

THE T. & R.

BULLETIN

THE INC.
RADIO SOCIETY
OF GT. BRITAIN

AND THE
BRITISH EMPIRE
RADIO UNION

Vol. 8 No. 7

JANUARY, 1933 (Copyright)

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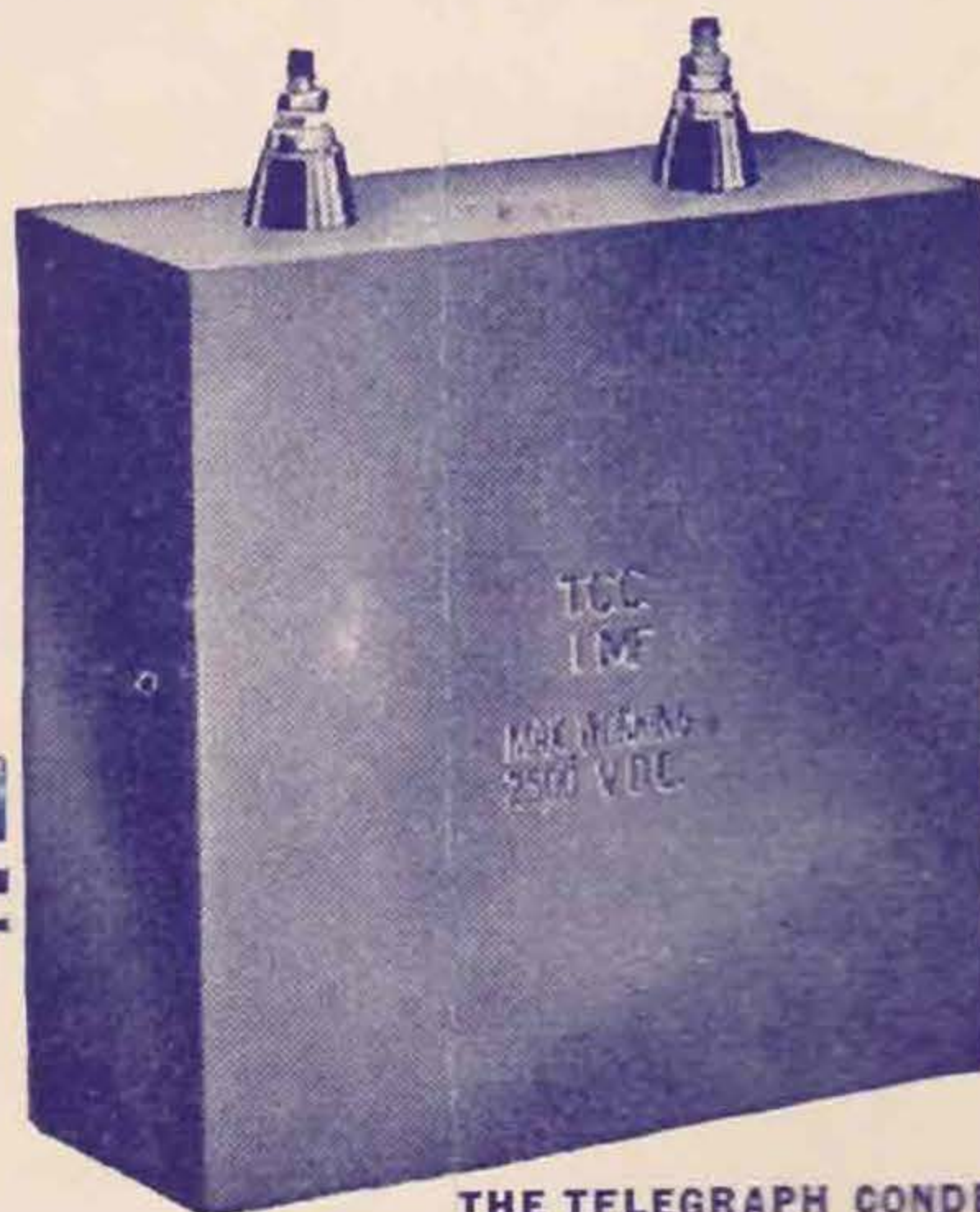
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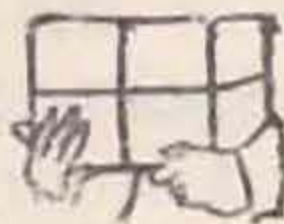
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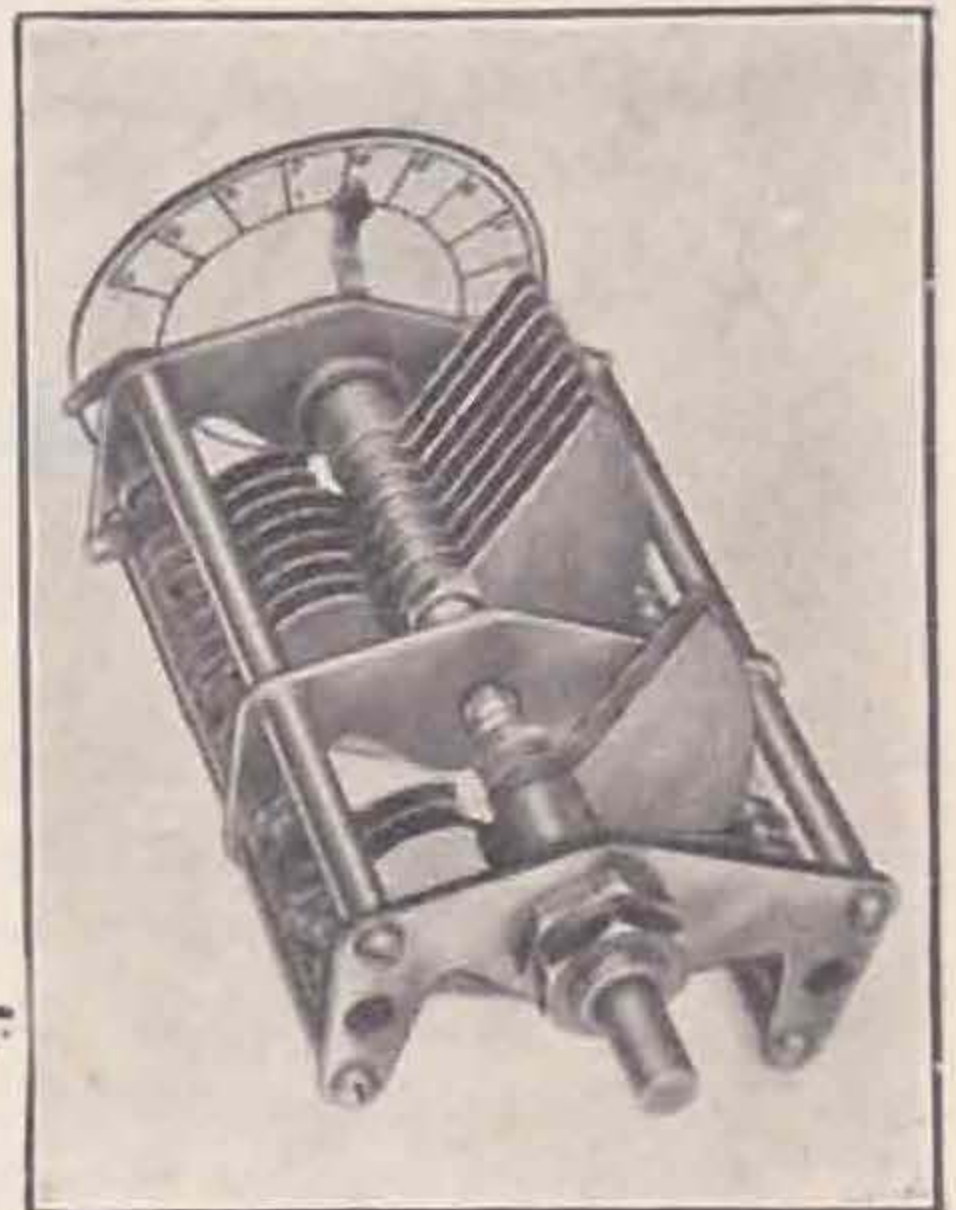
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R.S.G.B. CALENDAR.

Unless otherwise announced, all meetings are held at the Institution of Electrical Engineers, Savoy Place, W.C.2, commencing at 6.15 p.m. Tea is served at 5.30 p.m.

January 24. Meeting of the Midland Amateur Radio Society to discuss the R.N.W.A.R. Comdr. L. S. Saunders, R.N., and the Secretary will attend. Address: Hope and Anchor Hotel, Edmund Street, Birmingham. Time: 8 p.m.

January 27. Lecture by Mr. W. T. Gibson, Chief Valve Engineer, Standard Telephones and Cables, Ltd., on "Micromesh Valves" (at the I.E.E.).

February 24. "Cathode Ray Oscillographs," by L. H. Bedford, B.Sc., of the Cossor Valve Company.

March 31. Subject to be announced later.

OFFICERS FOR THE YEAR 1933

President: H. BEVAN SWIFT (G2TI)

<i>Acting Vice-President</i>	- - - - -	A. E. Watts (G6UN)
<i>Honorary Secretary and Treasurer</i>	- - - - -	E. Dawson Ostermeyer (G5AR)
<i>Provincial District Representative on Council</i>	- - - - -	H. B. Old (G2VQ)

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A. W. Alliston (G5LA), J. J. Curnow (G6CW), E. A. Dedman (G2NH), J. W. Mathews (G6LL), T. A. St. Johnston (G6UT), J. C. Watts (BRS246), H. V. Wilkins (G6WN).

Secretary: J. CLARRICOATS (G6CL).

All correspondence should be addressed to The Secretary (or other officer concerned), The Radio Society of Great Britain, 53, Victoria Street, London, S.W.1. Insufficiently addressed letters may be considerably delayed.

THE T. & R. BULLETIN

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G. W. Thomas (G5YK)

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Vol. 8 No. 7

Editorial Committee:—

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J. D. Chisholm (G2CX).

J. J. Curnow (G6CW).

J. W. Mathews (G6LL).

A. O. Milne (G2MI).

THE YEAR IN REVIEW.

PROGRESS, which has been the keynote of our last three annual reports, has once more been well maintained; in fact, with the passage of time it becomes more and more difficult, in presenting these reports, to cover adequately the many new phases of activity into which the Society enters.

Madrid.

The year 1932 will be remembered especially for the International Radio Telegraphic Conference at Madrid, and as it is the international side of amateur radio upon which our very existence depends, it is my intention to deal first with the work done in connection with this Conference.

As long ago as June, 1931, members of Council were in regular correspondence with the Headquarters of the International Amateur Radio Union and other amateur organisations. Every point in the Washington Convention likely to affect our future was carefully examined, with the result that in the early part of 1932 Council were in a position to approach the G.P.O. and ask for their support of a well-defined policy. That policy was in two words a request for *status quo*. We had realised from the inception that no useful purpose would be served by asking for the extension of existing amateur privileges, but we were convinced that, providing our views had the unanimous support of the British delegates, there would be every chance of retaining our present facilities.

As the year progressed we learnt with much pleasure that our Acting Vice-President, Mr. Arthur Watts, had been nominated by the I.A.R.U. Member Societies to serve as one of the Union Delegates to Madrid, and as we know his presence there undoubtedly carried a tremendous amount of weight for the amateur cause in general. We are not yet in a position officially to announce the decisions reached at the Conference, but as Mr. Watts has told us in his recently published report, there is every reason to believe that, as far as frequency allocations are concerned, the amateurs of the world will find themselves in an exactly similar position after the Madrid Convention is put into effect, as they are to-day.

The whole-hearted co-operation and helpful assistance given by the British Delegation is a matter which we, as a Society, should feel extremely grateful. Criticisms in the past may, or may not, have been justified, but we are convinced that at the present time the British Government is in complete sympathy with the amateur movement.

The R.N.W.A.R.

The early part of 1932 will also be remembered as the period during which the Council were officially approached by the Admiralty to assist them in connection with a proposal to inaugurate a Royal Naval Wireless Auxiliary Reserve.

For many years the Society had striven to obtain official recognition by one of the Services, and it came, therefore, as a surprise and pleasure to those responsible for the welfare of the Society when the Admiralty plans were disclosed.

Membership and Affiliated Societies.

The membership of the Society has again shown a satisfactory increase in numbers. Since the beginning of last year the total membership has increased from 1,231 to 1,803. During the current year more than 500 new members have joined the Society, whilst approximately 250 have either resigned or dropped out through lack of interest.

There has been a marked increase in the number of applications for affiliation by local amateur Radio Societies, the majority of which are under the control of members of the Society.

The B.E.R.U.

The second annual B.E.R.U. Contest, which was arranged during the month of February, was the most successful event of its type yet organised by the Society. It is now a matter of history that the B.E.R.U. Challenge Trophy, which was won last year by an Australian member, Mr. T. Evans, VK2NS, was brought back to England by Mr. F. W. Miles, G5ML. The Contest was supported by nearly 100 of the finest and best operated stations in the Empire, and it is anticipated that the 1933 Contest will prove even more successful than its two forerunners, especially in view of Council's decision to open the Contest to members of Honorary B.E.R.U. Affiliated Societies. In order to provoke more interest a senior and junior Contest will be organised in connection with this event.

The individual B.E.R.U. membership has again shown a considerable increase, nearly 400 of the best type of overseas amateurs being in association.

During the year several additional overseas organisations applied for and were granted honorary affiliation with the B.E.R.U. These included the N.Z.A.R.T., the Radio Association of Jamaica, and the Malayan Radio Society.

Valuable assistance has been rendered by our B.E.R.U. representatives. In practically every part of the Empire an official Society representative is now available to give advice to those interested in our work.

In order to place the B.E.R.U. on a sound constitutional basis, a draft constitution has been drawn up and forwarded to the Headquarters of all Honorary Affiliated Societies; it is anticipated that during the coming year the final constitution will be approved.

The "T. & R. Bulletin."

The past year has seen several changes in connection with the production of the BULLETIN. In general, the issues have been larger, whilst the amount of technical data published has been, we believe, comparable with that appearing in any other contemporary.

Considerable help has been given by our advertisers, and it is the wish of Council that they should be mentioned in this report, as we realise that the

success of the BULLETIN to a large extent depends upon their continued support.

Owing to unforeseen business duties, Mr. G. W. Thomas found himself unable to continue his Editorial duties during the concluding months of the year. Without hesitation our President undertook to shoulder this additional responsibility, an achievement which should be appreciated by all members.

The Convention and District Conventionettes.

Our seventh annual Convention drew larger crowds than ever to London; earlier in the year Council had viewed with mixed feelings the possibility of organising Convention during August, but as has been reported elsewhere, their fears were unjustified.

The social side of the Society's activities has been well catered for in the provinces. District Conventionettes were held in Liverpool, Leeds, Birmingham, Nottingham, Bristol, Exeter, Clacton, Tunbridge Wells and Cardiff, and at every meeting the previous year's attendances were exceeded. Headquarter's representatives were present at the majority of these meetings, and were able to give first-hand information concerning the activities of the Society in general.

The organisation of the English counties has proved eminently successful. Enthusiastic D.R.'s, supported by keen C.R.'s, have been able to hold the membership together in a manner which hitherto was impossible. Informal meetings have been held in most of the large provincial towns at regular intervals during the year, and in many cases interesting lectures have been given by members and non-members.

District Representation.

The English Districts have again been represented on Council by Mr. H. B. Old, of Nottingham, but unfortunately Mr. Old has been prevented from giving as much time to this work as in previous years, owing to demands on his services by the Nottingham Police Force, to which body he has acted as honorary consultant on police radio matters.

Certain changes are expected to be made during 1933 which will enable District and County Representatives to place matters before Council in a more satisfactory manner than hitherto.

The method of appointing D.R.'s will also be carefully examined, and, if considered desirable, these officers will be elected instead of appointed. In this connection it should be mentioned that Council were compelled to appoint these senior officers, because during the years when the provincial members were given an opportunity of nominating and electing such officers only seven or eight out of sixteen required were nominated.

In the case of County Representatives, only 11 names out of 41 required were put forward during the past year.

The Society's interests in Scotland have again been safeguarded by Mr. J. Wyllie. The membership has increased considerably in recent months, and regular gatherings in Glasgow and Edinburgh have been well supported.

Lectures.

Many interesting lectures and discussions have been held at the Institution of Electrical Engineers, London. The thanks of Council are extended to the President and Council of the Institution of Electrical Engineers for permission to use the Institution for meetings.

Sectional Activities.

Contact Bureau.—The experimental side of the Society continues to make good progress. Contact Bureau, the organisation set up to assist those members who are desirous of collaborating with others interested in kindred problems, has extended its activities in several directions. An aerial group and many additional sub-groups have been started to cater for the increasing interest in co-operative experimental work.

Good progress has been made in connection with 56 m.c. work, numerous tests have been organised, and, whilst no outstanding performances can yet be claimed, it is believed that the coming year will produce some events of importance.

During the year organised tests were carried out on the 1.7, 3.5 and 28 m.c. bands; the support given to some of these tests was somewhat disappointing, but it is anticipated that the series organised for the present winter season will prove more successful.

Frequency Measurements.—Considerable attention has been paid to improving the Society's frequency measuring apparatus, with the result that the present equipment has an extremely high degree of accuracy. The importance of this work cannot be under-estimated, and it was with considerable pleasure the Society learnt during a recent lecture that no less than 73 out of 74 British stations checked by the G.P.O. during the month of July were found to be inside the G.P.O. 7 m.c. limits, the remaining station was, however, inside the Washington limits.

Licensing Facilities.—During the year good contact has been maintained with the Licensing Authorities. Applications for high power and for the use of the 3.5 m.c. band have been expeditiously dealt with, and in no case have we been advised of a person failing to obtain additional facilities after recommendation by the Society. Permission to use modulated C.W. for experiments on the 28 and 56 m.c. bands has been granted by the G.P.O. in response to overtures from the Society.

Q.S.L. Bureau.—During the year approximately 75,000 cards were despatched to overseas amateurs, whilst at least a similar quantity were received from abroad. A further total of approximately 40,000 internal cards were handled, giving a figure of nearly 200,000 for the year.

Q.R.A. Bureau.—More than 700 new addresses were recorded and useful assistance rendered to organisations publishing call sign lists.

Social Activities.—Convention arrangements and London meetings were organised by the Social Section, whilst steps were taken to improve relationships between groups of London and Provincial members by arranging inter-district visits.

The B.R.S. Membership.

Every endeavour has been made to cater for the B.R.S. member both through the medium of the T. & R. BULLETIN, and through advice at local meetings. Organised tests have been arranged and reasonably well supported. Assistance has been rendered to this class of member by the D.R.'s and C.R.'s, and, as a result, a large number have already obtained full transmitting licences.

Valuable assistance was rendered by certain selected B.R.S. members who co-operated in the task of checking the occupancy of all British amateur bands. These checks were carried out

during the months of July and November, and the information obtained proved of much value during the Madrid Conference.

Other work of a similar nature will be conducted during the coming year.

Empire Link Network.

Much time and thought has been given to improving the efficiency of the Empire link network. An overhaul of the British network arrangement was effected during Convention, and given improved radio conditions, no difficulties should arise to prevent the network carrying out very effective work in future.

Public Assistance.

Many instances have occurred recently whereby the Society has been enabled to render assistance to the public services. Several members have been actively engaged in giving advice on radio matters to police forces in the provinces, whilst the Air Ministry on two occasions have requested the Society to co-operate with them in connection with long-distance flights. Observations carried out during the recent eclipse of the sun enabled the Society to provide much interesting and, we believe, useful data regarding radio conditions.

Future Policy.

Before concluding this report I think it desirable to outline briefly the future policy of Council.

Primarily, they propose attempting in every way possible to foster interest in our work amongst juniors. It is hoped to make arrangements for lectures or talks to be given to technical schools, boys' clubs, Scout troops and kindred organisations. Endeavours will be made to obtain publicity in the national and local Press, whilst judicious advertising in certain classes of journals will also be effected. Steps will be taken to improve the social relationship between members, both in London and the Provinces. More regular contact will be established between the provincial officers and Headquarters, and where possible more information will be disseminated to these representatives.

A national field day will be organised during the summer, and attempts made to arrange for more gatherings of a similar nature.

It is anticipated that some improvements may be possible in the T. & R. BULLETIN, especially in regard to the publication of articles more specially suited to the newer member.

Consideration and thought will be given to an oft-expressed idea that a Headquarters' station should be put into operation.

It is also the intention of Council to press for improved operating facilities. For some while it has been thought that the Licence Authorities would be agreeable to increase the minimum power allowance for new licencees, and when the time is opportune this suggestion will be brought forward.

An endeavour will be made to persuade the Post Office to withdraw the clause in transmitting licences which limits the time of operating to two hours per day, whilst an attempt will be made to obtain permission for all stations to use some portion of the 3.5 m.c. band.

On behalf of Council I should like to take this opportunity of expressing thanks to all who have in any way contributed to the success of the Society during the past year, and to express my personal appreciations to those who have rendered me assistance in my official capacity.

A 50-KILOCYCLE FREQUENCY STANDARD.

By A. D. GAY (G6NF).

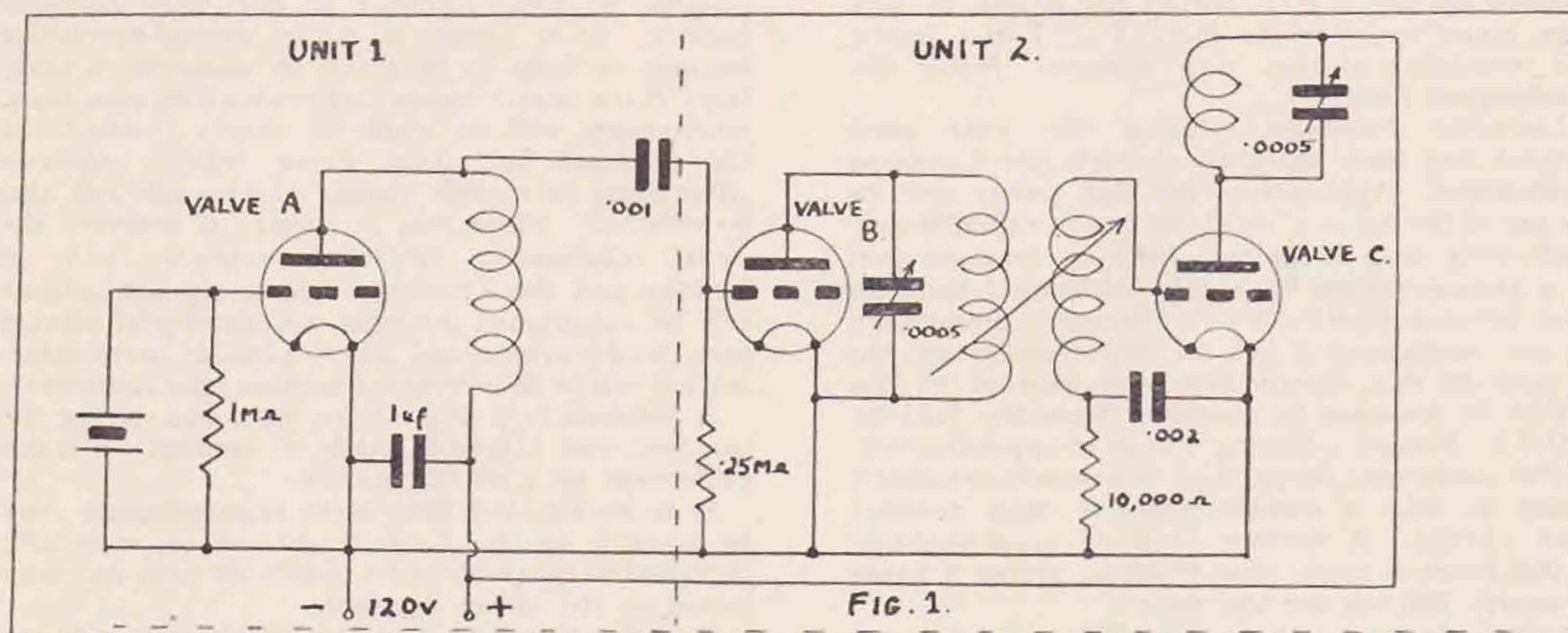
A description of a holder and circuit for a 100 kc. longitudinal oscillator which will provide a frequency standard which has been found to maintain accuracy within 1 part in 50,000. This is the companion article to the one on frequency meters published in the December issue of the journal.

THE ideal calibration source for frequency meters is, of course, the standard multi-vibrator circuit in conjunction with a tuning fork or 50 kc. Lucas-Sullivan quartz crystal standard. By means of this apparatus, calibration points for the curve may be obtained at intervals as short as 1 kc. apart if desired. A frequency meter which has been calibrated from such a source will have a perfectly accurate curve throughout its range, although it is seldom that such short intervals are required for the production of an accurate curve.

Whatever the source of calibration of any instrument and whatever its accuracy at a particular moment it must have a reference standard by which its accuracy may be continually verified or corrected.

as a reference standard, but gives the 100-kc. crystal additional value, inasmuch as it may be checked after mounting against commercial stations whose frequencies are a multiple of 50 kc. and who are known to keep a constant value. A list of some of these stations is furnished at the end of this article.

Over two years ago the writer was confronted with the prospect of re-establishing the Calibration Section of the R.S.G.B. The frequency meter, as it was then, was in an incomplete state, some of the reconstruction having been done by Mr. G. W. Thomas (G5YK) and Mr. J. W. Matthews (G6LL). It may be remembered that Mr. Hogg (G2SH) and Mr. Robinson (G2VW) were the constructors of the original instrument early in 1927. Having finished the reconstruction, the frequency meter



It is the purpose of this article to describe a comparatively simple reference standard which will maintain its accuracy within a few parts in a 100,000 and yet be inexpensive to construct and maintain. By means of a suitably mounted 100-kc. crystal and a valve to maintain oscillations a ready means of checking a frequency meter is obtained. The first part of the circuit described in this article is a self-contained unit of this sort.

The second part of the circuit consists of a frequency-doubler-buffer stage to which is coupled a valve oscillator with a fundamental frequency of 50 kc. This oscillator is held in perfect synchronism by means of its second harmonic, and no indication of regeneration from its first harmonic is apparent on the crystal. This latter part of the circuit is an added refinement which, of course, gives double the number of harmonics obtained from the crystal oscillator alone. It is not necessary

was calibrated from harmonics of 700-900 kc. of five transverse oscillators which were ground and calibrated with the assistance of a commercial long-wave meter. This system had its limitations, but was sufficiently accurate for the requirements of that period. Progression of accuracy in frequency meter design must, of course, go hand-in-hand with progression in frequency standards, an accurately calibrated frequency meter without a standard for comparison may be likened to a ship without a rudder.

Instruments of an accuracy from 0.05 per cent. to 0.01 per cent. are now quite common, and several articles have been published on their construction. It is, to use another metaphor, "like spoiling a ship for a ha'porth of tar" either to calibrate or check such an instrument against crystals which may vary—perhaps more than 0.05 per cent.—and the resultant curve will be horrible. Most

experimenters may have noticed that with crystals using top and bottom contact electrodes it is possible to alter the frequency considerably by moving the top plate about, and this does not in any way take into account the insidious influence of high temperature co-efficients which some transverse oscillators possess. The writer once heard an expert play parts of the national anthem by moving the top plate of his crystal holder about, heterodyning the beat note with his receiver.

The only way to calibrate a frequency meter and be able to claim a high degree of accuracy is to be able to obtain a succession of points not more than a few kcs. apart and all from the same source if possible. This may be done with the apparatus described in this article, and points on the calibration curve obtained at least 12.5 kc. apart.

The utilisation of harmonics of comparatively low-frequency crystals was naturally synonymous with the suggestion that even lower frequencies would produce more harmonics. It had been noticed that some of these crystals would oscillate in a longitudinal mode, and in a shunt-fed circuit they would oscillate in this manner by the simple expedient of removing the tuning coil, the H.F. choke then becoming the anode impedance. Search was made on the S/W receiver for harmonics on 3.5 mc., but they were too weak to be of any value. It was not until a low impedance valve was used for the oscillator, this permitting more power to be dissipated, that harmonics could be heard with ease below 1.7 mc.

About the same time Mr. E. Dedman (G2NH) indicated that he was carrying out experiments on the manufacture of quartz bars with a fundamental of 100 kc. There were none available to the writer then, so that experiments were continued using the pebble lenses. This has been described in the April, 1932, issue of the BULLETIN, and they were found satisfactory for ordinary accuracies.

They possessed, however, several disadvantages: firstly, their shape prevents a really satisfactory method of mounting; second, their temperature co-efficients have in some cases been found much higher than was at first anticipated and equal to that of some transverse oscillators. This may amount to more than 80 parts in a million in bad instances which will make an error of nearly 0.1 per cent. through a variation of 10 degrees of room temperature. We have to some extent mitigated the shape difficulty by grinding the pebbles oblong and then mounting in a proper air-gap holder. The temperature variation still exists, and in one instance, by holding the containing tube in the hand while the crystal was oscillating we observed the frequency of a 12,150 kc. harmonic decreasing rapidly by thousands of cycles while the temperature rose to blood heat, a simple yet convincing test of their inferiority. Properly cut quartz bars tested in this way only showed a decrease in frequency of a few hundred cycles, their temperature co-efficients being seldom more than five parts in million, and may be as low as one part in million.

Much of the inspiration for the design of this simple frequency standard is due to Mr. H. J. Lucas's paper, "Some Developments of the Piezo-Electric Crystal as a Frequency Standard," *Journal of the Institute of Electrical Engineers*, 1930, 68, 855. He describes the use of the transverse type of oscillator with a special type of holder, the 50 kc.

crystal being held at the nodal point in a considerable air-gap. By evacuating the glass tube which envelopes the holder, the damping due to air is removed, the crystal oscillating more freely, and humidity effects being absent, the crystal is found perfectly stable.

The profound influence of humidity is strikingly demonstrated by breathing on a crystal. The frequency of the crystal at first decreases and then it finally ceases to oscillate altogether. By mounting the crystal in the holder described in this article, oscillations are sufficiently energetic to render evacuation unnecessary. Protection against varying humidity influences of the atmosphere is secured by sealing into a test tube which contains a few granules of fused calcium chloride, with a well fitting rubber stopper.

The contention that the stability of these crystals mounted in the described holder may be maintained within one part in 50,000 is a very conservative statement. Under careful conditions their long period stability may be found better than this. This may modestly be claimed as an important advance in the technique of simple frequency standards, and the construction of such a standard will be found extremely worth while. We have two of these crystals adjusted to within a few cycles of each other, and a two-way switch enabling one to be checked against the other. The degrees of stability is amazing for such a simple device and a most gratifying reward for our work on the subject.

We utilised the transmissions from G5SW on 11,750 kc. for the purposes of observation on the stability of these frequency standards. The accuracy of G5SW during that period was maintained, we understand, between 5 and 10 parts in a million by the new Marconi method of crystal control.

It will be of interest to note that when the standard crystals were in dead synchronism with G5SW, two of the German stations, DGU on 9650 kc. and DAN on 12,400 kc., gave beat frequencies of 100 cycles and 200 cycles respectively with our Standard oscillator, indicating how accurate and useful some of these commercial stations can be from a calibration standpoint.

It must not be expected that such good agreements will be obtained with any station, or indefinitely with any particular station: some of them may vary more than 0.01 per cent., and it is only by many personal observations that conclusions may be drawn as to what may be regarded as a reliable transmission.

The 100 kc. Oscillator. Unit 1.

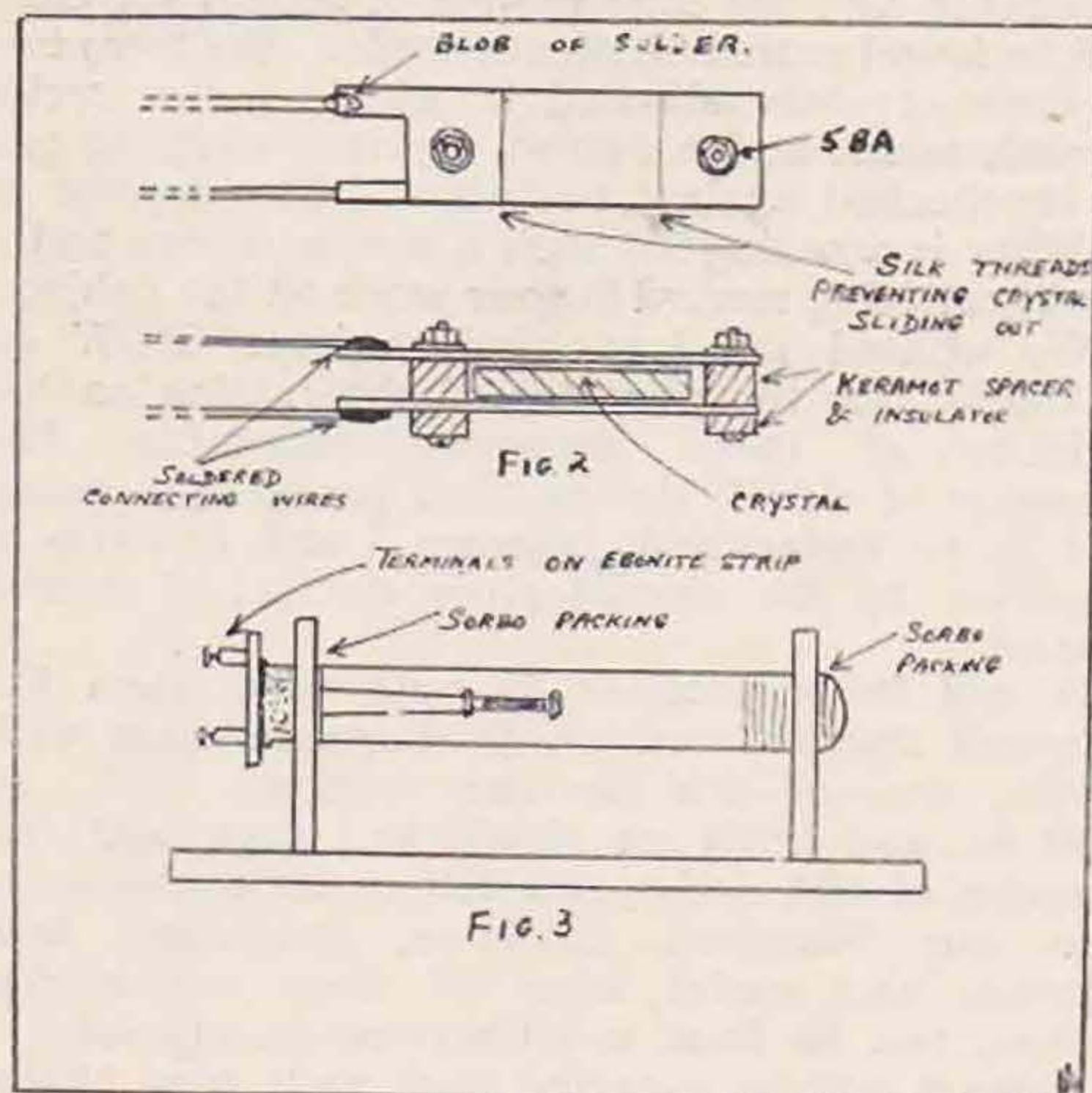
The employment of an oscillator of this type enables one to obtain calibration points for a frequency meter of 100 kc. apart. If the calibration curve is being plotted on the 3.5 mc. band a 100 kc. oscillator may be utilised for producing points 25 kc. apart. This is done by beating the frequency meters' 14 mc. harmonic against the 100 kc. intervals on 14 mc. This is clearly shown by a few examples as follows:—

Frequency meter	3500	3525	3550	3575	3600
reading	Multiplied by 4.				
Crystal	14000	14100	14200	14300	14400
Harmonic					

If this procedure is adopted on 28 mc. or even 56 mc., a shorter interval still is provided, and points on the 3.5 mc. frequency meter scale 12.5

and 6.25 kc. apart might be obtained. With these higher frequency ranges some difficulty may be experienced in finding sufficiently powerful harmonics, also tuning is extremely sharp and critical. The strength of the harmonics may be increased in the receiver by coupling to the oscillator with a length of wire and a small capacity of say 10 mmf. No appreciable variation of the standard frequency is produced, chiefly because of the wide difference in frequencies of the two circuits and the small capacitive loading involved. If any doubts are felt on this matter, frequency stability may be ensured by using a frequency doubling stage after the crystal of double the frequency. This will act as a buffer stage and also generate more powerful harmonics.

The ideal harmonic generator is, of course, the multivibrator circuit. This can be adjusted to give intervals of 1,000 cycles, but its complicated system is impracticable for amateur purposes. A 50-kc. crystal would give harmonic intervals of half that of the 100 kc. bar crystal, but the cost of such a crystal is prohibitive for the majority of amateur stations.



The second object of this article is to show how an oscillator may be constructed which will give the same accuracy as a 50 kc. crystal, and calibration points at half the interval between the 100 kc. crystal.

The 50 kc. Oscillator. Unit 2.

A consideration of the circuit in Fig. 1 will make the arrangement quite clear. A 100 kc. quartz controlled oscillator is feeding into a frequency doubler on 200 kc. which is coupled through its plate coil to a self-excited oscillator on 50 kc. The 200 kc. harmonic of the 50 kc. oscillator is held in synchronism by the 200-kc. frequency doubler, thus making it a locked oscillator.

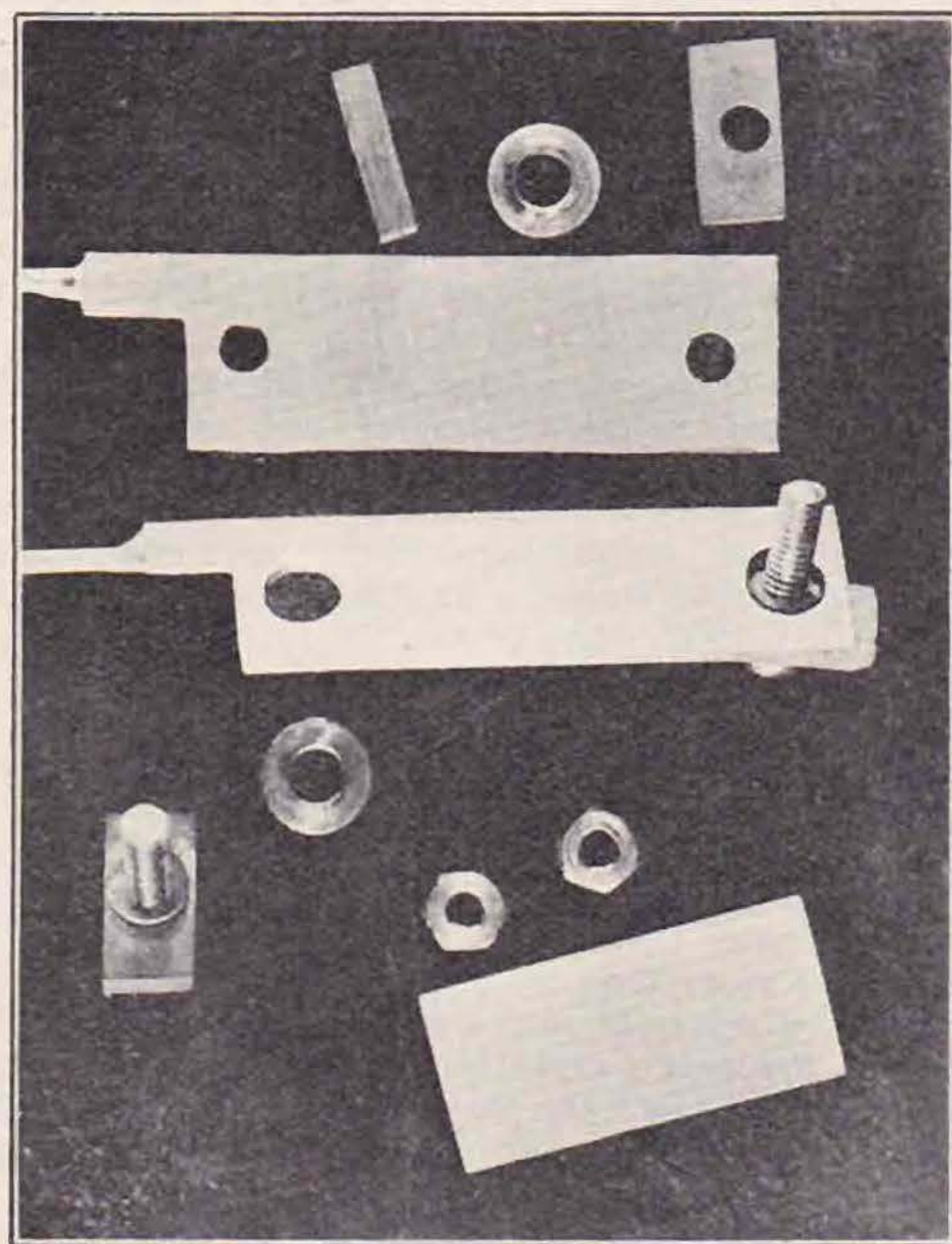
It has been found that the amount of lock obtainable with the circuit constants given, is sufficient to maintain the valve in synchronism for hours on end.

Valve A is the crystal oscillator, and in the writer's case is a DE 5. It must be remembered that the valve with which the crystal is calibrated must always be used here. Substitution of another

class of valve may alter the calibration frequency to a serious extent. For instance, the substitution of the DE 5 by a DE 5B increased the frequency of the 100 kc. crystal by 0.03 per cent. The plate inductance is a 300-turn Gambrell F coil. *It may be left untuned or a 500 mmf. condenser used, which will allow some variation of the frequency to be made.*

In Unit 2, Valve B is a DE 5B, which acts as a frequency-doubler-buffer. The output circuit of this valve, together with valve C might advantageously be screened from the crystal-oscillator stage, although no appreciable reaction from valve C has been encountered on these low frequencies. The plate inductance is a 200-turn Gambrell E coil tuned to 200 kc. with a 500 mmf. condenser.

Valve C is a P 625 oscillator with a tuned plate circuit consisting of a 500-turn Gambrell G coil in conjunction with a 500 mmf. variable condenser. The grid circuit is a 750-turn Gambrell H coil. These two coils together with the frequency-doubler-buffer coil are held in a three-way coil holder with the grid coil adjacent to the frequency-doubler-buffer plate inductance. A grid condenser



This photograph shows the component parts for the crystal assembly.

of 2,000 mmf. and leak of 20,000 ohms. are included in the circuit.

The Crystal Holder.—The 100.00 kc. crystal is one manufactured by the Quartz Crystal Co., New Malden, Surrey. It is held in a holder which has been designed by the writer for this type of crystal, and found very satisfactory for the purpose (Fig. 2).

The crystal holder consists of two brass electrodes 43 mm. by 13 mm. by 1 mm., separated at each end by two pieces of keramot 13 mm. by 6 mm., which are ground to a thickness a little greater than the thickness of the crystal, so as to allow a small

air-gap of 0.05 to 0.1 mm. The air-gap is adjusted according to the oscillation properties of the crystal. The electrodes have two small lugs to which are soldered 18 s.w.g. tinned copper wire. One of the electrodes has two holes to clear the 5 BA bolts for clamping purposes, the other has larger holes to clear insulation in the form of a small piece of systoflex passed over each bolt. These details are clearly shown in the photograph.

The surfaces of the electrodes are best ground flat, or they may be cleaned up on a piece of fine emery paper, but not polished. Care must be exercised over this operation, otherwise seriously curved surfaces may result.

The keramot spacers may have to be adjusted for width in order that the crystal has a free clearance each end. If there is insufficient room the oscillation properties of the crystal will be interfered with.

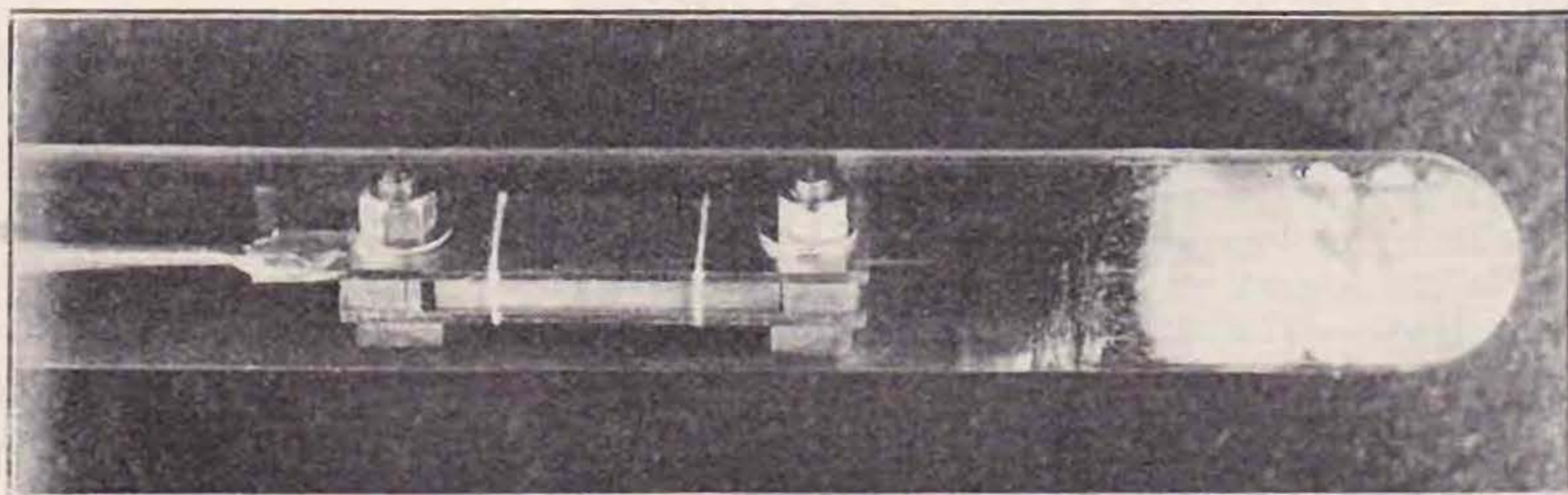
The photograph of components shows at the bottom the 100 kc. quartz crystal, two 5 BA

The actual adjustment of the crystal to the required frequency follows the same principles as the adjustment of any other crystal, and is outside the scope of this article. Instead of grinding to exactly 100.00 kc. the final adjustments may be made with the aid of tuning forks and corrections applied to the crystal nominal frequency.

Tuning forks for 512 and 256 cycles are obtainable from Messrs. Baird & Tatlock, Ltd., Cross Street, Hatton Garden, E.C.1, at 1s. 8d. and 2s. 6d. each respectively, and are extremely useful for this purpose.

It would not be good policy to make any statement as to the accuracy of any particular commercial station, but we append a short list of stations which have been found useful for checking purposes, and most of these can be relied upon within 0.01 per cent. By a continued series of observations it may be found that some of these may be relied upon to a much higher degree of accuracy. Unfortunately the highly accurate trans-

This shows the electrode and crystal assembly. The position of the crystal between the brass electrodes and the carefully adjusted Keramot spacers to give the required air-gap are clearly seen. The silk threads prevent lateral movement of the crystal.



nuts, a brass washer, keramot top spacer and bolt with piece of systoflex insulation, the two electrodes with one top spacer and bolt in place, and the inside separators.

The photograph of completed assembly shows the holder, with two silk threads preventing crystal from moving out, inside a sealed test-tube which has a few granules of calcium chloride held in place by a plug of cotton wool in the bottom. The 18-gauge wires from the electrodes being passed out of the tube through a well-fitting rubber stopper.

The test-tube can be mounted in a small wooden stand (Fig. 3), with the holder at a slight angle so that the crystal is almost resting on the silk threads. There will then be no tendency for any displacement. If displacement does occur, only a very slight change in frequency is noticeable; in fact, if the holder and crystal faces are truly parallel the assembly can be turned round 180° with no appreciable change in frequency. A heavy shock to the holder may send the end of the crystal against the keramot spacer; this may damp the oscillations sufficiently to cause a slight change in frequency, but we have only found it to amount to a few parts in 100,000. In order to insulate against shocks it would be an advantage to encircle the tube with sorbo rubber where it touches the wooden holder.

Calibration of Crystals.

A crystal which has been ground to 100.00 kc. with surface contact electrodes will be found to oscillate at a frequency between 0.01-0.02 per cent. higher than before, so that a crystal should be selected nearer 99.98 kc. than 100.00 kc.

mission from G5SW is no longer available, but the writer suggests that DGU and DAN will be found extremely useful for the purpose. One of the stations on the appended list instead of being within 50 p.p million of its nominal frequency, as was expected from its reputation, was found to be as much as 80 p.p.m.=0.008 per cent. high, a fact which was subsequently officially confirmed.

Conclusion.

Although the variable oscillator in unit 2 is normally operated on 50 kc., it will be obvious that its fundamental frequency may be altered. With the circuit constants given and a 0.001 variable condenser, the range is actually 40-75 kc. It has been found that when the circuit is tuned to 75 kc. it may be easily held in synchronism by the 300 kc. harmonic of the standard crystal, and harmonics are obtained at 25 kc. intervals in the 3.5 mc. band. And when it is tuned to 40 kc. and held in synchronism by the 200 kc. harmonic of the standard crystal, harmonics are produced on 3.5 mc. 20 kc. apart. This means that harmonics on the 14 mc. band will give points on the 3.4 mc. frequency meter 5 kc. apart if desired.

The ease with which these various frequencies are maintained in synchronism with the standard crystal and buffer stage is the amazing point about this circuit. The flexibility is such that a source of large numbers of harmonics of almost infinite variation is produced, and its simplicity is such that it may be hailed as the amateur's multi-vibrator circuit.

As far as we can see at the moment there is no reason why the frequency of this oscillator should not be reduced to 10 kc. with suitable coils and

still be easily synchronised by means of one of the harmonics of the standard 100 kc. crystal. In any case there would certainly be no difficulty in having a third unit on 10 kc. and synchronising this with the 50 kc. unit.

In order to see what the degree of synchronism sounds like on long waves, commercial stations FLE 41.7 kc., GIX 43.2 kc., FYG 50.85 kc., and GBV 78.0 kc. will be found useful for identifying 40, 50 and 75 kcs. in lieu of a wavemeter. This is not altogether necessary as the synchronisation for all these frequencies can easily be followed on the 3.5. mc. band.

By switching off the 50 kc. oscillator, two 100 kc. harmonics of the crystal are identified, say 3,500 kc. and 3,600 kc. When the 50 kc. oscillator is switched on and synchronised, the number of harmonics between 3,500 and 3,600 should be counted, only one will be found, and this will be on 3,550 kc. On 40 kc. the oscillator will be found to produce four harmonics on 3,520, 3,540, 3,560 and 3,580 kc., and on 75 kc. three harmonics will be found on 3,525, 2,550 and 2,575 kc., and, of course, all these harmonics will have the same accuracy as the standard crystal oscillator.

When some experience has been gained with this oscillator-harmonic-generator it will be found possible to adjust it to give harmonics exactly 10 kc. apart. The writer has been able to obtain harmonics of this interval by tuning to 70 kc. Owing to the remoteness of the controlling harmonic it is desirable to alter the value of inductance in the frequency-doubler stage. There are many other variations, too numerous to mention, which

have made this harmonic-generator worth many times its weight in gold.

Temperature control of the crystal is unnecessary for accuracies within 20 parts in a million which is more than the maximum frequency variation detected by this influence over the ordinary range of room temperature. In Vigoureux's book, "Quartz Resonators and Oscillators," the temperature coefficients for thin quartz bars oscillating in the longitudinal mode is given as -5×10^{-6} per 1°C . rise in temperature according to Dye. Cady gives the same figure and Horton and Marrison -4×10^{-6} . The figure for the specimens in the possession of the writer appears to be less than this and not more than -2×10^{-6} . Whether this is due to some compensation taking place in the holder only very careful observation will disclose.

If it is desired to use valves of other types than the 6V thoriated tungsten class the following will be found almost as good.

	Crystal Oscillator.*		Frequency Doubler.	50 kc. Harmonic Generator.
Valve specified	A	B		
2V. Batt. Valve	DE5	DE5B	DE5B	P625
4V. Mains Valve	PM2DX	—	HL210	PM2A
Ditto	354V	AC/P	354V	AC/P1
	MH4	AC/HL	AC/HL	104V

*The valves in column A will keep the frequency of the crystal the same, those in column B will increase the frequency by varying amounts up to .003 per cent.

LIST OF COMMERCIAL STATIONS WITH FREQUENCIES

A MULTIPLE OF 50 KC.			
GSA	6,050 kc.	GBS	12,150 kc.
DGU	9,650 "	DAN	12,400 "
GSD	11,750 "	PLL	13,600 "
FYC	12,100 "	HBE	15,000 "

THE ANNUAL GENERAL MEETING.

MINUTES of the Annual General Meeting, held on Tuesday, December 20, 1932, at the Institution of Electrical Engineers, London.

Present: Mr. H. Bevan Swift (President), supported by Mr. A. E. Watts (Acting Vice-President), Mr. E. D. Ostermeyer (Hon. Treasurer), members of Council, and about 70 members.

The President moved that the Minutes of the last General Meeting (as published in the Society's Journal, dated January, 1932), held on December 22, 1931, be taken as read. The motion was carried.

Mr. Ostermeyer proposed, and Mr. M. Child seconded, that the Honorary Treasurer's Report and the Annual Balance Sheet be approved. The Report was approved.

Mr. A. E. Watts read the Secretary's Report, in the absence of Mr. J. Clarricoats, who was prevented from attending owing to illness. The President proposed that the report be accepted. The motion was carried. (This report appears in the current issue of the T. & R. BULLETIN).

The Acting Vice-President announced the result of the Council Ballot, which was as follows:—

H. Bevan Swift (G2TI), President; A. E. Watts (G6UN), Acting Vice-President; E. D. Oster-

meyer (G5AR), Hon. Treasurer; G. W. Thomas (G5YK), Hon. Editor.

Members of Council:—J. W. Mathews (G6LL), H. B. Old (G2VQ), H. V. Wilkins (G6WN), A. W. Alliston (G5LA), J. C. Watts (BRS246), E. A. Dedman (G2NH), J. J. Curnow (G6CW). Mr. A. Milne was an unsuccessful candidate for election.

The President moved a vote of thanks to the scrutineers, Messrs. Parr and Wilberforce. The motion was carried.

Mr. Ostermeyer proposed, and Mr. Child seconded, that a vote of thanks be accorded to Mr. Ockleshaw, Hon. Auditor. The motion was adopted.

The President moved that Mr. Ockleshaw be invited to serve as Hon. Auditor for the year 1932-3. The motion was carried.

The President moved a vote of thanks to the President and Council of the I.E.E. for permitting the Society to use their building for meetings. The motion was carried.

Telegrams of good wishes were read from Mr. Old (G2VQ) and Mr. Nicholson (VU2JP).

This concluded the meeting.

Dr. E. H. Reyner then lectured on the subjects of "International Co-operation for the Study of Radio Propagation and Developments in the Measurement of Frequency." (It is hoped to publish this lecture in a future issue of the BULLETIN).

THE 1932 1.7 MC. CONTEST.

PROOF was again adequately provided during the November 1.7 mc. contest that our lowest frequency band is still one of the most popular for week-end work.

Two interesting features deserve especial comment. Firstly, the number of entries received bore no relation whatsoever to the number of stations actually known to have been active during that period, and, secondly, the success of the Scottish stations, who cleared the board by taking the first three places, deserves our warmest commendations.

Considering, first, the question of entries, whilst 30 members competed and sent in excellent logs, the almost incredible total of 155 stations were heard in operation. By a coincidence, a group of specially selected listening stations were carrying out band occupancy checks during November; hence the above information became available. It can only be assumed that many members were disappointed in their logs and failed to report, whilst others do not appear to possess the contest complex.

The Scottish successes can be regarded as further example of the great interest which is being shown in competitive radio by certain stations north of the border.

The Transmitting Entries.

The placing of the first twelve stations in order of merit was as follows:—

Position	Station	Location	Points	Contacts
1	G6FN	Edinburgh	177	89
2	G6ND	Denny	167	82
3	G6IZ	Aberdeen	166	83
4	G6YL	Felton	99	74
5	G2DQ	Wickford	96	70
6	G6UJ	Driffield	93	68
7	G5ZX	Glasgow	90	46
8	G6VV	Chatham	86	65
9	G5RX	Bacup	84	67
10	G2MI	Larkfield	80	57
11	G2ZC	Jersey	77	34
12	G5AV	Colwyn Bay	71	34

The other entrants in order of scoring were as follows: G6LI, G6ZH, G2WS, G5MP, G6CT, G6OO, G2PA, G5YG, G5UM, G5WU, G2DW, G5LO, G6LM, G6SO, G6US, G2BI, G2AK and G5PK.

Valuable logs which were used for checking competitors' entries came to hand from F8RJ, EI2B, G2GG, G6ZR, BRS727 and BRS475.

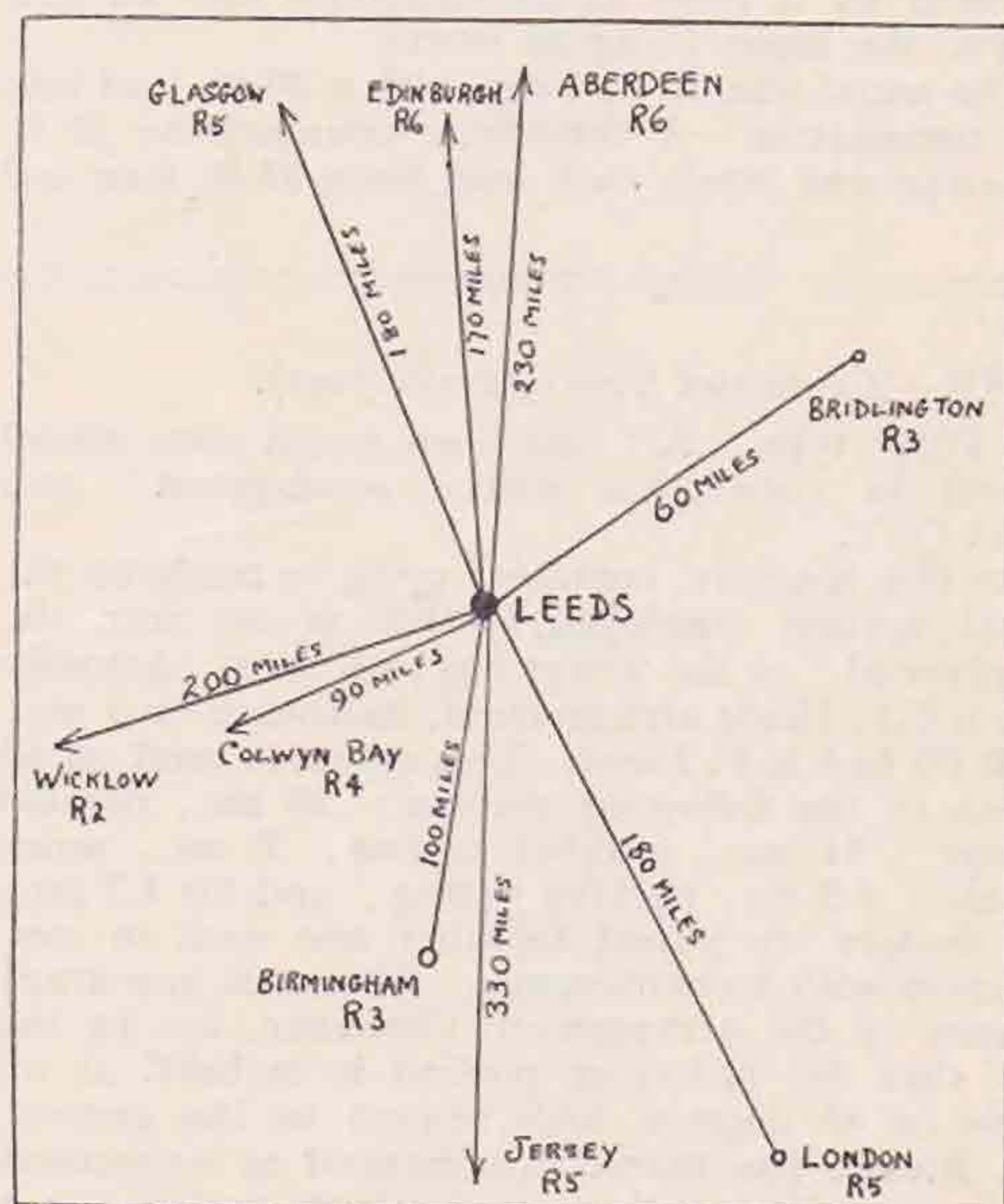
Mention must be made of the work carried out by M. Grossin, F8RJ (Ardennes, France), who, although ineligible to enter as a competitor, submitted a log giving a score of 204 points (68 contacts). His signals were received in all parts of the British Isles, and in Switzerland and Algeria. As a mark of appreciation, a special certificate is to be awarded to M. Grossin.

Awards Committee Comments.

In their report of the contest, the Awards Committee commented upon the method of scoring

and requested that constructive suggestions be invited from the membership in general. It was realised that the scoring methods adopted were somewhat favourable towards the Scottish entrants, but this was mainly due to the fact that the number of British stations to be worked from Scotland far exceeded the number of Scottish stations workable from England. It will be remembered that two points were allowed for inter-country working.

The Awards Committee also commented upon the necessity of adopting a standard form of log



The above diagram may be of interest in showing the signal strengths obtained by G2WS from various stations during the contest.

for all R.S.G.B. contests. They have this matter in hand, and hope to produce a form which will be suitable for future contests.

In this connection the Committee desire to accord their appreciations to Mr. Jack Wyllie, the Society's Scottish manager, who designed and supplied a form for use by the Scottish stations, an action which enabled the co-operating members to produce neat and clearly recorded entries.

The Leading Transmitting Stations.

The following are brief descriptions of the apparatus and aerial systems used by the three leading stations.

G6FN, owned by Mr. S. A. French, of Liberton, Edinburgh. The transmitter consisted of a CO-PA operating on 1,853 kc. The CO stage employed a Cossor 680 H.F. valve run at 300 volts 8 m.a., the power amplifier valve being an Osram LS5 delivering 9.8 watts (380 volts at 26 m.a.). Mr. French employed two different antenna systems, the first being of the Marcon

type 80 ft. long, and the second a singlewire 80 ft. long, with three 50-ft. wires as counterpoise. The receiver used employed a Cossor 215SG and an Osram PT2.

G6ND, owned by Mr. R. Miller, of Denny, Stirlingshire. The transmitter was a self-excited Hartley, using a Mazda P650 valve, run from 250 volts dry batteries at 30 m.a. The station is situated 400 ft. above sea-level and employs a 68-ft. horizontal aerial with a 30-ft. lead down and a counterpoise 7 ft. from the ground. A directly earthed (Marconi type) aerial was tried, but results were poor. The receiver used was I-V-1, with no earth.

G6IZ, owned by Mr. Ingram, of Aberdeen. The transmitter employed a DE5B as CO on 1,780 kc., followed by a P650 as sub-amplifier and an LS5 as PA, the input being 10 watts.

The aerial was 70 ft. long, with a 30-ft. lead into the transmitter. A three-wire counterpoise (6 ft. above ground level), each lead being 85 ft. long and

spread out 30° apart, was found highly efficient. The receiver employed a tuned S.G. stage, a S.G. detector and one stage of L.F. The volume being controlled by series tuning the grid coil of the first S.G. valve.

The Awards.

Besides the award to be made to M. Grossin, certificates of merit will be presented to Messrs. French, Miller and Ingram.

It is anticipated that one of the Society's trophies will be awarded to Mr. French at Convention.

Conclusions.

The contest has again shown the usefulness of the 1.7 mc. band for local work; and whilst no outstanding achievements can be recorded, it has emphasised that many of our members have that keenness and enthusiasm so necessary in these days, when every endeavour must be made to show that all of our bands are required for experimental work.

G6FN—(Continued from opposite page).

the Polar type "A" has been found very useful indeed in connection with "bandsread" and rapid QSY.

At this juncture, comment must be made on the aerial system employed, which is as near the "universal" as the writer has ever seen. Actually it is a C.F. Hertz arrangement, half-wave on 7 mc., with 60 feet R.F. Lines. This system is used on all bands in the following manner: 28 mc., parallel tuning; 14 mc., parallel tuning; 7 mc., series tuning; 3.5 mc., parallel tuning; and for 1.7 mc., the feeders are joined together and used in conjunction with a counterpoise. The most important feature of the arrangement, however, lies in the fact that the radiating portion is inclined at an angle of 45 degrees with respect to the ground. Mr. French has found this method of suspension far more efficient than that which makes for a horizontal flat top, as it appears to counteract largely the directional properties of the C.F. system, particularly when used on 14 mc. as a full-wave radiator.

G6FN has a more or less ideal situation in that it stands fully 300 feet above sea-level. There is some screening from the south, however, in the form of a hill, on the summit of which is a large reservoir, but, in the writer's opinion, it is a negligible factor.

Departure cannot be made from the radiating arrangements without mention of the tuning arrangements. A panel has been constructed, which contains three variable condensers and two Thermo-couple ammeters. By means of this, series or parallel tuning may be resorted to at will.

Apart from the Thermo-couples mentioned above, the station uses only one voltmeter and one milliammeter. These are so arranged on the power panel, however, that by means of plugs and radial switches they can be thrown into practically any circuit at will. When one is adjusting the transmitter most distant from the power panel, this arrangement is very apt to produce "crick-in-the-neck," but "FN" has got over this difficulty by

impounding a hand mirror, the property of Miss French, which looks like ending its days impersonating a periscope. However, she can always get back at him by using his R.F. feeders as a perfectly O.K. clothes-line.

The power supply is taken entirely from 230 volt A.C. mains, which the writer observed to be remarkably constant in pressure. The supply for the T61D is obtained from a Parmeeko transformer, the output of which is half-wave rectified by a GU1 valve, and subsequently smoothed. The lower voltages are obtained from a full-wave U8 rectifier, which also has its output smoothed.

In the circumstances, perhaps a few words relative to the transmitter used in the 1.7 mc. Contest will not be out of place. In general design, it conforms fairly closely to the other transmitters, with the exception that it is a three-decker affair, with the CO in the basement, the PA one stair up, with its tank coil on the roof. This transmitter may be seen in the photograph to the right of the receiver. The PA stage employs an LS5 valve, with an input of about 9 watts, and with this transmitter 89 contacts were made and 179 points accumulated.

In conclusion, may it be said that the writer regards G6FN as a model amateur station, and would urge some of our "haywire" experts to take a leaf out of Mr. French's book. Experimental work there is in plenty, but it is accomplished in a methodical and tidy fashion, and there is evidence that Mr. French's eleven years' experience of commercial operating with the Marconi Co., has stood him in good stead in respect to the design of his own station. Visitors are made very welcome, and there is such an abundance of good things to see that a visit becomes profitable as well as pleasurable.

G6FN is to take part in subsequent Society Contests, and will, the writer is convinced, make his presence felt.

In conclusion, he has asked me to express his indebtedness to all stations with whom he made contact during the tests, and to thank them for making possible his very pleasing success.

STATION DESCRIPTION No. 28.

G6FN*(Winner of the 1932 1.7 mc. Contest).*

BY "SCRUTATOR."

AT Liberton, some four miles south-east of Edinburgh, is situated one of the most interesting amateur stations it has ever been the privilege of the writer to examine.

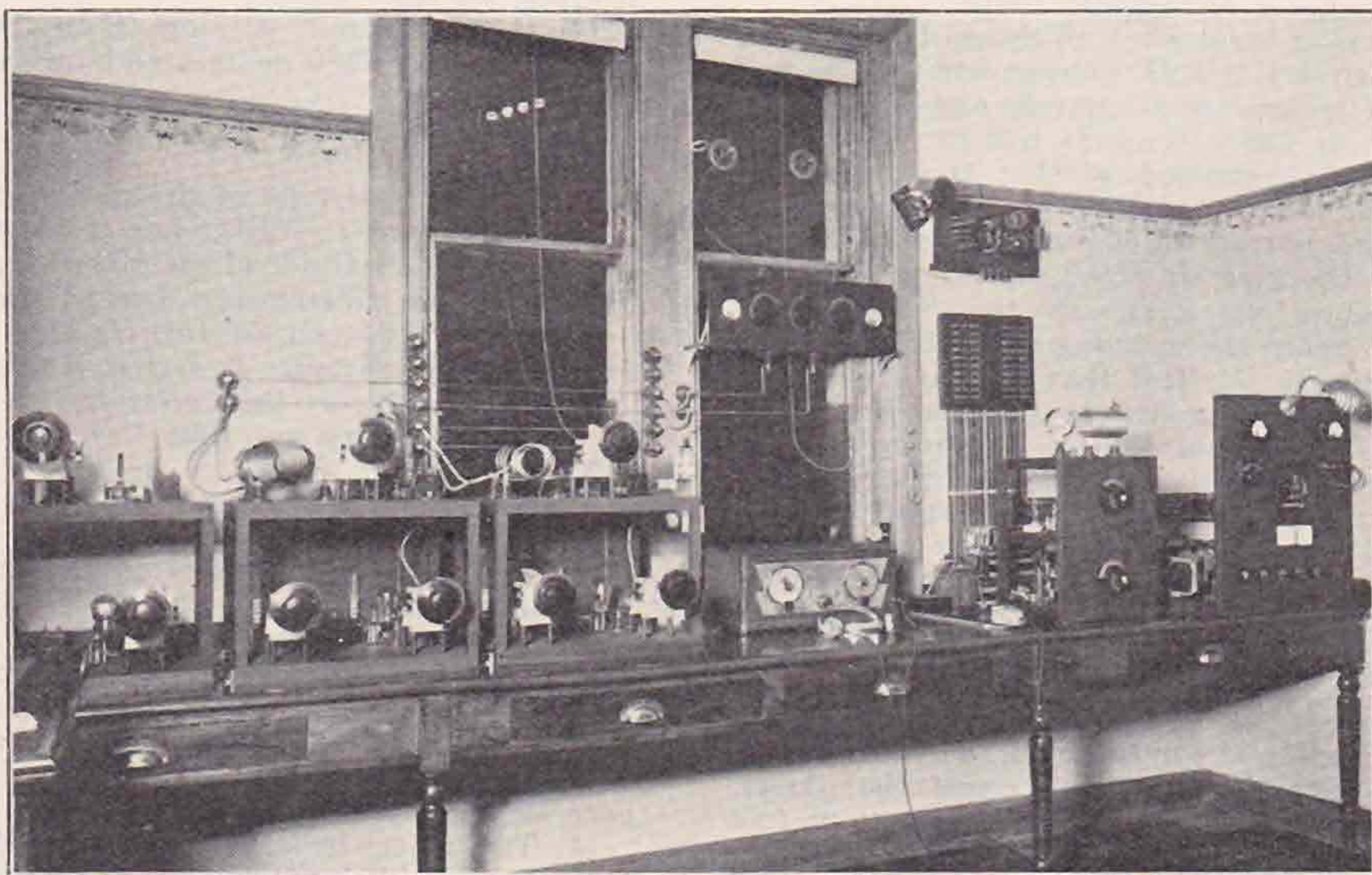
The station is G6FN, owned and operated by Mr. S. A. French.

Here is no multi-purpose transmitter. Actually, the station is equipped with five distinct transmitters, one each for the 28, 14, 7, 3.5 and 1.7 mc. bands, and each transmitter in itself a gem of neatness and efficiency. "Haywire" is anathema, and so far as the interconnecting cables are concerned, the writer has never seen neater work,

mitters would be a waste of time and space, as one and all, they are perfectly orthodox, consisting, with one exception, of COPA or COPAPA.

In all but the 1.7 mc. and 28 mc. transmitters, a Mullard T61D operates in the PA stage, and Mr. French is loud in his praises of this particular valve, the R.F. output of which is amazing.

The 28mc. transmitter comprises a S.E. push-pull circuit, using two LS5 valves, and can be seen hanging from the picture moulding at the right of the window. This is its normal position, by the way, which keeps it well away from body capacity effects.



even in high-grade commercial stations, where one has a right to expect that sort of thing.

G6FN has won the 1932 1.7 mc. Contest, and no one after a look over the station need be in any doubt as to the reason, which can be expressed in one word—*efficiency*. Efficiency, coupled with neatness, is the keynote of the whole station.

A striking feature of the general layout is a most ingenious multi-contact switch, a movement of which can throw any desired transmitter into action, thus making a complete change of communication channel in something like ten seconds. The wiring of this switch (which may be observed on the wall above the 1.7 mc. transmitter) is very complicated indeed, but in action it thoroughly justifies the thought and labour expended on it.

To discuss the circuits of the various trans-

The 1.7 mc. transmitter will be referred to later.

Generally speaking, the valves used in the intermediate stages of the various transmitters are either LS5B or Cossor 680HF.

So far as the transmitters are concerned, Cydon variable transmitting condensers are used throughout and a brave show they make.

The receiver is perfectly orthodox, and consists of S.G. Detector and Pentode. It is battery operated and reaction is obtained by varying the voltage to the screen of the detector valve. This type of receiver has proved highly satisfactory, and a similar type, consisting of SGHF-SGDET-11F, is at present under construction, and will be supplied entirely from the mains.

Polar condensers are used in the receiver, and
(Continued at foot of previous page)

CALCULATING DISTANCES BY THE GREAT CIRCLE ROUTE.

By A. E. LIVESEY (G6LI).

In response to our request Mr. Livesey tells in the following article how to measure Great Circle Distances between any two points on the earth's surface. The calculations are quite straightforward and involve only simple mathematics. This information should be of great help in compiling logs at the conclusion of the B.E.R.U. Contest.

THERE are two forms from which we are accustomed to obtain a comprehensive view of the world. The globe, familiar to all schoolrooms, and the flat representation known as Mercator's Projection. This latter is rather easily conceived if we think of it as the complete "skin" of the globe, rolled off and spread out before us, but stretched out at the four corners until it assumes a rectangular shape.

The time is at hand when all those of us entering the forthcoming B.E.R.U. Contest will need to find a means of measuring accurately and rapidly the distances over which contacts will be established. This article is composed so that those who can work *simple addition and subtraction* may be able to save Headquarters an enormous amount of time and labour checking up score sheets.

First, before we come to the "big stuff," just a word about the meaning of the term "Great Circle." Due to the fact that we have stretched the "skin" of the world to produce Mercator's Projection, it becomes useless for giving us any distances other than exactly along the equator. The Great Circle Route is the shortest distance between *any two points on the surface of the globe*. We could obtain a fairly accurate measurement direct from a model if one could be made of sufficient size, and the average schoolroom globe is far too small for the purpose of B.E.R.U.

There are, however, two numbers by which we can fix definitely the position of a point on the globe—the latitude (the rings round the globe), and the longitude (the lines which run from pole to pole). If these two figures be known for any two places then the calculation shown below will give the distance in statute miles between the two places.

The distance around the world is divided into 180 degrees, each degree is divided into 60 minutes and each minute into 60 seconds. In the average book of tables which must be used for the ensuing calculation, the accuracy is only expressed to the nearest minute, wherefore we are not concerned with anything more than degrees and minutes. A distance of *one minute* along the curved surface of the globe is known as a nautical mile, so that, if we can obtain the distance in degrees, multiply this by 60 and add to its result any minutes that happen to be appended also, then we have the *actual distance in nautical miles*. Now, *one nautical mile* is equal to one statute mile multiplied by 1.15.

The remainder of the problem is to get hold of the *distance in degrees and minutes*.

The first step is to find the difference of *longitude* between your own station and the one which you have worked.

(1) If both are east or both are west subtract the lesser number from the greater.

(2) If one is east and the other west add them together.

(3) If the answer equals anything less than 180 degrees, we shall use it.

(4) If the answer is more than 180 degrees, subtract it from 360 degrees and we shall use the remainder.

The next step is to supply some letters for a formula.

Let "a" = the latitude of the place nearer to the pole. (Either pole will work.)

Let "b" = the latitude of the other place.

Let "C" = the difference in degrees (and minutes) between the two places.

Let "c" = the distance in *degrees* between the two places—this is what we are going to try and find.

Then :—

There are *four possible different cases* which will confront us:

(1) Two places in *latitudes* of the same name—both north or both south—and the longitude difference *less* than 90 degrees.

(2) Both places in *latitudes* of the same name *but* the longitude difference *more* than 90 degrees.

(3) Two places in *latitudes* of *different* names—one north and one south—and the longitude difference *less* than 90 degrees.

(4) Two places in *latitudes* of *different* names *but* the longitude difference *more* than 90 degrees.

Let us take the four cases in their order and work out an example on each :—

CASE 1.

TO FIND THE DISTANCE BETWEEN LONDON AND CAIRO.

London is Point "A"—51° 31' North. 0° 6' west.

Cairo is Point "B"—30° 2' north. 31° 15' east.

We shall employ the following formula :—

$$\cos c = \sin a \sin b + \cos a \cos b \cos C.$$

The difference in longitude is—

$$0^{\circ} 6' + 31^{\circ} 15' = 31^{\circ} 21' = C$$

The easiest procedure is to put the sines and cosines into logarithms. The sine, cosine, etc., of a number of degrees is a number, and the logarithm of the number enables rapid multiplication to be effected. Since, as most readers are aware, the product of two numbers is obtained by *adding* their logs, and the subtraction of logs is the effect

produced by dividing two numbers. After the logs have been added or subtracted, according to whether the "sum" represents one entailing multiplication or division of two or more awkward numbers, the result has to be "antilogged"—or brought back again into a real number. Mathematical tables give all the logs needed for these calculations, and I suggest, for one, "Four Figure Mathematical Tables" by J. T. Bottomley; published by Macmillan & Co., Ltd.; price 3s.

Let's go straight ahead.

$$\text{Log Sin } 51^\circ 31' = 9.8936$$

$$\text{Log Sin } 30^\circ 2' = 9.6994$$

$$\text{Adding} = 9.5930$$

$$\text{Antilog of this} = .3917$$

That finishes with $\sin a \times \sin b$.

Now the remainder:—

$$\text{Log Cos } 51^\circ 31' = 9.7939$$

$$\text{" " } 30^\circ 2' = 9.9374$$

$$\text{" " } 31^\circ 21' = 9.9315$$

$$\text{Adding these} = 9.6628$$

$$\text{Antilog of this} = .4601$$

$$\text{Adding the two Antilogs} = .3917 + .4601 = .8518 = \cos c.$$

We must now turn to *natural* cosines and find what figure in degrees and minutes corresponds to .8518.

We see that this is given by:—

$$\cos c = .8518 \text{ or } c = 31^\circ 35'$$

Multiply this 60 and add the minutes:—

$$(60 \times 31) + 35 = 1895 \text{ nautical miles}$$

Multiply this figure 1.15, and the result is:—

$$2180 \text{ Statute Miles.}$$

(Note. In looking up sines and cosines, natural or logarithmic, remember to add the amount in the "difference" column for sines, and subtract it for cosines).

CASE II.

TO FIND THE DISTANCE BETWEEN LONDON AND HONG-KONG.

London is Point "A"— $51^\circ 31'$ north. $0^\circ 6'$ west.

Hong-Kong "B"— $22^\circ 12'$ north. $114^\circ 12'$ east.

This time we shall alter the formula to the following:—

$$\cos c = \sin a \sin b - \cos a \cos b \sin C.$$

The difference in longitude is:

$$0^\circ 6' + 114^\circ 12' = C = 114^\circ 18'$$

The tables of functions do not go higher than 90 degrees, so we subtract 90 from $114^\circ 18'$, leaving $C = 24^\circ 18'$.

Dealing with the new formula in two parts, as before, we get:—

$$\text{Log Sin } 51^\circ 31' = 9.8936$$

$$\text{" " } 22^\circ 12' = 9.5773$$

$$\text{Adding} = 9.4729$$

$$\text{Antilogging} = 0.2971$$

$$\text{Log Cos } 51^\circ 31' = 9.7939$$

$$\text{" " } 22^\circ 12' = 9.9666$$

$$\text{" Sin } 24^\circ 18' = 9.6144$$

$$\text{Adding} = 9.3749$$

$$\text{Antilogging} = 0.2371$$

$$\left. \begin{array}{l} \text{Subtracting the two} \\ \text{Antilogs} \end{array} \right\} = 0.2971 - 0.2371 = 0.0600$$

$$\text{Therefore } \cos c = 0.0600$$

$$\text{Whence we get } c = 86^\circ 33'$$

Translating into Nautical

$$\text{Miles} = 5183$$

This gives us 5961 Statute Miles.

(Note. It often happens that the first term in the above subtraction is the lesser. This gives a negative answer. The method of dealing with this is to find the number of degrees, from the natural cosine table, to which the negative number corresponds, *but* do not use this number as above. *Subtract it from 180 and use the remainder.* If the .0600 had been—.0600, then we should have calculated the miles, not from $86^\circ 33'$, but from $180 \text{ minus } 86^\circ 33'$.)

CASE III.

TO FIND THE DISTANCE BETWEEN LONDON AND CAPETOWN.

London is point "A"— $51^\circ 31'$ North. $0^\circ 6'$ West.

Capetown "B"— $33^\circ 56'$ South. $18^\circ 25'$ East.

In this case the formula becomes:—

$$\cos c = \cos a \cos b \cos C - \sin a \sin b.$$

The difference in longitude is:

$$0^\circ 6' + 18^\circ 25' = 18^\circ 31' = C$$

Since it is less than 90° , we use the value of C just as it stands.

Taking the formula in two parts, as before:—

$$\text{Log Cos } 51^\circ 31' = 9.7939$$

$$\text{" " } 33^\circ 56' = 9.9189$$

$$\text{" " } 18^\circ 31' = 9.9770$$

$$\text{Adding} = 9.6898$$

$$\text{Antilog} = 0.4896$$

$$\text{Log Sin } 51^\circ 31' = 9.8936$$

$$\text{" " } 33^\circ 56' = 9.7468$$

$$\text{Adding} = 9.6404$$

$$\text{Antilog} = 0.4369$$

$$\text{Subtracting the two Antilogs} = 0.4896 - 0.4369 = 0.0527$$

$$= \cos c$$

$$\text{Whence } c = 86^\circ 59'$$

This gives 5219 Nautical Miles. Which is 6001 Statute Miles.

CASE IV.

TO FIND THE DISTANCE BETWEEN LONDON AND AUCKLAND, N.Z.

London is Point "A"— $51^\circ 31'$ North. $0^\circ 6'$ West.

Auckland "B"— $36^\circ 25'$ South. $174^\circ 48'$ East.

This time the formula to be used is:—

$$\cos c = -\sin a \sin b - \cos a \cos b \sin C.$$

The difference in longitude is:—

$$C = 0^\circ 6' + 174^\circ 48' = 174^\circ 54'$$

Therefore we use $C = 174^\circ 54' - 90^\circ$

So that $C = 84^\circ 54'$

Taking the formula in two parts, as before, and noting carefully the minus signs:—

$$\text{Log Sin } 51^\circ 31' = 9.8936$$

$$\text{" " } 36^\circ 52' = 9.7781$$

$$\text{Adding} = 9.6717$$

$$\text{Antilog} = -0.4696$$

$$\text{Log Cos } 51^\circ 31' = 9.7939$$

$$\text{" " } 36^\circ 52' = 9.9301$$

$$\text{Log Sin } 84^\circ 54' = 9.9983$$

$$\text{Adding} = 9.6953$$

$$\text{Antilog} = -0.4958$$

Now, minus signs can be added, and the sum is also a negative quantity:—

Adding the two

$$\text{Antilogs} = -0.4696 - 0.4958$$

$$\text{Hence } \cos c = -0.9654$$

$$\text{So that } c = 15^\circ 7'$$

On account of the fact that the expression is a negative quantity, we cannot make direct use of $15^\circ 7'$ but *subtract* it from 180° and use the remainder.

$$\text{Hence } c = 180^\circ - 15^\circ 7'$$

$$\text{Therefore } c = 164^\circ 53' \text{ (the angular distance between the two places).}$$

Multiplying 164×60 and adding 53, gives us 9893 Nautical Miles.

This has to be multiplied by 1.15, to turn it into Statute Miles, so:—

Taking logarithms of both numbers (the easiest way of doing this part of the calculations) we get:—

$$\text{Log } 9893 = 3.9953$$

$$\text{Log } 1.15 = .0607$$

$$\text{Adding} = 4.0560 \text{ showing that the answer has five figures in it before the decimal point—if any.}$$

Therefore:

$$\text{Antilog} = 11,380$$

HENCE THE DISTANCE IS 11,380 STATUTE MILES.

(Note. The characteristics of the logarithms take care of themselves in the greater part of these formulæ, but the last piece worked out above, using ordinary logarithms shows the advantage of putting in the characteristics to determine the number of figures in the answer.)

There are certain points which must be regarded carefully throughout the working. First, correct figures read from the Tables, next is the careful

note of the Signs in the formula which is to be used, and finally, one must take care to add and subtract Minutes in the proper way—60 minutes to a degree. In writing down the subtraction of $15^\circ 7'$ from 180° , it should be put like this, to avoid any mistake:—

$$\begin{array}{r} 180^\circ 60' \\ - 15^\circ 7' \\ \hline = 164^\circ 53' \end{array}$$

By means of the four cases it is possible to determine the distance between *any two points on the earth's surface*. Take care in the working out of the problems, as it is very easy to make a slip until one gets practice. If the answer is thought to be wrong—utterly wrong—go back on the working and see if a decimal point has been displaced or if you have added when you should have subtracted.

Get the Logarithmic Sine and Cosine of your *own* location before anything, and keep them handy by you. This saves looking up afresh or looking back to the same figures which *must* go into *every* problem which is worked. It is also useful to remember the logarithm of 1.15, which is 0.0607.

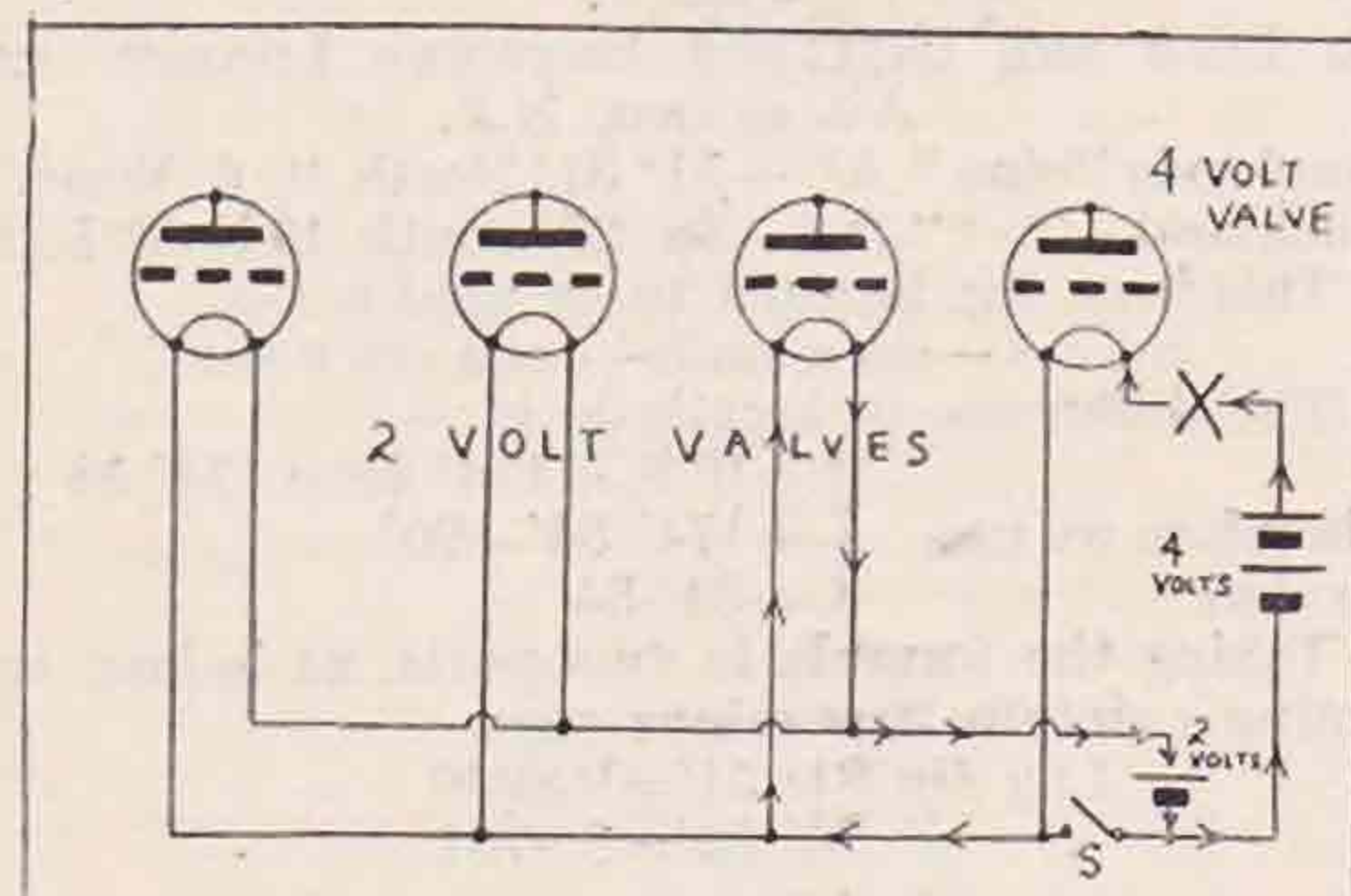
With normal care and intelligence, about 30 or 40 different cases can be executed in an evening, but it is advisable to do the calculating at the end of each B.E.R.U. week-end, thereby saving a big batch at the last. It is also good practice to do all the problems on each separate case one after the other—all "Case I" first, and so on.

I am indebted to W6ZD for furnishing the formula in an old copy of "Q.S.T."—on which I have elaborated somewhat to exclude possibilities of simple errors.

In conclusion, *do be sure* that you are applying the *correct* formula for the case in point!

A Curious Fault.

It was desired to obtain more output from a multi-valve set—a short-wave superheterodyne—and to fit a 4-volt 25-watt power-valve in the output stage. The preceding valves being all of the



2-volt class, fed from a moderately large battery, were taking sufficient load, and it was therefore necessary to supply the requisite 2 amperes for the final filament from a separate 4-volt battery. Both batteries had to have their negatives made common, and these were conveniently joined outside the

set so that all the valves could be switched on and off by the L.T. minus switch incorporated in the set. The positive terminal of the last valve-holder was, of course, disconnected, and a separate lead taken out to plus 4 volts. The switch worked as expected, and controlled the current to *all* the valves. The unfortunate point was that the 4-volt battery ran down long before its time!

The diagram shows how this happened. With the switch open, there was still a return from L.T. plus 4 volts through all of the filaments of the 2-volt valves, in parallel. One of the parallel paths is indicated by arrows. It was therefore essential to have a switch in plus 4 volts, fitted externally at the point marked "X." Still, this can be omitted if the reader appreciates a novel but expensive method of charging the 2-volt battery?

A. E. L.

STRAY.

We have received a copy of an advertisement from the *New York Sun* showing a super-heterodyne receiving set complete with valves for £3 15s. (par value), while a 10-valve de luxe super in full-size console, highly-finished case is shown at £10 4s. Evidently our American cousins are having to cut their prices heavily to keep sales up.

APPARATUS TESTED AND REVIEWED.

Lewcos Products.

LEWCOS have recently introduced a new form of their well-known Glazite connecting wire. The insulation is sprayed on, and not wound on, over a cotton covering, as before. This is a decided improvement, as the wire can be bent at will without breaking the insulation. A sample was tested for this, and it was found that the wire could be bent backwards and forwards until it broke, without the insulation cracking at all. It is very much easier to strip off the covering than on the old Glazite, and a much neater job can be made of it without being too careful. The insulation is good for 10,000 volts.

Another interesting Lewcos product is the 2-watt potentiometer, made in values up to 250,000 ohms. The contact is made by means of a rocking disc of novel design, and there is no friction on the wire-wound resistance element. The potentiometer is one-hole fixing, and the mechanism is enclosed in a dust-proof transparent celluloid case. The minimum resistance obtained with the sample under review between one end of the potentiometer and the variable arm was 170 ohms. The price is 4s. 6d.

Stand Off Insulators.

The Quartz Crystal Co. are now listing various types of porcelain stand-off insulators for coil mounting, and for supporting R.F. lines. The beehive type follows the usual line of these insulators, except that the standard fitting is a knurled nut instead of a hexagonal, or winged nut. The price of this is 1s., post free. The line support insulator is made in two lengths, 2½ ins. and 3½ ins., prices 6d. and 9d., post free, and is fixed by driving a nail, surrounded by a screwed sleeving, into the baseboard or some support, and screwing the insulator on to the sleeving. The line is gripped in a hook-shaped fitting, and fixed with a grub-screw. The Q.C.C. new list of apparatus for amateurs is well worth keeping handy in the shack.

H.F. Chokes.

We have had the opportunity of examining four of the new range of H.F. chokes recently placed on the market by Messrs. Kendall & Price.

The chokes submitted have been especially designed for work on the 3.5, 7.0, 14.0 and 28 mcs., amateur bands, and in construction were similar.

Polished ebonite rod is used for the formers, and the ends of the windings are brought out through holes drilled from one side to the other of the rod, thereby ensuring a sound mechanical termination. Close straight windings are employed in all cases, the ends being attached to substantial terminals which pass through the rod.

Lock nuts facilitate easy wiring, whilst small nickel-plated angle brackets allow the chokes to be mounted well away from the baseboard.

Small claws at the edges of the brackets are a noticeable feature as these ensure a good grip being obtained before screwing down.

The chokes are to be sold at the following prices : 3.5 mcs 3s., 7.0 mcs. 2s. 6d., 14 mcs. 2s., 28 mcs. 1s. 9d., and delivery can be made immediately from Aerial Works, Blackheath, London, S.E.3. (Telephone : Greenwich, Lee Green 5680).

Messrs. Stratton & Co., of Birmingham, advise us that, in response to several requests, they have produced a special type of six-pin coil suitable for use upon 90.2 kc., the frequency used by the GYB transmitter. This coil is to be sold at the price of 9s. 6d. each.

The Telegraph Condenser Co., Ltd., have sent us some of their condensers for test. These are of their type 87, tested to 1,500 volts D.C. They are intended for a working voltage of 400, but will withstand a peak voltage of 600/650. It is a fact often lost sight of that there may be abnormal rises in voltage in radio work, and, unless the condensers are able to withstand the increased strain, trouble is bound to occur sooner or later. Wherever a fixed condenser is placed, it is certain to be subjected at times to voltage surges. Even the kick from an atmospheric has been known to break down a condenser. In these days of all-mains sets, the question of safety is even more important. We have given these condensers very exhaustive test, which they have stood up to without a murmur. To endeavour to break them, we connected them, with a large inductive choke across the terminals, across a D.C. supply of 800 volts, and repeatedly made and broke the connection, which must have sent a very high voltage kick into the condenser. The quality of the di-electric may be judged by the fact that after the above test we left each condenser charged up at 800 volts, and they held this charge for six hours.

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STRAY.

G6SW, who has been QRT since February last, wished to thank the illegal transmitter who is carrying on the good work. He says he will be pleased to forward him several QSL's on receipt of a stamped self-addressed envelope. (We hope he will let us see that envelope.—Ed.)

The R.C.C.—1932.

The end of 1932 marks the completion of two years' work by the "Ragchewing Club." Towards the end of 1930, activity on the 3.5 mc. band was not too flourishing, and a number of the most active operators and experimenters using this frequency came to an arrangement to meet on the air each Saturday night, when they could be certain of an opportunity for contact with others for purposes of tests and friendly conversation. From these Saturday night meetings, the present organised club, with National R.C.C. Managers (N.R.M.'s) in twelve countries, has grown. Its name is a relic of the days when American slang terms were inseparable from amateur radio, but the ideas of the R.C.C. are those of to-day, when close co-operation is so essential to enable every amateur to keep abreast of modern developments.

With a continually increasing membership, the R.C.C. has been in a position during 1932 to organise a number of tests, designed to further the Club objects of improved operating standards and developing the unique possibilities of international friendships offered by amateur radio.

In November, a highly successful "Accuracy Contest" was arranged, in which competitors had to relay station descriptions, the rules being so framed that the descriptions handled were entirely in foreign languages. The relaying of technical descriptions in Czechoslovakian and Swedish through the heavy atmospherics prevailing at the time was a severe test of operation skill, and there is no doubt that the contest was thoroughly enjoyed by the participants.

At the time of writing, a series of Christmas and New Year "QSO parties" is in progress, the main object of which is to encourage the use of all amateur frequency bands from 56 to 1.7 mc. If one "party," for example, stations call on 1.7 and listen for replies on 3.5 mc., or *vice versa*, and this arrangement has encouraged many continental hams who are unable to transmit on the former band to listen for G's on the band; one result is that reception of British signals on 1.7 mc. is again reported from Czechoslovakia.

Another undertaking of the R.C.C. has been an enquiry into the use of various languages by European amateurs. Of 77 members replying to a questionnaire, 62 (80 per cent.) could understand English, 47 (62 per cent.) French, and 38 (50 per cent.) German. Those least conversant with English proved to be the Spanish hams; of 19, only five understood English, but the remaining 14 all understood French. Perhaps a surprising result was that 17 British members could, amongst them, use nine different foreign languages.

CONDITIONS OF MEMBERSHIP.

In order to qualify for R.C.C. membership, a candidate must consistently radiate a T8 or T9 signal, and be able to work "singles" at at least 15 words per minute. (Ability to use break-in operation is encouraged, but not regarded as essential.) He should work three R.C.C. members, and ask them to judge whether his operating reaches R.C.C. standard; if satisfied, they will authorise him to consider them as proposers to membership, and when he has received these three proposals, he should apply to the N.R.M. for membership. Written proposals are not required.

Although ability to work at a high speed is demanded of members, it would be a mistake to regard the R.C.C. as an exclusive association of quasi-professional operators. The man who can handle a key intelligently at 12 words per minute deserves his place in the air, and the R.C.C. ideals of better operating demand that one should reply to him at that speed. The same does definitely *not* apply to those who persist in sending "doubles" when their signals are reported as 100 per cent. readable.

The R.C.C. magazine "Ragchewing" is issued monthly, and is supplied also to non-members. The subscription is 3s., payable annually in December; as a general rule, subscribers are eligible to enter for R.C.C. tests.

All those hams who are interested in the objects of the R.C.C. are invited to communicate with the N.R.M. (G6FY), 37, Wallwood Road, London, E.11.

The Royal Normal College for the Blind Radio Society.

By A. H. BIRD (G6AQ).

(Hon. Member, R.N.C.R.S.)

In the June, 1930, issue of THE T. & R. BULLETIN appeared an appeal by Mr. Arthur E. Wilson, of the above College, for help and instruction in connection with the formation of a small Radio Society. In response to his appeal, several members of the R.S.G.B. came forward to assist.

Mr. L. H. Thomas (G6QB) gave a series of preliminary lectures on the basic facts relating to wireless generally, and I followed this up with short talks and a series of elementary papers describing the various components used in radio.

Later in the year, Mr. A. D. Gay (G6NF) kindly volunteered his services in advising as to the

efficiency of the members and the quality of their radio workmanship. He is still continuing this good work.

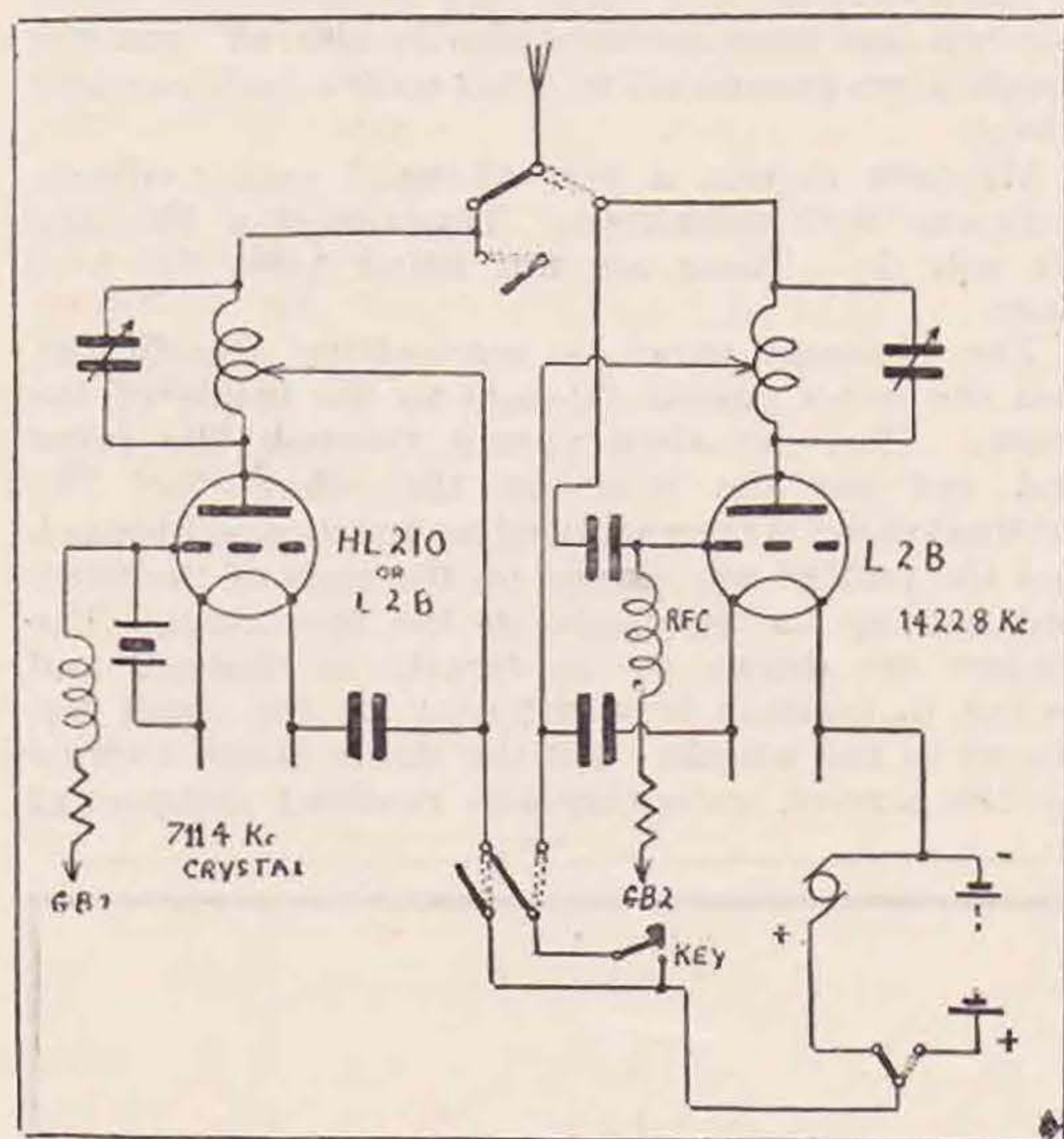
At the end of December the Society became affiliated to the R.S.G.B., and since that time continued progress has been made. Being handicapped by lack of eyesight, its members can only rely upon their hearing and sense of touch. The success achieved to a large extent is due to the energy and initiative of their President, Mr. A. E. Wilson.

About Christmas time they have a "Social" evening, and I have had the pleasure of being present on the last two occasions, when they have made me most welcome. On their behalf, I personally wish to thank the Secretary and Council of the R.S.G.B. for their interest in the matter, and especially those members of that Society who have helped, and to assure them that their efforts have been highly appreciated.

SCOTTISH STATION, G6LG.

Exactly one year ago, G6LG came on the air, licensed as a portable transmitter to operate anywhere in Scotland, and has since had over three hundred contacts in twenty-two countries—three continents. The first QSO was established between Braemar, the well-known Scottish holiday resort, and Radio ON4IF.

During the twelve days' stay some twenty-four stations were worked, using a single wire vertical aerial 63 ft. long, and at an angle of 45° from tree to shack. The farthest DX being HAF8D. At this



period a DE5B valve was used and operated from dry batteries, the maximum input never exceeding three watts. The transmitter shown in the diagram is c.c., with the aerial coupled direct to the last turn of the coil.

After the holiday the apparatus was returned to its permanent position in Aberdeen, and an inverted L aerial 30 ft. horizontal and 30 ft. vertical was next tried out, and found to give superior results as compared with the single straight type.

Various types of valves were tried, and a P625 was found to be more satisfactory than the DE5B, although the input was greater.

It was found that with the increase of input, the H.T. problem was becoming serious, dry batteries being unreliable and, incidentally, expensive. As there were no mains or "tap," a second-hand hand generator was obtained, rated at 600 v., 30 M.A., and this proved most satisfactory, and is still in use.

Up till now only the 7 mc. band had been tried, but when the 14 mc. boom came a few months ago, it was decided to add another circuit suitable for this band. The DE5B was used in the first stage, and the P625 is the second stage with excellent results.

The apparatus was again removed to Braemar this year, and every conceivable aerial was erected, interchanged and tried out, and much useful data obtained. It was found that the best results on both the 7 mc. and 14 mc. bands were obtained with a 26 S.W.G. enamel wire, 59 ft. long, centre tapped, with a lead in of 29 ft. pulled so that the horizontal portion of the aerial formed an open V. No earth or counterpoise was used.

With regard to the gauge of wire used, no difference was reported so long as the plate M.A. remained the same in each case. To obtain this, the larger gauge wire had, of course, to be correspondingly longer. The sizes used were 12 S.W.G., 18 S.W.G., and 26 S.W.G.

While the apparatus was being erected, the operator's phones accidentally fell down from his head right into the transmitter, shorting the G.B. to filament, and burning out both valves.



G6LG.

The only valves now available were an HL210 and an L2B, and it may here be mentioned that the L2B has proved a most wonderful valve. The HL210 was used in the first stage, and the L2B in the second stage, when operating on 14 mc., the L2B only being used on 7 mc. With this combination, CT2AN and W1QB were worked with 7 watts input from the generator, and sixty contacts were made during the ten days stay this year.

The writer has had, since his return to Aberdeen, the L2B valve dissipating as much as 25 watts, which has also been directly controlled by the 7114 kc. crystal, without any apparent ill-effects to either, as they are still both going strong.

Lastly, it should be mentioned that the crystal was selected and ground by ex-6VO.

STRAY.

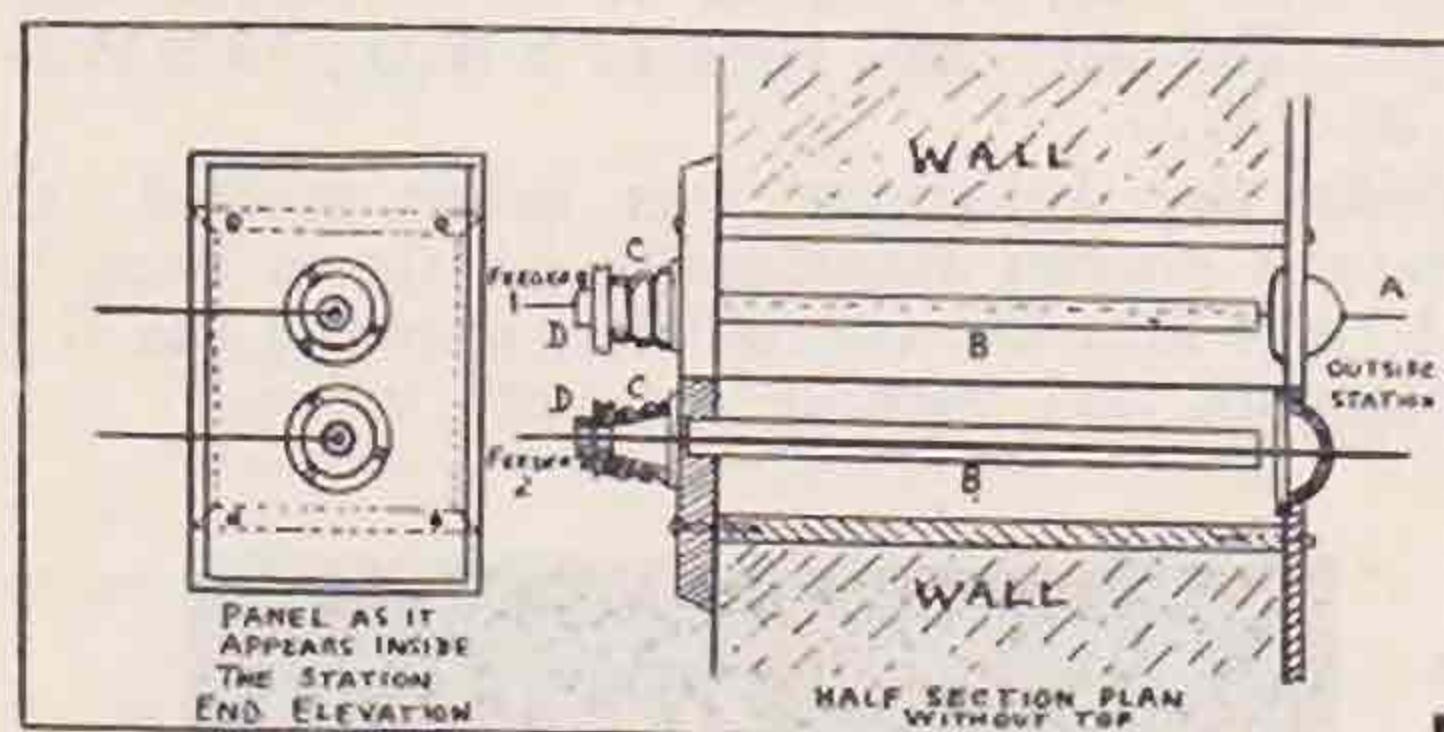
Mr. J. G. Willey (BRS 989) draws attention to the fact that his name was incorrectly spelt in the list of new members published in the November BULLETIN.

HELPFUL HINTS (No. 2).

Bringing in Zepp Feeders

Here is an idea which solves the problem of bringing in a pair of feeder lines through the wall of the "shack."

Essentially, it is necessary to have a hole made through the wall at the place where the feeders enter. The width of this hole is made about 4 or 5 ins. more than the spacing between the lines, and the depth should be about 4 ins. It will generally be found that a convenient number of bricks can be removed to give the requisite size.



A rectangular tunnel of wood is made to fit tightly into the wall on all four sides and pressed into position such that its ends are flush with inner and outer walls.

A neat panel of seasoned wood is cut for the inside of the station, and a piece of fairly thin,

seasoned wood for the outside. The outside panel has two holes cut, with centres a distance apart equal to the feeder spacing, into which are pressed tightly from the station side a pair of Pyrex bowl-type insulators.

The inside panel is drilled to take a pair of glass tubes a little shorter than the inside of the tunnel, pressed tightly in from the back side, but not all the way through the wood. On the front are mounted a pair of Eddystone stand-off insulators, as shown in the diagrams, and these may be ones from which the top has been accidentally broken off, and the rough edges ground off to a flat with a carborundum wheel.

We now require a pair of small pulley wheels, complete with set-screws. Those from a Meccano set will do. These are not fitted until the final stage.

The external panel is screwed to the tunnel, and the wires passed through to the inside of the room. They are then passed through the tubes and out *via* the holes in the stand-offs. The internal panel is then screwed up to the wood tunnel, and the pulleys are slipped on the ends of the wires and run up to the faces on the insulators. The feeders are drawn up as tightly as desired, and locked in position by tightening up the small set-screws in the wheels. All the strain is now carried by the screws, excepting the resolved component

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acting on the edges of the Pyrex bowls, if the wires enter at a slope to the wall.

To finish off the job, a small drip-board consisting of a strip of lead is tacked to the outside of the wall above the lead-in to prevent accumulation of water on the insulation.

The half-sectional plan is taken with the lid of the tunnel removed. The key to the lettering is:—

- A. Pyrex bowl-type insulators.
- B. Glass rods.
- C. Ground-down stand-off insulators.
- D. Meccano pulleys.

AIDS TO BETTER REPORTING.

BY W. A. SCARR (G2WS).

The chief interest derived from the majority of QSO's lies in the report obtained of the way in which our signals are being received.

In order that reports may be given rapidly and concisely, the R (QRK) and T (QRI) codes were devised, and these are in general use everywhere for reporting signal-strength and tone. More recently the QSA (or W) code was introduced and this is usually incorporated in a report as an indication of the readability of a signal as distinguished from mere loudness.

to the "ham" who is experimenting with telephony. The difficulty of obtaining accurate reports of 'phone transmissions has led many to abandon this type of research entirely. Most of us have experienced the hopeless task of trying to tell a foreign "ham" who knows very little English that his "modulation is about 50 per cent., that his speech is rough and accompanied by background noise." We have been exasperated by being told endlessly that our 'phone is "FB" when we were anxious for a full report.

Urgent Notice to all Members Resident in Great Britain. B.E.R.U CONTEST, 1933.

Arrangements have been made with the G.P.O. for all licensed 10 watt stations to use an input of 25 watts on the 3.5, 7.0 and 14.0 mcs. bands during the B.E.R.U. Contest.

Members wishing to take advantage of this important concession are asked to advise the Secretary, R.S.G.B., 53, Victoria Street, London, S.W.1, immediately, so that their names may be submitted to the G.P.O. together with a request that temporary licences be issued for the four week-ends of the Contest.

No application can be accepted after January 28th, 1933.

The purpose of this article is to put forward suggestions for two other simple codes which should assist the making of reports during QSO's.

The first concerns "conditions." It is often of interest to compare reception conditions at one station with those at another station and a transmitter will often report "conditions here very poor," or "conditions good." This information is extremely vague, as everyone has his own idea of what good conditions are. For example, one man intent on DX will consider conditions very bad unless DX is coming through well and not interfered with by local signals. Another man will think conditions good when he is getting R8 and R9 reports from, say, stations 500 miles away, on the 7 m.c. band.

Perhaps a code of the following nature would be of use in this connection. It could be indicated by the letter C.

CONDITIONS.

- C1. DX and local signals both coming through well.
- C2. DX signals good without interference from locals.
- C3. Good local signals, little or no DX.
- C4. Both local and DX signals weak or absent.

Perhaps the greatest trouble in reporting comes

The following is a suggested code for the reporting of speech modulated signals. The letter P might be used for this.

MODULATION.

- P1. No modulation of carrier can be detected.
- P2. Modulation less than 50 per cent., rough, unreadable.
- P3. Modulation less than 50 per cent., readable at times.
- P4. Modulation less than 50 per cent., rough but readable.
- P5. Modulation over 50 per cent., rough but readable.
- P6. Modulation less than 50 per cent., speech clear and readable.
- P7. Modulation over 50 per cent., speech clear and easily readable.
- P8. Modulation up to 75 per cent., speech clear and strong.
- P9. Modulation at least 75 per cent., speech quality perfect.

A modulation of 50 per cent. is taken to indicate that the strength of the speech is about half that of the accompanying carrier-wave. The actual strength of the speech may also be given according to the R code and the letters SR might be used here to avoid confusion with the report on the CW note.

HIC ET UBIQUE.

QSL Section—Calibration Section—Press Publicity—Forthcoming Tests—
QRA Section—Madrid Conference—Correspondence—Empire Calls Heard—
New Members.

QSL Section.

May we take this opportunity of reminding those who make use of the Q.S.L. Bureau that sealed envelopes containing letters or photographs for foreign amateurs cannot be accepted by the Society as it is one of the conditions of the postal rate under which the cards are sent abroad that the package must contain no communications in envelopes. Photographs, etc., should be pasted to the back of cards and marked with the addressee's call sign, to ensure that they can be handled in the event of their becoming detached.

There has been much improvement in the way that members have been observing the rules of the Section, and the staff are grateful for this consideration, which helps the wheels to go round so smoothly.

J. D. C.

Calibration Section.

As a result of the experience gained by the use of the new frequency meter, a great deal of experimental work upon our frequency standards has been rendered necessary.

A year ago we were thinking in terms of 0.1 per cent. accuracy. By developments in frequency meter design we are now in a position to make measurements which are ten times more accurate. This degree of accuracy has brought to light slight variations in our standards, which although only of the order of 0.02 per cent. maximum, they were nevertheless sufficiently unstable to be inadequate for our present requirements.

It is sufficient to say at present, that observations which have been made upon pebble 100 kc. oscillators over a long period indicate that their temperature co-efficients render them unsuitable for high-class calibration work. Two which were carefully mounted with air-gaps have been found to have temperature co-efficients of the order of 20 parts per million per degree centigrade.

With an accurate frequency meter this produces an easily detectable fluctuation through the various ranges of room temperature and may amount to 0.02 per cent. This is what might be expected from this type of crystal, but with the use of properly cut and mounted crystals the variations are indeed negligible, and at least a quarter of this figure must be considered an important advance in the stability of simple reference frequency standards.

Council has agreed to the following alteration to calibration fees:—

Crystals per calibration, 1s. 6d. plus postage both ways.

Frequency Meters, five points spread over any band, 2s. 6d. plus carriage both ways. Additional points 50 kcs. apart may be supplied at a charge of 6d. per additional point. All measurements being within 0.01 per cent.

Crystals and frequency meters should be sent to A. D. Gay, 49, Thornlaw Road, West Norwood, London, S.E.27, at owner's risk.

WARNING.

If you have your crystal silvered, be very careful to have the frequency checked afterwards, or before going on the air. This treatment makes a considerable difference to the frequency of the crystal. During a spell of frequency measurement we had to telephone a well-known London amateur and ask him how long he had held a commercial ticket; he was 50 kc. off-frequency, and silver deposit was the reason!

Frequencies measured between December 4 and 11, 1932, inclusive:—

G2BY	7140kc.	G6BB	{ 3612.4 kc.
G2GF	7150		{ 7168
G2LZ	3730	G6BS	3561.6
G2NH	7026	G6CL	14298
G2VR	3537	G6DU	{ 7044.6
G2XS	3574		{ 7124.6
G5AP	7153	G6FN	1851.5
G5DA	3553.7	G6JZ	7169
G5IM	7088	G6LI	3523
G5LA	7106	G6LL	{ 28712
G5OQ	3642		{ 3650.4
G5RX	3530	G6NF	{ 14080
G5XH	14226		{ 14368
G6YH	7123	G6PA	3699.7
G5YK	3722	G6RL	7157
G5SG	14282	G6RS	7105
		G6RV	7155
		G6WY	14044
		G6YL	3597.6

A. D. G.

Press Publicity.

The suggestion has been made that a concerted effort should be made to interest the national and local press in the work of the Society.

Council, at their December meeting, supported the suggestion, and as a result it has been decided to recommend to all members that invitation should be extended to local newspapers to send representatives to visit members' stations during the third annual B.E.R.U. Contests which are due to take place during the four week-ends in February.

Where possible, press representatives should be asked to pay a prior visit so that information regarding amateur radio can be imparted without interference with operation during the contest. The second invitation should be arranged to coincide with a period when the station is expected to be in operation.

BRS and A.A. members are urged to co-operate in this effort to obtain publicity.

When publicity is obtained, Headquarters will be pleased to receive press cuttings for record purposes.

Suggestions for future press campaigns will be welcomed.

Forthcoming Tests.

In addition to the Reception Tests announced below, the tests organised by R.E.P. and the special tests from ON4BO (details of which are to be found elsewhere in this issue) members are reminded of the dates for the following tests organised by the Society:—

JANUARY 14 to 22.—Low Power Contest. These rules were published in the September issue, page 89.

FEBRUARY 4 to 5 and 11 to 12.—B.E.R.U. Senior Contest.

FEBRUARY 18 to 19 and 25 to 26.—B.E.R.U. Junior Contest.

The rules for both B.E.R.U. Contests were published in the November issue, page 169, with an amendment in the December issue, page 196.

Reception Tests

Below will be found dates and periods for the next series of Reception Tests. New participants are referred to the May, 1932, number of the BULLETIN for detailed procedure as to the logs to be filled in, and are informed that all logs are circulated in the form of a Budget. The Réseau des Emetteurs Français are publishing this series of Tests in "Radio R.E.F.," when it is hoped that a contribution of French logs will be received. This arrangement has been made possible through the courtesy of our member, F8RJ, whom the 1.7 mc. contestants will remember for his recent whole-hearted co-operation. All logs should be sent to T. A. St. Johnston, 28, Douglas Road, Chingford, E.4, by February 20.

RECEPTION TESTS. SERIES 14.

Test Letter.	Date, 1933.	Period G.M.T.	Band mc.
A	Sat., Jan. 28	2300-2400	7
B	Sun., Jan. 29	0830-0930	1.7
C	Sun., Jan. 29	1000-1100	3.5
D	Sun., Jan. 29	1130-1230	56
E	Sun., Jan. 29	1300-1400	14
F	Sun., Jan. 29	1900-2000	28
G	Sat., Feb. 4	1430-1530	14
H	Sat., Feb. 4	2300-2400	3.5
I	Sun., Feb. 5	0900-1000	7
J	Sun., Feb. 5	1030-1130	28
K	Sun., Feb. 5	1130-1230	56
L	Sun., Feb. 5	2230-2330	1.7
M	Sun., Feb. 12	0000-0100	7
N	Sun., Feb. 12	0930-1030	3.5
O	Sun., Feb. 12	1100-1200	1.7
P	Sun., Feb. 12	1200-1300	56
Q	Sun., Feb. 12	1830-1930	14
R	Sun., Feb. 12	2200-2300	28

Long-distance Monoplane Flight to the Cape.

We were advised by the Air Ministry, on December 15, that the long-distance monoplane flight to Cape Town had been postponed until some date between February 5 and 12, owing to adverse weather conditions and the illness of one of the pilots.

An E.L.S. message was sent by G5ML to ZU6W immediately.

Our thanks are extended to all African amateurs who stood by to give assistance.

QRA Section.

Manager: M. W. PILPEL (G6PP).

NEW QRA's.

- G2TM.—T. W. N. MILLAR, c/o McEwan, 11, Murray Crescent, Perth, Scotland.
- G2WP.—P. L. WATERS, 18, Park Road, Whalley Range, Manchester.
- G5AZ.—H. HAZELDENE, 34, Marjorie Grove, Clapham Common North Side, London, S.W.11.
- G5MW.—MEDWAY AMATEUR TRANSMITTERS' SOCIETY. (Hon. Secretary, E. T. Pethers, 17, Tufton Road, Rainham, Kent.)
- G6PP.—M. W. PILPEL, 7, Woodberry Down, Finsbury Park, London, N.4.
- G6QC.—E. T. PETHERS, 17, Tufton Road, Rainham, Kent.
- G6QK.—R. HILTON, 14, Overton Drive, Wanstead, London, E.11.
- G6RV.—W. B. STIRLING, Moss Grove, Bridge of Allan, Stirlingshire.
- G6RZ.—G. SPENCE, 107, Dumbiedykes Road, Edinburgh.
- G6UI.—W. T. BASSAGE, "East Lynne," Joynson Street, King's Hill, Wednesbury, Staffs.
- G6UK.—T. W. GENTLEMAN, 36, Ashcroft Drive, Cathcart, Glasgow.
- G6UW.—CAMBRIDGE UNIVERSITY WIRELESS SOCIETY, Scroop House, Cambridge.
- G6VK.—A. E. BROOKES, 19, Alexandra Road, Uplands, Bedminster Down, Bristol, Somerset.
- G6XB.—G. E. JONES, 21, De Freville Avenue, Cambridge.
- 2AAU.—K. T. HARVEY, 41, St. Martin's, Marlborough, Wilts.
- 2APL.—J. B. INGLIS, c/o Davie, 51, Marchmont Road, Edinburgh, 10.
- 2AQD.—A. W. GROVES, 290, Ashley Down Road, Bristol.
- 2AQF.—A. M. RUTHVEN, Maitland Bank, Larkhall, Lanarkshire.
- 2AWJ.—H. E. M. LAWSON, 77, Kennington Avenue, Loanhead, Scotland.
- 2BDF.—G. W. McDONALD, Oakroyd, Woodburn Avenue, Aberdeen.
- 2BDT.—L. GRECH, 9, Stenhouse Gardens, (N.) Edinburgh.
- 2BMX.—N. BLACKBURN, 4, Huntroyde Avenue, Tonge Moor, Bolton, Lancs.
- 2BRQ.—A. G. WOOD, 33, Lattice Avenue, Ipswich, Suffolk.
- 2BVD.—E. KNOWLES, "The Caravan," Springfield, Hemsworth, near Pontefract, Yorks.

The following are cancelled: 2BJW, 2BVL, 2BXO.

Will members please note my new address, and that of the QRA Section, which is

7, Woodberry Down, Finsbury Park,
London, N.4.

(Telephone: Clissold 5766.)

Please send all new QRA'S, changes of address, etc., to the above.

MADRID CONFERENCE.

Concluding Report.

THERE is little to add to the November report of the Madrid Conference. On December 9 the tenth and final plenary session took place, and the result of the Conference is that Amateur Radio to all intents and purposes remains unchanged, and after a hard struggle we have retained all of our frequency bands intact.

We have been through an anxious time during the eighteen to twenty months of preparation for the Conference in the endeavour to be ready for any and every eventuality, and, frankly, we are very relieved now all is over.

I will conclude by giving the final decisions affecting amateur radio.

Article 1.—Definitions. Amateur station has been given a separate definition as was asked for.

Article 5.—All amateur bands remain the same as in the Washington Convention.

Article 6.—At the end of paragraph 2, a further sentence has been added, as follows:—"The above regulations may be modified by special arrangements between the countries interested."

Article 33.—The I.A.R.U. will be invited to take part in future C.C.I.R. meetings.

The Articles have been re-arranged slightly in the new Convention, and the two Articles that we have come to know almost by heart, Articles 5 and 6, have become Articles 7 and 8.

The Madrid Conference has accepted the Egyptian Government's invitation for the next Conference to be held in Cairo in the Autumn of 1937. We must have our eyes on the future, and I think we should be doing more on our lower frequency bands: there is a lot of work to be done here.

A. E. W.

Correspondence.

The Editor does not hold himself responsible for opinions expressed by correspondents. All correspondence must be accompanied by the writer's name and address, though not necessarily for publication.

Do You QSL?

To the Editor, T. & R. BULLETIN.

DEAR SIR,—When a radio amateur transmitter makes a QSO he likes to complete the contact by sending and receiving a QSL card, as proof of having worked that particular station.

The same thing means just as much to the humble B.R.S. man, because logging world-wide amateurs on his S.W. receiver is his sole hobby, and he certainly deserves to get *his* cards too, but I am afraid the B.R.S. man is rather neglected when it comes to an acknowledgment of his reports.

Amateurs should be grateful to these people, as I am sure they can obtain a certain amount of help from a listener's report, so buck up, fellow hams, with your QSL cards!—Yours faithfully,

JOHN DALTON
(2BCQ).

Heck!

To the Editor, T. & R. BULLETIN.

DEAR SIR,—With your kind permission, I address myself to "Heck."

DEAR HECK,—I enjoyed your good-humoured tilt at BRS, and, reading between the lines, I

quite agree with you that ham language can be overdone. Ham language, up to a point, is commendable in transmission and on QSL cards; but why it should creep into correspondence beats me. There are two abbreviations in ham language that have tradition behind them, which gives them a certain dignity, O.M. and 73. Other ham abbreviations in correspondence look ludicrous, and lower the dignity of the other two, not to mention the annoyance to those who have to read it.

But, by Heck! yours is not the only shaft that has a sharp point. You are a transmitter; and I trust you are not one of those who—

After BRS has hung on for half an hour, changes over with "over."

Runs his keying up and down, as though he had a yo-yo in one hand and a key in the other.

Lingers lovingly on his dots, and tries to make it up on the next dash by giving it a kick.

Makes the break sign sound like neet.

Kids himself he is on a radio marathon, and strings his call and the station he is calling in one continuous line from here to there without a break.

After having a QSO at a reasonable speed, signs himself yours anonymously by giving his sign at such a speed that he trips up in doing it.

Uses a bug that does not know how to behave itself, and one that he could not use if it did.

Kids himself that he is T9, but has such a lovely chirp that BRS cannot tell whether the key is up or down, and makes him say *Viva la, R.A.C.*

Uses the abbreviest of abbrevies, and after every three or four of those thingamagigs, gives four breaks, three end of messages, and pause. Afterthought, another break—Oh! and a comma.

Who gives—but, Oh! why keep on!

By Heck! BRS has longed to borrow that blood-stained knife of yours—but, no, on second thoughts, this is the Jolly Season of the Year—so shake!—Contritely yours,

"BRS"

Modulation.

To the Editor of THE T. & R. BULLETIN.

DEAR SIR,—May I trespass upon your space to make a few comments on Mr. Hardie's paper on Modulation?

In putting forward a theorem to which he rightly attaches a great deal of importance he unfortunately mistakes the case and, moreover, fallaciously proves it!

On page 148 is the statement that maximum *current* will flow in a circuit supplied by a source when the resistance of the external is equal to that of the generator. This is obviously incorrect, since the maximum practicable current which can be drawn from any generator of constant internal impedance is obtained by short-circuiting the generator, i.e., making the external circuit resistance equal to zero.

In the next column, however, he correctly states the problem, i.e., that maximum *power* will be developed in the external circuit when the resistance of the latter is equal to that of the generator.

There would appear to be no chance of a slip of the pen, however, since a proof is given for the well-known case of a number of batteries in series-parallel each of e.m.f. E and internal resistance r . If there are " m " rows of " n " cells in each row

the current flowing in an external load of R ohms will be, as given by Mr. Hardie :

$$I = \frac{E}{\frac{R}{n} + \frac{r}{m}}$$

Now, according to the article the maximum value of I is given when the denominator is equal to zero, i.e. :

$$\frac{R}{n} + \frac{r}{m} = 0.$$

$$\therefore \frac{R}{n} = -\frac{r}{m}$$

$$\text{not } \frac{R}{n} = +\frac{r}{m} \text{ as quoted.}$$

Thus

$$R = -r \cdot \frac{n}{m} \text{ for maximum current. Now this}$$

result is quite reasonable. The internal resistance of the whole battery is $\frac{rn}{m}$. The above equation

means that maximum current will be obtained when the external resistance is equal to the battery but *negative*. The *minus* sign which Mr. Hardie has mislaid is the crux of the matter. If the external resistance is *minus* the internal resistance the total resistance would be zero. Hence the current would be infinite. Although, of course, impossible in practice, this is the correct interpretation of the working given by Mr. Hardie.

Suppose, however, we take the correct view that the *power* will be a maximum in the load when its resistance equals that of the generator. Then the power in the load is given by

$$W = I^2 R$$

$$\text{But } I = \frac{E}{\frac{R}{n} + \frac{r}{m}}$$

$$\therefore W = \frac{E^2 R}{\left(\frac{R}{n} + \frac{r}{m}\right)^2}$$

$$\begin{aligned} \therefore \frac{dw}{dR} &= \frac{E^2 \left(\frac{R}{n} + \frac{r}{m}\right)^2 - E^2 R \cdot \frac{2}{n} \left(\frac{R}{n} + \frac{r}{m}\right)}{\left(\frac{R}{n} + \frac{r}{m}\right)^4} \\ &= \frac{E^2 \left\{ \left(\frac{R}{n} + \frac{r}{m}\right) - \frac{2R}{n} \right\}}{\left(\frac{R}{n} + \frac{r}{m}\right)^3} \end{aligned}$$

For a maximum value $\frac{dw}{dR} = 0$.

$$\therefore \left(\frac{R}{n} + \frac{r}{m}\right) - \frac{2R}{n} = 0.$$

$$\frac{R}{n} + \frac{r}{m} = \frac{2R}{n}$$

$$\therefore \frac{r}{m} = \frac{R}{n}$$

$$\text{or } R = \frac{r \cdot n}{m}$$

Mr. Hardie has undoubtedly confused this with another well-known case. Given a number of cells and a *fixed* external resistance R , what is the best arrangement of cells to get a maximum current? Note that in this case we have to vary, for example, the number of cells in a row (n), it being given that the total number (nm) must remain constant.

In this case, as before,

$$I = \frac{E}{\frac{R}{n} + \frac{r}{m}}$$

We have now to differentiate with respect to m , not R .

Then for I to be a maximum,

$$\frac{R}{n} + \frac{r}{m} \text{ must be a minimum.}$$

Now, both n and m are variable. Since $nm = \text{constant} = \text{number of cells in battery} = K$, let us say

$$nm = k$$

$$m = \frac{k}{n}$$

$$\therefore \frac{R}{n} + \frac{r}{m} = \frac{R}{n} + \frac{rn}{k}$$

$$\frac{d}{dn} \left(\frac{R}{n} + \frac{rn}{k} \right) = -\frac{R}{n^2} + \frac{r}{k}$$

This must = 0 for a minimum.

$$\therefore -\frac{R}{n^2} + \frac{r}{k} = 0.$$

$$\frac{R}{n^2} = \frac{r}{k}$$

$$n^2 = \frac{kR}{r}$$

$$\text{or } n = \sqrt{\frac{kR}{r}}$$

Thus we must put $n = kR \sqrt{\frac{1}{r}}$ cells in each row.

But we already know that the total battery resistance is given by

$$\begin{aligned} \frac{r \cdot n}{m} \\ \therefore \frac{r \cdot n}{m} &= \frac{rn^2}{nm} = \frac{rn^2}{k} \end{aligned}$$

But $r \cdot n^2 = kR$.

$$\therefore \frac{r \cdot n}{m} = \frac{r \cdot n^2}{k} = \frac{kR}{k} = R.$$

Thus the arrangement of the cells must be that which incidentally gives the total resistance equal to that of the external load.

Summarising the above three cases, we have the following results:—

1. Given a fixed number of cells supplying a *fixed* external resistance, then the maximum current will be obtained when the cells are so arranged that the total battery resistance is equal to the external load resistance.

2. Given a fixed number of cells so arranged as to give any internal resistance, the maximum current (i.e., infinite) will be given theoretically

when the external load is equal to the internal resistance and *negative*. The maximum practicable current will be given when the load resistance is zero, i.e., with the battery short-circuited.

3. Given a number of cells arranged so as to have a given internal resistance supplying a load resistance which is variable, then maximum power will be delivered to the load when its resistance equals that of the battery.

In all three of the above cases the cells may be replaced by any generator of substantially constant internal resistance such as a thermionic valve. It is the last case which is of importance when considering modulation, since the modulator valve is the generator and the P.A. acts as a resistance equal to the H.T. voltage divided by the anode current under normal driven conditions.

In conclusion, may I say how much such a comprehensive article as Mr. Hardie's on modulation is appreciated.

Yours faithfully,

H. A. M. CLARK (G6OT).

Empire Calls Heard.

Members are again reminded that only British Empire Calls (included British ships and Expeditions), can be published. Contributors must in all cases prepare their lists in STRICT alphabetical and NUMERICAL order otherwise publication will be withheld. The period of the year during which the calls were heard and the frequency band must in all cases be stated.

T. H. Beaumont, BERS1, 1st Battalion Beds and Herts Regiment, Mhow, Central India, on 7 mc., November 6 to 26, 1932 :—

g2xs, g2zq, g5cu, g5yh, g6li, sulec, vk2ek, vk2ou, vk3dt, vk3es, vk3gu, vk3je, vk3kk, vk3mj, vk3mr, vk3yp, vk3zw, vk6gw, vk6fi, vk6fl, vk6mn, vk6ra, vk6xr, vk2ba, vk2mw, vs6af, vs6ag, vs7gt, vs7rd, vu2ah, vu2bg, vu2dj, vu2jp, vu2jx, vu2lj, vu2lt, vu2lz, yi2ds, zllak, zl2ah, zl2ce, zl2gn, zs2a, zs4tz, zu5j.

BERS1 between Southampton and Bombay, October 11 to November 1, 1932 :—

7 mc. : ei2b.

14 mc. : g2ko, g2ol, g2zq, g5gs, g6dl, g6im.

L. Deane, 40, Tusmore Avenue, Tusmore, South Australia, on 14 mc., October, 1932 :—

g2dz, g2ii, g2oa, g2nh, g5wq, g5np, g5qa, g5bj, g5vm, g5ku, g6li, g6ll, g6vp, g6xq, sulec, sulaa, vs6ab, vq2jo.

A. S. Mather (VK2JZ), 14, William Street, Singleton, N.S.W., on 14 mc., from October 13 to 31, 1932 :—

g2ig, g2ii, g2kb, g2nh, g2oa, g2zq, g5fv, g5hb, g5np, g5hb, g5wq, g6rb, g6vp, g6xq, vs6ao.

BERS74 and BERS79, 31 (AC) Squadron, Quetta, India, during November, 1932 :—

7 mc. : g5ml, g6li, vk2lz, vk3lp, vk3kx, vk6hf, vk6or, vs6ag, vu2lt, vu2lz, xyi6bz, yi2ds, zelpb, zllar, zs2a, zs2al, zs2d, zs6b, zt2hc, zt5r, zulr, zu5ez.

14 mc. : g5bj, vk2vl, zu6m.

BRS822, 63, Tennyson Road, Small Heath, Birmingham, October to November, 1932 :—

7 mc. : sulec, su6hl, veldi, vk3kr, vk3wb, vk3zb, vk5gk, vk5hg, vk7ch, vu2cs, xyi6bz, yi2ds, yi2fu, yi6wg, zu6w.

14 mc. : velae, veldm, veldr, velea, ve2ca, vk6mu, yilgn, yi2ds, zs4m, zu6w.

VS7AO from November 6 to 28 :—

7 mc. : g5cv, g6hp, vk2vs, vk2zh, vk3cx, vk3fm, vk3gu, vk3je, vk3kv, vk3kk, vk3lp, vk3nk, vk3oc, vk3rw, vk3xf, vk4rm, vk5hg, vk5rd, vk6ck, vk6dh, vk6gf, vk6jk, vk6kr, vk7ck, vk7ry, vs2ab, vs6ag, vs7gt, vu2ah, vu2lt, vu2lz, zgc1b, xulu, xyi6bz, zxn2b, yi2ds, zllar, zl2bw, zl2dp, zl3bv, zu5j.

14 mc. : sulec, vk2bx, vk2gw, vk2hk, vk2hw, vk2hz, vk2jt, vk2lx, vk2lz, vk2no, vk2xg, vk2xy, vk2xz, vk2yk, vk2yz, vk2zw, vk3bw, vk3je, vk3jj, vk3wy, vk3yp, vk3zl, vk4as, vk4jb, vk5gr, vk5wr, vk6mu, vs3br, vs7gt, yi2ds, zllar, zllca, zllce, zllck, zllcs, zllgq, zl2ac, zl2bz, zl2ck, zl2lb, zl4bt, zslh, zs4u, zs6ah, zt6m.

VQ2XD, B. M. Orr, P.O. Box 49, Livingstone, N. Rhodesia, November, 14 mc. :—

g6xq, g6gf, sulec, su6hl, ve3wa, ve4bm, vrlma, vs7gt, vs3ac, vq4crl, vq4crh, vq3msn, vu2lz.

A. J. Mathews (BRS497), 24, Woodside Park Road, London, N.12, November 4 to December 18, 1932 :—

3.5 mc. : vo8aw, vo8z.

7 mc. : vk2yr, vy2zh, vk3al, vk3bq, vk3bt, vk3cp, vk3dt, vk3fq, vk3kr, vk3lp, vk3oc, vk3rj, vk3rq, vk3wl, vk3yw, vk3zb, vk5gk, vk5hg, vk5pk, vk5yk, vk6ag, vk7ch, vq4crl, vs6ag, vu2jb, vu2lt, su6hl, yi2fu, zllaf, zllcn, zllgq, zllgu, zl2bw, zl2bz, zl2ce, zl2ci, zl2dn, zl2dx, zl2gs, zl2je, zl2jq, zl2kx, zl3ai, zl3aj, zl3ax, zl3az, zl3bj, zl3ck, zl3cm, zl3cs, zl3dx, zl4ao, zl4ba, zl4bg.

14 mc. : vk4gk.

VE1BV, C. S. Taylor, Stewiacke, Nova Scotia, December 1 to 10, 1932 :—

7 mc. : g2ig, g2nh, g2tm, g2yc, g5aw, g5la, g5yh, vk2bk, vk2br, vk2bv, vk2dt, vk2hl, vk2jn, vk2mw, vk2tx, vk2wu, vk2zr, vk3bw, vk3bx, vk3dt, vk3go, vk3mj, vk3oc, vk3wd, vk3wl, vk3xf, zllcp, zl2ap, zl2di, zl2dj, zl2gn, zl2gs, zl2jl, zl2kq, zl3cz, zl3dw, zl3fw, zl4ck, zl4ct, zs2j, zu6w.

VS7AO, October 8 to 28, Ceylon :—

7 mc. band : ac8na, ac9gh, v6bh, vk2ah, vk3bi, vk3dt, vk3gp, vk3je, vk3oe, vk3vl, vk5bp, vk6ft, vk6hf, vk6kr, vk8na, vu2bg, vu2lj, vu2lz.

14 mc. band : af8j, g2ii, g2oa, g2sa, g5np, sulaa, sulec, ve3oa, vk2ba, vk2hp, vk2je, vk2jt, vk2xy, vk3je, vk4gk, vk4rv, vu2ah, vu2lz, zxn2b, yi2dc, yi6ki, zt5v.

G5YH, December 4-28 :—

7 mc. : sulec, su6hl, vk2hq, vk3aw, vk3dt, vk3gj, vk3kr, vk3rj, vk3rw, vk3vl, vk3wl, vk3zb, vk5pk, vk5yk, vo8z, vs6ag, vu2lt, xulu, yi2ds, yi2fu, xyi6bz, zllar, zllcn, zl2ak, zl2av, zl2aw, zl2az, zl2bz, zl2ci, zl2cp, zl2fi, zl2gn, zl2go, zl2gs, zl2gu, zl2je, zl2jq, zl2lb, zl3aj, zl3aw, zl3ax, zl3ck, zl3fi, zl3gs, zl4ao, zl4aw, zl4bj, zl4bp, zl4bt, zl4cw, zs2f, zxn3d.

New Members.

HOME CORPORATES.

- T. HALSTED (G2AL), Briar Royd, Briar Road, Thornton, Blackpool.
 T. VICKERY (G5VY), 274, Mount Pleasant Road, N.17.
 F. G. INGLETON (G3FI), 48, Grasmere Road, N.10.
 R. F. WESTON (G6PZ), 252, Hucknall Road, Nottingham.
 C. H. L. ASKHAM (G6TT), 18, Stanley Gardens, Orrell Park, Liverpool.
 R. W. WRATTEN (2BQH), 28, Tufton Road, Ashford, Kent.
 C. D. WHALEY (A), "Danum," Ramsey Road, St. Ives, Hunts.
 W. F. J. DUNN (BRS1030), Bowden Lodge, Bowden Hill, Lacock, Wilts.
 L. A. R. WILLIAMS (BRS1031), Aronmore, Jeffcock Road, Wolverhampton, Staffs.
 J. W. DEAN (BRS1032), 100, Stanley Road, Gloucester.
 L. SCHOFIELD (BRS1033), 14, Market Place, Shipley, Yorks.
 C. F. IRONS (BRS1034), Eynesbury, St. Neots, Hunts.
 E. CAMERON (BRS1035), 25, Liberton Gardens, Edinburgh.
 S. HUNTER (BRS1036), 44, Market Street, Limavady, N. Ireland.
 R. H. JACKSON (BRS1037), 54, Princess Street, Stockport, Lancs.
 A. R. LAND (BRS1038), 10, Kimberley Street, Bradford, Yorks.
 R. J. RANDALL (BRS1039), Eddington Villa, Eddington, Herne Bay, Kent.
 N. P. SPOONER (BRS1040), 18, Warwick Road, Boscombe, Bournemouth.
 H. HARGREAVES (BRS1041), Moreton, Sydney Avenue, Whalley, Lancs.
 R. V. D. BEAUMONT (BRS1042), Le Seigneurie, Sark, C.I.
 W. H. ROBERTSON (BRS1043), 4, Nelson Terrace, Prospect, Whitehaven.
 A. OUGHTON (BRS1044), 20, Irby Street, Boston, Lincs.
 F. HIRST (BRS1045), 183, Oldham Road, Royton, near Oldham, Lancs.

- A. P. MORGAN (BRS1046), 19, Temple Fortune Hill, Golders Green, N.W.
 S. G. HART (BRS1047), Station Road, Stansted, Essex.
 F. LANCASTER (BRS1048), 30, Banksville, Holmfirth, Huddersfield.
 R. F. DAWSON (BRS1049), 11, Furber Street, W.6.
 A. H. CAMPBELL (BRS1050), Flowers Court, Pangbourne, Berks.
 L. R. SHERMAN (BRS1051), 33, Stanley Road, S. Harrow, Middx.

DOMINION AND FOREIGN.

- E. CANETE (EAR3), Jacometrezo, 1 entlo, Zaragoza.
 F. ROLDAN (EAR10), Ave Pablo Tolesias, 17, Madrid.
 A. URIARTE (EAR12), Alberto Aguilera 29, 39, Madrid.
 J. M. DE CORDOVA (EAR96), Apartado 745, Madrid.
 J. G. CORCUERA (EAR125), O'Donnell 16, Madrid.
 J. M. LUQUE (EAR219), Nunez de Balboa 15, Madrid.
 M. R. CANO (EAR224), Villanueva 21, 29, Madrid.
 C. M. LYONS (VP2MK), 68½, King Street, Kingston, Jamaica, B.W.I.
 J. SCOTT (VQ4CRM), Vet'y Research Laboratory, P.O. Box, Kabete, Kenya Colony.
 J. S. BUCKLEY (WIARB), 73, Cottage Avenue, Ansonia, Conn, U.S.A.
 C. BRONSON WEED (W1BHM), 224, Saint Ronan Street, New Haven, Conn, U.S.A.
 C. HARLING (ZT6D), P.O. Box 1639, Johannesburg, S. Africa.
 G. H. G. GALBRAITH (ZT6H), 72, Sydney Road, Judiths Paarl, Johannesburg.
 W. I. COULSON (BERS156), c/o G.P.O., Perth, W. Australia.
 F. E. LYONS (BERS157), 68½, King Street, Kingston, Jamaica, B.W.I.
 C. H. CHESTER (BERS158), Helsingfors, N. Esplanadsg 27, Finland.
 D. W. HADFIELD (BERS159), Burma Railways, Myitnge, Upper Burma.
 C. A. V. GRANT (BERS160), Munnar P.O., Travancore, S. India.
 D. SERRAO (FRS21), 1, Broome Street, Port of Spain, Trinidad, B.W.I.

BOOK REVIEW.

Report of the Radio Research Board for the year 1931. Published by His Majesty's Stationery Office, London. Price 2s. 6d. 124 pp.

The Radio Research Board have again produced a most valuable addition to our store of knowledge. Detailed reviews are given of subjects of special interest to amateurs, which include, under the heading "Propagation of Waves," the results of work carried out on the Polarisation of Downcoming Waves in the Northern and Southern Hemispheres and Research on Ultra Short Waves. Chapters are devoted to Direction and Ultra Short Wave Problems. The development of radio frequency standards has received careful study; whilst methods of measuring radio frequencies are treated at length.

Information is given regarding the N.P.L. calibration waves transmitted for the benefit of amateurs, and some useful data in connection with the establishment of a quartz frequency standard should prove of value to those interested in accurate frequency measurements.

It is interesting to note that a series of observations carried out on the Rome-Sardinia 10-metre telephony service show that the reception has been very erratic, and over long periods, especially in winter, when the electron limitation is probably effective, no signals whatever were obtained. Records have been taken of the fluctuations in intensity of these signals, and it has been found that the fading period is normally of the order of 15 seconds except during magnetic storm conditions, when the period is reduced to about 5 seconds.

The report should be read by all who are anxious to derive benefit from the careful studies of the Research Board staff.

STRAY.

With reference to the report of the 56 mc. tests for November 20, G2OW says that he kept both his own schedules and those of G6XN, using his own call in both cases.

North-Eastern Amateurs Form New Society.

We understand from Mr. Hornsby (G5QV), of 7, Lansdown Gardens, Newcastle-on-Tyne, that a new local amateur society is being formed in the Newcastle district.

Mr. Hornsby is our Northumberland County Representative, and is anxious that all members and persons interested in amateur radio living around Newcastle should join this new venture, which is aimed at providing opportunity for exchange of ideas and lectures. A charge of 6d. per meeting has been fixed as a temporary subscription until such time as rules are formulated.

Mr. Hendry (G6FG) has been appointed Chairman, whilst Mr. Hornsby is acting as hon. secretary and treasurer.

Stray.

Greetings from the new Czecho-Slovakian Organisation C.A.V. assembled at their meeting in Brno, were recently received. We are glad to note the existence of this Society, and trust that an I.A.R.U. Member Society may soon be appointed for this rapidly growing "Amateur" country.

A Silent Key.

We regret to announce the untimely death of Mr. H. Higson (G6IS), of Lower Darwen, Lancashire, after a very short illness. Our deepest sympathies are extended to his widow.

Another Pirate!

Mr. D. D. Marshall (G2MA), of Glasgow, complains that his call sign is being used by another station for CW and 'phone on 7 mc.

CONTACT BUREAU NOTES.

By H. C. PAGE (G6PA).

MAY I be allowed to commence my notes this month by thanking all of you who so kindly remembered me at Christmas? Owing to their number, and a particularly busy time of year for people of my profession I am unable to reply to you all individually, but you must take the wish for the deed.

There are several events of importance to record during the past month. The 28 mc. Tests have taken place, and although I have received no official intimation of the result yet, I understand from G6VP that no DX has been achieved. Once more 28 mc. seems to have let us down. However, I will say no more about this matter, as you will find full reference to it in the 28 mc. groups report.

The 1.7 mc. Group is to be congratulated greatly on their success in picking up American Amateur signals on that band. From the report which you will find elsewhere in these notes, you will realise that this is no freak affair, but has been possible for a period. Above all, I think our praise is due to these men for the way in which they have stuck to their task. It is well over a year since G5UM told me that the group proposed to listen for the W stations. An expression of thanks is also due to the W9 stations who took part in the experiment, for their co-operation in this matter.

My next piece of news is not of so pleasing a nature. I regret to have to announce that G2ZC, one of our oldest C.B. members, and a Founder Member of Group 2B, has had to resign, owing to ill-health. Probably everyone is aware that he has been the Group Manager of the "Two" groups ever since I took over C.B., and I would like to take this opportunity of thanking him publicly for his good work on behalf of C.B. His place is being taken by G6MB, who, I am sure, will prove quite adequate to his job, and in whom I have every confidence.

This month I have received a report from VU2JP, who is the group centre of a S. Indian C.B. group. This group has just been formed, and is not yet fully manned, but it is hoped to rectify this shortly, and regular reports on work in India will be forwarded to C.B. VU2JP reports that 28 mc. has been very poor for some time past, although VU2FY did hear that one or two VK stations were heard in August; 14 mc. is also more or less dead, but here again VU2FY has heard several G stations. It is remarked that QRN has been worse than for many years. Monsoon conditions were abnormal too. Some parts of the district having as much as 320 inches of rain!

28 M.C.

G6VP, Group Manager.

Another disappointment—the Tests over, and not a DX signal heard even. On the face of it, it looks bad, and yet when we consider the awful conditions at present on both 14 and even 7 mcs., what could we reasonably expect?

As far as ground wave radiation goes, the signals heard were infinitely of better quality and even

stronger than when 28 mcs. was at its best. It's to be wondered whether the band will be as slow to recuperate as it has been to lose its capabilities. All groups seem to have been working and here are their reports, with one exception.

Group 1a.—The group has been active in the tests, but not a single amateur signal has been reported. A few commercial harmonics, such as IRJ and EAZ, together with a station using suppressed carrier telephony have been heard.

G5FV was unable to employ his 6/2 vertical aerial supported by hydrogen balloons, as a gale blew on both week-ends, and transmissions were made off a 4/2 wire, presumably of the design which proved so successful in the summer months. For the A.R.R.L. tests, a four-wire directive array has been erected. It was unfortunate that G hams did not learn of these tests (for each week-end of December) until they had already commenced.

In the group budget, it is suggested that on this frequency, contacts in a north-south direction are easier than those in an east-west direction. Has this effect been noticed on 14 mc. during times when DX is scarce?

Group 1b.—G5SY reports that although he was active during the whole of the Tests, he did not hear any signal. G5QA has a similar report. He was, using a self-excited Ultra-Audion. He tried the effect of first establishing contacts on 14 mc. and Qsy'ing, but without success. G6LL also reports nil; he hopes that we will be able to arrange supplementary tests during the summer. G5LU, after a long period of enforced silence, has now found a suitable QRA with excellent facilities for the erection of aerials, plus A.C. mains.

Group 1c.—G6VP was on all the time, but beyond four local contacts—nil. G6WN had just changed the location of their station from outdoor shack to indoor and struck the usual bunch of troubles. On the 3rd they heard the Rome and Sardinia carriers; beyond this one local QSO and local stations heard.

Group 1f.—BRS25 heard local stations only. G6HP heard locals only. 2BHK heard Rome and Sardinia, harmonics of EAX, also locals. He suggests that we obtain the co-operation of foreign radio societies before arranging future tests. We do, o.m. (VP). He finds 16 ft. 6 in. the best aerial length. G2CX has been altering his receiver with a new type of quick switch over from one band to another, for comparative purposes. G6JT reports nil. G2OI thinks that the south hear all the DX!!! and wonders whether anyone up north hears any. (Same as the South, no doubt)!

The failure of the tests is felt by all, but before closing these notes, I should like to bring before you the disappointment it must have occasioned the organisers. I do not think we are grateful enough to them; still, we may show them our appreciation by keeping on keeping on and plotting a nil on the graph with as much care and exactitude as a success.

Fading, Blindspotting and Skip.

Group Manager, G2ZC.

I should like to draw the attention of all readers of our notes, to the brief report from Group 2A. In this report the word "Front" appears, and so far as I know, this is the first reference to a Front that has appeared in the BULLETIN. Having a slight knowledge of the subject, it is rather remarkable that up till now, no special observations seem to have been made regarding a meteorological Front, and we might perhaps follow this line of investigation closer. As Group 2A seem to have found a very definite connection between meteorological observations and W/T conditions, I should like to suggest that this group give us all a short paper on the subject, showing clearly just what a Front is. Under medical advice and pressure, I have had to tender my resignation as Group Manager, and I do so with the very sincerest regrets, as for the five years that I have been associated with the groups studying the subjects we have been investigating, I have found that in our groups, the work undertaken has been carried out smoothly, and I attribute the success of our having kept so well together, to be due to the wonderful spirit of co-operation. All members have been loyal to their G.M., G.C., and to the traditions we started, and in fairness to all concerned, I would like to express my deep appreciation of all the help I have had, without which we could not have prospered as we have done. I should also like to express my appreciation for the help we have had from Headquarters R.S.G.B., and from C.B. Manager (or rather, I should say Managers, for we have worked under three), but one and all have given freely of their best.

It is this very point that makes the parting all the harder for me, and if we have merited any praise I should like this to be given by means of as full a support to my successor, as has been my fortune to receive.

All future applications and reports should be sent to G6MB (A. J. Buttress, 25, Staines Road, Sunbury-on-Thames), who is the new Group Manager.

Groups have reported as follows:—

Group 2A.—In investigating the effect of meteorological conditions on radio transmissions, results so far seem to indicate a connection between pressure systems and W/T wave propagation, so far as distances up to 1,500 miles are concerned. It appears, however, that the position of a "Front" is the deciding factor governing good or bad reception, rather than the actual pressure distribution, and when propagation is through a Front, or surface of discontinuity, reception conditions are not good, but where propagation is through the same mass of air, then reception conditions are improved.

Ultra High Frequency Work.

Group Manager, G6XN.

Although there is little of general interest to report, members of the Group have been for the most part very active.

2BHX, G2OL and G6XN have been active during the London 56 mc. tests, and have heard the usual stations. 2BHX noted a general drop in signal strength from dusk until darkness, and wants to know if anyone can explain it. As far as is known

to the G.M., this effect has not previously been observed, and is presumably local.

G6XN, with co-operation from G2OW, recently spent an evening observing the behaviour of signals from a 5-metre transmitter at his "digs" in Welwyn Garden City. The transmitter used $3\frac{1}{2}$ watts input with a four-wave aerial. The receiver was 0-v-0 straight, with a half-wave aerial erected on a "baby" Austin. Some eighteen stops were made in all directions from the transmitter, signals being heard up to a maximum of six miles. Contrary to all previous results, hills were found to have no screening effect. Signals inaudible on one hill had been heard in the valley beyond! There was a suggestion that the more broken the country, the more rapid the attenuation.

On some high ground near the transmitter, signals were, of course, strong. A mile further on, with the hill intervening, they were nearly as strong. But a mile further, on much higher ground, there were no signals. This was explained by the position being in exact line with the transmitting aerial. The foregoing helps to emphasize a long-felt need for *complete co-ordination of all results on 5 meters, from all sources.*

The isolated reports which come to hand are to a large extent conflicting, and of relatively small value, as long as they remain isolated.

Will *all* who have done any work on 5 metres kindly let me have a summary of their results, so that some kind of co-ordination may be attempted by the Group? Details of power, aerial, direction and distance of receiver from aerial, nature of intervening country, and relative signal strengths are the most important details required.

G2KB and BRS77 are continuing their work on electron oscillators.

2 M.C. Work.

G5UM, Group Manager.

A significant commentary on present radio conditions is afforded by successful efforts by Group 10A to receive trans-Atlantic amateur signals on 2 mc. During the first ten days of December, Group 10A members kept watch on 2 mc. from 05.00 to 07.00 for signs of any of nine W stations who were transmitting for their benefit. Although only two were received, they came in so consistently that if a British station were permitted to use high power for a special tests with U.S.A., two-way communication should be easily achieved.

The first ten days of December were marked by a particularly cold spell of weather. Static remained at a fairly low level all the time; at first there was a new moon, which waxed to full by the end of the tests; most mornings were fine and cloudless.

G2WS and G5UM appear to have been the first to hear the Americans. The latter station logged W1AGA and WIDBM on December 4, both at 05.45 G.M.T. at R3 and R4 respectively, while G2WS logged WIDBM an hour later. On December 5 G5UM received a doubtful CW signal at R1-2, WID?? December 7 was a red-letter day, when G5RX and G6FO, who were now standing by, logged WIDBM at R6 with S.G. receivers, as did G2YI and G5UM. December 9 showed a further spell of good conditions, and not only was WIDBM logged by several members, but W8CPE, handling traffic, was heard at R5 by G5UM.

Continued on page 239.

NOTES and NEWS



BRITISH ISLES

DISTRICT REPRESENTATIVES.

DISTRICT 1 (North-Western).

(Cumberland, Westmorland, Cheshire, Lancashire.)
MR. S. HIGSON (G2RV), "Hebblecroft," Egremont Promenade,
Wallasey, Cheshire.

DISTRICT 2 (North-Eastern).

(West Riding, Durham, Northumberland.)
MR. L. W. PARRY (G6PY), 13, Huddersfield Road, Barnsley,
Yorks.

DISTRICT 3 (West Midlands).

(Warwick, Worcester, Staffordshire, Shropshire.)
MR. V. M. DESMOND (G5VM), 199, Russell Road, Moseley,
Birmingham.

DISTRICT 4 (East Midlands).

(Derby, Leicester, Northants, Notts.)
MR. H. B. OLD (G2VQ), 3, St. Jude's Avenue, Mapperley,
Nottingham.

DISTRICT 5 (Western).

(Hereford, Oxford, Wiltshire, Gloucester.)
CAPT. G. C. PRICE (G2OP), 2, St. Anne's Villas, Hewlett Road,
Cheltenham, Glos.

DISTRICT 6 (South-Western).

(Cornwall, Devon, Dorset, Somerset.)
MR. H. A. BARTLETT (G5QA), "Donbar," Birchy Barton Road,
Exeter, Devon.

DISTRICT 7 (Southern).

(Berkshire, Hampshire, Surrey.)
MR. E. A. DEDMAN, 63a, Kingston Road, New Malden, Surrey.

DISTRICT 8 (Eastern).

(Cambridge, Huntingdon, Norfolk, Suffolk.)
MR. S. TOWNSEND (G2CJ), 115, Earham Road, Norwich.

DISTRICT 9 (Home Counties).

(Bedfordshire, Hertfordshire, Essex, Buckinghamshire.)
MR. F. L. STOLLERY (G5QV), "Kingsmead," Lancaster Gardens
East, Clacton-on-Sea, Essex.

DISTRICT 10 (South Wales and Monmouth).

(Monmouth, Glamorgan, Breconshire, Carmarthen, Cardigan,
Pembroke.)
MR. A. J. E. FORSYTH (G6FO), "St. Aubyns," Gold Tops,
Newport Mon.

DISTRICT 11 (North Wales).

(Anglesey, Carnarvon, Denbighshire, Flintshire, Merioneth,
Montgomery, Radnorshire.)
[To be appointed.]

DISTRICT 12 (London North).

MR. S. BUCKINGHAM (G5QF), 19, Oakleigh Road, Whetstone,
N.20.

DISTRICT 13 (London South).

MR. A. D. GAY (G6NF), 49, Thornlaw Road, West Norwood,
S.E.27.

DISTRICT 14 (London East).

MR. T. A. ST. JOHNSTON (G6UT), 28, Douglas Road,
Chingford, E.4.

DISTRICT 15 (London West and Middlesex).

MR. H. V. WILKINS (G6WN), 81, Studland Road, Hanwell,
W.7.

DISTRICT 16 (South-Eastern).

(Kent and Sussex.)
MR. H. A. M. WHYTE (G6WY), Killiney, Worsley Bridge Road,
Beckenham, Kent.

DISTRICT 17 (Mid East).

(Rutland, Lincoln and E. Riding.)
MR. A. E. LIVESEY (G6LI), Stourton Hall, Horncastle, Lincs.

SCOTLAND.

MR. J. WYLLIE (G5YG), 31, Lubnaig Road, Newlands,
Glasgow.

NORTHERN IRELAND.

MR. C. MORTON, (G15MO), 27, Bristol Avenue, Belfast.

District Notes for publication should be written as concisely as possible and should be in the Editor's hands by the 25th of the month preceding publication. They should be of a general rather than personal nature. Individual reports from County Representatives will not be accepted for publication.

DISTRICT 1 (North-Western).

CHESHIRE must have gone to sleep for the winter, since I see only three members mentioned in the C.R.'s report. G2OA reports varied conditions during the month, good at first and poor later on. Managed to work his first ZL on 14 mc. He is now trying CC. again, and gets as much output from his second FD as from a push-pull T.P.T.G. This, with a UX247 Pentode as CO and first FD! G5OZ has moved his QRA. G5FC writes me direct, and says he is staging a complete re-build, and expects to be on the air by the middle of January. G6OM tells me that is nearly able to work on any band except 28 mc. The feat will be accomplished shortly. G2RV has had a mysterious stoppage, which, up to the time of writing has not been found!

Many stations report active from Lancs., and the meetings in Manchester are still well attended. That to be held in January is for general debate, and that in February, G2OI is giving a station description. G2DH reports ten contacts with VK on 7 mc. Several stations report lack of DX, while others seem to be enjoying it and working all they hear. 2BRG has our sympathy for being

ordered off the air for a while, owing to his health not being all it might be.

The following stations are active:—G2WP, G6JN, G2WQ, G2DH, G5YD, G5WR, G6ZS, G6QA, G6AX, G5MB, G2YO, G2OI, 2BMX, and BR5767.

DISTRICT 2 (North-Eastern).

Yorkshire county activity continues to increase and the following report: G6BX, G6NP, G5YV, G5YU, G5SZ, G6KU, G5IA, G5TQ, G5CX, G5UB, G6AZ, G5ZI, and 2BCQ. The first-mentioned station is preparing for work on one metre and welcomes co-operation. Mr. Rayner (G5TQ) and Mr. Gill (G6NP) recently tracked a pirate to earth, who was using the latter's call, the QRA was a cemetery in Halifax! As near to earth as possible, says G5TQ!

The next Leeds group meeting will be held at Mr. Riddiough's house (G5SZ), Tranmere Park, Guiseley, Leeds.

The Sheffield group held a successful meeting on December 20 at Mr. Beckett's (G5HK) address, when the modulation equipment came in for appreciative comment. The Durham county

membership have little to report, G2AW, 2BWX (who has applied for a full licence), and 2BFJ are active. It is interesting to record that ten new calls were allotted during 1932 to members living within a few miles of Stockton. Monthly meetings are held at G2AW on the last Friday in each month.

Northumberland activities are reported elsewhere.

DISTRICT 3 (West Midlands).

Judging from reports received, G2KB is the only active station in the district, as his is the only report to hand. He is extremely busy working on ultra short waves (45 cm.), Television, and is also on the committee of the B.T.H. Radio Society and giving Morse instruction to members each week.

Will the members of this district please let me know if they want these notes to continue, and, if they do, please supply me with the material, otherwise I shall be compelled to discontinue them.

DISTRICT 4 (East-Midlands).

Leicestershire.—I am pleased to see an increase in the number of reports received this month, all reporting with the exception of three. (What about it, G2CZ and BRS753?) I believe BRS835 has returned home to Costa Rica, so this may account for him not reporting. G6GF testing choke control fone on 7 mc. QSO with SU1EC, who reported R8 with an input of 35 watts. Will be testing fone on 3.5 mc. shortly and would like reports. G5VH is also testing fone on 7 mc. and would appreciate reports. BRS 884 active on all bands. G6JQ active on 7 and 14 mc.

DISTRICT 6 (South-Western).

Things in this district have been rather slack during the past month. G5SY is leading with just on a hundred ZL and VK contacts since November. We are all very sorry to hear of the continued illness of G5WY. I hope he will not (as he thinks) have to undergo a serious operation. The budget still continues to fill a good-sized copy book each month and seems to get better and better as regards quality. It is suggested by G5VL that a special subject be chosen for discussion each month, and we are going to try out this idea. The 28 mc. band seems to be quite dead, as far as amateur sigs. is concerned. Active stations in the District are: G5SY, G5QS, G5WY, G6RP, G5YP, G5YR, G2ZP, G2FN, G5VL, G5QA, BRS836, BRS958. I would like to see more BRS men in the district, and I hope that Exmouth may (through BRS958) produce them. If any of you want the budget, don't forget to send in a contribution of your month's doings to G5SY by the 15th, and ask to be put on the mailing list. I should like BRS958 to let me have a list of the G stations whom he may hear on 20 meters, together with their T and R. reports. Best of luck for 1933.

DISTRICT 7 (Southern).

The D.R. and C.R.'s wish to take this opportunity of wishing all members of No. 7 District a Happy and Prosperous New Year. The December monthly meeting was held at the QRA of G2NH, and was well attended, all the usual staunch visitors being present. The well-worn PA. v. Goyder Lock argument was again thrashed out, without any conclusion being reached. A definite answer to this question seems impossible, as so much depends on individual requirements and knowledge!

The letter budget was again absolutely full of interest to transmitters and B.R.S. men alike. Following the Television lecture, interest in this subject has increased and G2GG and G5JZ are now active in this field. G5JZ gives a very interesting description of his televisor, with results and circuit. G2DC gives some interesting results of experiments with the "2BI aerial" finding that an alteration to the gauge of the aerial wire makes a considerable difference to the results obtained. G6NA is a new contributor and gives the results of his BK and GM oscillator experiments on the ultra high frequencies. A number of stations in the area are now operating in the 3.5 mc. band, and are obtaining very good results with low powers.

We welcome our first YL full licence in the district. Miss N. Corry (G2YL), of Walton-on-the-Hill, is active on both 7 and 14 mc. and fully maintains the high standard of operating already established by the other YL operators in the country.

The venue of the February monthly meeting has not been settled, but your C.R. will have the full details by the time these notes are published.

DISTRICT 9 (Home Counties).

Having lost the tide on last month's notes, some details are included with these. Before proceeding, the DR takes this opportunity in conjunction with the CR's, in conveying to all members our sincere and hearty wishes that much profit and pleasure will accrue from the coming year's work. Good luck and favourable breezes to all for 1933. Just an early reminder: The District Conventionette will be held at Southend-on-Sea, June 17. Please note this. Quite a lot of correspondence on various matters has been received, much of it very interesting, some of it pointing to the enthusiasm in the area. We welcome another new station, G6OA, and also BRS 1011. How the number climbs! G2DQ very active, and getting good reports from Bristol and Cardiff re phone transmissions on 1.7 mc. G2YI is busy on 1.7 mc. G2HJ with BRS490 are most regular reporters from Bucks. G2WG used 132 ft. aerial ($\frac{1}{4}$ wave 3.5 mc.) with greater success on distance and a diminution in strength of ground wave. G5FB was about to commence the great rebuild for A.C. when, unfortunately, he was ordered to hospital. Pleased to say he is now back home and on the key. G5VT has been heard testing out on 1.7 mc. phone. G2LZ, G5VS, and the "ancient mariner" are all very active, but no direct reports are to hand from these stations recently. G6DH and G6QO are dismantled for the time being.

DISTRICT 10 (South Wales and Monmouth).

The December meeting, which should have been held in Cardiff early in the month, could not be arranged, as our liaison on the spot, G5WU, has, unfortunately, been laid up, so that the first meeting of the New Year will have taken place there by the time members read these notes.

Activity in the district has been up to the average, and there is increased interest in 28 mc. work. In this connection, G5KK reports QSO's wity OH, D and HAF. During the recent tests on this band, nothing was heard in the Newport area, though local schedules were arranged with Bristol. The stations in this district taking part were: G2PA, G5KK, G6FO, and 2BRA. It is

hoped that more stations in No. 10, both receiving and transmitting, will turn their attention to 28 mc.

G2PA is rebuilding the transmitter, a three-stage CC arrangement. G5KK is also reconstructing his TX gear, while 2AKG, 2BRA, 2BNP and 2BVB are active in the AA field.

2AWN writes to say that he has been successful in forming a Short-Wave Club in the Swansea area, from which great things are expected. Meetings are held fortnightly on Mondays, and the membership is about twenty-five. He has the co-operation of the active transmitters in the neighbourhood, and anyone interested should write: W. K. Walker, 2AWN, 53, Ty-Coch Road, Sketty, Swansea. His efforts in this connection deserve both congratulation and support.

By the time this is in print, the question of the election of a CR for Monmouthshire will, I hope, have been settled. G2PA of Newport, has consented to act, and in him the County will have an experienced transmitter, who is also one of the oldest of the RSGB members in this district.

There are two points to which I wish to draw attention once again: (1) The Letter Budget. This deserves more support, if only for the reason that it is helpful to new members, who have, without exception, expressed their appreciation of the ones they have seen. But I cannot produce Budgets out of a hat, so do please let me have your contribution by the 30th of each month. If you have no queries or problems, write up a couple of pages on something with which you are thoroughly familiar. More and more new men are getting the Budget, and it will help them. (2) The CR's are not getting their full quota of monthly reports. All that is required of members in this respect is that they remember to remind their CR by the 15th of each month that they are still alive, adding anything else of interest as well. If you don't know your CR, drop me a postcard with your name and address and "My CR, Pse?" on it. You can even omit the "Pse."

I hope it is not too late to wish all members of No. 10 District a Happy and Prosperous New Year, and a quickened interest in the best of all games.

DISTRICT 12 (London North).

The last District meeting, held at Mr. Clarke's (G6OT) new house was attended by about one dozen members, a poor show for a district having nearly 100 members.

The feature of the evening was an exhibition of ancient and modern amateur gear, some of the earlier component parts will, it is suggested, prove of much interest to the membership generally when the Society's 21st birthday celebrations take place during 1934.

Future meetings will be held on the dates and at the address shown below:—

January 28.—27, Belmont Avenue, N.17. (Mr. G. Bloomfield, 2ASG.)

February 25.—17, Eastwood Road, N.10. (Mr. J. Hum, G5UM.)

March 25.—36, Westholm, N.W.11. (Mr. P. Carment, 2AQW.)

All meetings will commence at 1930 G.M.T.; a postcard to the host a few days beforehand will be appreciated.

During November the Letter Budget was divided

into two sections, viz., Part 1 for Transmitting Members, and Part 2 for Non-Transmitting Members. This decision became necessary owing to the size of the original budget and the delay which occurred in circulation.

The Budgets will be interchanged monthly, so no loss of information will occur.

New and old members living in the North and North-West London Postal Districts are invited to contribute to future budgets.

Plans in connection with the National Field Day are already in hand.

DISTRICT 13 (London South).

Judging from the attendance at the last meeting, when Mr. J. Clarricoats delivered a very interesting paper on Short Wave Problems, the South London area is full of interest. For the benefit of those who may be unaware of these meetings, I should like to repeat that they are held at 8 p.m. on the first Thursday of each month at the Brotherhood Hall, West Norwood—opposite the bus garage; why not come along to the one on February 2?

As regard transmission, about 50 per cent. of the South London members appear to be active, and 9 interested in 56 mc., G5IS, G5KH, G6NF, and G5AW were active in the November tests, with good results—R8 reports from 10 miles across London being obtained.

The latter budget remains as fat as ever and the list for this one is still full up. The suggestion that Mr. Brown—G6QY—should run another for the benefit of the BRS membership has been met with no response, and from this we assume that our BRS members are satisfied.

DISTRICT 14 (London, East).

The next District Meeting will be held on January 24, at QRA of G5AR, 59, Gordon Road, Woodford, E.18.

G6SG has left the district, but has only crossed the "border," and his QRA is now Woodford Green, in Essex. G6KC has also moved away, and is now at Devonport, and carries the very best wishes from all members of this district.

DISTRICT 15 (London West and Middlesex).

Owing to no notification, the December meeting was very poorly attended. The January meeting will be sponsored by G6JP and will be held on the 25th at G6WN, at 7.30 p.m. Please make a special note of the date, as I have had to change it.

May I take this belated opportunity to wish everyone a very happy and prosperous new year and sincerely hope it will be an even better year for the district than its predecessor.

Should anyone have any ideas to help along the social side of the area still more, either of the sub DR's or myself will be only too pleased to hear of them.

I would advise all those not already contributing to the letter budget to do so, as it is proving to be a very useful medium for exchange of ideas on the many matters pertaining to radio and electrical.

Reports are few this month, due, no doubt to the holidays intervening. As there is very little to comment upon, I will only quote the call signs: G5CV, G5PQ, G6RS, G6VP and BRS 642.

DISTRICT 17 (Mid. Eastern)

East Riding.—Three meetings have been held in the past month at the QRA's of G6OY (Novem-

ber 27, attendance 14); G5VD (December 7, attendance 10); and BRS967 (December 15, attendance 8).

G5VO reports erratic conditions on 7 mc., and is busy preparing for 56 mc. work. G6OY, G5FV, BRS738, BRS859, BRS967, have been taking part in the 28 mc. Tests. All stations in East Riding are active.

Lincolnshire.—G5LQ reports taking part in 28 mc. tests, the only station heard being G5FV, but has received a report of his signals being heard by G6OY.

BRS are active on all bands and preparing for B.E.R.U. contests.

2BIH is preparing for full licence. G6AK working on 7 mc. band. G5CY active and preparing for high power. G5GS active on 7 mc., has been QSO VK. four times in a month on Q.R.P.

SCOTLAND.

There is little of real interest to comment upon relative to the December period. Conditions have remained almost uniformly poor on all bands, and while a good deal of DX has been audible on the 7 mc. band, it has been found in most cases impossible to make contact. Illness has been rife, and many active stations have been temporarily closed down for this reason.

The Budget referred to in last month's Notes has not been favourably received except by the members of "C" District. Consequently, quite apart from the labour and expense involved, there is no object in producing the unwanted and, in future, the reports of the various districts will be circulated to the District Officers only, to deal with as they see fit.

Mr. S. Rowden, "D" District Officer, has now completed his year of office, and has handed over the reins to Mr. S. A. French (G6FN), Valetta, Alnwickhill Road, Edinburgh, who will act during 1933. The writer would wish to record his appreciation of Mr. Rowden's work during 1932. "D" District is probably the most enthusiastic and certainly the most active in Scotland at the moment, and this is due in no small degree to Mr. Rowden's leadership.

Two new radiating licences have been issued during the month. G6UK has been allotted to Mr. T. W. Gentleman, 36, Ashcroft Drive, Cathcart, Glasgow, formerly BRS897, and G6VI to Mr. MacCallum, 21, Park Place, Stirling, who was formerly BRS883. In addition, 2AVU and 2BTT have been granted licences subject to passing their morse tests, and it is expected will be fully licensed before these notes reach print.

It was noted in District 17 Notes in the November BULLETIN that the QRA of Mr. Burton (G2UG) was enquired for. For information, Mr. Burton's address is meantime, Maryville, Pleasance Avenue, Falkirk, and he is consequently located in "A" District, Scotland.

The following new crystals have been put in service: 2APL—7038KC, G6VI—1794KC and 7178 KC, G6UK—7095KC.

To revert for a few moments to the matter of District Reports, I would like District Officers of "A," "B," and "D" Districts to give an eye to the report submitted this month by "C" District Officer, which will reach them in course. I ask this, not for the purpose of drawing odious comparisons,

but to draw attention to a very pleasing enthusiasm, a good deal of which might be emulated with advantage. Mr. Hamilton is very obviously keen on his job, and finds it a pleasure to function.

Such enthusiasm is infectious, and the effect on the District will be watched with great interest.

"A," "B," and "C" Districts continue to hold their regular meetings, but no word has been received of anything of the sort in "D" District. The December meeting of "C" District was well attended, considering the scattered nature of the District, and some interesting points were raised for discussion. Suggestions relative to the formation and establishing of a local club in Dundee with a permanent club-room were put forward, but, after discussion, it was decided that the time was not yet ripe for this. Arrangements for the special field day which the District intends to hold in the Spring were also discussed, and it is probable that two transmitters will take the air. The District Officer reports that over 60 per cent. of the members are definitely known to be active.

From a general standpoint, there is little of an outstanding nature to record. Our old friend NX1XL has again made his appearance, and many stations have made contact. In the matter of schedule work, so far as can be ascertained, the only successful schedule at present in operation is that run daily on 7 mc. by G2TM and TF3B.

Permit me in closing to wish you "all the best" for 1933.

Contact Bureau—(Continued from page 235).

The G.C. was fortunately able to keep watch every morning, and logged WIDBM eight times (excluding the doubtful occasion), WIAGA during three transmissions on one morning, and WSCPE twice on one morning.

G6FO suggests that WIDBM had at least 500 watts input, in view of his very consistent transmission. Confirmation is now awaited with interest. Fading was, in fact, almost non-existent and most members report WIDBM as QSA4 or 5. Incidentally, no member used a superhet or anything of that ilk! Reception was effected on standard "straight" sets. The Americans were called in vain: clearly, 10 watts is far too low for trans-Atlantic contacts on 2 mc.

The U.S. tests have naturally occupied most time during the month, but Group 10A have had interesting discussions on the lessons of the R.S.G.B. 2 mc. contest of November. G2WS puts forward some thoughtful theories about skip effects, and points out how skip distance has been increasing on 2 mc. during the past year. He submits the tentative generalization that when conditions favour good reflection, they are bad for reception by ground wave. To support his contentions he encloses a map showing how QRK varied during the contest. G2YI also mentions a noticeable increase in 2mc skip.

G5RX eulogises the G5IS series modulation system, with which he has already had remarkable success. He would be glad if an individual in the London district would select another call-sign—not his. The G.C. has worked this pirate, who, by the way, is believed also to have appropriated the call of G5SL.

Empire



News.

B.E.R.U. REPRESENTATIVES.

Australia.—H. R. Carter (VK2HC), Yarraman North, Quirindi, N.S.W.

British West Indies, Bahamas, Bermuda, and British Guiana.—H. B. Trasler, No. 2 Mess, Pointe à Pierre, Trinidad, B.W.I.

Canada.—C. J. Dawes (VE2BB), Main Street, St. Anne de Bellevue, Quebec.

Ceylon and South India.—G. Todd (VS7GT), District Engineers Bungalow, Nuwara Eliya, Ceylon.

Channel Islands.—H. J. Ahier (G5OU), Lansdowne House, 45a, Colomberie, St. Helier, Jersey, C.I.

Egypt and Sudan.—E. S. Cole (SU1EC), Haking House, Abbassia, Cairo, Egypt.

Hong Kong.—P. J. O'Brien (VS6AE), 12, Kent Road, Kowloon Tong, Hong Kong.

Iraq.—H. W. Hamblin (YI6HT), Wireless Section, R.A.F., Shaibah, Basra, Iraq.

South Rhodesia.—S. Emptage (ZE1JG), Salcombe, Plumtree, Southern Rhodesia.

Irish Free State.—Col. M. J. C. Dennis (E12B), Fortgranite, Baltinglass, Co. Wicklow.

Kenya, Uganda and Tanganyika.—H. W. Cox (VQ4CRF), Box 572, Nairobi, Kenya.

Malaya.—T. G. Laver (VS3AC), Government Electrical Power Station, Johore Bharu, Johore, Malaya.

Newfoundland.—Rev. W. P. Stoyles (VO8MC), Mount Cashel Home, St. John's East.

New Zealand.—D. W. Buchanan (ZL3AR), 74, Willis Street, Ashburton; and C. W. Parton (ZL3CP), 69, Hackthorne Road, Cashmere Hills, Christchurch.

Nigeria.—Capt. G. C. Wilmot (ZD2A), 1st Battalion Nigeria Regt., Kaduna, Nigeria.

N. India and Burma.—R. N. Fox (VU2DR), C/o VU2FX, Sgt. C. D. Connerton, Aircraft Park, Lahore Cantonments, Punjab, India.

South Africa.—W. H. Heathcote (ZT6X), 3, North Avenue, Bezuidenhout Valley, Johannesburg.

Australia.

October-November.—From VK2HC. — There is little activity on 56 or 28 mc. The 14 mc. band has livened up, and "Pacific Area" DX can be worked in the afternoons. From 12.00-14.00 G.M.T. the European and others are good at times, but unreliable. VK2LZ is outstanding with his 14 mc. phone. 7 mc. is still good for early morning work, about 20.00 G.M.T., the W's from 08.00-14.00 G.M.T., but QRN is rather bad on this band at times. When QRN slackens, all the 3.5 mc. stations get going, and the ZL's come in well about 08.30 G.M.T. We hear talk of special aerials, etc., for the next B.E.R.U. contest, which will soon be here again. From VK to all B.E.R.U. members in the Old Country, the Dominions and other parts of the world, a Happy and Prosperous New Year.

Canada.

By VE2BB
(via G5VL).

DX, except for VE1 stations, is still poor. VE1BV was QSO VK at 19.35 G.M.T., which is quite unusual. The "All Red Route" looks like being an established fact. The route is: VE1BV, VE2BB, VE3GT, VE3HA, VE4HE, VE4GR, VE4DQ, VE5AC. We are waiting to hear from VK and Hong Kong. The VE gang would be only too pleased to QSO African stations, for many W.A.C. certificates depend on this contact.

We wish everybody a very happy and prosperous New Year.

Ceylon and South India.

By VS7GT.

November.—VS7AO, reporting from Bombay, states that conditions there are very much better

than at Trincomalee, and that he will shortly be active again on a new C.C. outfit.

VU2JP, in a report covering the period October 15 to November 15, states that conditions have been very variable, with occasional bright patches. He reports one exceptional evening, October 22, when, in a very few minutes, 14 countries were logged on 7 mc. Unfortunately, no QSO was established, as the receiver was being tested away from the station. He has recently had to renew all condensers at his station owing to breakdown due to excessive humidity.

We welcome back VS7GJ after what we hope has proved a healthful holiday, and he wishes me to say that he thanks all G amateurs who were so ready to give him all assistance whilst he was in England, and that he regrets that as his visit was short, he had the opportunity of visiting but few. VS7GJ attended the business meeting in connection with the seventh annual convention, and considers that our B.E.R.U. membership has great cause for self-congratulation on having so efficient a President as Mr. Bevan-Swift (G2TI), and Vice-President, Mr. A. E. Watts (G6UN), as well as Secretary, Treasurer and Council. These gentlemen have the best interests of amateurs at heart, and appear to leave no stone unturned for the furtherance of the cause of the R.S.G.B. and B.E.R.U.

(Spare our blushes!—Ed.)

Iraq.

By YI6HT (via G2OA).

December.—YI6HT is active once more, and thanks YI6KR and YI2DC for their efforts in keeping Iraq Notes in the BULLETIN.

During November and December conditions were patchy on both the 14 and 7 mc. bands. YI2DS has been handling B.E.R.U. traffic, and also reporting on Empire Broadcasting Tests. YI6BZ has returned to Basra, and is active again. YI6HT is working on 14 mc. and 28 mc. He has now W.A.C. on the former band, and is of the opinion that 14 mc. is better than 7 mc. for reliable contacts, owing to the bad QRM on the latter band.

It is hoped to reorganise the Iraq group immediately, and with this in view will all members please notify YI6HT of their present QRA and the nature of their present activities?

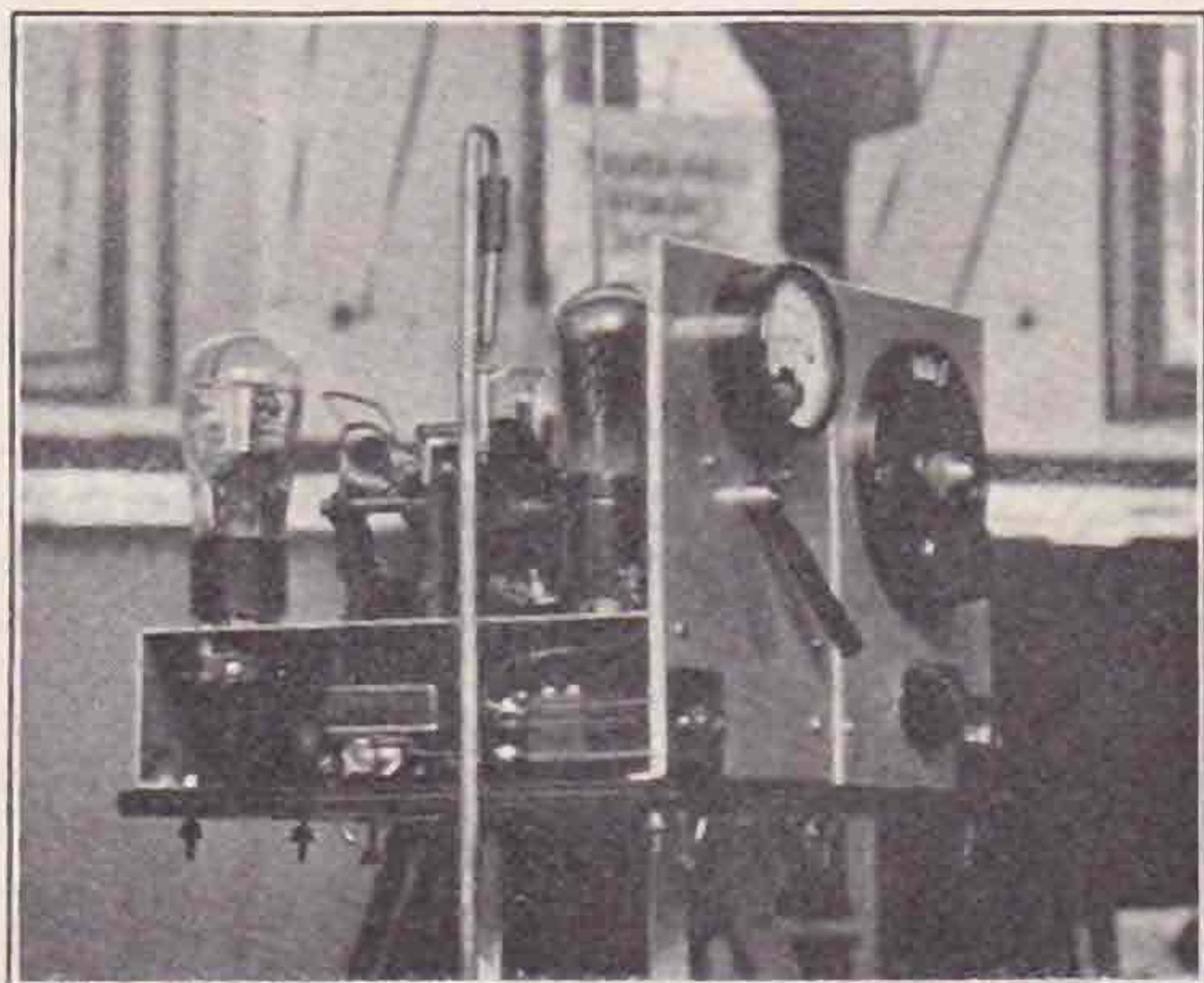
Newfoundland.

We understand from the Rev. W. P. Stoyles (VO8MC), that his station has now closed down. We take this opportunity of thanking Mr. Stoyles for his assistance in the past and offer our good wishes in his new sphere of work.

New Zealand.

By ZL3CP (via G2ZQ).

December.—Amateur radio continues to boom in New Zealand. At the end of October, licensed



The above photograph shows VK6AG's 56 mc. Transmitter and Receiver on show at the Amateur Radio Exhibition, Wireless Institute of Australia (W.A. Division). VK6AG and VK6SA have pioneered 56 mc. operation in Western Australia (VK6). Duplex has been worked up to 20 miles.

amateurs numbered 621. The average increase per month has been about 20.

The various branches of the radio emergency corps have held numerous field days, testing portable sets, and some fine outfits have been constructed.

Conditions have been good lately on both 7 and 14 mc., and quite a number of ZL's have qualified for W.A.C. Many North Americans are audible on 3.5 mc.

The headquarters of the N.Z.A.R.T. will be in Dunedin during 1933, the address being Box 517.

Northern India and Burma.

By VU2AH.

November-December.—Conditions have again been very patchy, especially on 14 mc., which improved rapidly towards the end of November. ZL stations

have been heard on the 14 mc. band at VU2AH for the first time in 18 months.

General satisfaction is expressed in No. 1 District at the reception of the Empire Broadcasting Tests. The 25 metre transmission was received well over most of India, the only trouble being the quick fading and the cut-off after about 21.30 IST (16.00 G.M.T.). The 16 metre transmission appears to have been a complete washout, only a weak carrier being received.

With reference to the 28 mc. tests, VU2AH was on the air at odd times from 07.00 G.M.T., but found the transmitter very unreliable and refractory. A signal was heard at about 07.30 G.M.T., R3 at times, but fading and wobbling.

A VK2 was heard at 12.03 G.M.T., calling CQ. Fading heard was very bad, though the tone was C.C. I believe the call to have been VK2CX.

VU2AH will be on the air all day Sundays in future, from 04.00 G.M.T. to about 16.00 G.M.T.

There were two carrier waves on top of the 28 mc. band, from about 12.30 until sunset (13.15 G.M.T.), when they quickly disappeared.

Observations were made on PPX during the sunset period. PPA was unaffected until quarter of an hour after sunset, when a rise in signal strength was noticed. (R2 increase.) This lasted for about 12 minutes, when the strength returned to the normal R3.

South Africa.

By ZT6X (via ZU6W and G5ML).

December.—The severe 'phone QRM complained of in my last notes has received a severe check, and the P.M.G. has threatened to take actions against amateurs who have been conducting lengthy and frivolous conversations and broadcasting gramophone records.

In spite of a careful watch by ZS6Y and myself, nothing was heard on the 28 mc. band during the recent tests. DX is coming through fairly well on both 7 and 14 mc. bands, although QRM is very bad at times. Please convey Christmas and New Year greetings to headquarters, and may 1933 see the continued expansion of the B.E.R.U.

[ZS1AA, of Rondebosch, has also sent us some detailed observations on conditions and useful information concerning the new B.B.C. Empire station, which we have passed on to the Corporation, as it will undoubtedly be of interest to them.—ED.]

European Notes.

THE Norwegian Radio Relay League have now put their headquarters station, LAIC, into operation. Special N.R.R.L. broadcasts, morse practices and skeds have formed the programme on 3.5 mc. The 7 mc. band is, however, to be tried in the future. It is stated that when calling CQ LA, calls from foreigners will remain unanswered; when, however, the plain CQ is used, they will be pleased to work with anybody.

The Norwegian Rilsen-Larsen Antarctic Expedition starting from Norway on New Year's Eve, seeks co-operation with amateurs all over the world, and will commence work in the 14 mc. band on January 8, and try to communicate with amateurs. The call is LMZ, the frequency near the low-frequency end of the band, and working times every

Sunday from 0700-0800 and 1900-2000 G.M.T. The transmitter used will have a power input of 80 watts.

The expedition will be at about 30° North on the first Sunday on its way southward. The Antarctic work will start at the Southern Polar Ice Region at about 60° East, i.e., south of Madagascar, a district from which very little if anything, is known of radio conditions. Reports via N.R.R.L. will be much appreciated, as well as any information received from LMZ.

R.E.P. (Portuguese) Contest.

The following is an abstract from the rules of the first contest arranged by the R.E.P. for Morse stations.

The contest is from 00.00 G.M.T., January 15, 1933, to 00.00 G.M.T., January 21, and is open to all foreigners to work with R.E.P. home members. Code words consisting of six letters will be transmitted by the R.E.P. station, and must be correctly copied by the other station. Logs from foreigners taking part (or merely Q.S.L. cards) should be forwarded, and must show date, time, call of station worked and code word.

Points up to the maximum of three will be counted for each successful contact alike by Portuguese and foreigners. Great Britain counts as one point.

There will be six prizes for the contest, consisting of one silver cup, one silver ash-tray, and one work of art (accompanied by a diploma) for the Portuguese; and a gold medal, a silver medal and a bronze medal, together with a diploma, for the foreigners. A diploma will also be conferred on the leading competitor in each country.

Test from ON4BO.

A study of the transmissions of a crystal controlled set working on 84.78 metres is to be carried out from ON4BO, from February 1 to 15, inclusive, as follows:—

08.00 to 08.10 G.M.T. (Morse), 14.30 to 14.40 G.M.T. (Morse): Test de ON4BO (repeated).

08.10 to 08.20 G.M.T. ('phone), 14.40 to 14.50 G.M.T. ('phone): Here ON4BO Test (in French, English, German, Spanish and Dutch).

Reports at the conclusion of the complete test are asked for, and may be sent to the Réseau Belge, 33 Rue Alph. Renard, Brussels, and should give days and hours exactly noted, QRK, QSA, QRI, QSB, sigs., fone, exact QRA. If, despite attempts, nothing has been heard, listeners are particularly requested to say so.

EXCHANGE & MART.

Rates 1d. per word, minimum 1/6. First line in capitals if desired. 2d. per word where all capitals are required. Minimum 3/-.

WILL LONDON BRS or Transmitter offer Provincial Transmitter in town till March, small corner of his den (A.C. mains) for 28 mc. and fone work, week-ends only. All apparatus supplied, and remuneration.—G5MP.

QUARTZ OSCILLATING LENSES, plano-convex, 3s.; bi-convex, 2s. 6d.—SMITH, Bryn Rodyn, Colwyn Bay.

1,000 VOLT working 10 mfd. Condensers, 7s. 6d., postage 1s. "Autoplex" Bug Keys, 25s., postage 1s. Seven days' approval.—(G2MA) MARSHALL, 41, Kelvinside Gardens, Glasgow.

G6DS For neat and snappy QSL Cards also Log Pads. Samples on application.—QRA, "Inglenook," Orlando Drive, Carlton Nottingham.

TANTALUM AND LONIUM.—Make your own Battery Chargers for alternating current. Simple, reliable. Lionium Rectifying Electrodes, 2-4 amps., 10s., 5-10 amps., 15s. Also Transformers, Blue Prints, 1s. each, and complete Chargers.—BLACKWELL'S METALLURGICAL WORKS LD., Liverpool.

MORSE INSTRUCTION.—Day or Evening. Easy Terms. Special course for beginners; faulty formation; and advanced students.—TELEGRAPH SCHOOL, 29, Talfourd Road, Peckham, S.E.

MORSE PRINTER, with Relay attachment, Transmitting Key, Galvanometer and Lightning Protector on same base; cost £25 pre-war; open exchange offers. Brown's Transmitting Key, equal new, 5s. 6d. carriage paid.—SAM MIDDLETON, 29, Talfourd Road, London, S.E.15.

G6VP.—Phones, Transformers Rewound; Brown's A a speciality; any resistance; 24-hour service; lowest terms in the trade.

CHESTER BROS. TRANSFORMERS, 200-240 v. primaries, secondaries 750-0-750v. 120ma., 8.5v. 5a., 7.5v. 3a. C.T., £1 10s.; 6v. 9a. C.T., 14s.; T61D, used one hour, £4; G.P.O. Polarised Relay, 10s.; Combined Monitor and QST Dynatron Frequency Meter in aluminium case; UX224 in dynatron, coil requires winding; Monitor, less L.T. only, £2 10s. Portable S.W. Receiver, det. and L.F., in aluminium case, 11in. by 10in. by 8½in., complete with set of Eddystone coils, £3. Transformer, 200v. primary, secondaries 500, 1,000, 1,500, 2,000v. 150ma. C.T., 13v. 9a., 7v. 6a., £1 15s. Ferranti 0-15ma. £1. Turner Thermo ammeter, 0-1-5a., £1. Everett Edgecumbe 0-2,000v. Electrostatic Voltmeter, £1 10s. Weston 0-5a A.C., 15s. QCC Crystal 3,525kc., in dustproof holder, £1 5s. Two T.C.C. 2mfd. 2500v. Working Condensers, £1 12s. 6d. each. A.C. S.W. Receiver Chassis, S.G., det., R.C., Pentode, wired, but requires slight attention, £2. Two P650, DFA8, 5s. each. Westinghouse A4 L.T. Rectifier, 9s. Rich and Bundy Transformer, 110-200-230v. primary, secondary 5v., 7.5v., 10v., 9s. Burton Micro Log Dials, 1s. 9d. each. Colvern KSW Coil, 6s. Postage extra. High-class components purchased up to one-third list price. Write for particulars of part exchange.—COSMIC RADIO SERVICE, 23, Water Street, Liverpool.

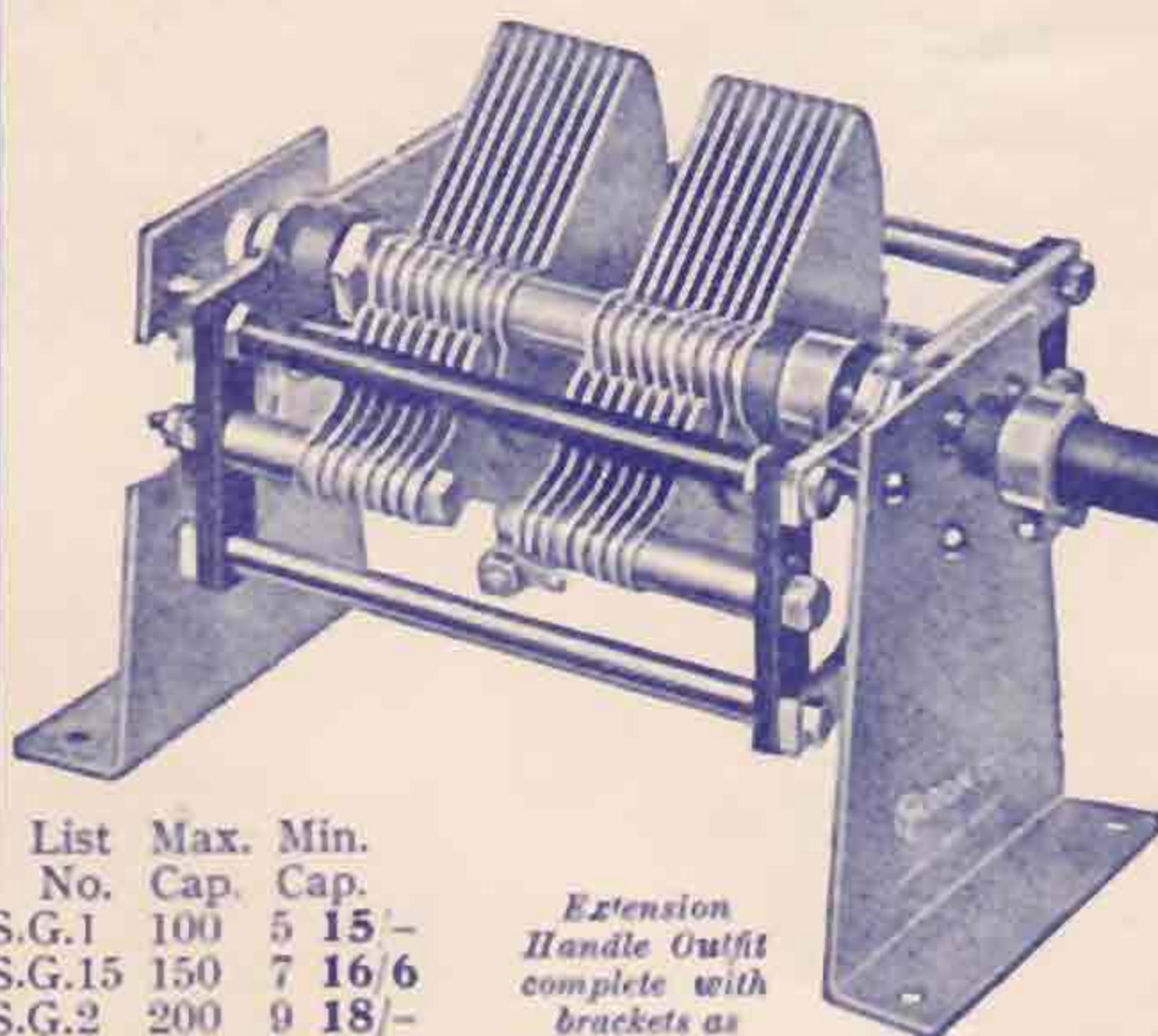
CORRECTION.

Our attention has been drawn to the fact that the LF chokes mentioned in the small advertisement inserted by B.A.I., 18, Broadmead Road, Woodford, Essex, have inductance values of 120 Henrys and not 20 as stated.

YOU CANNOT SUBSTITUTE CYLDON AND STILL EXPECT CYLDON PERFORMANCE

STANDARD CYLDON SERIES-GAP CONDENSERS AS ILLUSTRATED.

CYLDON SERIES-GAP Condensers are acknowledged by their performance alone as the world's finest short-wave condensers. Their remarkable power factor is achieved by the use of superfine materials, perfect insulation, CYLDON rigidity of construction, and true mathematical precision in assembling. Each condenser is rigorously tested over every stage of manufacture. Exclusive CYLDON Features include: no pigtail; absolute silence in operation; no backlash; and provision for earthing framework to cut out all hand capacity. That is why Series-Gap Condensers remain the world's best condensers designed specially for short-wave reception.



List No.	Max. Cap.	Min. Cap.
S.G.1	100	5 15/-
S.G.15	150	7 16/6
S.G.2	200	9 18/-
S.G.25	250	12 19/6
S.G.02	20	4 14/-

*Extension
Handle Outfit
complete with
brackets as
shown 4/6 extra.*

THE WORLD'S MOST
PERFECT SHORT-
WAVE TUNING
CONDENSERS.

CYLDON BEBE
SERIES-GAP CONDENSERS.

CYLDON'S latest triumph—a condenser for 5 metre working.—It's successful because it's CYLDON. Max. cap. 25 mmfds. Min. cap. 3 mmfds. **8/6**

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Phone: Hillside 2244. LONDON, N.20.

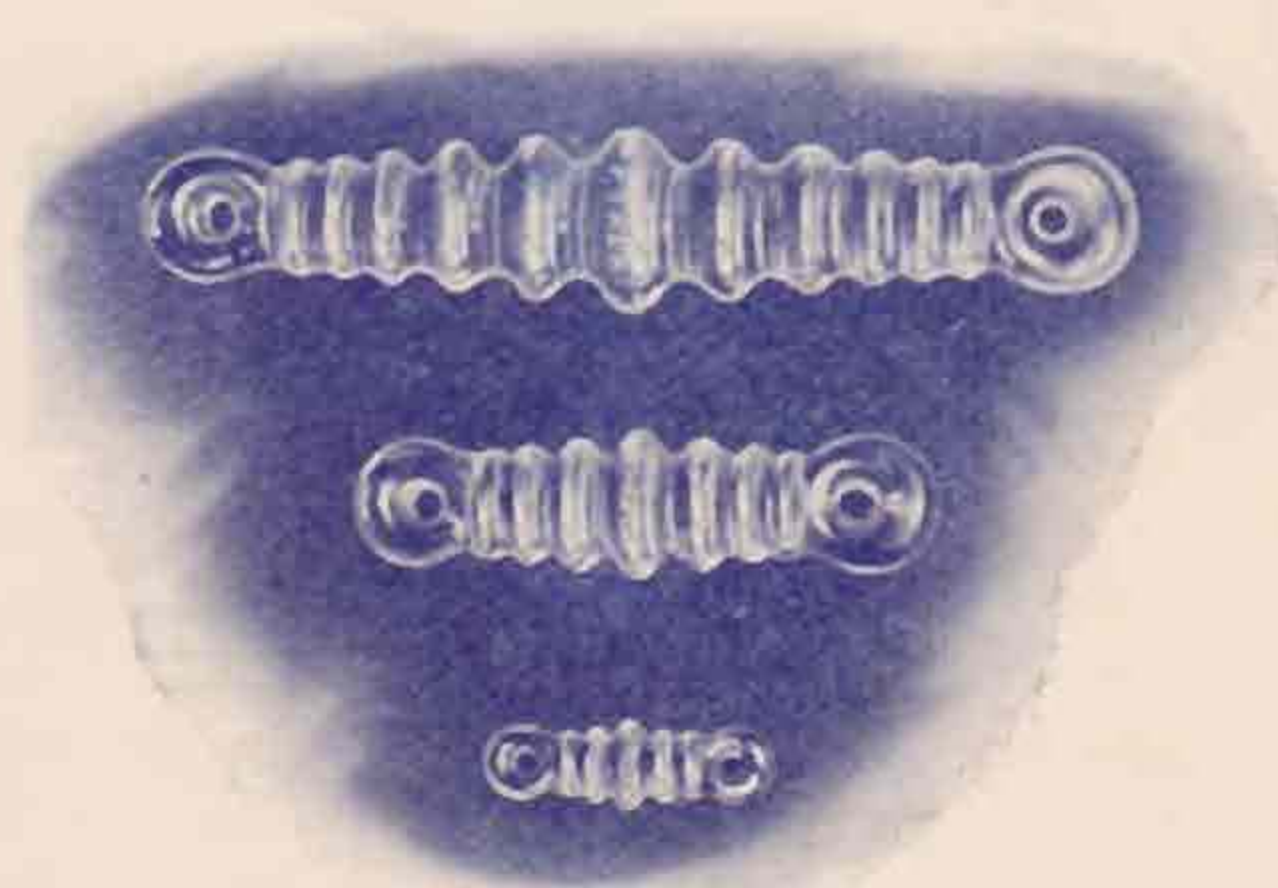
THE SIGN OF THE BLACK DIAMOND



You will want a Call-sign Brooch as well for your next Conventionette or County meeting.

*See last Bulletin,
p. 197, for full details.*

The R.S.G.B. Sales
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PYREX THE BEST ALL-WEATHER INSULATOR

Small for QRP **9d.** each. Large for QRO **6/3** each.
SILVER PLATED INDUCTANCES GIVE INCREASED EFFICIENCY.

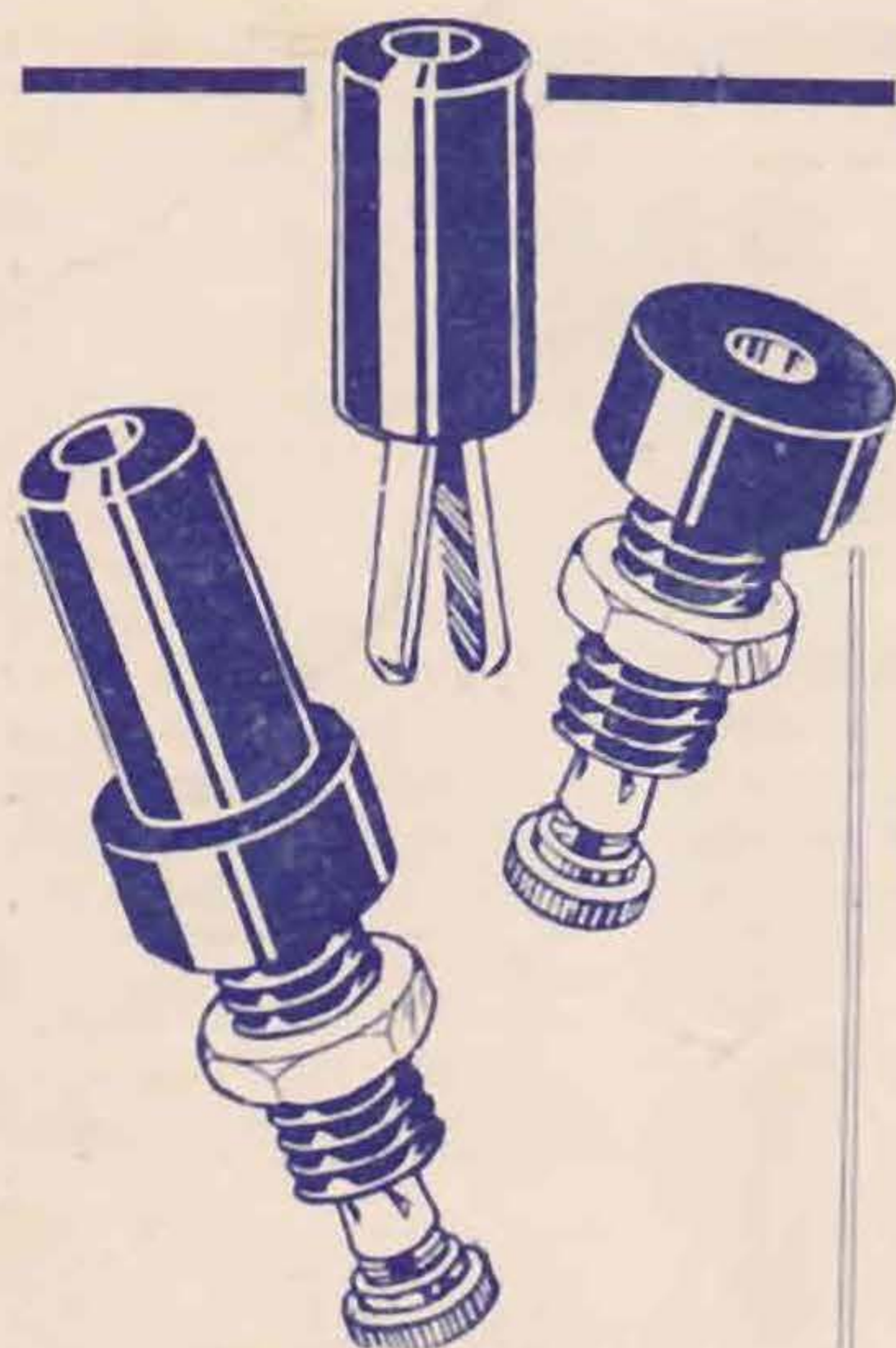
3 ins. diameter silver-plated and lacquered.
3/16" Tube **7d.** per turn.
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White Porcelain stand-off Insulators for inductances, etc., **9d.** each.
14 SWG Enamelled Copper Wire for Antennas, 68 ft., **2/6.**
New Reiss type Mikes with Transformer, **75/-** each.

All TX and RX requirements.

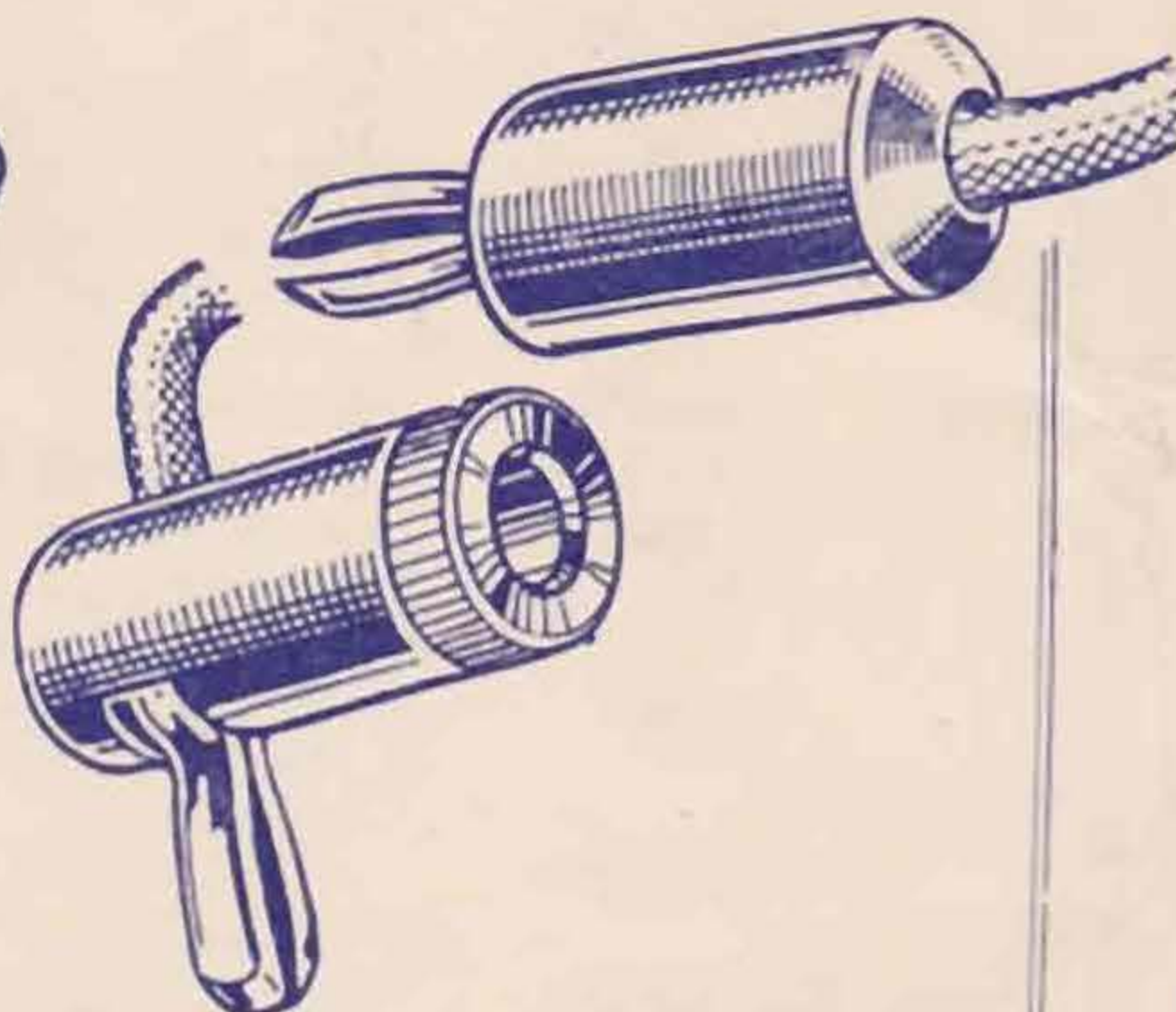
LOOMES RADIO (G6RL, G6US),
32-34, EARLS COURT ROAD, W.8.
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**INSULATED SOCKET
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The perfect socket for metal chassis work. Completely insulated and fitted with strong screw terminal for connection. Socket is specially designed for use with the Clix "Master" Plug. Insulated Socket with terminal, 2½d. "Master" Plug, 1½d.; **COMPLETE 4d.** Supplied with all standard engravings.



"DUAL" WANDER PLUGS.

Specially designed for Mr. Scott-Taggart for the "S.T. 400."

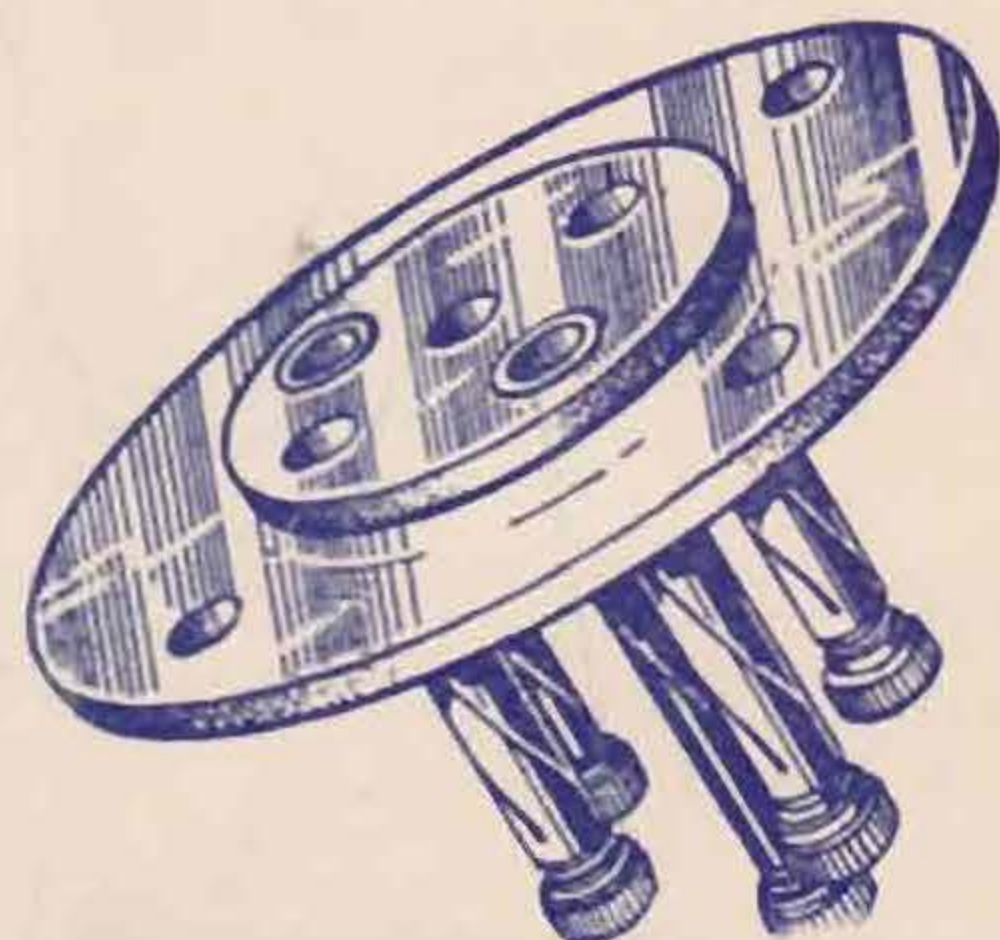
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