistor mixer. Write for list. Fernand Beck, 5637 Newton Ave., N. Y. C.

WRITE for price list of apparatus used at 1B17, 133 Bayard St., Providence, R. I.


BEGINNS an organization of radio "nute" with over 3000 members. Important products of this group are all hams, all of them radio-wise—dealers, builders, experimenters. Over $40,000 stock of high grade receiving and transmitting sets only to hams. Spend over $5,000 yearly on our own experimenting, carrying nothing until it passes our tests. 50c will bring prepaid over four pages of interesting results, and weekly data sheets for experimenters and builders (more reliable data than all radio magazines together)—20 weeks $1.00, 52 weeks $2.50. Full dealer's discounts to licensed hams, and radio-wise builders. Fred Luther Kline, Established 1920, Kent, Ohio.

500 VT4 navy five wammbers $1.50 each. Same voltages as UX2190 Q O. D. on request. Send for list. E. P. Haldeman, 1735 W. 6th St., Cleveland, Ohio.

250 Volt 1000 Watt Motorgenerator 110-220 Volt, AC drive $250.00. 1500 Volt 500 Watt motogenerator AC drive $125.00. 1000 Volt 200 Watt motogenerator, 110 Volt AC drive $75.00. 250 Volt motogenerator 110 Volt AC drive $45.00. 300 Watt 250 Watt generators $8.50. Couplings $1.75. 1/8 Hp. long shaft motors, fine for television $7.50. 1/8 Hp. 3450 speed motors $8.50. Also larger motors and generators. Queen City Electric Co., 1784 Grand Avenue, Chicago, Illinois.


SALE—one UP101 transformer and one DeForest "H" tube. $20.00. Express collect. Edwin H. Williams, 1225 Worland St., Charlottesvile, Va.

500 Volt 100 watt motor generator 110 volt AC drive $34.50. 250 volt DC generator with 24 volt DC motor $10.00. James Swatt, 1784 Grand Ave., Chicago, Ill.

SALE—Robins & Myers dynamo 1.5 K. W. 40 volts 38 amperes. Standard field rheostat and circuit breaker. 9CIG, Morris, Ill.

DEFECTIVE audio transformers reclaimed using factory windings. Original guarantee, 90c. "B" units $1.00. Inquiries invited. 9 S. Reed Ave., Mobile, Ala.


James Radio Curtis, 1109 Eighth Avenue, Fort Worth, Texas.


Aero-Bx 1-MFD 1000-volt tested condensers $1.50. 5-Dial phone $12.00. $2.00 4 volt variable condensers 40c. Griffith, 1109 Eighth Avenue, Fort Worth.

TRANSFORMERS, 5 volt, 75 watt, $5.75. 12 volt, 150 watts $6.63. 24 volt, new cabinet mounted. $10.20. Also cores, castings, etc. Send for list. Robert Annis, 524 N. Oriental, Indianapolis, Ind.

QSL cards, new forms, government cards $2.00 per hundred. Write $1.00. 8 page catalog $2.00. Free copies of QST, 257 Parker Ave., Buffalo, N. Y.

SNAPS—two WE 211Ds Western Electric fifty waffers brand new and in original factory sealed cartons. $23.00 each. 150 meter power crystal with mounting $14.00. Postpaid. Radio 2YV, 1005 Foster Ave., Brooklyn, N. Y.

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275 VOLT direct current generators will give up to 600 watts used $2. 6 to 400 volt watt dynamos $15. 200 watt 600 cycle $10. 500 cycle motor-generators. Dubbler condensers. R. Wood, 46-20 102nd St., Corona, N. Y.

MORE and more "Hams" are buying Master Radio Waves and saving money. Send for description. Accurate parts-account metering guaranteed. 100 and 400 meter up- pers—$1.20, 0-10 or 15 AC Volts—$2.50. Pure rectifier elements and copper tubing induction. Send for our complete line of meters. William Harrison, 95 Ft. Washington Ave., New York City.

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CRYSTALS: 86 meter band $15.00. 175 band $10.00. Blanks $1.00. Hollister, 9DRD, 930 Baltimore, Kansas City, Mo.

Samson 210 power block. Acme Parvot 210 condenser block, all necessary Hardwick-Field and Electro Tru- volts of course. Samsun Simphonic audio transformer. Samson Simphonic audio transformer and output choke, for first stage and 210 push-pull amplifier and plate supply, used less than ten hours. Complete on 52 power transformer, $90.00 primary with line compensating switch, 525, 8 and 8 center tapped. $10. Two American No. 84, 100 Henry chokes, $4 each. Gen- eral radio 85A speaker—all new. All fit a 8.8 Swarth- more, Pennsylvania. All used very little, perfect. A. H. Kigre, Swarthmore, Pennsylvania.

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15WATT laboratory built transmitter—full wave tube rectifier and filter, 96 dollars. Send for photo. 900 cycle generator thirteen dollars. Watson, 4006-155th St., Flushing, N. Y.
3/16 inch contact Signal Corps kert, 95c, 37v volt, plate transformer with 2 center tapped filament windings and C biased, $2.75, Ward Leonard resistors, 65c to $1.00, Bradley radiostats, $5.50, Bradley &c 2000 to 30,000, $2.75, Bradley straight with copy in following address form only:
2 BUO—Werner H. Olpe, 14 Brooklyn Ave., Jamaica, L. I. N. Y.
9UG—Ray E. Crayder, Morris, Ill.
W1BN—Frederick L. Shaw, 19 Carrie Ave., Rumford, R. I.
y51FM—J. Fred Mejia, 7a Avenida Norte No. 18, San Salvador, El Salvador, Central America.

QR A SECTION
50c straight with copy in following address form only:
2RJO—Werner H. Olpe, 14 Brooklyn Ave., Jamaica, L. I. N. Y.
9UG—Ray E. Crayder, Morris, Ill.
W1BN—Frederick L. Shaw, 19 Carrie Ave., Rumford, R. I.

The following stations belong to members of the A.R.L.L. Headquarters gang. Mail for them should be addressed care A.R.L.L., Hartford, Conn. When operating 1MK they use personal aines as indicated.
W1MK
L. R. Huber "ou."
R. A. Hull "ab."
WIAL H. P. Westman "rs."
WIBDI F. E. Handy "fh."
W1HH W1EH K. R. Warner "kh."
W1BMM-W1FL G. D. Mersere "dm."
WIBUD A. L. Budlong "bud."
WICER-W1SZ J. J. Lamb "jm."
WIES A. A. Hebert "ah."
WIKP F. C. Beckley "beck."
WIPX C. G. Kenedie "ck."
W1SZ-W1BIZ C. C. Rodimon "rod."

QBRE—Wagner H. Olpe, 14 Brooklyn Ave., Jamaica, L. I. N. Y.
9UG—Ray E. Crayder, Morris, Ill.
W1BN—Frederick L. Shaw, 19 Carrie Ave., Rumford, R. I.

QR A SECTION

50c straight with copy in following address form only:
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WIKP F. C. Beckley "beck."
WIPX C. G. Kenedie "ck."
W1SZ-W1BIZ C. C. Rodimon "rod."

BRADLEYSTATS—E210
E-210 Bradleystat is fine for controlling the A. C. input line voltage into A. C. sets, thus protecting the tubes from being blown due to a sudden line voltage surge. Also adapted for filament and plate control. Applications on Power Transformers in Transmitters. Current Capacity 10 amps.
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COILS . . . . . . . . .
of all descriptions made
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Complete Kit of parts lists at $55.30, our
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An indicating instrument is an essential part of the equipment of every good radio receiver installation, since it aids in maintaining efficient operation, secures the best reception and fully protects the financial investment.

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Three Range Instruments for A. C. and D. C. Operated Sets. A. C. Model 528, D. C. Model 489

These designs are an outstanding achievement in high-grade, small instrument manufacture. They are enclosed in bakelite cases—black for D. C. instruments and mottled red and black for A. C. instruments. Their excellent characteristics and performance commend them to the attention of all who appreciate fine workmanship and demand unfailing reliability. The illustration at the right shows the three-range model—750-250-10 volts for D. C. (1000 ohms per volt). Also made as a three-range A. C. instrument—150-8-4 volts. A. C. $16.50 D. C., $28.00.

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These instruments are also furnished as D. C. double-range Voltmeters—(with either 1000 ohms or 125 ohms per volt)—and as single and double range Ammeters. $13.50 to $22.50. For A. C. testing they are supplied as single range Ammeters and Milliammeters and double-range Voltmeters. $13.50 to $18.50.

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and falling note so often troublesome in CW code recep-
tion, due to instability in the circuit, will obviously play
havoc with Broadcast Reception on the short waves, if at
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DENSERS are rigid and vibrationless and will absolutely
hold their calibration, thus eliminating one of the im-
portant causes of circuit instability in short wave receivers.
The tuning curve is ideal, midway
between SLW and SFL, attained with-
out eccentrically shaped plates, thus
concentrating the weight of the rotor
close to the shaft. It will pay you to
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Transmitting Condensers for powers up to 50KW
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Receiving Condensers in all standard capacities.
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All good Dealers carry Cardwell Condensers.
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Super-Sensitive
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For super-sensitivity in your short wave receiver—for greater distance range and reliable performance—build your set around the famous Aero Interchangeable Short Wave Receiving Coils. Aero Coils are ninety-five percent air dielectric, with less than one-sixth of the losses of celluloid or bakelite. The new two inch diameter coils have already won wide popularity. The Aero Short Wave Tuner Kit No. LWT 12 illustrated above consists of three Aero Interchangeable Coils and base mounting with Primary Coil. Price Complete $12.50

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The range of the LWT-12 Kit can be considerably increased by adding Aero Coil No. INT-4. This coil can be plugged into the LWT-125 mounting base and has a range of from 125 to 275 meters. Coil No. Int-4 ......... $4.00

Aero Coil Kit No. LWT-10. For use with Foundation Units containing plug-in mount, or replacing LWT-126 Coils. Same three coils as in LWT-11 Kit. No. LWT-10 ................... $10.50

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The Green Book contains data needed by every net builder, 63 pages—wiring diagrams of receivers and transmitters—information about new developments. Send 25 cents for your copy.

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In keeping with its policy of assisting in the experimental development of the art of radio, Burgess Battery Company contributes a high potential battery particularly necessary for the successful operation of the receiver used in radiovision, television, and other methods of reception where there is the transference of an image, moving or stationary. In photo electric cell experiments, the PL is indispensable. Also can be used for airplane radio, plate supply.

“Ask any Radio Engineer”

BURGESS BATTERY COMPANY
MADISON, WISCONSIN
Changes in the Rules and Regulations

ATTENTION is called to some changes which appear in the recent edition of the Rules and Regulation of the Communications Department. The major changes that have been made facilitate message handling and League organization with respect to our operating procedure in line with the Washington Convention. As much useful information as possible has been included in this eight-page booklet to make it a useful reference for the operators of the individual stations. Each Official Relay Station appointee and C. D. official should have received a copy by this time. Additional copies of this publication will be sent to any address on receipt of a postal card. Send for your copy today.

The book contains lists of international prefixes, the American way of calling, examples of calling practise, message cable-count check, "service" messages, an explanation of the new system of individual or international operating material on relaying, getting "fills" in messages, League organization, the duties of various A. R. L. officials and appointees and how they are chosen for the positions they fill, in addition to a more complete section on the subject of radio communication laws and regulations than has been included in this publication before. The official practise determined upon by the International Radio-telegraph Convention states that the calling station shall make the call by transmitting not more than three times the call signal of the station called and the word DE, followed by its own call sign or information, not more than three times. In amateur practise we find this procedure expanded somewhat as may be necessary to establish communication. The call signal of the calling station must be inserted at frequent intervals for identification purposes. Repeating the call signal of the called station five times and signing not more than twice (this repeated not more than five times) has proved excellent practise in connection with break-in operation. The receiver being kept tuned to the frequency of the called station. The use of a break-in system is highly recommended to save time and reduce unnecessary interference to a minimum.

The committee of "Directionals" COs it is suggested that every general call of inquiry be made informative when possible to reduce the number of useless answers and lessen needless interference under the operating conditions that we shall meet in 1929. Stations desiring communication with amateur stations in a particular country shall include the official prefix letters designating that country after the call sign of that country. Until such time as the official prefixes used by the amateurs of various countries are designated by these countries from the block of prefix letters assigned each country by the Convention, and until these amateur prefixes become known, the older I. A. R. U. system of international designations (formerly used by telegraph and letter mail) may be used in calling (just like the prefix W or K) or following each CO to indicate continent and country. The "intermediates" will of course be preceded by prefixes just as fast as these are assigned. Thus a United States station looking for communication with any Canadian amateur station calls: CQ VE CQ VE CQ VE DE W8NR W8NR W8NR AR.

To differentiate domestic from foreign calls in which the directional CQ is used, the city, state, point of the compass, etc., is mentioned only after the third CQ just before the word DE and the thrice repeated station call. Thus a western station with messages for points in Massachusetts might call: CQ CQ CQ DE W8CBA W8CBA W8CBA AR. Another western station with traffic for eastern points might call as follows when looking for an intermediate relay station: CQ CQ CQ EAST DE W6AJM W6AJM W6AJM AR. As always, the A. R. L. method of calling, that is, that of calling three times, signing three times, and repeating three times. After a CQ, the dial should be covered thoroughly for a number of minutes looking for replies.

The new Q Code includes a number of important changes from that indicated by previous international radio-telegraph conventions. For instance, QTA and QTB are now "QRR Official A.R.R.L. "Land" QRR Official A.R.R.L. "Sea" QRR Official A.R.R.L. "Land\Sea" or in effect, "Canceled nr. . . . as if it had not been sent.\n
QST General call proceeding a message addressed to all amateurs and A. R. L. Members. This is in effect "CQ APRIL.\n

Attention is also called to the use of the standard abbreviations indicated by the International Radio-telegraph Convention for requesting, "repeats" or in effect, "fills." The abbreviations each carry the meanings indicated below. Each is used after a question mark and in most cases followed by a word from the text to request a repetition.

AA, all after . . .
AB, all before . . .
AL, all that has just been sent.
RN, all between ... and ...
WB, word after . . .
AQR, address
PRL, preamble

QST FOR NOVEMBER 1928 I
PRIORITY IN EMERGENCIES

As exemplified once again in the recent emergency in which amateur radio stations and operators played an important part, the station owners considered the possibilities of an emergency arising before the trouble actually came to pass were the owners to be credited with doing the most important work. They were ready, prepared for the crisis when it came. It behooves all of us to think upon these matters, to likewise prepare ourselves and each and every future opportunity for such work. The very least we can do is to study the history of such cases so that we may proceed carefully and systematically about our business without losing our heads and passing up glorious opportunities for service in any crisis.

Priority must be given messages from a stricken point asking for relief measures such as food, antitoxin, blankets, doctors, nurses and necessities of life. Messages informing the outside world of all that has taken place, the extent of the disaster, perhaps containing public appeals for assistance if the authorities in the affected area believe this necessary. A third class of messages is between friends and relatives, messages of sympathy or messages of assurance to and from the stricken territory. In each emergency, many amateur stations at as many different points all over the country get on the air with such messages from anxious friends on the outside. Of course it is necessary for stations with such traffic to stand-by until the relief and press messages are off the hook and an opportunity is given for clearing such private messages.

During emergencies it is often possible to send broadcasts to the press generally (or addressed to U.C., A.F.N., etc.) between the transmissions of relief priority traffic. Invariably such messages are correctly delivered to local newspapers in such association the public kept informed, and amateur radio credited. Such broadcasts should be sent at regular intervals if possible. They sometimes have been overlooked in the rush. Perhaps the duty of the emergency station is a full report of the work that was done so that the whole achievement might do its bit for amateur radio.

Considerations of an emergency power supply are of first importance in many cases where radio is destined to play a part. If local electric service mains are crippled one may have recourse to B-batteries, dynamotors driven from storage batteries and the like. In a serious emergency, communication is of first importance. By consulting with other amateurs and putting all the available facilities together in the most favorable location a station can be made operative in short order. An order from the competent authority will make supplies of batteries or temporary service from a public utilities company available for emergency stations. It is sometimes as easy to move the amateur station to a power supply as to connect power supply together and bring it to the amateur station. This is especially true if the transmitter and receiver are built as independent units that may be moved about at will. In some emergencies B-batteries have been provided from local electric supply stores. In other cases broadcast listeners have been called upon to contribute their individual batteries to the common cause.

It is impossible to tell just when or where will be the one to render the service in any emergency. In the North, sleet storms and crippled wire service threaten public safety during at least the last three months of each year. Floods periodically threaten various sections of the country at different times of the year, due to melting ice and snow or to long-continued rainstorms. In the southern hurricane intensive hurricane intensifies. The situation in all such emergencies is a serious one. The entire question is one of preparedness for the individual station. Shall we be ready or not, if and when an emergency arises? Be ready for the emergency call, QRZ, when it comes. Jump into the breach with your station if feasible or stand by and avoid interference to those handling emergency traffic if this seems to be the right thing to do.

If you live along the line of a railroad you should get in touch with some representative of the railroad so he will communicate with you in case amateur radio can help in an emergency. You should likewise make note of the address of Red Cross headquarters, of local military units, police departments, representatives of press associations and the like, if possible putting your station on record with such organizations. Petent authorities so that you will be called upon to assist when emergency communication appears to be desirable. Under such conditions it is best to keep in touch with the situation by radio and to again offer service to these agencies well in advance of the actual emergency. In case stations have kept hourly schedules in expectation of a coming emergency which did not materialize but in other such cases signal service was performed with considerable satisfaction to individual amateurs and amateur radio operators generally. Emergency work repeats big returns in public esteem and personal satisfaction. If we consider the history of radio work in cases of emergency, it is evident that amateur radio from whatever standpoint it is considered.

Every amateur should give some thought today to the construction and installation of a set capable of doing emergency work. A list of organizations and responsible individuals that will want to file priority traffic once the emergency broadcasted (or is used in addition to) inadequate wire communication facilities should be prepared for emergency use. The people on the list should be informed of the nature of amateur radio work and invited to make use of our facilities in any crisis. Keep a workable emergency rig in readiness. Know where a power supply can be obtained for the rig in case it is needed even if you do not have such a power supply at your station regularly. Prepare today, volunteer your services. When the crisis arises, volunteer your services. PREPARE TODAY!

HURRICANES AND AMATEUR RADIO

By Louis R. Huber *

The recent hurricane which has done so much damage carries with it a lesson for amateur radio. Over a score of stations, most of them amateur, took part in getting relief messages and press messages transmitted to their destinations. Now the excellent report of the story made up from the reports we have received will be in order. It seems best to start with the hurricane, which hit the Virgin Islands on September 13. By noon of the same day, NAU, the Naval Radio Station at El Ceyz, Porto Rico, was without antennas, Communication and travel between El Ceyz and San Juan, where the control station is located, were impossible. Cable service was interrupted. The first communication was effected by means of an improved high frequency transmitter put together at San Juan, using the call of NAU. WSSO was the first station worked. The second, occurring near midnight of the 14th, was heard at two points—The University of New Mexico at San Pedro and the Naval Radio Station at Balboa. From their reports, Washington (NAA) who were able to get into communication at the beginning of the 15th, about five hours after NAU worked WSSO. The signals from NAA were not very strong at this time, and after two hours of communication, daylight cut off the signal. NAA was put on the air at Washington. The next good contact was through W2APD of Brooklyn, who handled a number of important messages during alternate hours.

On the neighboring island of St. Thomas the Naval Radio Station, NBB, was put out of commission. KAAN volunteered his apparatus, however, and moved over to NBB with two UX-210's in his Hartley transmitter, using a small motor-generator as plate supply. After communication was established, KAAN signed as NBB.

*Assistant to the Communication Manager
In the future, when the hurricane visits you—we trust we answered. If the balance had been handy we amateur radio will be found as the one type of communication that never fails.

W2BB in New Jersey was the boy who put the new NBB into communication with NAA, by a pretty piece of relaying. Schedules were kept from NBB with NAA for the next week and a half. On the NBB-NBA-AAA circuit the following amateurs helped in relaying traffic: W1RF, W2AFO, W2BBB, W2BBG, W2WSZ, W2BBY, W2CRD and W2CTG. W2AFO and W2CRD have received the first details of the extent of damage in St. Thomas.

The hurricane didn't stop in the Virgin Islands or in the Bermuda Gap, but kept going and eventually hit Florida—hardest. With this ability in mind, W4AFC and W4AGR in Palm Beach bought a set of emergency "B" batteries and homing transmitters. Since Holli is the Fire Department, emergency traffic was handled by Holli and Dana (W4W) of the Fire Station's end of the building that served also for the Police Department and Street Department. Before the storm hit the city the set was tested with W8SUM at 6:00 a.m. of the 16th. Most of this day, as the storm swept over the surrounding country and finally engulfed the whole locality, schedules were kept with W4AGS and W4ANU. At 4:00 p.m. the antenna was blown away. The wind increased so that the station had to be vacated until 6:00 p.m., when a short lull allowed the apparatus to be moved to the Police Department end, suffered much damage as the former location. The whole station had to be reinstalled and a new antenna had to be set up. Attempts at using an indoor antenna failed, so a bent Hertzian was put up amid a shower of brick bats and roof tile. At daylight of the 17th, communication was re-established. W4W, W4ABH (UN) until 6:00 a.m. at the key proved to have best contact at this time. From the time of the worst blow (starting on Monday, the 17th, at 7:30 a.m.) W4AFC, operated by Holli, and W4AGS in the air continuously until relief communication superseded amateur radio's emergency communications (Thursday, Sept. 20, at 3:00 p.m.) W4AFC handled traffic intermittently with periodic schedules on Friday and Saturday. The arrival of a Tampa relief radio unit, with call of 4CV, allowed Holli and Dana to get some much-needed rest.

Perhaps we should mention the fact that Dana (W4AGR) lost his home, his car, and all his personal effects in the storm.

Time WPBT frequency Remarks
0000-0100 8800 kc. General amateur contact on 0700 kc. band.
0200 8800 kc. W2UO on 7680 kc. (39.6 m.)
0255 8800 kc. W4IM and W2ALU
0500 8800 kc. W9US on 7080 kc. (42.4 m.)
0530 8800 kc. W4MK (M, T, Fri.) on 7160 kc. (41.9 m.)
0600-0630 8800 kc. W4UO as above followed by traffic on on 7890 kc. (39.6 m.)
0700-0730 8800 kc. W6ARD traffic and ARCC traffic going for Waddinks.
1200-1230 12800 kc. NPU traffic on 3290 kc. (86.6 m.)
1815 5800 kc. General amateur contact on 7000 kc. band.
1900 8800 kc. W6ARD press on 7070 kc. (42.5 m.)
1910 8800 kc. NAA traffic on 5270 kc. (58.5 m.)
1955 8800 kc. W6RF and W2ALU
1100 8800 kc. W4W on 7020 kc. (40.6 m.)
1130 8800 kc. General amateur contact on 7000 kc. band.
1200 500 kc. Commercial two-way work.
1230 12180 kc. General amateur contact on 8000 kc. band.
1300 500 kc. Commercial two-way work.
1400 500 kc. Commercial two-way work.
1600 7800 kc. W2HF and W2UO on frequencies near or above 16,000 kc.
2100-2200 1250 kc. W6ARD press.
2200 500 kc. Commercial two-way work.
2300 12180 kc. W2HP in 14,620 kc. (20.5 m.)
2330 12180 kc. W2BBR traffic on 14,810 kc. (20.2 m.)
2400 500 kc. Commercial two-way work.

Open for amateur traffic. WPBT also listens directly after each traffic schedule if there is sufficient time before the next schedule.

VOQ

On September 23 Lansingham and Wallace had a one and one-half hour contact with Ed Manley of VOQ from W6AM giving him the latest dope from CQST. In fact, the Medics sent a Weekly press message, as did W1AFB and W4ALF. In Cuna, noAY held up the amateurs' end of things. W1RF held on and we answered. If the balances had been handy more could have been weighed and not found wanting. Work of this sort is distinctly worthwhile. In the future, we hope our four contacts here this morning amateur radio will be found as the one type of communication that never fails. WPBT

W2KR and W2ALU have been keeping schedules with WPBT, the S.S. City of New York of the Byrd Antarctic Expedition, each station keeping the schedule on 7850 kc. (38.2 m.) on alternate nights. According to a report from operator Berkner of WPBT, these two stations have handled 56% of all the personal traffic from the expedition. In the first two weeks alone W2KR delivered 105 messages and handled between thirty and forty replies. The ship's position has been reported daily to Commander Byrd's office largely through the aid of amateur radio operators. One night W2KR handled eleven messages in exactly 22 minutes—not such a bad record for speedy transmission. W6AUG also reports keeping the daily schedule WPBT on September 5.

The one-kilowatt tube set is being used for most of WPBT's work. Although most of the schedules are kept on 8000 kc. the ship's radio—42.5 meters—also mentioned 60 cycle note may also be heard on 12,160 kc. (24.6 meters). Operator Berkner sends us the following list of schedules through W1MK to show the open periods for work with WPBT. He stated that he hoped to work as many amateurs as possible—but that it was sometimes impossible to work all those heard calling the expedition due to impending schedules which must be kept with commercial stations.

We understand that the sister ship, WPAT, left Norfolk about September 6th. It is hoped that the following list of schedules will be useful to everyone interested in the Byrd expedition. Note particularly the times left open for general amateur contact. All times indicated are GMT.

We should mention that Dana (W4AGR) lost his home, his car, and all his personal effects in the storm.

Communications passed through a number of amateur stations and through WVA, the Army's control station at Washington. Owing to the unsettled condition of affairs during the long period of unbroken operation it was almost impossible to keep an accurate log. In making out a report for us, however, R. F. F. H. delayed the approximate order of their service: W4TO, W4TA, W4NA, W4JM, W4CWV, W4RN, W4ACI, W4ACS, W4QJ, W4CT, W4W, W4IX, W4KV, W4ADP, W4ACK, W4ATC, W4ZZB. A rough estimate puts the amount of traffic handled at W4AF during the week at 8,000 words. Sixteen individual messages were handled. Seventeen Red Cross messages were handled. Approximately 162 messages of a personal nature were handled.

The Palm Beach officials—especially the Fire Chief—were very helpful throughout the whole time of disaster.


The interrupted cable service between Bermuda and Halifax was supplemented by communication between n3JTP and W2BBB, W4RN—to (W2BSC), W2CUQ—(42.5 meters), W2ADP—(50 meters), and W2AHU—(7000 kc. band). W2ALU, W2W, W4AGS, W4AAO, W4ASW, W4ZT, W4BM, W4RH, W4GC, W4AU, W4ACI, W4ACS, W4QJ, W4CT, W4W, W4IX, W4KV, W4ADP, W4ACK, W4ATC, W4ZZB. A rough estimate puts the amount of traffic handled at W4AF during the week at 8,000 words. Sixteen individual messages were handled. Seventeen Red Cross messages were handled. Approximately 162 messages of a personal nature were handled.

QPST FOR NOVEMBER 1928

III
often and reappearing in clouds of steam. Signals surely have been poor. North of latitude 68 was the best place. We found east coast reflects numerous up there. The conditions in the Behring sea were so poor that we would hardly hear the Pacific coast. Only a dozen or so stations have been heard on twenty meters during this entire trip.

WSDME has been heard at VOQ and has spent some time in attempting QSO, especially when the Morrissey was off Wrangel Island in late August.

WSBS

After leaving Hamburg, Germany, the Yacht Carnegie of the Department of Geophysical Magnetism visited Iceland and Barbados and at the present writing (in early October) is approaching Balboa. Starting from Hamburg it has a new transmitting antenna of the inverted L type was installed with improved results on 6674 and 9045 kHz. During August some “dead” nights were observed, coincidental with the appearance of Aurora Borealis. On these nights no signals were heard with great intensity and once even the reliable NAA time signals failed to be heard. In middle August a curious effect was also observed. Contact with the United States would be excellent at about nine and ten P. M. EST but by about midnight all signals, especially those from the eastern part of North America would have faded practically out. WSBS signals faded in the same manner. Stations in the middle west were only slightly affected during these periods. In August it was reestablished with NKF, but not in daylight. Daylight tests were continued but without avail. Atmospheric noises were quite substantial but strong and steady. Above 2000 consistent traffic schedules were maintained four nights per week with W2XAU in New York and three other work with W1MK in Hartford. The W5DME reports keeping a regular Saturday night “sked” with WSBS.

The most recent report from “LJ” reaches us as the Carnegie is nearing the Canal Zone. In Barbados members were observed down all over the island and in the two weeks they were there, were made members of the Aquatic Club, the Yacht Club and several social parties. The old-time work of expediition doesn’t permit a great many hours to be devoted to radio but all of the work is extremely interesting. On one occasion “LJ” reported almost casting a ten foot shark when the line went fishing—but got away when he had a few feet out of the water. (The Carnegie is scheduled to leave Barbados October 14 bound for the Lesser Antilles, Cailio, and Papete). The radio report follows:

S. S. Carnegie WSBS nr 159 Oct. 8, (via WIMK) “Schedules have been worked consistently with W2XAU, W1MK, and WCEI during September. In addition W9AVZ, W4AHL, W5CXL, W5AVD, W6CUM, W6SX and NKF were worked. Conditions were very good all that time. Schedules were temporarily discontinued the last two weeks of the month while the yacht was anchored in Carlisle Bay, Bridgetown. Barbados although we kept WICEI up late two nights putting through a rush message for us. A large number of stations have done us favors and thanks are tendered them all. As time goes on we shall be able to add more and more to our “worked” list. We sailed from Barbados on October one and are now about 250 miles from Panama where we shall stay for a few days. Our schedule is working order and conditions excellent. We have had very little trouble with static. VY 75 to all the gang.


WIMK

WIMK operates on frequencies of 3675 kc. and 7150 kc. Robert B. Farmeren, “RF”, is the chief operator. His fist is familiar to most of the amateur fraternity of the air. Less frequently from WIMK the schedules may be heard by Mrs. R. Huber (Assistant to the Communications Manager), “FH” of F. E. Handy (Communications Manager) or “MAN” of A. A. Hebert, (the League’s Treasurer-Field Man).

“3500” and “7000” are used to designate the frequency band on which operation from WIMK takes place. Most amateurs are familiar with the “eighty meter band”, and 7000 kc. to the “forty meter band”. Throughout this notice three groups are 70th meridian (Eastern Standard) time.

All the latest official and special broadcasts are sent simultaneously on 3575 kc. and 7150 kc. at the following times:

3:00 p.m.: Sun., Mon., Tue., Thu., and Fri.
7:00 p.m. Mon. and Fri.
12:00 noon Sat., Mon., Tue., Thu., and Fri.

PERIODS OF GENERAL OPERATION have been arranged to allow everyone a chance to communicate with HQ. Usually these general periods follow one of the Official Broadcasts. They are listed below:

3500  —  7150 kc.
9:15 p.m. — 9:00 p.m. on Sun., Mon., Tue., Thu., and Fri.
10:00 p.m. — 11:00 p.m. on Mon. and Tue. (no official broadcast is sent preceding this period)

The following regular schedules are kept with other stations. Traffic to and from HQ will travel quickly through any of the following: (Eastern Standard Time used throughout)

WIACH (3500) Sun., 7:00 p.m., Thurs., 7:15 p.m.
W1RG (3500) Mon., 7:00 p.m.
W1BQD (3500) Mon. and Fri., 9:00 p.m.
W1RY (3500) Mon. and Fri., 7:30 p.m.
W1VB (3500) Thurs., 7:45 p.m.
W2BR (7000) Sun., 9:15 p.m.
W2GP (3500) Sun., 7:30 p.m.; Fri., 9:15 p.m.
W2PA (7000) Sun., 9:45 p.m.; Mon. and Fri., 7:15 p.m.
W6A (7000) Mon., 11:45 p.m.
W2ED (7000) Fri., 9:45 p.m.
W1VB (3500) Fri., 1:30 p.m.
W1X (7000) Sun., 7:45 p.m.
W1VY (3500) Sun., 7:45 p.m.
W6MC (7000) Mon., 11:46 p.m.
W6V (7000) Fri., 12:30 p.m.
W6J (7000) Mon., 11:30 a.m.
W1VB (3500) Mon., Fri., and Sat., 11:30 a.m.
W9A (3500) Sun., 11:15 p.m.
W1AY (3500) Tues., 11:30 a.m.
W5BN (3500) Tues., 11:15 p.m.
W6DED (3500) Wed., 9:30 p.m.
W7Z (3500) Sat., 11:00 p.m., Thurs., 9:00 p.m.
W5AL (3500) Tues. and Fri., 7:15 p.m. (W59AL on 7220)
W3AF (3500) Tues., 9:00 p.m. (W9APY on the 7000 kc. band)
W9BQ (3500) Mon., Fri., and Sat., 11:00 p.m.
W9XO (3500) Sun., 11:30 p.m.; Thurs., 11:15 p.m.
W8X (7000) Mon., 11:30 a.m.; Fri., 11:45 p.m.
W8FA (7000) Tues., Wed., and Sat., 12:30 a.m.
W6J (7000) Sun., Mon., and Fri. at approximately 10:15 p.m.

About 28-mc. Work

W2JN reports activity on the 28 mc. band on the increase. On September 30, PCHR’s second harmonic radiation was heard again at 1400 GCT, and again weaker at 1500 and unheard at 1600 GCT. The 28 mc. harmonic of W50H was both copied and returned on W2JN. W50H was last heard at 1100 GCT. W2JN was RT7 through using but one UX210 with 500 volts. Schedules for further 28 mc. tests to be run on October 3. W50H were arranged for 28 mc. (28 kHz.), 1500, and 1600 GCT. It is impossible to give results at this writing (Oct. 5) but we hope to have such material for presentation next month. GCP.

W5HE (3500) reports through W2NHE. He copied W2JN on 28 mc. on Sept. 30 from 1530 until 1736 Greenwich. The signal fading out at dusk, GCP heard W2JN (3500) Mon. and Fri. 9:30 p.m. W2AD, W2JN, and W2JN were heard with good audibilities on the 28 mc. band on October 1 and 2 between 1525 and 1720 GCT. BR598 (Antonino) worked in Northwich, England, on the following station at about 1630 GCT Sept. 20: W2JN calling W2EDA, W2EDA replying to W2JN, W2NM calling W2JN.

W6DWP was copied for about an hour on 28 mc. on Sept. 16 at W8SEX. W6DWP藓s that many commercial stations can be heard also and that he believes the success of this band for regular work assured as soon as more stations begin to use it. GCB plans to operate a beam transmitter on the 28 mc. band this coming season and looks to us for...
reports. GANH expects to transmit regularly each Sunday on 28.6 mc. at 1500 GCT, c.w. will call U.S.A. on 80 mc. Sundays from 1400 to 1415 GCT, listening for North American 28 mc. stations from 1415 to 1430 possibly continuing through other periods starting at 1500 GCT.

K5CFQ has been doing a lot of work on this band. He has one of the newest two-way power through a 16-foot two-wire voltage feed system. K5CLJ, W1XR, W2A, and K6JZ have been heard on the 28 mc. band by K5CFQ who has also had excellent two-way contacts with K5CLJ and K6JZ on this frequency. K5CLJ has been reported R5 in Salt Lake City, Utah, this week on this frequency. Who is testing daily, 10.2 meters between 4 and 5 p.m., E.S.T.

Traffic briefs

Miss Elizabeth Zandonini, W3CDQ, was among the U.S. amateurs who visited Europe this last summer.

During the National Air Tour the Tulsa gang threw together a set at the Municipal Airport, operating under special license with call letters KGHR for several days. Reports on flying conditions were transmitted from local observers and 8XAA, one of the planes, was copied enroute.
WIMK will go on the air on Thanksgiving Day the same as usual for schedule operation.

All who took part in the Scandinavian-American Tests are urged to send their logs to A.R.R.L. Headquarters if they have not already done so—in order that the full results of this competition in QST and so the prizes may go forward to the winners at the earliest possible date.

At the Denver Radio Show, the station of Colorado's Reuben's W3BO, was operated by over wires furnished free of charge by the telephone company. About 500 messages were originated.

**LO S A N G E S G E T - T O G E T H E R**

The Amateur Radio Research Club of Los Angeles gave an excellent banquet on September 12th, Mr. H. A. Layton, the president and chairman of the meeting constituting the regularly quarterly meeting of the Los Angeles A. R. R. L. Section. One hundred and seventeen amateurs sat down to dinner on the top floor of the Chamber of Commerce Building, with the distinct understanding that all the noise could be made that was wished.

Director Badcock came down from San Francisco and gave a fine talk on the new status of Amateur affairs. He always gives us very fine information and it was much appreciated by all.

**ATLANTIC DIVISION**

**D - D E L - D — SC M , H. H. Layton, W3AS — Delaware: W3ALQ is rebuilding his chemical cooling coil for third time. W3WJ has been off the air rebuilding the station. W3AJH is on 14,000 kc. now. Maryland: W3CRC is now an ORS and has a sked with W3ANS, and W3ADE, W3BRW wants a sked with stations south. W3TR has no trouble in moving traffic, W3RQ will soon be working with crystal control. W3AXP is still out in middle west enjoying his vacation after midshipman cruise. D. of C.: W3GT is the busiest man of the Section. Skeds are maintained with W3RWF, W3FJ, W3AJ, W3ARD, W3ARO, and W7IQ, FB.

**S O U T H E R N S O U T H J E R S E Y — S C M , M. J. Lotysh, W3CGF—W3CGF leads us as usual with highest total in lenor State of six daily schedules. W3AMS amassed a total of 67 in spite of being busy with service work. Some of the others who haven't been reporting had better be careful. W3ATJ is doing fine work. He delivered a sked at Long Branch and in Phila. from Chicago regarding his wife's operation after this man's being unable to send or receive word via W. U. For W3AMS is quite a newcomer and looks like a good ORS prospect. W3ARN is having antenna trouble at present and you are all expected to report. Traffic: W3CFG 480, W3ARO 67, W3ATJ 10, W3AVS 8, W3ARN 5, W3ATP 2.

**E A S T E R N P E N N S Y L V A N I A — S C M , J. B. Morgan, W3PQ—Z3FZ sure is piling up the traffic. ZF and WEU work the set on alternate nights, keeping the "Northern Century" from spreading the rails. W3WJ had a lot of Allentown Radio Show traffic. W3QF finds traffic good and doing little 700 kc. DX work as we can get. W3BIO has the new bug pretty well under control. W3AVK complains of lack of traffic. Look at his total. School has started to Q0F apart time at W3BIO but his total still looks good. FB. W3CDS can't seem to get started at all. W3CWU works now in a radio repair shop, good to night school and still has time to handle some. Good complete. WEUSD says 2500 kc. has come back to life again up his way. W3BFV is hampered by uncertain hours, as far as we can gather. W3CSS rebuild and saw ras recently and now is very good. Now for a good filter and some careful tuning, OB, and no one will be able to say you haven't the 1929 idea. Here's another first time reporter, W3CDD with a big fat total. He is the western point for W3ZF in the now famous New York-Chicago nightly traffic route. ZF reports W6CMO is a very good op.

**W I S C O N S I N — S C M , C. L. Wright, WEU—**

The same bunch are still at it getting in reports on schedule traffic, etc. W3ADE reports no traffic due to rebuilding, for 1929. W3AFG makes the BPL this month a hit after W3OK. W3WAS has just returned home and will be on the air soon. W3AWSX makes the BPL with over 300 messages, W3AVS is handling traffic and rebuilding. W3CMC has schedules.

**W I S C O N S I N — S C M , C. S. Taylor, W8PJ—**

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**Q S T F O R N O V E M B E R**

DIVISIONAL REPORTS

**W A S Q , Mon., Wed., Fri. 8 p.m.: W6ALZ 7320 kc. (41 m) Daily except Sat. and Sun. 6 pm; W6BHU 7004 (40 m) Mon., Wed., Fri.; W6BGU 7084 (42.25 m) Mon. Wed. Fri. 7 pm.

**OFFICIAL BROADCASTING STATIONS**

**C H A N G E S A N D A D D I T I O N S**

(LOCAL STANDARD TIME)

**W S A Q , Mon.**

**W 8 Z E F 5 1 5 , W 8 S W J 2 9 4 , W 8 G P 1 4 6 , W 8 B E 2 6 5 , W 8 A V K 3 2 0 , W 3 A D E 2 0 5 , W 3 C W O 3 8 , W 3 D E T T 1 8 8 , W 3 B F L 1 7 , W 7 M Q 3 8 6 , W 8 A W O 2 5 , W 8 C M O 3 4 6.

**W E S T E R N P E N N S Y L V A N I A — S C M , A. W. Mc- Carthy, W3QQC—**

W3QQC is an ORS, and the first plans this month with a fine total. The SCM got some of that traffic and the report by W3CNS has been down traffic and we work with W3QPQ, W3QMO, W8BVO, W3ATK, and W8QY, W8AVJ, Master of Ceremonies. Reports from the various managers of theylon stations at the Air Meet were received with great applause. Amateur radio scored a big hit for its excellent work at the Mines Field Air Show. W8CMO has a full program in QST by Wally Wiggins. W8CHZ. The crowning event of the evening was the introduction of and talk by Mr. James Warner, radio operator on the Southern Cross flight. Reports from those who handled the A.R.R.L.-A.R.C. booth at the Radio Show Beautiful, showing that over 2100 messages were handled during the day. The SCM handled a few of the coming events and sold a few tickets for the coming convention at Oakland. It was certainly a bang-up banquet and was handled very benefici all the way.

It is the plan of this Section to have these meetings each quarter, under a different club in the Section. So far meetings have been held under the auspices of the Handshake and the Program Club and now the A.R.R.C. From all appearances the Associated Radio Amateurs of Long Beach will take over the next meeting, to be held in early December.—W6AM.
of the air due to going back to school. W8BNJ wants winter schedules and is now active with traffic. W8BQR handles traffic and also his call W8NN and W8DP is playing on the air regularly now, ready for traffic. W8JPC has returned from Europe and is now active with traffic and schedules. W8NAH handles the Army net work and his new 1929 transceiver is working FB. W8DDL is handling traffic, along with W8DIK. W8DDU is attending the presentation at the 4th annual radio show there, and also had a television receiver and a collection of short-wave equipment and a 250 watt transmitter of 1929 type in operation at the show. W8BNJ was the call used. Direct communication was held from the show with W8NN, Newfoundland, at W8BNJ. Direct communication was held from the show with W8NN, Newfoundland, at W8BNJ. Direct communication was held from the show with W8NN, Newfoundland, at W8BNJ. Direct communication was held from the show with W8NN, Newfoundland, at W8BNJ. Direct communication was held from the show with W8NN, Newfoundland, at W8BNJ.

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several schedules and handles a fine bunch of traffic. W8CZK says traffic is picking up on 3500. W8DVQ, a newcomer, has done fine work. W8BQI will be back next month. W8BXL reports to let me know Grand Rapids is on the air. W8CDL is on the air and is QRV. W8DSD is back on the air with a 310 and 450 kc "bulk". W8AUW is on the air from Ann Arbor with a 210 in the TP & TG circuit. W8ZLS is very QRV. Work, the ham station, is quite busy. Sure hope he fixes himself up. With all this, he takes the honors this month with W8CZK. W8ECEX reports that he has no news—Guess nothing much happens up that way. Everybody is set for the election and the November 16th, 2 pm. for the 3500 kc gang and let’s have all the fellows on that can possibly get on 3500. Will have some letters on this. Special traffic is more interesting. For the 7000 kc fellows, the date will be Sun. afternoon Nov. 18th at 2 p.m. Both tests will be run in the same manner as the last one. Now let’s see how many MO stations can show on these dates. More details will now follow in the letters. Don’t forget to turn in the log. OMs.


ILLINOIS — SCM, F. J. Hinds, W8APY—Would like to see more ORS and more traffic from this state to aid in the above schemes for work; if you cannot get them yourselves, call on your RM. W8DZQ, W9AAW was QRV for Florida traffic. W8AIJ is a new transmitter. W8BDO has a new antenna and works the world. Ex-W8BEA is now W8AIY. W8FUH is now operating from W8MT. W8CHT is early morning work. Schedules are invited. W8BRE sends word that there are not some stations on 14,000 kc W9ALK is rebuilding. W8BSS worked fl-1AB. W8AFQ will be on 1760 kc. W8CXZ in much better shape but time is coming. We8CQ is XRS-3. It looks like to see television using 48 hole disc with speed of 940 rpm every evening. From 2 to 8 CST. W8MCDQ has a portable call in W8FZB. W8MTA states his delivered traffic was 95% foreign this month. W9HDX is now putting on a new DX. W8FOY is a Friend's mike, kindly giving some nice experience. W8CET now has two transmitters, W8BZQ is at 1415 with an xtal. The snow W8PB is W8AOA, W8WCTO and W8CSD—they are going to make traffic dust this year. W8FHJ is rebuilding. W8FQD has moved to Bronx, N. Y. Sorry to lose you. OM, W8DME is on again with a bang. W8FUR will soon have mercury on and W8PRI is experimenting with television. W8CE of Cicero, Ill., is running a telephone transmitter from the county on the presidential election and requests amateurs on 3500 work him, stating his choice: Hoover or Smith. If you can’t work him, send a card.


WISCONSIN—SCM, C. N. Crape, W9VYD—W9DLD brings in the GP again, and is keeping 18 schedules. He has re-arranged his schedule entirely and is now using break-in again. W9NDN handled a lot of traffic originated at W9CAA, W9CAT, W9PS and W9UW. Traffic reaching W9HXX lives in a town but his message totals are large. W8BPW says his 1929 Harley transmitter and CDQ are working fine. He has two new work—W9EMD is rebuilding but his station is on the air with very little interruption. W8EYH at Troy Centre says he coded DX reports using 50 cycle CHAG input to his 1929 Harley. W9DH claims his DX is regular, but wants a few good schedules. W9LI is on the air as usual and says the BCLs are still kicking—as usual. W9AOA needs an application for an ORS. W8BHS has finally joined the Radio Club. W8DZM is on the air over one of the groups. W8CVI sends in a larger total over one month. He has kept schedule with W8DLS since June. W8WRO says he is FB, weather FB, but DX and traffic not so good. W9S0 received six messages from the Byrd Expedition and two naval messages from Porto Rico regarding the hurricane. W9COTT- W9PTI says things are going fine, as the station DX is good and the pole is still up. W9PAW has not been active during the summer but says “watch my station.” W9DZZ has been busy with the BCL work. W9EHN reported by radio via W9BSS. W9DKK is with us again using the old quarter-W and pounding out Navy Drill by the yard. W8ERM is hams down in town. W9DNE has been off the air most of the month rebuilding. W9VD has finished his 1929 transmitter setup and is going great.


HUDSON DIVISION

EASTERN NEW YORK—SCM, F. M. Holbrook, W8JCN—Seven stations report 59 messages. W8ABI is now back at old ORS and getting out fine. W2AKD will be on air again soon. W2P9’s MG set went bad. W8KBN has built MO-Pa and hopes are high. W8BK has set some 8 inch electrostatics from W9BQL. Said N. D. as saving them for grid leaks. W2BAC made his first report. He QRN’d egerty and returned answer in 10 minute report and had a very high one with RAC note. W2AGR leaving for school in Boston. W2AYK during summer visited W1GB and was with W3GIC and W2AGR and was back in town. W2EPF was in a private yacht and was visited by W40Q and W8CRF. W2ABJ has a rather good trouble. W8EPV, ex-S8JK is now at G. E. Co. Schenectady and trying to make transmitter work. He would enjoy seeing visiting hams. W8BFF wants an ORS appointment.


NEW YORK CITY & LONG ISLAND—SCM, M. B. Kahn, W2KR—Things are coming along fine and this months’ DX is a big dump. Four stations made the HPL. They are W2K2 and W8ALU, both keeping nightly schedules with W8RT which accounts for over 350 delivered. W2APD who did some fine work with Porto Rico during the hurricane and W2AVP who is keeping seven schedules per week. Many stations are sending in reports and are in line for an ORS appointment. Keep it up, fellows.

Manhattan: W2WK was the short wave transmitter installed at the A. R. L. booth at Madison Square Garden. World’s Radio Fair and many BCLs were keenly interested in his set up. Many of N. Y.’s prominent amateurs took their turn at the key. W2KR and W8ALU are alternating with nightly scheduled calls for W8TFE’s Byrd’s Antarctic Expedition and several wives of members of the crew have visited their stations and held two-way conversations with their husbands. Their reaction to this experience has been enthusiastic. W2EDN was still involved for the time and trouble necessary to carry this out. W8BQP is still doing his usual good work within foreign countries. W2DK is still simply enjoying himself and is of his vocation as a saxophone artist. W8GO is doing his best to get a net organized between NYC and B. L. To facilitate delivery into N. Y. W2AFO increased his power to 50 watts. W2EMC has a little tube so is off the air temporarily. W2BNL got back from his vacation and is now on the air. W2DNK is on a DX hunt, is doing DX and keeps his DX in spite of the weather. W2ALL has had the flu and missed a month at school but is OK now for a few tests. W8ETF (give it to him, gene—SCM). W2AET handled a lot of traffic. W8BH is another who has been QRT on account of illness but has recovered.

Brooklyn: W2APD played a big part of Puerto Rico and Florida traffic during the hurricane. W2BPW is busy with the new Army-Amateur Net. W2BAMZ is another station in line for an ORS. W2BFX has his other big ham and will soon have his ORS. W2AVP due to his many kegs made the HPL. W8A1Z has been on vacation which accounts for no activity. W8A1Z is all back for winter after his outboard motor boat has kept

QST FOR NOVEMBER
him busy all summer. W2ALS has been rebuilding his shack for 1929.


NEW JERSEY—SCM A. G. Wester, W2WR—ORS are failing to report and unless conditions change at once, several ORS certificates will be cancelled without notification. Some good stations on this band and are interested, please get in touch with SCM Wester, W2WR. W2AT just returned from a business trip, W2WR, W2BDG and several other amateurs welcomed OK-4CL when he arrived in this country on board the Homeric, W2EY is trying out a vertical Hertz. W2KA related some messages en route to N. Y. Traffic: W2BQF is on due to build a three high power transmitters to cover all bands, all being crystal controlled. W2ANG handled a fair amount of traffic, W2MD handled the most traffic this month for the season, W2CTQ is attending Newark Technical School which keeps him from the air. W2CJX is away on a business trip and will be off for a brief period. W1OIS and W1AGE paid a visit to WSBY. W2BQY has a 300 watt water which makes it hard for her to listen to signals. W2IS has built a MOPA and is awaiting reports on the transmitters as the new direction of work. W2LT and W2TR have combined and have a fine 500 watt station on 700 kc. W2BIH blew out his grid leak and has a strong desire to install a second grid leak, W2CQF is in a temporary TA. TYMCA building in Hackensack. W2BGG is the only ham in his Section handling traffic, W2THW is trying to get a license to get in on 14 kc. W2CHD is completely remodeling for a 1929 station. W2AMT continues to step out in all directions. W2ABE just got his commercial first class ticket. W2WK 360, W2KR 259, W2ALU 240, W2CQJ 13, W2CWA 11, W2EGU 9, W2BFF 2, W2DQ 2, W2AKM 1.

SOUTHERN MINNESOTA—SCM, D. F. Cottam, W9NYA—This month holds two official meetings of the Twin City Radio Club to outline the work for the coming winter. They were held at the home of Dr. G. W. Swinnerton (WHL) and with him at the clinic, many ORS stations are dropped off with very delightful lunches and general station discussion. Several St. Paul hams were present and from all indications they will have some very fine 1929 stations. W9EFO has sold all his old junk and is buying all new apparatus with plenty of power capacity. W9BYA has moved to a first floor apartment and announces a place to put the junk, but is rearranging the house in general so it won't be long now. W9CBW has been QSO 49 times this month and most of his traffic has been with foreigners, but did handle some from the Los Angeles Radio Show. His signal strength is very good all over the world. W9CBW's time is very limited and he sends code on the horn whenever he sees another ham. W9EYL has a new antenna with good results but has but some trouble with it, as he does not have much time to be on the air but will keep skeds very short. W9DAMA's junk went on the air but is on once more. W9DQH has business QRM. W9BEX is in business.


SOUTH DAKOTA—SCM, Dwight M. Pasek, W9DGR—W9DQN deserves honorable mention for his high traffic total. He keeps 9 and I take this opportunity to thank most sincerely each and every one of the stations and operators in this Northern Division. Section for the very fine cooperation they have given me during my two terms as SCM. The work has been most enjoyable and has added greatly to the pleasures I have derived from the hobby. My work in the future will be devoted to the USNR and to insurance, which is my occupation. The Section's work would be impossible if there were not time for the air, if there is not. My amateur activities through W9FGU will not decrease in the least, and I hope to work all of you often via my station. Send reports to me via W9FX. W2JPT has his 250 watt has his 75 watt screen grid receiver percolating in fine shape, W2BFR, our good old-timer from Barnesville has visited W9DFQ and he made him a call 830P, W9DFQ is a new ORS, a call 830P, W9BFR has put up a new 50 foot pole for his antenna. W9ERT, another new ORS, puts in good reports, and Roy Class—chief operator at WMD—The Duluth commercial station, W9DPH reports QRM to start from college and football. W9BRF works on both 8500 and 7500. W9BMM is a traffic operator. W9CWA is traffic operator in the Androy Hotel, Hibbing and has his transmitter in his room. W9CWT has gotten back from the Lakes again, and is on with a 75 watt. W9CWM was QRMed by work. His usual large traffic figures have slumped, as a consequence W9CWT got on the air with a real hamfest one Sunday, a short time ago.

He has a 1929 25 watt, using Hartley circuit arrangement. W9DOQ was visited by the Radio Inspector and got his first class ticket in stead of the temporary permit. W9AKM is building a new monitor box, having done the first rebuilding for 1929 operation, W9CFP is back in with us again now. W9KV is on the SS Chas. Hutchinson, WMIU until December. He reports that W9JHD has torn up Purdue University campus and is in the hospital when he is on. W9BVM is about through rebuilding for a quick and easy QSY to 3500-7000-14,000-28,000 kc. Traffic: W9FFU 40, W9ETH 89, W9DPB 83, W9BHT 18, W9HWA 11, W9CWT 9, W9EGU 9, W9BVF 2, W9DQ 2, W9AKM 1.

DAKOTA DIVISION

NORTHERN MINNESOTA—SCM, C. L. Barker, W9EGU—This report brings to an end the SCM year. We have had two official meetings of the Twin City Radio Club and the coming winter. They were held at the home of Dr. G. W. Swinnerton (WHL) and at the clinic, many ORS stations are dropped off with very delightful lunches and general station discussion. Several St. Paul hams were present and from all indications they will have some very fine 1929 stations. W9EFO has sold all his old junk and is buying all new apparatus with plenty of power capacity. W9BYA has moved to a first floor apartment and announces a place to put the junk, but is rearranging the house in general so it won't be long now. W9CBW has been QSO 49 times this month and most of his traffic has been with foreigners, but did handle some from the Los Angeles Radio Show. His signal strength is very good all over the world. W9CBW's time is very limited and he sends code on the horn whenever he sees another ham. W9EYL has a new antenna with good results but has but some trouble with it. He does not have much time to be on the air, but will keep skeds very short. W9DAMA's junk went on the air but is on once more. W9DQH has business QRM. W9BEX is in business.


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DELTA DIVISION

ARKANSAS—SCM, H. E. Veite, W4ABI—I wish to thank the gang at this time for my election to the office of SCM for Ark. I will endeavor to do my best and continue the good work of our retiring SCM, W5AIP. We are glad to note that traffic has taken an upward jump this month.

QST FOR NOVEMBER 1928 IX
WBCZC, one of our newcomers, leads the gang in traffic handling. He has handled traffic on a Radio Show in Calif. W6ANN is spending a lot of time and effort on his new transmitter. W6ahi has been improving on his transmitter. He reports some of the QSLs are coming in. W6k4n in Little Rock, W5kHn is QRV as is most of the L. K. gang. WSS is QRV working in the harvest field this month. He is looking forward to having an improved transmitter. W5lvt in Ft. Worth is working QSOs. Says he is making some money so that he can build a bigger and better station, FB, OM. W6rh has moved to Missoula and will be heard from there soon. Halls QRV and always on the "go" call. W5qck is the proud father of a new baby girl. Congratulations, OM. W6kll is still looking for that power supply. W5zaa does business as usual. He expects to be on this winter. Only two ORs reported this month which is not a very good showing for us. Fellows, I invite you all to drop me a line to let me know what you are doing or what you are planning to do. If the gang will lend their assistance to the SCM, I am sure the Arkansas gang can and will lead the Delta Division, so let's go!


LOUISIANA—SCM, C. A. Freitas, W5uk—W5ut is a new phone ham on the air. Local phone work is continuing to be done here. W5rd is now located in a new hotel and is working on 14,000 kHz, exclusively. W6la is back in the game again and I do not think it will be long before he will have another job and his station will be closed again until he has recuperated, Hi.

Traffic: W5rd 4, W6ut 40.

MISSISSIPPI—SCM, J. W. Gullett, W5akp—W5aed reports that his plate transformer expired peacefully one Sunday not long ago at 10:45 CST and that he had a motor-generator to provide his 1929 signals. W5ajj is rebuilding again and will use a TP-TG on 14 m. c. and 7000 kc. Instead of the familiar Hartley that he has been sticking to as an OR for W5akp, he is ex-QAO who is still going strong on 1720 kc. and that W5ty at Drew, Miss. and W5qB at Greenwood are keeping him company as they also use phone on the high waves, too. W5fq is now on about so much talk getting down to the serious business of rebuilding his big 250 watts set, W5ags and W5aqt have departed to college where they will endeavor to absorb a little knowledge. W5akp has rebuilt his antenna system and also has a new receiver and transmitter that work beautifully on 14 m. c. and 7000 kc. He is now employed as a BCL repair man at the Radio Service Company.

Traffic: W5akp 37, W5gc 10, W5fq 12, W5aed.

MIDWEST DIVISION

NEBRASKA—SCM, C. B. Diehl, W9byg—W9anz is back from his vacation and says that he is among us for another year. W9fww is now QRV with a new transmitter. W9dyr is still at 1em. W9qg is QRV with work and can't be on much. W9dfr is operating at WOW. W9ryg is still tinkering. Tinkered so hard that he cracked the crystal, W9dvf is still high man: some of you Ol' Timers better get QRV or he will run you all off. W9fam would like schedules with eastern stations as he has a fine schedule we would like to have. W9glt is amplifying for QSOs between links at school. W9boq is on 3500 for traffic. W9ctb moves a little traffic between times after 2000 when W9gct is out. W9aetz comes out for first shot with 42 that's quite a mark. W9ett breaks out with 50 this time. FB, let us come again, and show up some of these taxi boys.

Traffic: W9anz 6, W9dfr 1, W9dvr 80, W9pam 12, W9di 6, W9boq 1, W9cb 10, W9aet 42, W9ept 50.

LOWA—SCM, H. W. Kerr, W9dzw—The month's traffic report has been handled on the usual schedule, and ORS, with one of the latter topping the list, FB, folks, it looks as if Iowa might be the pivot thru which traffic centers. May we urge, tho., when a fellow when he writes to QSO that he encloses QSOs—will it help a lot in totals and good feelers. W9edw is heard daily but won't answer the SCM. Hi. Anyway he leads! Hamfed on chimp improves W9bcas totals. He is a good clearing point in any direction. W9dww is on 80, upholding Goldie's reputation. W9'hn has logged QSOs on the QRV BCL sets. W9czaa renews his Denver skeds. W9qcrq is forced to abandon most of skeds, QRZ electric station. W9ayu is QRV traffic with a fine fine... W9dfr and W9sml in August had too many QSLs to count before summer inactivity. W9ewi always reports some traffic but has a glass arm from time to time so is subject to break down, transmission wise. W9ewi reports—has combined with W9ieiv their QRA now Sioux City and QRV all traffic most any hour of the day. Have our leaves and skeds, gang. Our thanks to W9sml, for his cooperation.


KANSAS—SCM, J. H. Amis, W9cet—With only 30 of the month's reports completed, the SCM expects to be on this winter. Only two ORS busy getting his grocery business going again. He with a "9" call. W5iq is the proud father of a W5boz, one of our new comers, leaving the gang in swimming f00. Let's go!


MISSOURI—SCM, L. B. Lalibert, W9rr—St. Louis Stations reported FB this month. W9dsu is a new arrival in St. Louis, moving from W9hob. Questions are of affairs is a new sked and ORS. 1, W9chq gains the thanks of the SCM for his very complete report by letter. Ex-SCM is operator of W9chq. W9lao reports arranging numerous QSOs with ORSs. W9ru is another newcomer. W9hft and W9heu were the high traffic stations. W9dzn and W9mu handled some traffic, but that was without trouble. W9rj, is QRV for traffic skeds and improving his outfit to handle them better. W9ayk is a prospectives ORS. W9cde recognizes the need for an improved handling system. He is on the air all day into the radio business at Stockton. W9bqs put up a big antenna and arranged skeds to cover football with W9dae. W9cws had a good month. We are all like news, says that W9ebu and W9ajw are away at college. W9bzm and W9feg still on but QRV school, W9edw sent in a good report with three good skeds and promises he will occupy the 2500 kc. band soon. W9cfr reports he is ready for any traffic moving thru Festus. W9dgg has the assistance of W9ara for second operator. W9pf is keeping two skeds on 164 meters with good results. W9lti is keeping a watch on skeds when he gets some free time. W9erm is off for ORS and plans QSO. W9bja reports his OBS schedule is going fine and he gets numerous QSLs. W9gar is a new station at West Plains, MO. W9gcu is the old W9cqn, well known in these parts last winter, has moved to Livinston, Mont. Where he will remain incognito, and we hope so. W9brq drops in with another good monthly report, but says he is bothered by key click troubles. W9bsv is a new station in Webb City. Kansas City: W9ntt is away for the month. W9fio will try to keep all his skeds and will try to QSO W9enu via W9mI at Urbana, W9dnq be the lead. He reports receiving three skeds plus ORS. W9qc led Kansas City for traffic this month. One of W9qcn's office partners is on the air with a brand new crystal station. W9dwr is back in the fray and working QSOs thru QSOs. W9hcr got in on the Florida hurricane, coping dope from several stations who were having trying experiences, if one may judge from the log. Several messages were handled from parties having friends.
or relatives in the storm zone. The USDA Net lost two stations in K. C., when W9MA was obliged to QST due to job and W9KXI left for school. W9FO and W9DOY are still on the skids. W9SBS is still off doing experimenting, W9XBR is being handled full as president of the ham club, plus job and work in the service. The USNR is going strong in this state with units being organized in St. Louis, Kansas City, and Oklahoma City. We shall be on the roll soon as the necessary applications are on hand. W6AFK has moved into this state from Arkansas, locating at Mansfield. The newly established office on behalf of this city is doing a creditable job.

Traffic:

**W9HII 88, W9BEU 64, W9BMU 11, W9DSU 1, W9Dzn 5, W9CQ 29, W9DAE 18, W9CDF 8, W9ECS 38, W9AVY 9, W1EPX 17, W9KGD 13, W9DJP 33, W9DRA 21, W9QUC 142, W9QHN 26, W9RTR 15, W9AYK 92.**

**NEW ENGLAND DIVISION**

**AINE—SCM.** Fred Bart, W1BG—Attention gang! The SCM wants at least one more Observer Station to team up with WIAQD on observer work. A good frequency meter is the main essential. Also two stations with a good punch are desired to send the observer set recheckings per week. Good luck, the gang.

**Traffic:**

W1VQW is at Bay Bridge, N.Y. W1XQA is on the move, W1XQA's set will do for a traffic man. He requests that Hal CWCX be located at 7800 kc. and 3840 kc. and wants the gang to know that he is ready at all times for traffic on both hands. He wants to know if there are any models to be picked up at the new WIAQD station.

**W9MA**

He heard W8EAL calling CQ NYC RUSH for 40 minutes without a response, so he answered and told W8EAL he could have the call whenever he was ready. He then said that he was on a QST three times in front of 350 cm, to which W2AT came right back and took the message. The gang asked him to name the set and he said it was a 1929 model transmitter almost ready to go on the 3500 kc. band. W1AQW is still on the sick list, but we hope to hear from him on the air again soon. WIAQW, the Queen City Radio Club, is functioning in the usual fine style, and the boys are busy with the details of next year's Second Annual Maine Section Convention which will be held in Bangor, Maine.

W9CAZ, W9XQF, W9DOP, W9QW, W9BEU, W9CDL, W9IL, W9CQF, W9CSP, W9AR, W9CDL, W9DOP, W9QW, W9BEU, W9CDL, W9IL, W9CQF, W9CSP, W9AR, and W9CDL all have a fine QSL report this week. Several of the Kansa

**QST FOR NOVEMBER 1928**

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soon to give way to an ultra-keen "1929 type" installation. We hope that the whole gang is following suit. WJFE had a very pleasant vacation. Schedule change at 6:30 Monday, Wednesday and Saturday.

**Traffic:**

Traffic: WBOQ 24, WIBLS 9, WMO 10, WIAWE 11, WIKCB 13, WIBQ 4.

**NORTHERN DIVISION**

**DAHO—SCM, James L. Young, W7ACN, WJL**

This is the first report from your new SCM. We hope that everyone in his section in bringing the section to the front. W7ACN has been traveling this summer, doing photographic work with W7AC and he hopes to be on a lot of work off the hands. W7ACK-W7ALI, the instructor of the Nampa High School Radio Class which has 25 pupils. W7AC is the call of one of the stations and it will be on regularly during school hours, with plenty of ops. W710, one of the oldest of Idaho's old timers, will be on all winter with a pair of 852's on nearly all the bands. W7AB and W7JS are the only active ORS to hand in a traffic total this month. W7AO, ex-last, is on regularly in Boise, and is after DX and with a little better. W7JA, another Idaho school station, is on again with a radio class of seven and some good ops behind it. The school no longer owns KFAP. WTVU, of Eugene in the new ORS for the new KFAP and he will be on all winter, using his ham set. W7Y, is putting in a 500 watt ham set at the Idaho State Fair. W7DF, our SCM, is going to Eugene to school where he will have an RSC. W7AMG, formerly of Eugene, will be in Boise this winter looking for DX and traffic. W7JU is on the air, YL, O, and will be on steady this winter. W7DI got R7 from ex-ZGO two nights in succession. He is using 7000 and 5500 and for his DX traffic W7ACK-W7ALI will be on all winter, also with a K2 and 210 in parallel. We fear that W7ZQ will quit us. W7CJ is on quite a bit.

**Traffic:**

W7TV 29, W7ABB 21.

**MONTANA—SCM, O. W. Viers, W7AT—W7AHN announced out of it and too busy to hand in traffic this month. W7ZZC-JSO of Portland, Ore. who is now located at Billings, works on 7000 and is looking for traffic. W7DD reports that a new ham is getting steady on the air at Glasgow, Mont. W7EL says he's VRW with his apple crop but will be on more from now on. W7FL says his UTC60 doesn't perk right. W7AT had QRM from motorcycle.

**Traffic:**

W7AAW 55, W7ZGC 89, W7DD 23, WTEL 3.

**OREGON—SCM, R. H. Wright, W7PP—W7MF has worked all continents—also worked al-MF. He says that 14,000 kc. is on consistently, handling traffic, his 1929 transmitter is working FB. W7GO has kept regular contact between radio room, W7F, and W7JW for weeks. Alaskans are very easy to raise from his location. W7SI finds 14,000 kc. excellent for QSR cast, he will be on on all bands, W7AMQ, a comparatively new station on the road, is on regular work. W7ALK is on consistently, W7AHB has worked another FO station. W7ACV is installing a new transmitter. W7IN has had to do work over a 60 or 75 watt crystal controlled station. W7ALT took his portable WPAFL on his vacation and managed to move traffic through it. W7K has a new transmitter and receiver and will be on soon. W7AJW is being rebuilt for higher power and 1929.

**Traffic:**

W7MF 100, W7TN 82, W7GG 26, W7SI 26, W7AMQ 19, W7L 17, W7ABH 14, W7JN 12, W7RF 8, W7FL 2.

**WASHINGTON—SCM, Otto Johnson, W7PD—W7IZ and W7TX continue as clear stations for Alaskan traffic. W7LZ is experimenting with different antenna systems. W7BR, W7AM, W7RO, W7FF and several others have excellent traffic. W7ACS seems to be Tacoma's only active ham—he reports school QRM. W7IZ in Casey is heard frequently. Many ham sets are getting new station call variations. W7HH has returned from Alaska and will help out the Seattle totals. W7AG is building a new radio room, W7FR will soon be on. An attempt to QSO with Mason of the Byrd Expedition is to be made by Seattle stations. All
that at last cards have been mailed to headquarters in a real total to celebrate the close of the coming season, K7ABE and K7AFR will probably be the mainstay of Alaskan traffic over the winter. They each ship schedules with W stations.

Traffic: K7HIL 266.

PACIFIC DIVISION

LOS ANGELES—SCM, D. C. Wallace, W6AM—Nine stations made the BFL this month: W6BZL, W6WEF, W6BOK, W6BDD, W6CZT, W6AKD, W6UJY and W6AGF. W6BZL made a few skeds for Radio Show traffic. W6ASM reports that using RIGC handled 2152 messages at the Radio Show, which was a huge success and all stations that helped send the traffic. W6DSG has been very busy with his outfit at the Ventura County Fair. This month he has also started to have hams by ordering and delivering each a copy of Handy's handbook, and getting each a subscription to W6BZL. He’s very QRO in any direction. W6BRO operated at Minimum Air Mail Standards for one week. He says it was quite an experience, trying to copy signals with planes passing within 25 ft. west of the station. W6JAX just RQRO to 80 watts. W6AKD wants to have another Radio Show so we will not run out of messages. W6UJ handles some traffic from KNT, also few from Byrd’s station in another part of the state. His family stayed in the air for a while, and W6BZJ wanted to swap his ship clock. W6GAJ began in another hour contact with W6LX of New York City. W6EBO is experimenting with a spark coil plate supply. W6TVT points out that the news stands are coming up as a traffic man. W6BZU at Concord has no traffic over the air, but expects to stage a comeback next month. During the Admission Day celebration of the Native Sons and Daughters in Oakland, W6BEO established WSSR in the Joy Zone and fed a steady stream of traffic to W6IP and W6ALX for various parts of the world. W6EBO handled a good deal of traffic in the section to make the BFL through his deliveries from skeds with op-1PW and K6BQI. W6CTX brought up quite a mass of traffic in spite of spend- ing over a lot of time nonetheless. W6CM reports the power leak easing off and traffic work getting better. He is changing his UX-562 tuned plate tuned grid to a high circuit, and oz and aj. W6CMG reports the power leak easing off and traffic work getting better. He is changing his UX-562 tuned plate tuned grid to a high circuit, and oz and aj. W6ITW sent a report of R7 from FO-A4E received. Now he only needs Europe for WAC. W6CTU is using a new grid, and the traffic is free to go, but expects to change it to get in a 1929 model but is having trouble keeping the plate current down below 200 ma on his UX-510 with 350 watts. W6IIT sends that old 6AJT of Redlands is now on the air for the first time at Long Beach signing W6IT and rarin’ to go. W6AVY is building his 14-mc. set into a 1929 layout, and W6AYW is doing some good work. W6DKV delivered a message of U.S. Arizona from un-INC and got a long letter of appreciation. W6EBO has laid out a tube rectifier to W6DMH is a new A.R.R.L. member and says it is a relief to QST come in the mail instead of having to buy it at the newsstands. W6EAD is keeping some good schedules with W6PEN and W6HYE, and is running up a big total secured from five schedules. W6CC'k, however, expects to stage a comeback next month. During the Admission Day celebration of the Native Sons and Daughters in Oakland, W6BEO established WSSR in the Joy Zone and fed a steady stream of traffic to W6IP and W6ALX for various parts of the world. W6EBO handled a good deal of traffic in the section to make the BFL through his deliveries from skeds with op-1PW and K6BQI. W6CTX brought up quite a mass of traffic in spite of spend- ing over a lot of time nonetheless. W6CM reports the power leak easing off and traffic work getting better. He is changing his UX-562 tuned plate tuned grid to a high circuit, and oz and aj. W6CMG reports the power leak easing off and traffic work getting better. He is changing his UX-562 tuned plate tuned grid to a high circuit, and oz and aj. W6ITW sent a report of R7 from FO-A4E received. Now he only needs Europe for WAC. 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Q S T FOR NOVEMBER 1928

ORS are requested to report to the SCM each month. Another house-cleaning may be necessary to keep five stations only in the ORS list.


ALASKA—SCM, D. D. Wilson, WWDN—KTHL sends in a real total to celebrate the close of the coming season, K7ABE and K7AFR will probably be the mainstay of Alaskan traffic over the winter. They each ship schedules with W stations.

Traffic: K7HIL 266.

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still on 7000 kc. and handling some traffic. W6CGU interspersed his experimenting on 28 m. c. with traffic work on 7000 kc. W6BUX reports a new transmitter and says he is starting a couple of A51 received. W6CGU was on 210 and was for a la 1929. W6DMS is on the air with a UX112 with 250 volts DC. W6GEY has been away for most of the month and was put back into service on his receiver. W6CLZ is QW school but has hooked up again with K7AEF on 14.000 kc. W6CMG says he has been trying to get the set going all summer but expected something. Several more QSLs were held this month in Vallejo, the Oakland, Berkeley, and Alameda gang going north by automobile. WEBPC, W6DTI, W6HJ and others of the Vallejo gang put on a meeting and visited stations that had a tour of Vallejo stations. Everybody had a good time and found the Vallejo gang a FB bunch. Or someone was putting on a month for the purpose of handling traffic men together to work out mutual problems. SCM and CBM are the presiding officers, and W6BDU was appointed to serve this month. He will have 60 messages a month mailed to SCM, and 50 messages a month thereafter. Failure to get the 60 means a cent for each, and is ready to bust the ether with a genuine 2929 signal. W6BAX with 18 watts input into a 201A received 88 from se-1AH. He is now a WAC and the 12th member of the Santa Clara Amatuer Radio Association. He has together with others formed a club in the future, consequently his station will not be on the air for some time. W6BHY rebuilt his transmitter and power supply and is ready to bust the ether with a genuine 2929 signal. W6BAX with 18 watts input into a 201A received 88 from se-1AH. He is now a WAC and the 12th member of the Santa Clara Amatuer Radio Association. He has joined this exclusive club. W6ALW is another SOV ham on the air with a 2929 signal. He will use the 14 m. c. his QSLs with 1929 performance. W6KQG is again back on the air. W6KG has a SG receiver pending. His mercury arc is producing a 1929 note.


ARIZONA—SCM, D. B. Lamb, W6ANO—W6BWS leads the state in traffic this month. W8OKL came back from Kansas and suggested that he go to college. We now find BWS in college. W6CDY is back at the U. of Ariz. and can be found at 5 pm MST. The Santa Clara School KRM makes him QRW. W6BFJ has been on 14.000 kc. mostly. Also QRW work. B80QG is a bit DX during this month. W6AZM still works radio DX. Between going DX and handling this month W6EAA is playing with a UX 222 receiver. W6DPU reports and has applied for an ORS. W6ANO is on the air mornings from 8 am to 9 am MST. W6DQG is on occasionally. W6CCL is in Phoenix from Fresno, Calif. and will be on the air soon with 60 watts. W6SW is also heard occasionally. W1L looks for more QSLs. W6XAGC was returned to college at Arizona.


SAN DIEGO—SCM, G. A. Sears, W6BQ—W6AJM is again at the top with two daily schedules with the Philippines and expects to get into a new week soon. W6BYZ is also handling daily schedule with Philippines and has a good traffic total. W6BQ found time to handle a few messages this month which W6WYK is proud father of a baby girl. W6KQ is present and desires more reports with W6CPM and W6Z. W6DZ works on 7000 kc. (40 meters). W6CFM and W6BQ is presently working with W6CPM and W6Z. W6DZ is working on 7000 kc. (40 meters). W6CFM and W6BQ is presently working with W6CPM and W6Z. W6DZ is working on 7000 kc. (40 meters). W6CFM and W6BQ is presently working with W6CPM and W6Z. W6DZ is working on 7000 kc. (40 meters). W6CFM and W6BQ is presently working with W6CPM and W6Z. W6DZ is working on 7000 kc. (40 meters). W6CFM and W6BQ is presently working with W6CPM and W6Z. W6DZ is working on 7000 kc. (40 meters). W6CFM and W6BQ is presently working with W6CPM and W6Z. W6DZ is working on 7000 kc. (40 meters). W6CFM and
WASHINGTON 3000 kc. (50 meter) band. W3AMB reports using single 210 in 1929 Hartley feeding Zp voltage feed antenna, chemical rectified battery. Hourly with fox PW36 and W3OH are two new stations at Richmond. W3ASC has opened up and is sending eight death messages to New York and beat WU by six hours. Has a flock of skeds and wants more. W3CU is still on at working KEGO and two call signs on the air. Says W3WM is lonesome without W3CEB and W3KU. W3KU visits the hams in ports. Let's hear from some more ORS about getting a license. I am not about reporting as you signed up to do. Let's have a card if nothing else to let us know that you are still living and on the air at times.

RAINIER. W3CEB 185, W3AMB 8, W3ALS 46, W3CA 8.

NORTH CAROLINA--SCM, R. S. Morris, W4JR - Fellows, I want to thank you all for your fine cooperation during the several years in which I have acted as SCM. I want to add that it has been a pleasure to work with you and I only wish that time permitted me to continue. I have a helping hand to the new SCM, W4JS, and let's see if we can't bring amateur radio to the front in this section. See you on the air soon.

W4 takes the honor roll position this month with 131 points for a test and a pair of outstanding W40 and Florida station form. W400 has put in 7120 kc. crystal for 1959. W4TS has its best periods on the air. W444 reports traffic from the station of rug holes on 7000 kc. W4JR is trucking cleverly up into the sky with the advent of cooler weather. W449 reports good work with a 201-A on 7000 kc. W4AEE has quick traffic and is working by appointment. W4QF is still living and on the air at times.


ROCKY MOUNTAIN DIVISION

COLORADO--SCM, C. R. Stedman, W3CA--The traffic is shaping up here for an early in the season. Four Colorado stations made the BPL and totals show a good increase for most other stations. Part of the large total can be blamed on the Denver Radio Show. It would be larger had all the stations who handled radio show traffic reported. W3WCA was mentioned remotely controlled and the radio show booth, takes first place. W3WCA handled most of the balance of the radio show traffic, most other stations being afraid to tackle the load. W3WCA might be added here. W3WDN at Pierre, S. Dakota did some fine work in clearing the traffic, handling as much as 76 messages. W3WEH at the Springs has applied for an ORS and shows he is in earnest by holding down a bunch of messages and by handling a fine total. W3WKU at Pueblo has added a lot of messages at the State Fair and made his total go up. He has also applied for ORS. W3WCC, the YL who so successfully vaulted the Division Convention, had some trouble with the transmitter but after she got it working, she is working a fine score. W3VCB is planning a master oscillator outfit built along 1929 principles. 1012 was building a 400 volt B battery station for a test but the 400 volt battery was a new QRA and will probably be on again with only a day or two interruption. W3D0G decided to quit his business and has moved to the desert where he decided that he can't run it. W3HH has an old rig that is going to be in the air soon. W3WBY is building a truck radio station and reports that he is working a fine total. W3WBRN at Cheyenne is using a 500 volt battery and reports that he is working a fine total. W3WBRN has 1958 his hopes of becoming an ORS and is going some skeds to work in preparation. W3NJD is on again and doing good work. W3ND is off temporarily and is spending some time in the hills. W3IN is on the air and he has the time of his life. He is leaving town for a while. We trust his wife, who recently took out her license, will keep W3CHY on the air. W3EDD is back after a long lay-off. W3ESA has come to life.


UTAH-WYOMING--SCM, F. N. James, W5AJ--Most of the traffic has been handled by W6APD who made the BPL on deliveries this month. The station was doing a big business and had some ORS which were hard to handle. W6VWR has been working on some of the new control stations that have been using two CX81's as plate supply for a fifty. W6DZK is doing a pair of ORS's on 14 and 23 mcs. He has heard K6CLF on 14 and W6DZK is working on the air by the middle of Oct. W6BUBH is still very QRM.


SOUTHEASTERN DIVISION

FLORIDA--SCM, C. E. Foulklee, W4LE--The SCM is writing some nice letters this month. W40 and many of new men showing up in the section and will be looking for a report from them soon. Have a new report from W4APC on his prospect, W400, who rumor has said he is leaving the traffic. The U.P. sent press thru W4TJ during the recent "Blow" here. W4AGY is applying for ORS. W400 lost on the air regularly now at noon. The storm kept W5WYB out of the office. You can see that the SCM is putting in pretty good work. W5WYB put a message through from Hawaii to Calif. in 20 minutes. FB. W5WYB is W4AC's old time buddy and the SCM is working hard for him. W5WYB has offered his help to W. U. in Homestead during the storm. A T-P-T outfit is making history for FL6K. Good luck to him. W6JF in Petersburg after a summer north. A nice 250 is working away for W4MS. Have you met the OW? W5FW lost his mast and all the antenna system. Always glad to hear from any of the gang that care to write.


WEST GULF DIVISION

NORTH TEXAS--SCM, J. H. Robinson, W5AKN--Well, gang, school has started and our grand total has dropped but we have quite a few new stations showing up. A few more ORS have been appointed since the last report and one renewed. When this gets in print, our West Gulf Convention was held last month and we are all talking glorious history. W5HY is leading the North Texas bunch. He has three schemes, W5BBF has a schedule both north and south. W5WF was the station of the Commerce gang and W5HF was the round up. All the fellows there assisted with the station keeping it on the air 24 hours a day, getting the messages out there was W5TJ. Always glad to hear from any of the gang care to write.

TRAFFIC: W5AIH 145, W5WYB 21, W5AGY 38, WANE 20, W5OA 15, W5HY 12, W5AC 9, W5AAO 9, W5AKF 7.
in touch with stations wanting skeds. Write me. Non-reporting ORS are warned that we have no place in our files for dead wood. The SCM had the pleasure of a visit from W5BBF and W5ATM. Glad to have you, Bob, and Bob. WR5A WAIN has applied for an ORS and heads the list in traffic this month as well as DX, having worked twelve foreign stations. PB, OM, W5LFL, a former ORS in Houston, has just got his new 852 working and reports having worked France on 14,000. Our old friend W5MS is rebuilding and wants at last to get out in traffic. Better watch him, fellows. W5KF is up on the S. H. Housekeeper. Our ex-SCM, W5EY, expects to have his own new DX station by the 1st of next month. He has a 250 watt going with raw AC but has a mercury in transit and expects to have a MOPA going in the near future. W6P0 has a new lathe and turns out those wet ters that he expects to wreck a few cans with. W5PY + doing some good work with the 852 at home. W5A is out of sight 7000 by next month. Good luck, OM. W6E W has just completed a 250 watt for traffic. All is well as far as DX, having worked twelve foreign stations wanting skeds. Write me.

V5AL DIVISION

ALBERTA—SCM, E. J. Taylor, VE4HA—Here we are again after a couple months in the woods. The gang has been busy polishing off the old sets but we are all brushing up the old sets again getting lined up for the 1929 conditions. VE4MH is back again from England and says the boys over there are sure FB to techie dope. He will have lots to tell us at our next feast. VE4GT sure has station in his new location—DX all the time. VE5PL will be in on AC and work most DX, the former working among the African and the latter France. Northern Dist: VE5EL is somewhere in the North beyond Port Arthur, and is keeping in touch with the World by a schedule with W5EH. Traffic: VE5AL 16, VE5BC 19, VE5VS 17, VE5EL 16, VE5BL 11, VE5CJ 10, VE5BH 9, VE5AY 4.

QUEBEC DIVISION

QUEBEC—SCM, Alex Reid, VE2BE—Vacations are over, and with the long evening hours on hand, the gang are busy overhauling the old sets for 1929 operation. We will this year as usual have a booth at the Radio Show and expect to have some station in operation for transmitting and receiving the Show traffic. We also hope to have some new exhibits this year. VE2BH has returned from the Arctic and reports having worked amateurs on those runs. VE2AX is busy building a new booth for the Show. VE2BD is busy working on his new QTH. VE2BG has made his first DX when he clicked EG-3MS on 14,000 kHz at 9 P.M. VE2AY now has three trans and is running a 14,000 and 7000 kHz, bands, starting Oct. 10th. VE2AP made his first DX when he clicked EG-3MS on 14,000 kHz. VE2AZ has three trans and is running a 14,000 and 7000 kHz, bands, starting Oct. 10th. VE2AP made his first DX when he clicked EG-3MS on 14,000 kHz. VE2AZ has three trans and is running a 14,000 and 7000 kHz, bands, starting Oct. 10th. VE2AP made his first DX when he clicked EG-3MS on 14,000 kHz. VE2AZ has three trans and is running a 14,000 and 7000 kHz, bands, starting Oct. 10th. VE2AP made his first DX when he clicked EG-3MS on 14,000 kHz. VE2AZ has three trans and is running a 14,000 and 7000 kHz, bands, starting Oct. 10th.

CANADA

ONTARIO DISTRICT

ONTARIO—SCM, W. Y. Sloan VE5HJ—Central Dist: VE5BL is keeping a regular schedule on 5700 kc. (62.6 m.) and is well known to many of the DX people. VE5HJ is pretty well set up DX wise and is working on a DX station for a while. VE5ATD is getting ready to go on with his new QTH. VE5HS is busy recording his conversations on the radio, and VE5AX is working on his new DX station. VE5A is busy working on his new DX station. VE5AY is busy working on his new DX station.

LATE AND ADDITIONAL REPORTS

W2ASZ was busy taking college entrance exams. W5ALA has just applied for renewals every night. W2ASZ was busy taking college entrance exams. W5ALA has just applied for renewals every night. W2ASZ was busy taking college entrance exams. W5ALA has just applied for renewals every night.