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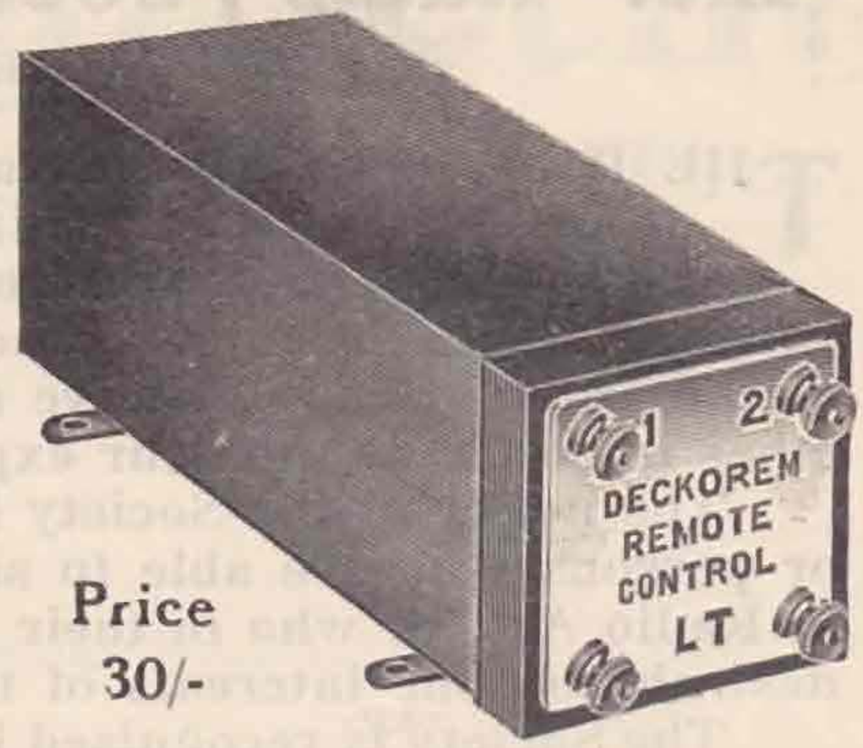

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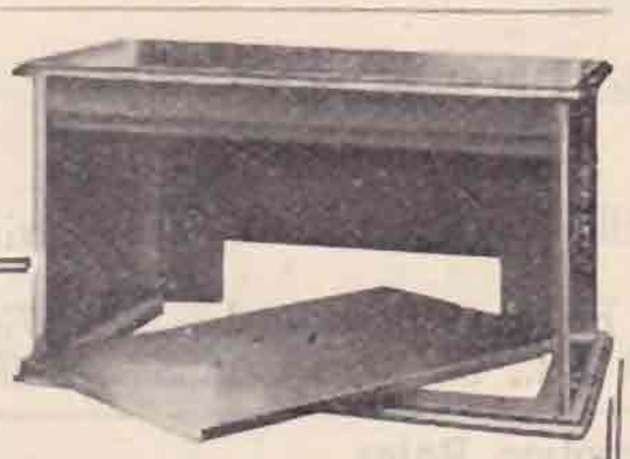

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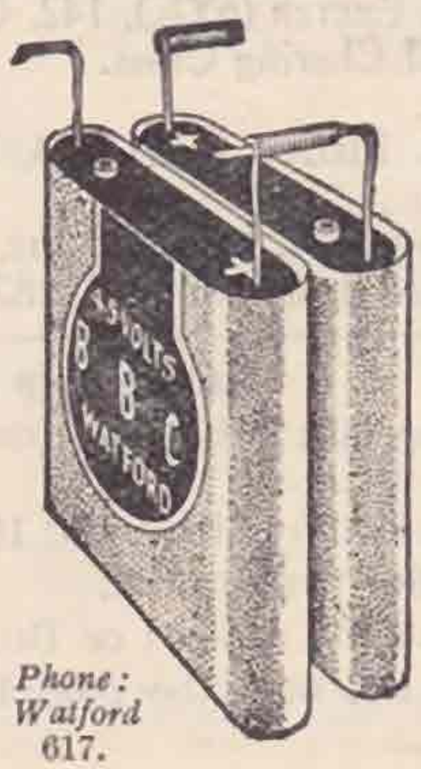

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The policy of the Society is to accept to its Membership any person or persons who are able to satisfy the Council that they are interested in Radio Art, or who in their opinion are persons whose Membership is desirable in the interests of the Amateur Experimenter.

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T. & R. Bulletin

THE INC. RADIO SOCIETY OF GREAT BRITAIN,

53, Victoria Street, S.W.1

Headquarters of the British Empire Radio Union.

T&R BULLETIN.

The only British Wireless Journal Published by Amateur Radio Experimenters

DECEMBER, 1927. Vol. 3. No. 6

EDITORIAL

Christmas Greetings.

We are unable to meet you all, neither are we all able to meet one another in order to exchange greetings, so that this greeting might be taken as one between each individual member and his fellow —A Merry Christmas to all and a Happy and Prosperous New Year to all and for the Society. It is regretted that we have not much space for "Christmassy" material in the BULLETIN, but we sincerely hope that each and every one will bear in mind that the best Christmas Box which he can give the Society and the movement generally is one or more new application forms for membership duly filled in by an applicant. We want more and more new members in order to secure a sound financial and representative position for the amateur and the most certain method of doubling the membership is for each to introduce at least one new member, so please don't forget to do your bit for the show during the coming holiday.

The British Empire Radio Union.

This Union is now well on the road to that stage where it might be considered as being in existence. At a meeting of the Council held on November 21 it was decided that in future our offices should be regarded as the headquarters of the Union, and in consequence you will have noted the alterations on our cover and elsewhere. There may be a vague doubt as to our contemplated activities in this direction, and accordingly we give a brief outline of the ideas in the minds of the sponsors of the scheme.

We have many hundreds of members scattered over the British Empire, and in most cases these are without any accredited representative to act on their behalf when communicating with headquarters on matters concerning policy, licences and organised tests. Further, it has for a long time been apparent that a determined lead was required in order to ensure that the usefulness of amateur radio should be concentrated and organised within the Colonies and Dominions so that it has a central administrative body which can put into effect any matters which affect the welfare of individual members or the movement as a whole within the Empire. It seemed natural that this Society, which has developed from a purely domestic organisation such as was the "Wireless Society of London" into a national concern, should now expand its activities so as to embrace the widespread Empire and represent it whenever amateur radio is discussed at the Conference Table. Further, very useful work in Empire wireless communication can be carried out when conditions are such that proper arrangement of experiments and tests can be carried out and when the utmost possible freedom has been secured for the individual experimenters.

With these things in mind it was not difficult to foresee that sooner or later a British Empire Union was inevitable, and we have now reached the stage when we are on the threshold of a glorious achievement in the annals of amateur radio.

During the next few weeks circular letters will be sent to all known radio enthusiasts in the Empire asking the various countries to appoint representatives to act as Colonial managers and explaining the broad scheme, and it is hoped that by the time that the February issue of the BULLETIN appears we shall be in a position to announce the names of these managers and further details of the scheme.

Washington.

On going to press we hear bad news from Washington. R. K. Warner, of the A.R.R.L., is not generally given to pessimism but he finds cause to feel so owing to the position in which the American amateur finds himself as the result of a lack of support by brother amateurs in other countries. The reason is not hard to seek. Amateur radio is not yet capable of enforcing its will on the various Government officials responsible for the adminis ration of the ether in the various countries. However keen a few may be they are in the minority, and the fact has to be faced in these days of International Conferences and massed movements, the only people who count are those who have banded themselves together and are able to speak with one voice.

At Washington the various delegates had received their instructions from their administrations and in no case do the delegates appear to have been impressed with the importance of the amateur. Hence the American amateur is losing concessions which were once the envy and admiration of every other nationality. We must see to it that in the future we are strong enough to insist on our rightful inheritance in the ether. We sympathise very deeply with R. K. Warner in the position in which he finds himself, and it is hoped that ere long ways and means will have been found to ensure a maximum of support from the British amateur.

J. A. J. C.

That Experiments Log.

By Hugh J. B. Hampson (6JV).

Those members of the T. & R. who were able to attend the Convention this year may remember that the writer advocated a more extended use of an "experiments log" in which careful records should be made by each experimenter of the results of his own work; and it is thought that no apology will be needed if the writer attempts to set forth in a short article the reasons why such a systematic recording of experimental work is desirable.

In the first place, then, we British amateurs all obtain our permits upon the grounds of various experiments which we desire to carry out—we are essentially an experimental society and not just "communicators." Hence both as individuals, and as a Society, our first and foremost aim should be to experiment. But of what use can our work be to the progress of the art unless we take steps to ensure that the conclusions which we form, and the results of our work, are actually given to all who are concerned with the developments of radio communication? This does not, of course, preclude the right of the individual to safeguard the outcome of his own efforts by recourse to the Patent Office, where any valuable discovery is made. However, there is much of value which each serious worker may contribute to the general knowledge, and which may not be, in itself, of sufficient importance to warrant the cost of patenting—or, indeed, be even capable of patent.

This, then, is where our experiments log comes in, and its object is twofold:—(1) To furnish convincing proof that the British amateur *is* carrying out work of *real value*, and thus to substantiate our claim to reasonable bands in the spectrum. (2) To assist us by systematic recording of our experiments and conclusions, to form sound judgments in our future work, and to give to others the results of that work for their guidance as well.

The case for the experiments log being thus established, how may it best be kept?

In attempting to answer this question, the writer does not pretend that the system which he will now proceed to outline is the best that can be done. He is sure it can be further improved, and merely makes the following suggestions as being the result of his own deliberations and as a foundation upon which to erect something even better.

In his own log the writer makes the following entries of each experiment carried out:—(1) Date; (2) object of experiment; (3) apparatus used; (4) description of experiment; (5) conclusion reached. The records thus made are frequently read over in spare moments, and, where necessary, cross references are noted in the margin to subsequent pages which contain results that confirm or modify previous conclusions.

During the process of turning over the pages of the log it will be found that fresh ideas constantly occur to the mind of matters which require further investigation. These are noted down in a back page of the log, which thus furnishes an unfailing source of fresh work and an ever-increasing interest.

It will be found that if these suggestions are followed the habit of recording all work done will grow until the experiments log becomes an even more treasured possession than the station log itself.

In conclusion the writer would like to add that the work of the experiments log is not complete unless the owner thereof regularly writes up the most interesting extracts in the form of an article for the Bulletin, thus assisting fellow members and providing valuable technical articles for which our Editor frequently appeals. An example taken from the writer's log will be given in a subsequent issue of the Bulletin—just by way of showing how much his methods may be improved!

"UR QSB FB, OM, DC ES STDI."

(By G-5YM).

The radioese used as the title of this article is the kind of report we all strive for, and are overwhelmed with joy when we can attain and keep it. To judge from the signals one hears on the 30-50-metre band, the majority of stations find the attainment of a really good and steady note a matter of extreme difficulty.

As this station has recently been rejoicing in just those very reports which make glad the heart of the enthusiastic operator, an explanation of the steps taken to obtain a pure and steady note, with a single valve sender, may be of interest to brothers of the key who are still struggling.

The equipment which gave the happy results on 44 metres at G-5YM is as follows:—

Aerial.—"Roof," 65 ft.; down-lead, 25 ft.; single wire; near end, 40 ft. high; far end, 45 ft. high; No. 14 enamel covered copper.

Counterpoise.—Single wire, 75 ft. long; near end, 15 ft. high; far end, 10 ft. high; No. 18 phosphor bronze.

Circuit.—Balanced colpitts; series feed.

Inductances.—Grid and plate, each 12 turns No. 12 silver-plated copper 3¼ ins. diameter, spaced 5/16ths inch dielectric top and bottom only. Aerial coupling coil 10 turns No. 18 tinned copper wire, 3¼ ins. diameter, spaced ¼ in. A clip is provided at the counterpoise end for tuning.

Valve.—Mullard O/50.

Power Supply.—Mackie 60-watt generator fed from 18-volt. car type batteries. Actual supply to oscillator 30 ma. 1,400 volts.

Filter.—2 microfarads capacity and two Ford coil primaries in parallel.

Grid lead 100,000 ohms. wire round.

Tuning Condensers.—0.0003 double spaced.

Everything is built as solidly as possible, and the inductances are raised 8 ins. above the base board. The circuit is shown in Fig. 1, and the equivalent "balance" net shown in Fig. 2. A glance at Fig. 2 will show that when the two sides of the circuit are correctly balanced the R.F. potential at any given instance will be equal at the two points marked "filament negative" and "C3." As the grid leak, power supply and key are all connected between these two points there can be no R.F. loss through them and no radio frequency chokes are required. The circuit will be recognised as that described by G-5SI in the February, 1926; but G-5SI did not explain how it worked. He only recommended "confidence."

The sender was first worked with a back loading resistance; but this device means a considerable waste of very valuable "juice" from the accumulators which are the foundation of the whole power supply. Therefore the grid leak was increased until a value was found at which the generator showed practically no disposition to slow down when the key was pressed. The value—100,000—seemed rather high, and a bad development of harmonics was feared; but several observations on 22 metres by kindly brother "hams" shows that the second, at any rate, is not present.

At this time the sender was being worked with a Hertz aerial of the "Secretan" type, and the reports were almost always of a good and steady "rac" note, though occasionally, with variations in the tuning, the note would be described as "bad." With this kind of Hertz aerial the aerial coupling was tight. There was only 1 in. distance between the coils.

About this time experiments were started with crystal control and a change was made to the harmonic tuned aerial. Also, in order to get some control over the intensity of oscillation, variations in coupling between the two inductances of the oscillator were experimented with. It was then found that if the coupling between the two coils is made sufficiently loose, the capacity of the condenser C3 had a very considerable effect on the intensity of the oscillation. Eventually, for the particular valve in use, a capacity of 0.0008 mf. was fixed on, with a coupling of 3½ ins. between the coils. This reduced the oscillation a little and the "revving" of the generator became even more steady.

It was now found possible to crystal control the circuit; but as no more lead could be put on the generator, the crystal control valves, oscillator and amplifier, were fed from accumulator cells. The drain on a battery to give 350 volts was found to be excessive, and attention was turned to the single valve circuit again, with the idea of getting an absolutely clean note.

Here it may be noted that absolute balance between the two halves of the circuit is an essential of success, and therefore "efficiency"—*i.e.*, maximum aerial current for minimum input milliamps.—cannot be attained by varying the grid inductance tuning. This state of efficiency must be arrived at by adjusting the grid leak, the coupling between the inductances, and the capacity C3.

There is no drop in the feed milliamps at the point of resonance, and therefore tuning must be done by means of some form of indicating wave-meter, the point of balance being indicated by maximum response. At 5YM the indicating meter is an absorption circuit with a Neon tube indicator. Practically, the wavemeter is set to the desired wave-length, and the circuit then adjusted to this point, with the aerial uncoupled.

Having the circuit tuned to the desired wave-length the aerial coupling can now be adjusted. Using the harmonic tuned aerial this coupling can be very loose. With the circuit and aerial as described, the best coupling was found to be between 5 and 6 ins., nine turns of the coupling coil being in circuit.

With the circuit adjusted in the manner described a very steady D.C. note is obtained, the only fault being a slight key click heard only by stations within about 100 miles. This is due to a minute spark in "break." It is not heard by distant stations at all.

Tuning with a Hertz aerial is just as simple as with the harmonic type, as the resonance point of the aerial will be known to within half a metre, if not closer, and the wave-meter will be true to within 1 per cent. at least. The oscillator is set to the approximate frequency and final adjustments can then be made for maximum transfer to the aerial.

With the "Secretan" form of aerial (BULLETIN, September, 1926), which is fairly flexible, no difficulty at all will be found. At 5YM the "Secretan" aerial used for the 44-46 metre band is simply a single inverted "L" 90 metres long, coupled to the oscillator and connected to counterpoise or earth as shown in Fig. 3. For the 33-metre band a quarter wave-length wire is slung from the main aerial and coupler and connected in the same way.

Great trouble has been experienced in getting a pure "D.C." note with either this or the more ordinary form of Hertz with the resonance indicator in the centre of the system. The trouble is that coupling must be fairly tight. Experiments have recently been started with the parallel "Lecher wire" feed Hertz indicated by G2OD in the BULLETIN of December, 1926, and fully described by Mr. M. Scroggie in *Experimental Wireless*, March, 1927. This allows of a much looser coupling.

It has proved to be the most efficient type of aerial yet used at this station; but there is still difficulty about the quality of the note, though no complaints have been heard as to steadiness. Some reports of a "D.C." note are received; but most of them are of "rac vy gud." As nothing in the oscillator has been changed, and the only change is the aerial system and the reduction of the aerial coupling from 6 ins. to 3 ins, it is obvious that the note has been affected by the closer coupling.

To sum up the experience gained: Steadiness depends on the keying arrangements, on the aerial coupling, on keeping the anode cool, on not overheating the filament, and on using a circuit arrangement in which the discharge of condensers does not cause chirp. Also, when a generator is used, in keeping the power supply constant.

A "D C." note depends on the filter circuit, when any form of generator is used, and on the aerial coupling. Both steadiness and note can be badly affected by incorrect tuning.

Theory and Adjustment of a Transmitter.

By F. Aughtie, G6AT.

Part II.

Oscillation Transformers.

We have seen that the output from the valve must be transformed from 420 to 25 volts. Now, firstly, no iron can be used in the core, because at all frequencies employed for transmission by the amateur, iron is quite useless magnetically, while the losses in it become excessive. An air core transformer must therefore be employed.

Every transformer takes what is termed a magnetising current when its secondary is open-circuited; this current does not represent power loss in the transformer, because it is out of phase with the supply voltage across the winding. (This assumes the resistance of the primary to be negligible.) But this current has to flow through the generator and causes power loss in the generator itself, due to the resistance of the generator. It is not practicable to reduce the magnetising current indefinitely by increasing the primary turns because resonance may occur within the transformer itself, causing a host of troubles.

The magnetising current may, however, be supplied by connecting a condenser across the primary, of such a size that it just supplies the magnetising current, leaving the valve to supply the power component of the current through the primary. (The current through an inductance and a condenser supplied from the same voltage are in opposite phase.) When this condenser is connected the primary is tuned to the frequency of the supply. Commercial transformers are never tuned, because the interest on the capital cost of a suitable condenser would be more than the cost of power lost by leaving them untuned. All generators of commercial supply frequencies have an extremely low internal resistance.

The transformer may then be made into an auto-transformer by using a part of the primary as the secondary winding also, *i.e.*, the aerial is tapped off a suitable number of primary turns. This gives the familiar direct coupled aerial arrangement.

Unless the aerial happens to be working on its fundamental wavelength, which is unusual in most cases, it will have a high *impedance*, *i.e.*, a large voltage is necessary to cause much current to flow in it, and current is required in the aerial if we wish to radiate power since its *resistance* is low. Note that the voltage and current will be out of phase to a greater or less extent according to the ratio of impedance to resistance. This (out of phase) voltage may conveniently be obtained by putting an inductance or condenser in series with the aerial, and making it of a suitable value. When this is done the aerial circuit is also tuned to the working frequency.

If the inductance used is too small we may increase the voltage across it by increasing the current through it; this may be done without affecting the external circuit by putting a condenser in parallel with the coil. This gives the familiar parallel tuned arrangement.

Loose Coupling.

We will next consider the case of loose coupling where both primary and secondary are separately tuned. See Fig. 1.

Visualise three fields:—(1) That through the primary which does not link with the secondary; (2) That through the secondary which does not link with the primary; (3) That which links the primary and secondary. Call these φ_1, φ_2, and φ_3 respectively.

The field φ_1, requires a current to maintain it; this is supplied by the primary tuning condenser, as already shown. Similarly, φ_2 requires a current to maintain it and this is supplied by the secondary tuning condenser in the same way. φ_3 is the link by which energy is transferred from primary to secondary. Note that if the secondary condenser is omitted, the field through the secondary is φ_3 only instead of φ_2 and φ_3, and since φ_2 is much greater than φ_3 the E.M.F. across the secondary is much less. This explains why both primary and secondary of a loosely coupled transformer should be tuned. In a tightly coupled transformer practically the whole of the primary field passes through the secondary, and *vice versa*, *i.e.*, φ_3 is nearly equal to φ_1, and φ_2.

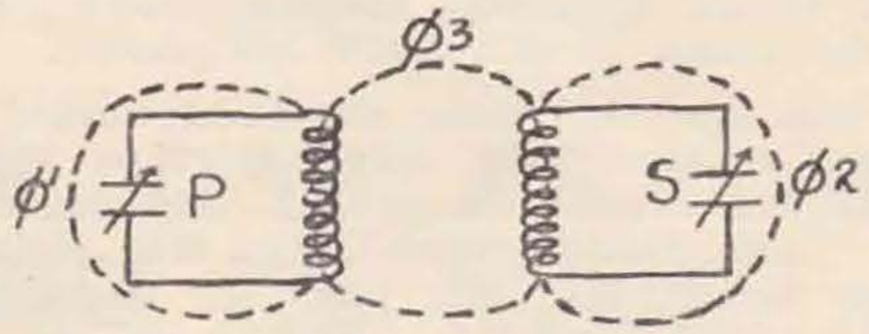


Fig 1.

The condition for energy to be transferred from primary to secondary is that φ_3 shall be in opposite phase to the voltage across the primary, this field φ_3 combined with φ_1, is the total primary field. The effect of φ_3 then is to cause an increase in the apparent resistance of the primary. This means that it will draw power from the supply generator. This power is taken in the form of current from the generator in phase with the supply voltage. The field set up by this current is actually in opposite phase to φ_3, the net result would therefore be, that the primary field would be constant and independent of the sceondary current were it not for the fact that when a load is thrown on the generator the supply voltage falls due to its internal resistance. The final effect, therefore, is that as load is placed on the secondary, the primary voltage, and with it the primary field, falls.

Tuning the Secondary.

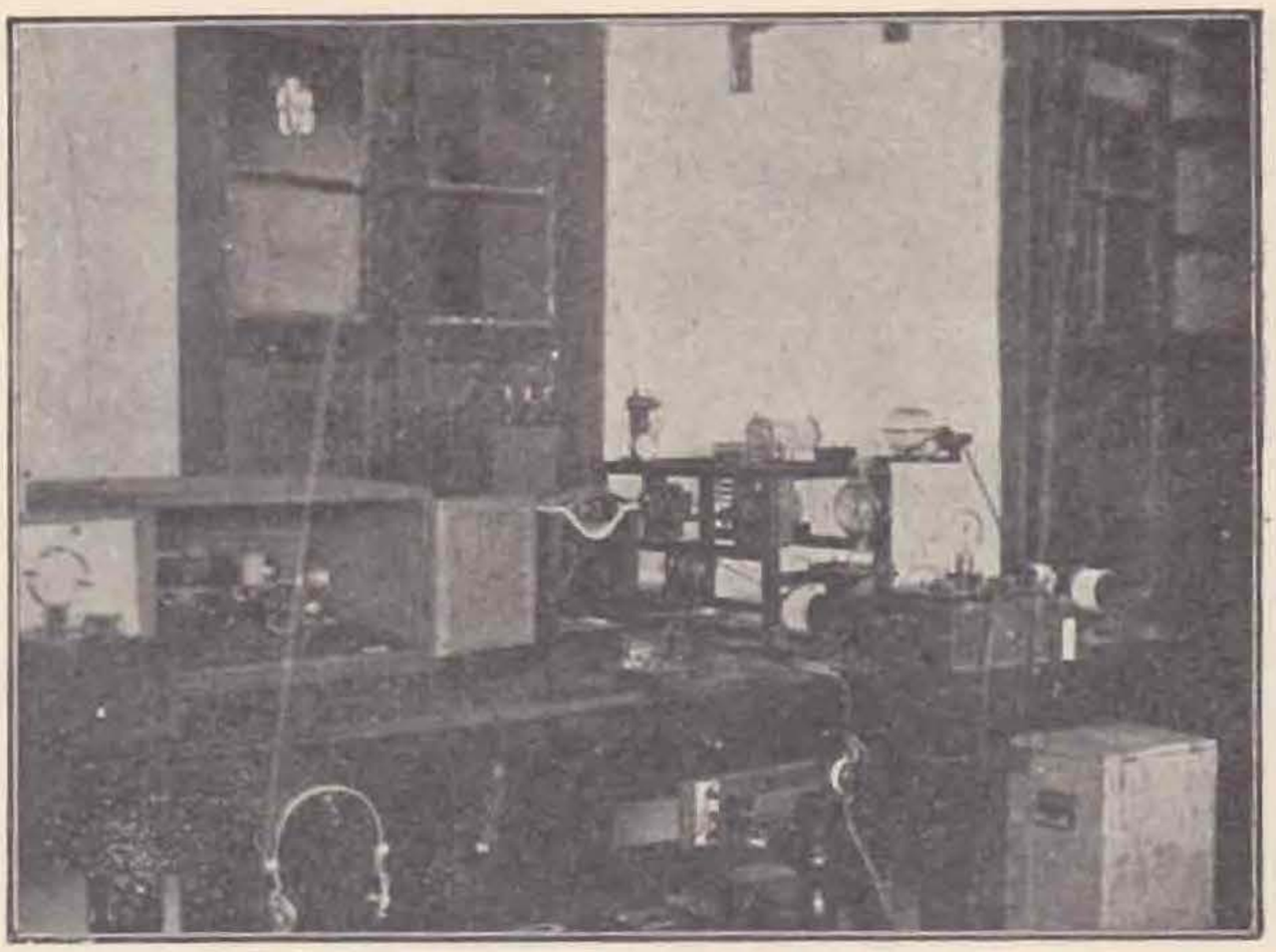
Consider now how the secondary may be tuned. If the equivalent capacity of the aerial (*i.e.*, its effective capacity at the working frequency; this is very different from its "static" capacity measure with D.C.), is of just the correct value to supply the magnetising current, it may be connected directly to the secondary. If it is too large, reduce its equivalent capacity by putting another condenser in series; if too small, increase the equivalent value by putting a condenser in parallel. There is no theoretical preference for either arrangement.

(*Concluded at foot of next page.*)

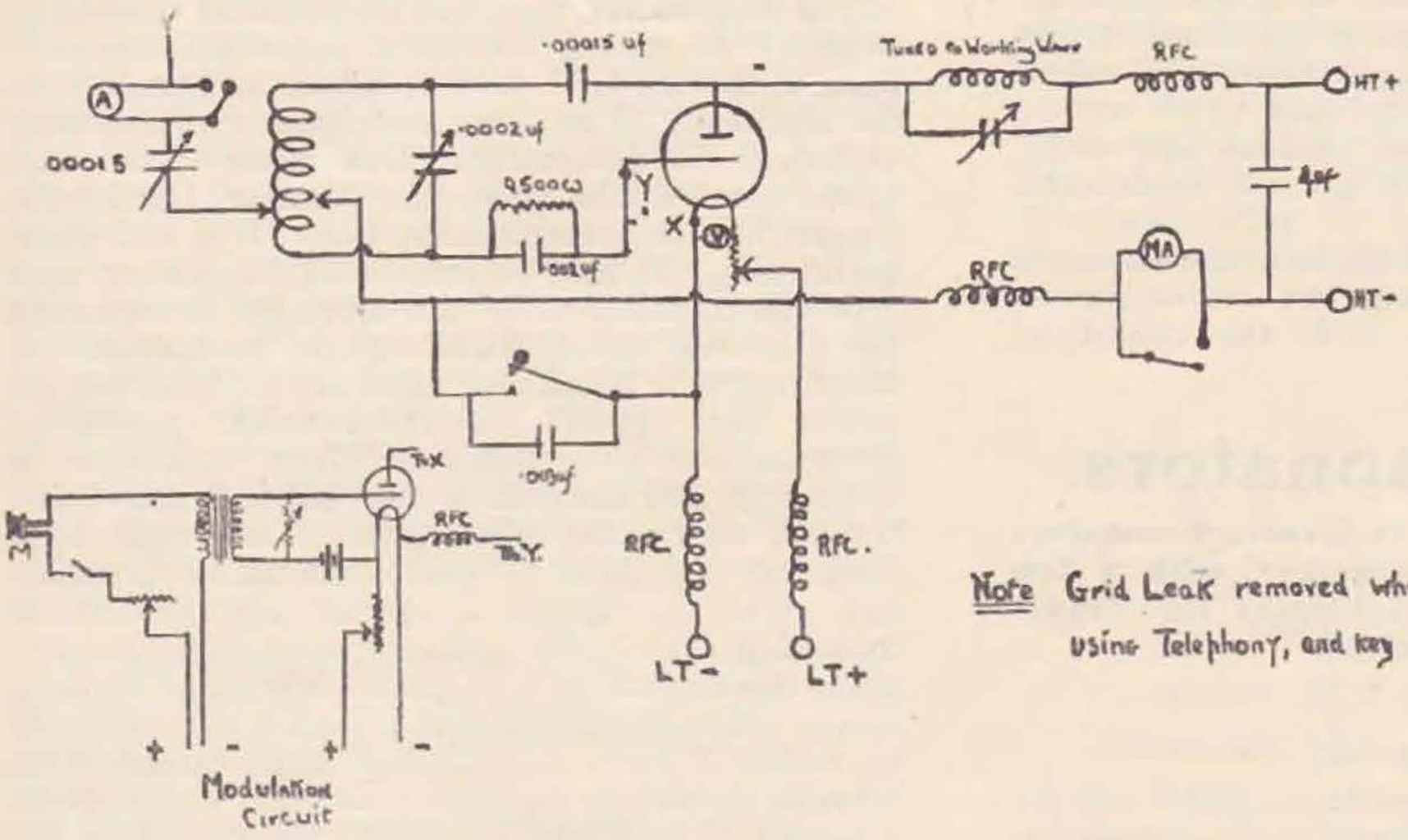
A12KT.

The equipment at this station is very simple and straightforward — my profession demands that I may have to move my station at very short notice, and of necessity it must be so constructed that it can be quickly dismantled and packed in a reasonable sized box. About an hour suffices to stow the equipment away ready for transportation to any distance.

The transmitter is a Hartley circuit, with parallel feed, one tuned choke coil is used in the H.T. plus lead, a similar choke coil in the negative lead does not appear to be an improvement, and only adds another control to be adjusted. The circuit is very flexible and stable, and works equally well on 29, 30 and 45 metres, three coils being maintained to suit the wave-length in use. Filament chokes proved to be a great asset and improved the over-all efficiency of the set considerably.



The aerial, a half-wave Hertz, 13 metres high, with a single feeder, is coupled directly to the transmitter. Loose coupling has not, so far, improved signals, and again adds further adjustments. No complaints of local interference have yet been received, tests have been mad working within a fraction of a metre of P.C.J.J., and also whilst the Indian BroadcastingStations have been working, with negative results.



Note Grid Leak removed when using Telephony, and key shorted

I am lucky enough to have a rotary transformer, and the necessary batteries at my disposal and my power supply worries are nil.

The receiver, a 3-coil O-V-I, was finally adopted after many circuits had been tried. A separate aerial is used for reception, and during the hot weather a 5-metre vertical indoor one is used; experience shows that this is the best length for reducing the ratio of atmospherics to signal strength.

Telephony has been tried using grid circuit modulation, a first attempt a few days ago resulted in fairly good telephony being transmitted to South Africa with an input of 50 watts.

During the period January-May, 1927, with an input never exceeding 65 watts, the following DX has been achieved: All continents bar two on the 45 band, bar one on the 30 band, and bar three on the 20 band. Of the continents not yet worked on, the various band reports have been received from two of them. Unfortunately the 20 band is now forbidden, but I hope the restriction will soon be removed.

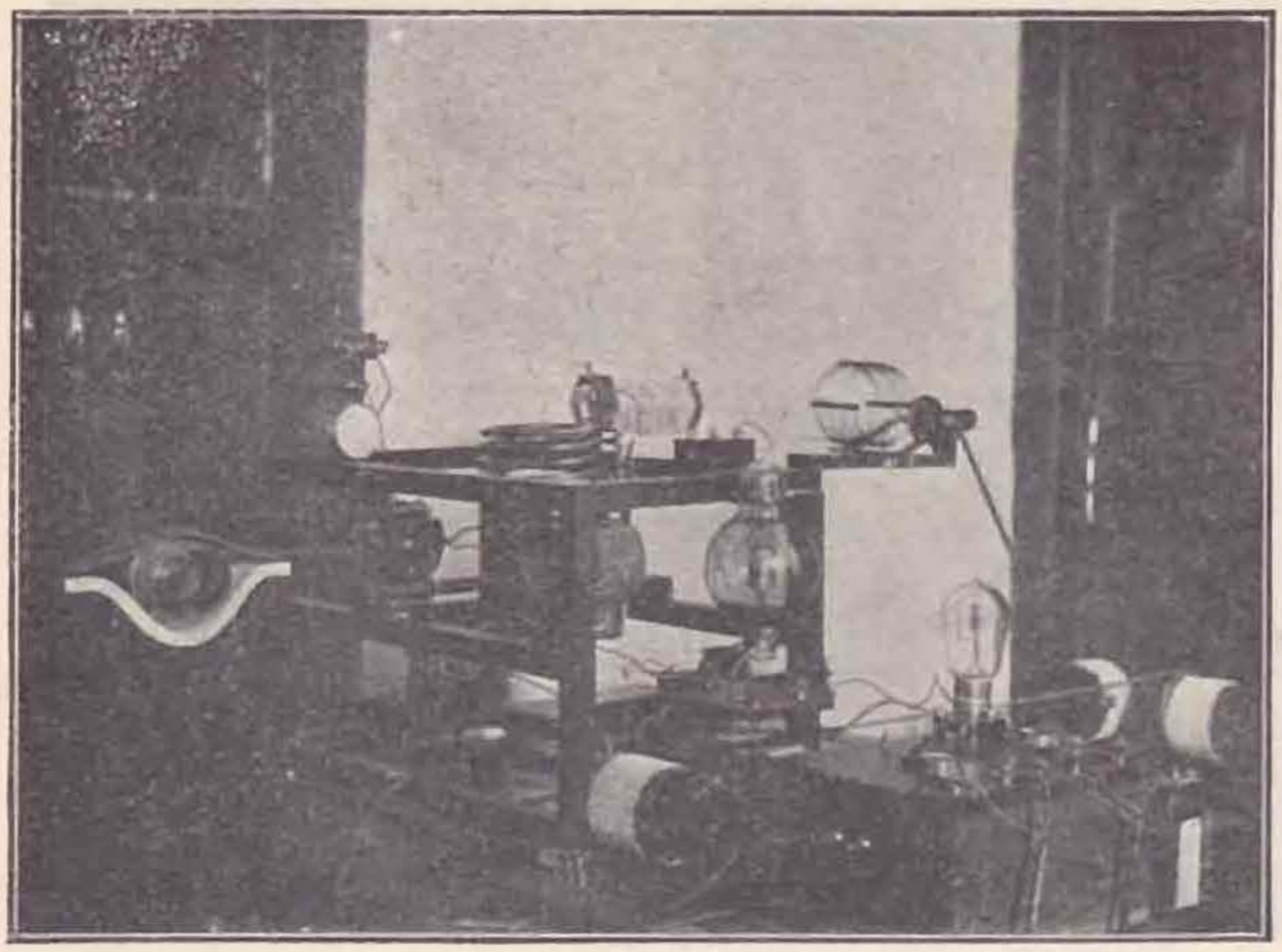
The photographs show the equipment fairly clearly; the receiver is "boxed" to compete with the dust, a most necessary proceeding. The card on the door of the cabinet is my QSO list and

Theory and Adjustment of a Transmitter.

(*Continued from previous page.*)

Note that with parallel tuning the secondary current is greater than the aerial current, and hence the losses in the secondary may be increased unless the resistance of it is correspondingly reduced. With well designed coils and a parallel capacity of not more than about 0·0003 mfd. there is nothing to choose between the two methods from the point of view of efficiency.

In the next article we will examine the problem of the primary inductance, and with it the vexed question of L/C ratios. We may state in advance that if the loss resistance is indefinitely small there is nothing to choose in efficiency between high and low L/C ratios. The problem therefore reduces to choosing such a ratio which simplifies the design of the inductance and condenser. By "design" here, we include the "loss" resistance factor of the components.



hows my "Black List" of stations, those who say they will QSL and don't.

The generator is housed in the large box under the table to reduce noise when using telephony.

The modulation equipment is contained in the box in front of the transmitter, the two-way switch on the left permits two microphones to be used.

The transmitter valve is an "Edison 100-watt," and the valve used as a grid-leak for modulation an "Osram L.S.5."

No doubt severe and well-merited criticism will be made on the equipment, but circumstances dictate conditions, and to fulfil the conditions efficiency must be lost.

Quartz Resonators.

Some Recent Developments in Quartz Resonators as Frequency Standards, together with a few Notes regarding Quartz Oscillators for Transmitter Control.

By R. A. Weber and A. S. Fussell.

(*a*) *Quartz Resonators as Frequency Standards.*

The development of the quartz oscillator and its various applications, particularly to the generation and control of H.F. oscillations, has somewhat overshadowed the not less important development of the resonator utilising longitudinal vibrations.

Recent improvements in the technique of the optical production of oscillators has given us crystals of vastly improved performance as compared with those available even a few months ago. For instance, it is now possible to obtain crystals capable of producing oscillations of the order of 3,000,000 per second without any associated oscillatory circuit, *i.e.*, with a purely resistive load. This opens up interesting possibilities, which are referred to in the notes below. The main point of the present note is to draw attention to the parallel developments of the resonator. These, while possibly less spectacular and of more limited application, are, in the writer's opinion, of more fundamental importance, as they have made precision frequency standards available for radio engineers at a price which is not prohibitive. Previous to their introduction the only standard available was the Multivibrator. Owing to their initial expense and difficulty of maintenance, these instruments are to be found only in Government Departments and a few of the richer Corporations. Apart from the special case of the N.P.L., where the Multivibrator has been developed under ideal circumstances, accuracies of the order 1 part in 10,000 were the best that could be obtained. Accuracies of a higher order than this can now be obtained by means of specially selected and mounted quartz resonators, and further more, the initial expense incurred is only a very small fraction of the cost of a Multivibrator, whilst there are no maintenance expenses or other difficulties.

Cady's original research was devoted largely to the longitudinal vibration of the resonator, and both he and Dye, in his equally important work, stressed the fact that the longitudinal vibrations of quartz had a greater freedom from temperature and other errors than had the transverse vibrations utilised in the oscillators. Naturally it follows that the former were the more suitable for use as frequency standards. Unfortunately further research has shown that the longitudinal vibrations were by no means free from error. These have been noted up to 1 part in 5,000, and, moreover, the frequency errors were associated with alarming variations in decrement. This latter point has raised some doubt as to the value of the figures quoted for the decrement by Cady, Dye and other authorities. It may be mentioned, in passing, that Dye has commented on the difficulty in repeating his observed values until certain precautions in mounting were taken and warm dry air was pumped across the crystal. A considerable period of research into the causes of these variations in frequency and decrement has led to their being tracked down and eliminated. The result is a frequency standard of quite remarkable precision and stability. Under a special arrangement of mounting which the authors have experimented with, the decrement is of such a low value (usually of the order of 0.0001) that a circuit can be tuned to within 2 parts in a million, and, furthermore, remains absolutely constant. In other words, given a source of sufficient accuracy, the period of the crystal can be determined to this degree of accuracy.

A short outline of the application of such a standard resonator to a Multivibrator system may be of interest, but before giving this, it may perhaps be as well to outline the normal Multivibrator method, which is as follows. A standard 1,000-cycle fork is utilised to maintain or control the frequency of a circuit very rich in harmonics. This covers the band down to 20,000 metres. Below this value, the harmonic which produces 20,000 metres is utilised to control a second circuit also rich in harmonics, and a further step is necessary to deal with waves below 300 metres. It will be realised that the system is very complex; also the exact determination of the fork period is a difficult problem, as it is affected by load, temperature and other conditions.

In the case of the specially mounted quartz resonators under discussion, it can be stated that the temperature coefficient is negligible, and once

the period is determined it may be definitely relied upon to remain constant, as it is not loaded in any way by control. It is utilised as a reference standard only, and, furthermore, the 1,000 to 10,000-cycle circuit is entirely eliminated. If the short-wave band is desired, the second stage may also be eliminated.

To indicate just one use of such a crystal, we will outline the method of calibration of a sub-standard wavemeter, range 300-600 metres, capable of being read to 1 part in 3,000 and accurate to 1 part in 1,000. The standard crystal adopted had the value 100,005 cycles. This represents the normal closeness to a nominal value that a crystal can be worked. In this case 5 in 100,000. Research had shown that oscillatory circuits by suitably proportioning the L/C ratio, choice of suitable valve, etc., can be designed to remain constant to within 1 part in 100,000 for comparatively long periods. It was this fact which produced the decision that there was no need to attempt control by the resonator. Such a circuit of the value 10,000 cycles is set up and utilised to drive a power circuit of about 30 watts input. In this latter circuit there is no need to study stability ; in fact, rectified A.C. is used to supply power to the valve. The output of this circuit is fed into a harmonic producing device which gives the whole range of harmonics from 10,000 to a million cycles in steps of 1 K.C. To tune the system to the resonator, the 10th harmonic is tuned in on a closed circuit with the crystal and a Moullin voltmeter across it, and by this means the bottom of the Cady "Crevasse" determined. This can be done to within 2 parts in 1,000,000, the fine tuning condenser of the "drive" being calibrated in cycles. The system gives 50 readings over the range 300-600 metres. Should it be desired to cover the short-wave band a 300,000-cycle resonator is used, with a 30,000-cycle drive. This arrangement will cover a range down to 20 metres.

In concluding these notes on resonators, it may be said that an analysis of the probable errors involved shows that an overall accuracy of 1 part in 10,000 is easily obtained.

(*b*) *Quartz Oscillators for Transmitter Control.*

A good deal has been written of late regarding the use of quartz crystals utilising transverse vibrations for transmitter control, so that a few notes on their optical production and electrical performance may be of interest.

During the last few years the authors have devoted a large proportion of their time to the productiou of quartz oscillators, and a study of their electrical behaviour.

Much interesting data has been established, and, contrary to general opinion, we have repeatedly found that the best oscillators are not always produced from quartz which is optically perfect. In general, it may be said that there appears to be very little direct relation between the optical structure and the electrical behaviour of a quartz crystal. The production of a good oscillator is, however, dependent to a very great extent on the perfection or otherwise of the optical working, and certain precautions must always be observed to prevent stressing or straining the crystal during cutting and working.

Ultra-Short Wavelengths.

The works of short-wave transmitters is for the greatest part experimental. This is the reason why since a new problem asked by the technique is solved, one finds ever a new struggle to gain a new world to discover.

In that way, after having worked on 200, 180, 100, 40, and 20 metres, the amateurs are now looking towards shorter wave-lengths, from 10 metres and below.

These waves show strange phenomena in their propagation and reflection. It is quite certain that till a wave-length of 7 or 8 metres, one can expect a transmission very certain, if it is not reliable, no matter the place of the transmission ; in other words, one can tell for these waves they have the characteristics of 40-metre and 20-metre waves (*i.e.* propagation through inert corpses, negligible reflection, etc.) ; *cf.* the tests of Lieut. Malgouzou on 9 metres in 1923, who made a DX of 60 kilometres (call OC9).

Below, one finds sudden changes ; with an equal power the DX diminishes in considerable proportions, the steadiness of the wave becomes so precarious that it is nearly necessary to adopt a modulated high-tension (raw A.C., interrupted C.W., etc.), reflection phenomena become apparent. The latter being the most important, I am to give some examples of them.

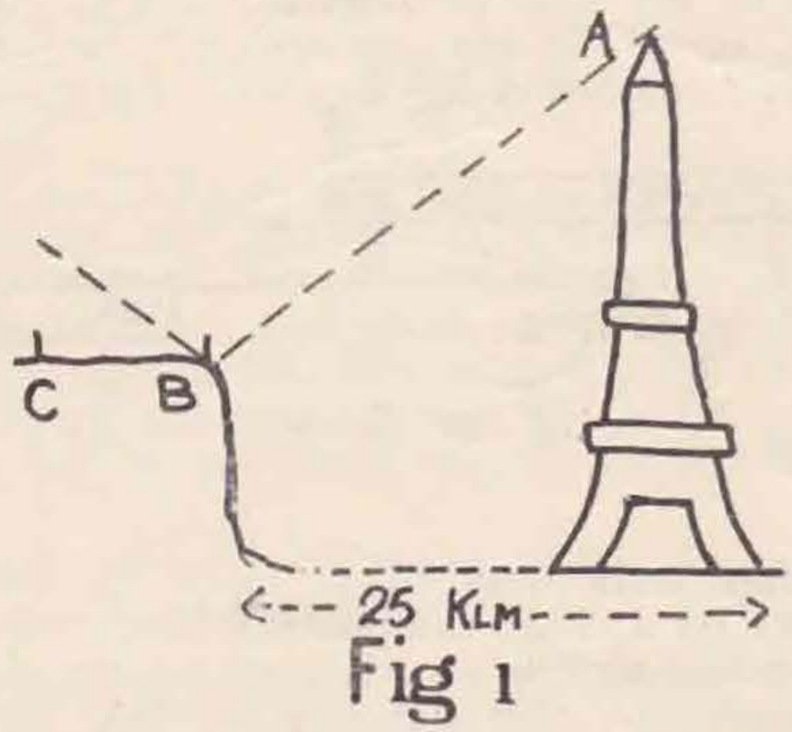


Fig 1

It appears certain (tests of the Comm. Mesny, of 8JN, 8DQ, 8PY, etc.), that *these waves have a propagation quite similar to light waves*, that is to say, they are in a position to be reflected by any obstacle. We are then in presence of quite new phenomena, not permitting (in the actual state of the technique of short-waves) a reliable transmission safe in the two stations *can see each other*, all meteorological questions set apart, such as fog, clouds, etc. It is to be remarked that the analogy with the light waves is quite the same ; so, certain days in Corsica, it is feasible to see the French coast though a straight line drawn between the two places passes 180 metres below the sea level ; the light rays follow then the globe's curvature. Commandant Mesny, while experimenting a 3-metre wave between Corsica and Toulon, was heard on both sides ; from that, we can assume that there is really a strong analogy between the two systems.

To picture the reflection of these waves, here is

the description of a test made by Mr. Mesny (Fig. 1). The transmitting set, working on 3 metres, was placed on the summit of the Eiffel Tower, and the receiver went to a hill, 25 kilometres far. As it had been thought, the operator placed in B received immediately the signals ; he got back on the hill and noted a regular and progressive reduction of the signals' strength till they were extinguished at C. All was done as if the transmitter was a luminous source and the hill a mirror.

The tests of 8JN are pictured in Fig. 2, which represents a field AB where one can see hills 1, 2 and 3. The transmitter was first placed in C, and it was quite impossible to receive the signals between E and F ; the transmitter going up to G, the silential zone was reducted to EH ; placed in D, it was only possible to pick the signals between I and J, though the height of D was quite superior ; that was because the transmitter was not near the board of the hill, and that the waves were obliged to " go into the game " after having passed upon a certain surface of ground, which augmented the surface of the silential zone. And a last argument in favour of the analogy of ultra-short wave-lengths and light waves, an operator placed in K was not able to pick up any signals. The wave-length at 8JN was 5 metres.

Fig 2

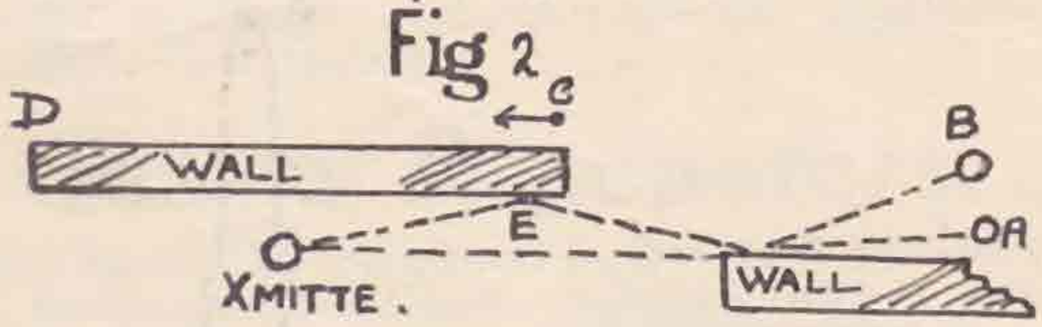


Fig 3

Similar tests were made by 8DQ, looking in advance on a chart the places where, logically, the reception of signals would occur (places hidden by hills, walls, etc.) ; in each case the ideas were found right.

Reflection tests were made by the writer as shown in Fig. 3, with a wave-length of 2.7 metres, and call sign 8PY ; the transmitter was placed near a wall, and the receiver in A. Though the two stations can see each other, one would have thought the signals to be strong ; it was wrong, signals were almost weak, probably because of the second wall too near. Besides, the receiver placed in B seeing not the transmitter heard the signals more strongly, these being evidently reflected twice, in E and in F.

A curious thing was noted. While moving the receiver from C towards D I noted the presence of stationary waves along the wall ! The effect was soon discovered to be done by the presence in the wall of wires of the mains, where the stationary waves were induced by the transmitter. When an operator put his corpse between the transmitter and the receiver the strength of the signals was altered to a great extent.

It is considered as certain that it seems impossible to have *reliable* transmissions through obstacles, and that the virtual seeing of the two correspondents is a *sine qua non* condition of a good correspondence.

We can turn now to the producing of these waves. In principle all systems of transmission are good, but one must look on them with great care, for here we must remember that a centimetre more in a wire can forbid the transmitter to " perk " on 50 centimetres below.

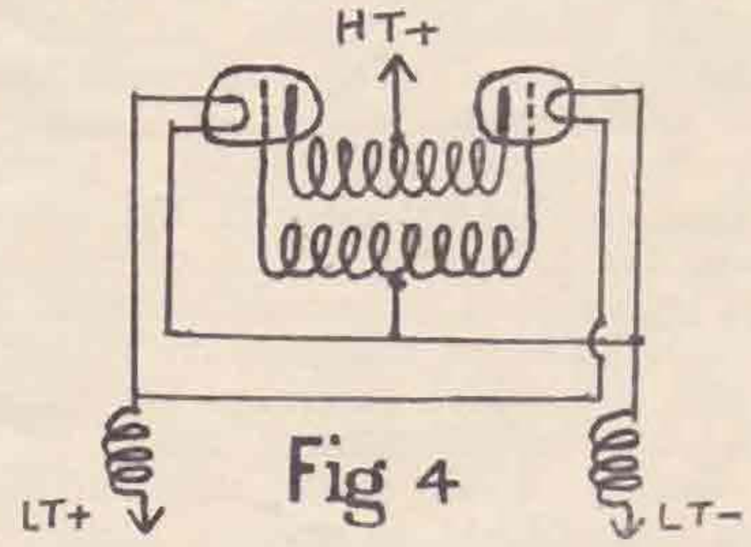


Fig 4

After several tests the Mesny circuit was adopted, because of its well-known ability to oscillation ; it requires two valves, and the differences of internal capacities in the valves can become troublesome in the neighbourhood of 1 metre, for example ; but for 2 metres and upwards is quite OK.

The circuit is shown on Fig. 4 and the transmitter on the photograph. The grid coil had two-thirds of a turn, with bare wire of 3 mm. ; the plate coil, with flux inversed, had one-third turn of the same wire ; the two coils were coupled tightly at 5 mm. ; their diameter was a little more than 2½ ins. No tuning condenser was used to reduce as far as possible high-frequency losses and damping.

It is not necessary to use a choke coil in the high-tension circuit, because there is no high frequency in it theoretically (middle point on the coil, Fig. 5) ; practically, the nodal point may not be quite identical with the geometric middle point because of the inegal internal connections of wires in the tubes ; for this reason one can put a slight choke coil (15 turns) in the plate connection as well as in the grid one.

But it is necessary to have a choke coil on each filament connection ; at 8PY each choke coil was made by 13 turns of 1 mm. wire, quite rigid, each turn being separated from its neighbour by 2 mm.

A glance at the photo will tell better than a long

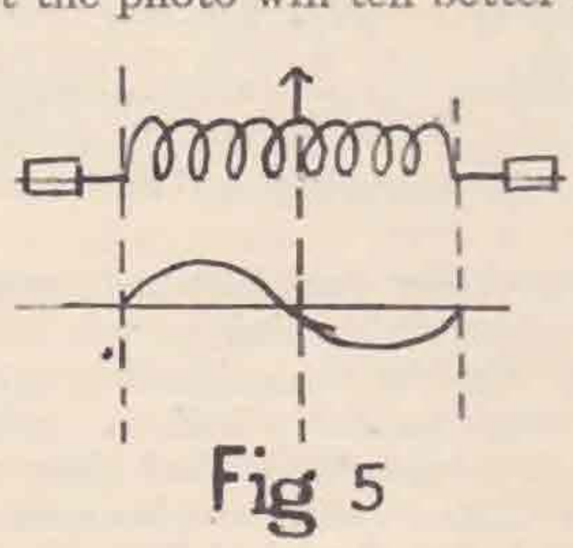


Fig 5

article the manner in which the transmitter is made. Note that, save the valve sockets, which are the better towards proper capacity, there is not an atom of ebonite in this transmitter ; at these very high frequencies the ebonite suffers from a sort of internal dissociation. I used personally

a sort of wood specially prepared, chemically isolated after boiling in some cellulosic preparations.

The tubes were 20-watt affairs; it would have been better to use low-capacity tubes (grid and plate connections opposite), as I have done in my tests on 0.9 metre, the high-frequency losses being smaller; nevertheless, in an experimental point of view, the actual transmitter is quite satisfactory.

To see if the set oscillates one can build a Hertz resonator in the following manner: Take a dull emitter valve in order that its sensitiveness may be quite high, and short-circuit its filament by half a turn of 1 in. about, wire bare or not. Approach slightly the resonator of the transmitter's coils; if the set oscillates the filament must glow.

To measure the wave-length on which the set oscillates, the best method is to use Lecher wires. Mount two wires of about 10 yards long so that they are parallel, isolated at one end and connected to the other by half a turn (Fig. 6). Couple the transmitter with that "coil," and drive smoothly on the two wires a "bridge" made by a small lamp, whose each connection is prolongated by a bare wire 8 ins. long.

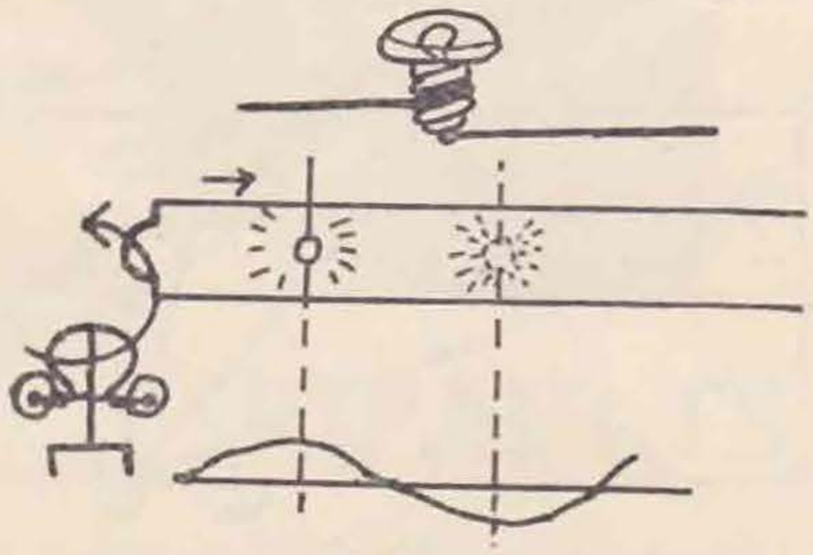


Fig 6

As Lecher wires are saturated with stationary waves, when passing to maxima of intensity, the lamp will glow. It is only simple to measure the distance separating two successive glows, which represents half a wave-length.

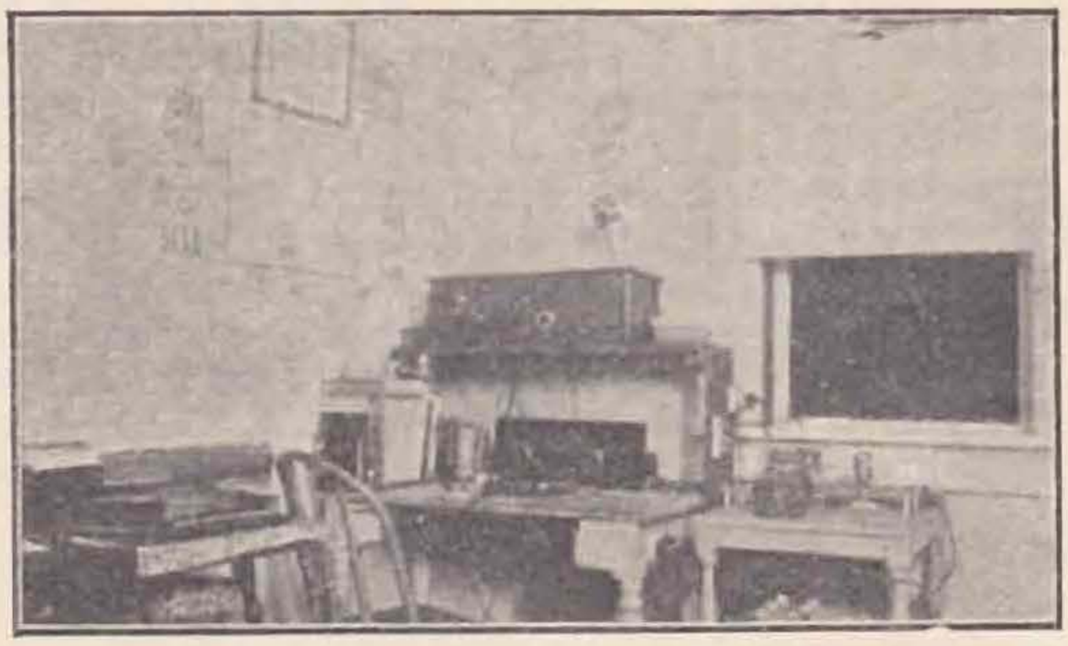
For all the tests made in the laboratory no aerial was used, in the fields the Lévy aerial was used with success; a strong coupling is not recommended, for it causes the set to cease oscillating; the optimum distance was found to be about 10 ins.

The receiver was a Weagant system, which proved to be the better; of course, it is necessary to use very excellent materials; the tuning condenser, shielded and quartz isolated, had a maximum capacity of 0.1/1000; the grid coil had half a turn of a little more than an inch in diameter; and the plate-coil two-thirds of a turn two inches in diameter. These valves must not be counted as steady, for they will be different for other condensers than the one I used. The detector tube had been established especially for the tests, with special connections for grid and plate, and a UV-199 filament. The detection condenser was air-isolated, and the resistance, a vacuum affair, obtained by the cathodic bombardment principle.

The receiving aerial may be any piece of wire, about 10 yards in length, connected to earth; the receiver is coupled very slightly to the aerial. In some cases one can put his aerial in a box; while in all my tests the receiver was put on the foot-plate of a motor-car, the co-called aerial being the metallic chassis.

My new tests are now going towards the wave-lengths inferior to 1 metre; the circuit is quite different as the difficulties are also very much more superior. These will be the subject of my next article.

HENRY PIRAUX.



NU-8CFL.

Radio station NU8CFL is located at 433, S. 17th Street, Columbus, Ohio, and is owned and operated by Mr. C. C. Justice.

The transmitter uses a Hartley circuit with 550 volts of chemically rectified A.C. on the plate of a CX310, and is operated in both the 20 and 40-metre bands. The antenna is a Hertz.

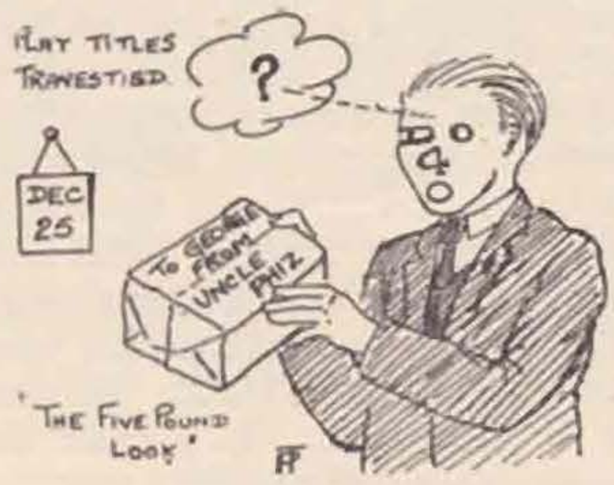
The receiver is a "Schnell" with 2 stages of L.F. amplification.

8CFL is an O.R. S. and does a good deal of traffic handling, but also finds time for DX work—Belgium, France, Uruguay, Mexico, Porto Rico, Dominican Republic, Cuba and ships at sea have been worked and 8CFL has also been heard in England, Spain and Australia.

Reports will be welcomed and all cards will be QSL'd.

"Quartz."

A handy book of reference by A. Hinderlich, M.A., price 2/6, obtainable from the Publications Department, is well worth having. It contains a deal of information on piezo-electric effect, which is invaluable to those who are seeking knowledge on this subject. including circuits and a handy Bibliography.



The Valve as a High-frequency Power Amplifier.

By G2HK.

This is my acceptance of 5KU's challenge for criticism that he made at the Convention. I shall make several shocking statements and endeavour to uphold them.

I must first dispel the idea that the wave form of the voltage impulse given to the anode circuit of a valve, by the valve, has any serious relation to the wave form in the radiator. The wave form of the voltage impulse is in most cases of valve oscillators or efficient amplifiers an approximation to a triangle, thus, Fig. 1. Now this wave form may be analysed by fourier series into an infinite series of even partials, in continually diminishing amplitudes.

$$\lambda, \frac{\lambda}{2}, \frac{\lambda}{4}, \frac{\lambda}{6}, \frac{\lambda}{8}, \text{ etc.} \quad \frac{1}{2n}\left(\sin 2n + \varphi\right)$$

Should we now cut off the tops we shall get the whole series of partials. It is extremely difficult to keep to the pure amplification scheme and in any case even if one does, the maximum efficiency is in the neighbourhood of thirty per cent., as used in the P.A. stages of 5GB. To those who think they have made their amplifier on the perfect wave form principle let me suggest that they should listen to their harmonics first before boasting about it.

To get back to the sheep, making the grid excitation larger than that necessary to make the vertex of the triangle touch the saturation emission does not increase the voltage impulse on the fundamental but merely increases that on the odd partials, which are the ones to avoid. When considering the harmonic question the mode of excitation of the aerial must be known. In that most generally adopted as being most easily susceptible to calculation, I refer to the current fed half-wave variety, coupled with a coil in the centre, we *must* have volts at the ends and no volts in the middle. If we generate in the valve only the fundamental and even partials the aerial will accept the fundamental and have nothing to do with the even partials. The danger of harmonic radiation is only appreciable when the coupling between the aerial and anode coils is too tight.

In the perfectly general case of a loaded aerial, the aerial will resonate at the frequency of the fundamental of the loaded combination and at several higher frequencies *none* of which are integral multiples of the fundamental. For this surprising statement I must refer the reader to an article on the subject by P. K. Turner, in *E.W.* some years ago. As the valve only generates integral harmonics a loose coupled aerial, loaded by inductance and/or capacity will not resonate to them but may be forced by them if the coupling is too tight. In general therefore one may say, forget about the wave form, as the tuning circuits and the aerial look after that except in extreme cases of tight coupling.

Now I want to introduce to these pages a form of valve diagram which is most useful when power is the chief consideration—I mean the anode current anode volts diagram (Fig. 2). Take the case of a valve with a pure resistance in the anode circuit and H.T. battery of Vo volts across the lot. As the current in the valve is increased by variation of Vg, the voltage on the anode itself is reduced by the extra drop in the resistance and the curve traced out is the straight line VoR_1, VoR_2, VoR_3, depending on the value of the anode resistance. Suppose instead of having a fixed resistance we had a tuned circuit, which as you all know, acts as a

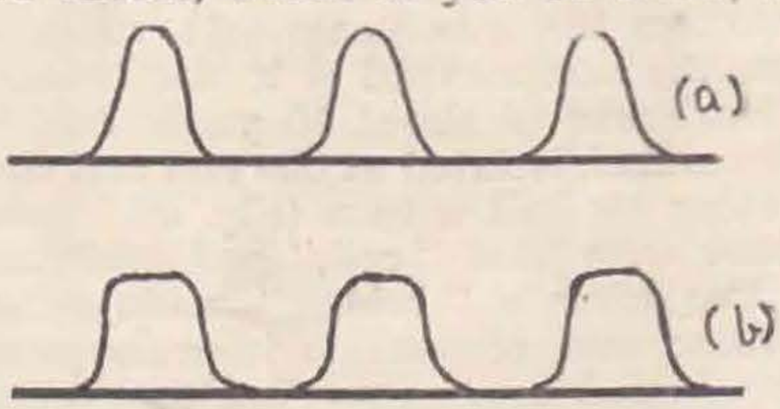


FIG. 1

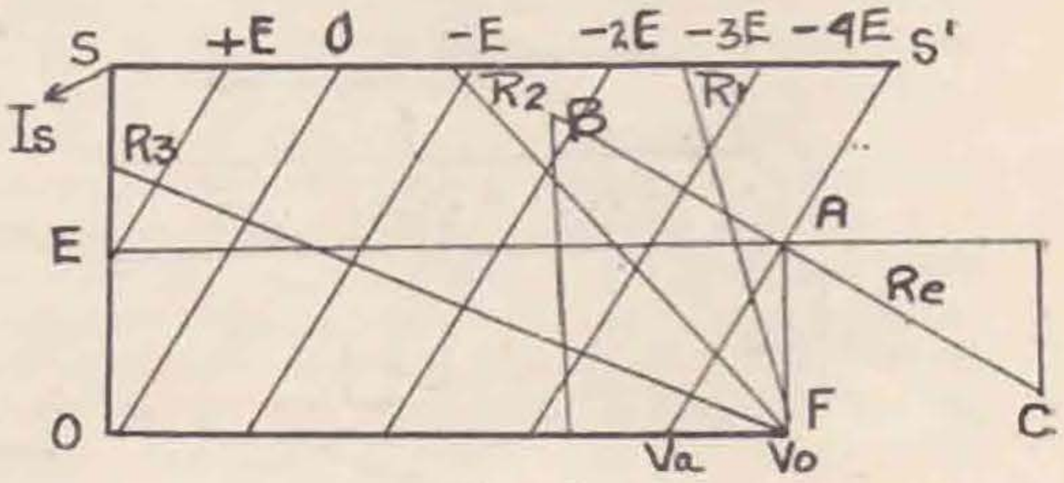


FIG. 2

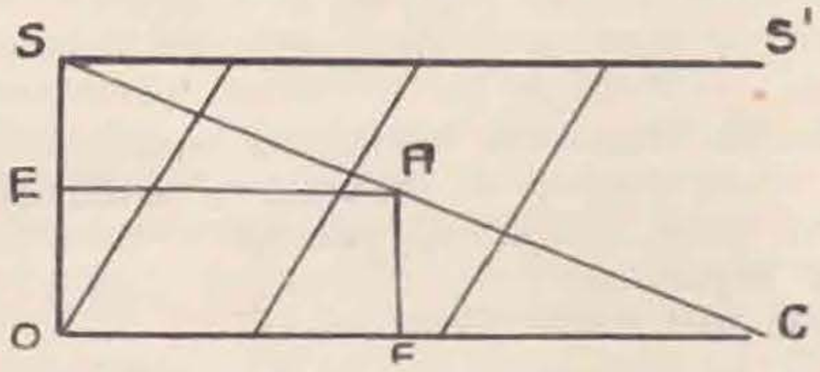


FIG. 3

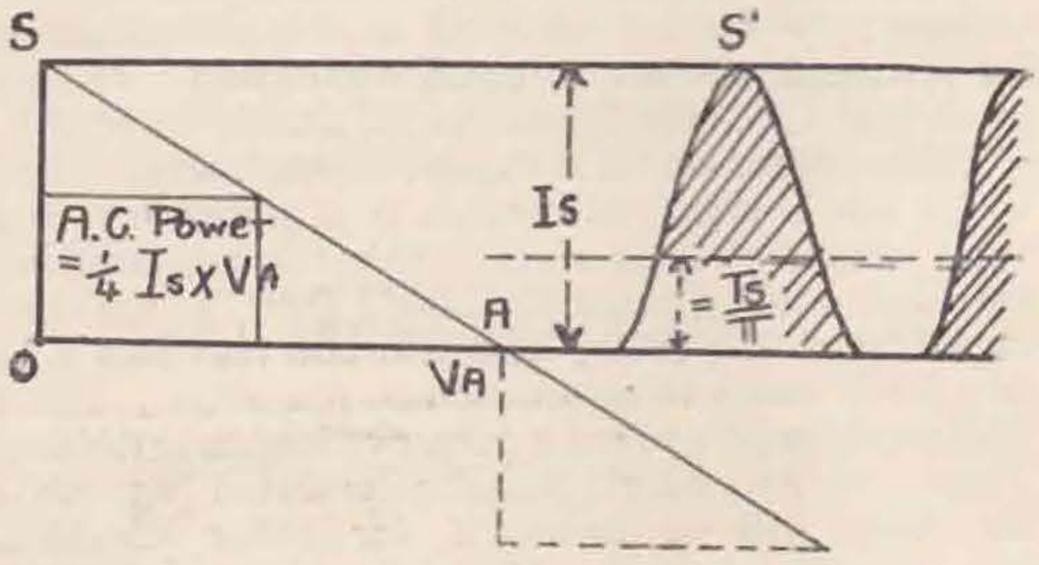


FIG. 4

high (but not indefinitely high) resistance at the frequency of tune, and arranged our grid bias and H.T. volts so that the conditions were represented by the point A on the diagram. Now this circuit has no D.C. resistance so there will always be Vo on the anode plus the alternating component of voltage across the tuned circuit. We thus have

the possibility of a higher potential on the anode than the H.T. alone. The tuned system will have a definite impedance which we may call Re, and this Re is equivalent to the R in the previous diagram, the difference being that for different values of Re the curve swings round the point A instead of some point on the base line. Here we get the flattening out mentioned by 5KU, but I must insist that no amount of anode resistance will straighten out a crooked characteristic. Consideration of the lumped volts characteristic should be enough to convince anyone that the straightness or otherwise of a characteristic is a function of the current at the point to be considered. The DE5 class, for instance, becomes straight at an anode current of 5 milliamps and the other conditions make no difference. Now then, referring to the figure (Fig. 2), so long as we don't excite the grid too much, the mean anode current will remain fixed at the chosen value represented by A. The anode volts are also fixed ; so the D.C. power supplied is equal to Va X Ia.

What now is the A.C. power ? If we assume an excursion on the curve of B to C about the point A, we have the A.C. volts are AD at max. and the current BD, and these are in phase so the A.C. power is represented by the area of the triangle ABD. The D.C. power is represented on the same scale by the rect. AEOF. We see that the efficiency is not exactly high. How then may we improve it ? The line SS^1 represents saturation of valve, so we can't go above that, though of course as this is a power amplifier we can do what we like with the excitation and just consider anode circuit conditions by themselves to begin with. Let us make ABD as big as we can ; it will be equal to ASE (Fig. 3) (and we must for the moment keep the negative side intact). So the power is now half AEOF, and the efficiency is now 50 per cent., and this is all we can get. Even so we have not thought of grid current and so for pure amplification the efficiency is much less than 50 per cent. Well, this sort of thing is very nice for the 5GB stuff but is poor business for the DX merchant if he will allow himself to be so called. We must do something to increase the D.C. to A.C. efficiency. Suppose we remove the negative side of the excursion and pass no anode current for half the cycle. The A.C power is now half the area ASO (Fig. 4) and the D.C. power is Va times the current. The current is the mean of half a sine wave whose peak is equal to the emission of the valve considered. The current under these conditions is one over pi of the Is. The efficiency is now

$$\frac{Ac}{Dc} = \frac{\frac{1}{4} \times Va \times Is}{\frac{1}{\pi} \times Va \times Is} = \frac{\pi}{4} = 78{\cdot}5\%$$

78·5 per cent. is no mean efficiency, although I know I shall be told of efficiencies much greater, actually obtained, I must say that anyone who gets 70 in the valve is not doing at all badly.

We must now examine our working and the diagram to find out how to run the valve to obtain this efficiency. To begin with the valve must be biased to pass only a very little anode current at no grid excitation, and the given anode volts. Five milliamps is about right to allow for the effect of the bottom bend of a DETI.

Now for the external load. This must have impedance equal to the resistance that would pass a current Is with the given H.T. across it. This load is in the form of transformer with the aerial load direct on the secondary. The aerial resistance is about 80 ohms for a straight vertical wire operating at its natural wavelength, and the transformation ratio required is made up of two coils of fixed turns ratio and variable coupling to alter the magnetic leakage and hence the effective turns ratio. The approx. turns ratio is given by

$$\sqrt{\frac{80 \times Ls}{Va}}. \qquad \propto RE = \frac{Va}{Is}$$

but it is advisable to put twice as many turns on the secondary and make up in a looser coupling to avoid capacity to the anode coil. Next we want to know the value of the grid excitation and this can be found by looking at the diagram. Draw a line through S perpendicular to the fixed grid voltage lines, and measure the length as far as the grid voltage line through Vo, the given H.T. volts. The bias may be read off at the same time. On this method we can actually calculate the requirements of a valve, and know what its efficiency is going to be. There are one or two interesting points brought out clearly by this treatment of the valve. For instance, increasing the anode volts requires a loosening of the aerial coupling to get maximum efficiency with a power which is greater in the ratio of the anode volts. This follows from the Va over Is and external load equation.

I think it may be taken that the valve is working at its most economical point. Although a higher efficiency may be obtained by still further biasing the valve, the output as well as the input goes down. At the same time a greater excitation of the grid will be necessary and a larger bias battery, both of which are increases in expense, and the only actual objective gained is efficiency while the actual power output has dropped.

In conclusion a word a two on the practical side. For tuning :—

(*a*) Detune amplifier anode circuit.
(*b*) Reduce anode volts of P.A. to less than half and tune the excitation unit for maximum anode current in P.A.
(*c*) Tune anode circuit of amplifier for minimum anode current.
(*d*) Put on full H.T. and again tune for minimum. This should be very little greater than the anode current with no excitation ; if it is there is something seriously wrong.
(*e*) Finally loosely couple aerial and tune aerial for maximum in the anode. Then increase aerial coupling until the anode current has risen to one over pi times the total emission.

At 2HK the measured excitation is 230 volts. The anode volts 800 and the power input 55 watts. It was expected to obtain a slightly higher anode current, but the deficiency is satisfactorily explained by allowing for the failure of the grid to reach its maximum potential owing to the charge acquired when positive. For those interested I give the last frequency doubler and P.A. circuit in use at 2HK. Notice the condensers tapped on at equal numbers of turns on either side of the earth point of the coil. The amplifier circuit is properly neutralised as witness the key in the frequency-doubler H.T. The biased current is 8 milliamps, the excited, 15ma., and the loaded anode current, 68 milliamps.

"Break-in."

By G2ZC.

I am prompted to pen a few lines on the subject of break-in, firstly, on the suggestion of 5GW, and, secondly, because from my own experience I am quite convinced that a large number of British hams either have never tried it or are not aware of the great advantages it carries with it. To those who know about it and who use it, this article may appear unwanted, but the remarks in it are addressed to those who have never known the joys of a real BK QSO, and only to those. To begin with, the term break-in means that if two stations are in communication, one is able to break-in on the other, at a moment's notice, and stop the operator who happens to be transmitting, so as to draw his attention to something, without having to wait till the end of the transmission. Let me just give one or two instances. A. and B. are having a QSO, with A. on the key, and suppose a word is missed by B.—A.'s wave suddenly alters—a particularly bad atmospheric comes along—B. wishes to explain to his OW he is just coming to bed—or in fact anything turns up so that B. wishes to stop A.'s transmission—this can instantly be done if both stations are using break-in. The method, in simple words, is just that if B. puts down his key, A. hears him whenever his key is up, and stops his transmission at once to see what B. wants. Now the operation in many cases is very simple and as my own system is perhaps the simplest of all, I might just quote it. At 2ZC I use two distinct aerials. Outside I have my transmitting aerial, and use one of 70 feet indoors and at right angles to the transmitting aerial for receiving. As I use accumulators for my H.T. supply, I have no ripple, magneto click, and other local QRM so that all I have to do is tune in the station wanted, switch on my transmitter H.T. and L.T., retune the receiver (owing to the alteration of H.T. supply as H.T. supplies both receiver and transmitter) until signals are up to strength, and then all is ready for a BK QSO. May I just explain how this is done, and for example I shall imagine I wish to work 5GW (with whom I have had several BK workings). I start and call 5GW in the usual manner, and sign off with "BK." 5GW then starts to call me, using "BK" after his call, *i.e.*, "2ZC, 2ZC, 2ZC, de, 5GW, 5GW, 5GW—BK," which is an invitation for me to BK him whenever I have tuned him in. I proceed to tune him, and having got him, put down my key. From my original call he knows my note and stops, and then the QSO proceeds, one station breaking the other whenever necessary for repetition or any other cause. Another station starting up (QRM), even if of a similar note, can at once be spotted, as a pause is made, and when it is found to be QRM only, and not the other station breaking-in, the QSO is continued. The point, of course, is that whenever your own key is up the receiver is tuned to the other station, and if his key goes down, then you just stop to hear what he wants. The system used by 5GW is different, inasmuch that he uses one aerial only, having a *small* switch in the aerial, and signals are received even when on the transmitter, by means of capacity, and it works splendidly. In the simplest words I have tried to outline the great advantages of BK, and I can assure those who can use it, but do not, of the

wonderful saving of time, as it saves lengthy calls, repetitions, or what, to my mind, is the worst of all evils—to be asked for a full repeat owing to QRM at the end of a long and detailed report ! ! I am sure all hams using BK will be only too pleased to demonstrate its usefulness to anyone, and I for one will be very pleased to " break " any ham who cares to QSO me, even just to show its efficiency, or if he cannot break in to me, to let me " BK " him. I hope before long to hear nearly every G station intimate " BK " in his call, and this short and simple article may help to bring this about.

R.F. Chokes.

By N. C. Smith (5YX).

A perfect R.F. choke would be an inductance with no self capacity. It would then offer infinite impedance over a wide range of frequencies. Actually no inductance can be made possessing no self capacity. The effect of this self capacity is to tune the choke to some wave-length. Now if the ratio of capacity to inductance is small, the choke will be effective over a fairly wide range because the resonance is very flat. The self capacity of a solenoid is roughly proportional to the radius of the coil, and so if one wants little capacity the coil should be wound on a small diameter former. The gauge of wire used will obviously depend on where the choke is to be used—filament chokes must be wound with thick wire, whereas chokes only required to carry a few milliamps should be wound with thin wire. A choke that is too small behaves as a capacity and is worse than useless ; thus a choke must be wound to an adequate size if it is to be effective. It is not a good policy to go to the other extreme and wind on hundreds of turns in the belief " the more the better " because the chokes may then have a number of " dead spots." These may cause curious effects on the tuning, and may let R.F. energy escape to earth. The best policy is to wind the R.F. choke just a little larger than necessary.

When 5YX transmits on 45 metres two chokes are used in the H.T. leads. These are wound with 32-gauge D.C.C. copper wire on a 1" glass boiling tube, the winding being about 4" long. They are however on the large side and about 3" of winding will be ample. On the 23 metre transmitter the H.T. and grid leak chokes consist of 60 turns on a $\frac{5}{8}$" specimen tube. These will just choke on 45 metres. The filament chokes are wound with 24 D.C.C. copper on 1" boiling tubes and consist of 50 turns. They have a combined resistance of about 2$\frac{1}{2}$ ohms, and so, using an LS5 valve, there will be a potential drop of 2 volts across them : hence the filament is supplied with 8 volts to compensate.

When building the 23 metre transmitter at 5YX considerable care was taken to reduce the losses to a minimum, and the R.F. chokes were given a considerable amount of attention. The problem was to test the chokes and see if they were satis factory. Since the function of the R.F. choke is to hold up R.F. volts, they were tested by connecting each in turn across the plate coil of the transmitter, thus placing a considerable R.F. potential across their ends. The transmitter was initially adjusted, with no aerial load, on 23 metres, to minimum input, when the R.F. voltage across the plate coil was considerable. When a good R.F. choke was connected across the plate coil, there was no noticeable change in milliamps input and no detuning. From the former it is supposed that the loss was negligible, and from the latter that the self capacity was also negligible. A bad choke made a noticeable difference to the milliamps and tuning. This was not considered to be a good test as the chokes were not to be used across the plate coil ! How is one to test the R.F. choke in the place in which it is actually going to work ? There is the neon lamp test, but this is not applicable to QRP since a neon lamp needs a considerable voltage to light it. However all the chokes on the transmitter when tested with the neon lamp showed that the R.F. voltage fell off as one proceeded down the choke, and the glow ceased before reaching the end. However the chokes might still be leaking even if the neon lamp did not show it. The tests that were finally applied were to touch the " earth " ends of the R.F. chokes while the transmitter was in action. This should not cause a burn, neither should the milliammeter show any change in milliamps when the end of the R.F. choke is touched. A more sensitive test is to set the receiver to some loud harmonic or overtone of the transmitter so that the beat note can be heard. without wearing the 'phones. If the note does not change when the " earth " end of the choke is touched the R.F. chokes are really excellent, but if the note changes much the choke is faulty. This latter test can be recommended to QRP stations since poor chokes are, as a rule, very difficult to detect.

Some Experiences, Amusing and Otherwise.

No doubt all transmitters have had some funny experiences. In the hope that others will open up a bit here are a few. First, the otherwise. When you put both hands into the middle of a transmitter make sure you have switched off. Once upon a time, the writer, working in a noisy room, went to change a choke and couldn't hear the generator working. Result, a dead short through both wrists and held there till the filament of a 15-watt valve blew, The family said it sounded like a dog in pain. It certainly felt all that.

Next. In a mad moment and in search of the demise of a spacing-wave it was decided to key the H.T. plus. Result, using a certain form of modulation with the mitre earthed the right knuckle touched the key ; further result, 1,000 volts smack on both hands. Next thing remembered, the dining-room table isn't soft to the small of one's back, and it was eight feet away ! The man at the other end wondered what was up.

There is such a thing as a high frequency burn. On 10 watts it lets you know it. On 70 or 80 it is really hot. Key your aerial or counterpoise and grab the metal of your key by mistake and see. Better still, shift the clips on your inductances and admire the lovely fat spark jumping to your fingers. In America some hams are said to gauge their H.F. current by the burn they get. Don't do it if you use series few unless you have a coffin all ready waiting.

Ever had a tube blow up ? We have had about five of 'em. A 30-watt tube with 1,000 volts, 25ma on it. Thought it was a firework. It went lovely colours and crackled like a squib. It really took some courage to switch the thing off. A sister valve went the same way, only worse, within a week. I heard of one ham though who MELTED the plate of a 250 watter ! Some juice. The prettiest thing I have seen was a 50-watter, run at 75 watts for a month, go on strike and give up the ghost.

Apart from the fact that five of the best went west in five seconds it was really funny. The rainbow only has a few colours, but that valve brought the ultra-violet and ultra-red into the spectrum and then some. Anyway it made us shield our faces while we switched off. There wasn't time to toss for who should do it, so we both did the same thing, took cover and grabbed the switch.

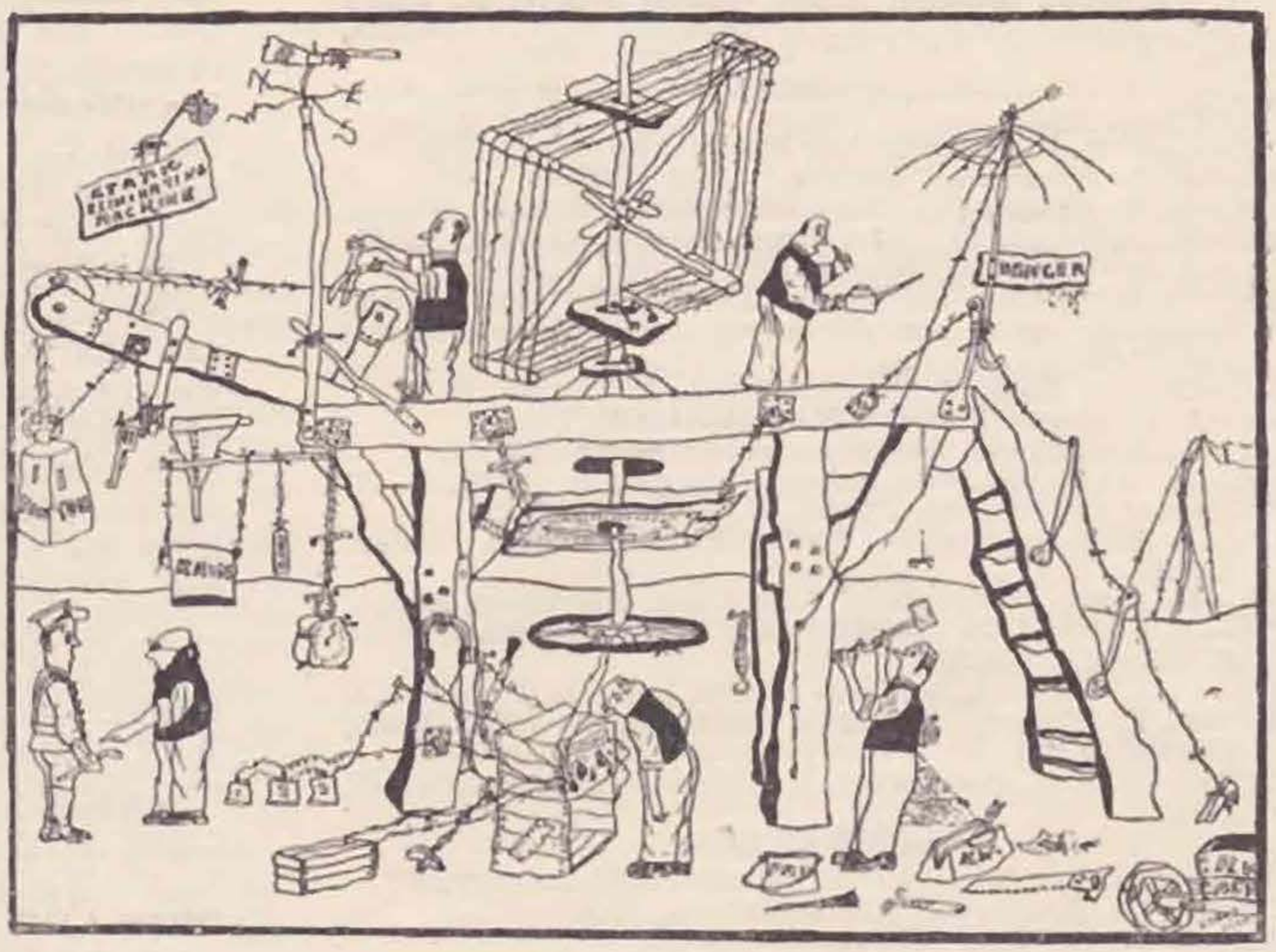
Ever had your mast come down in the middle of a pretty bit of DX ? It's a grand feeling ! Just been called by an A, and the mast at the house end broke and mixed up a big four-wire flat top with a seven-wire counterpoise. There was a gale blowing and that same gust took down five trees on the main road and blew a man off his bicycle in the village street. That's an absolute fact.

Now for the other side. I think the palm, bun or cocoanut must go to a Continental station. Picture my salad days, 180 metres, I think, with a Welsh address of 15 letters, only three vowels in it, and two of 'em diphthongs. One solid hour trying to drive it in. Result, impatience, nearly temper, desperation and the following : " Sa OM I cannot help the name of the beastly place." Reply : " I do not understand English swear words. VA." Well, who wouldn't laugh ?

An Australian calls you. You give him " OK but QRN and QAM vy by BZ. PSE QSZ," and the fathead gives you a 500-word commercial message that was in the papers the evening before. Half of it absolutely jammed out. What's the great idea ?

Next please. A Continental station jamming on 34 λ and spreading badly with raw A.C., knocks you off a Z and says : " You are QRMing someone or other, please QSY." You tell him (instead of getting ratty), you are .2 off your wave, give him wait and QSY .2 of 1 metre. Then " Sai OM. You are jamming Q and A badly, using raw A.C. and spreading badly." He comes back : " You are a very gentleman, tks, etc. Will QSY." He does so for two mins. and then comes back and jams again. What can one do ? In a fit of mental aberration or what you like to call it, one fetches out the old set and goes up to 440 (not 300 not 500, but 440 ± 5 !). One Sunday morning for the sake of old times, idle curiosity or devilment. I don't know which. Hence the following, on fone, of course (a key isn't much use on 440 it seems. Hi !) Distance about 25-30 miles as the fly crows or the flea cries to its young. After half an hour of listening to a tortured gramophone which ought to have been drowned in the ark (or at birth, if possible), and having given the necessary reports, (sugared, usually), with great restraint. Preamble as usual, *ad lib.* and sundry " Hellos." " Well, OM, your fone is very good. What is your power and how are you modulating ? It's excellent. Over, etc." My reply : " Ten watts from M.L. Where are you and what are you using," He : " My address is so-and-so (which I knew) ; am not sure of my input, using choke control, etc., etc." My reply : " Using absorption control ; easiest I know of and first time on 440 for twelve months. Ten watts input fm ML," and the worthy man comes back : " You know that modulation is no good for any distance ; take my advice and use choker control or you won't get outside your own COUNTY ! ! ! " Give me a reviver, someone. In the last 16 hours we had been QSO North and South America, Australasia and French Congo, 75 watts, I grant you, but what does that man call " any distance," and has he altered a thing since I heard him first about 3½ years ago ? And has he still got the same old records ? It sounds like it.

Still, I suppose he's happy. He doesn't have to drag out of bed at an ungodly hour for the fascination of finding out why Z's and A's come in when Yanks won't, and *vice versa*. He doesn't worry why Heaviside invented a layer, or why some nights 44.5 goes over where 45.5 won't. He doesn't get jammed out by commercials and he certainly doesn't suffer from Continental raw A.C. amateurs. He has the enormous satisfaction of telling his pals not to osculate ; so let's leave him to it.



Direction Finding at the Radio Research Board.

Q.R.A. Section.

As this is the last issue before Christmas, I would like to take this opportunity of thanking all those amateurs who have so very kindly supplied me with information for publication in this Section during the year, and to wish one and all a Very Happy Christmas, and an F.B. DX New Year.

I have received a communication from Japan to the effect that amateurs in the land of "Rising Sun and Cherry Blossoms" are at last being licensed, and the calls allotted are JXAX, JXBX, JXCX, etc. Japanese amateurs all belong to J.A.R.L. (Japana Amatora Radio, Ligo), and communications for members of this Society can be sent to Shigeo Shima, member of the Executive Committee, J.A.R.L., 45, Yakanawa Minamicho, Shibaku, Tokio, Japan.

F. J. Barnett, A.M.I.E.E., A.M.I.R.S.E., ex AM-VS2AC, is now in England. He says he would very much like to hear from experimenters in short-wave work, especially from those amateurs who claim exceptional DX with one-figure watts. His temporary address is c/o 13, Park Road, Blackpool.

L. J. Hughes, the Radio Correspondent for "The Times," of East Africa, writes to know if British amateurs have heard VPQ or FK-3MS, usually testing nightly between 18.30 and 19.00 G.M.T. on 37, 34 or 28 metres. If so, will they please forward details to Box 318, Nairobi, British East Africa. He also states that "The Times of East Africa" will willingly forward QSL cards to FK amateurs where QRA's are unknown.

At the time of writing these notes, I hear that, through unavoidable circumstances, there may be a little delay in the publication of the R.S.G.B. Call Book for 1928. I can assure members that the lists are very full and up to date this time, and I trust that they will be found worth waiting for until the New Year.

Q.R.A.'s Found.

BVJ.—Lieut. E. T. Warner, R.N., R.N. College, Dartmouth.
EB-4QQ.—Alex. Berqueman, 17, Rue Fontainas, Brussels (**not** Saint-Hilles, as previously given).
EG-AXA.—Army Wireless Station, Catterick Camp, Yorks.
FE-A1ES.—Corpl. E. W. Corbett, No. 1 Wireless Company, Polygon, Cairo, Egypt.
FE-A1WT.—Sergt. N. A. Norcross, No. 1 Wireless Company, Polygon, Cairo, Egypt.
EJ-7XO.—L. Lederer, Gunduliceva 3, Zagreb, Yugo-Slavia. (QSL under cover. Inf G6YL.)

G.

2AXA.—I. A. G. Cole, 174, Broomwood Road, Clapham Common, S.W.
2AZI.—B. W. S. Challans, 1, Baltic House, Balham Hill, S.W.12.
2BCM.—A. L. Clare, 13, Macmillan Street, Rochdale, Lancs.
2BRI.—D. D. Marshall, 41, Kelvinside Gardens, Glasgow (Inf GC-5YG).
2BUW.—W. C. Roe, "Minydon," Ridgway Road, Farnham, Surrey.
2BXC.—Battersea Grammar School Wireless Society, St. John's Hill, Clapham Junction, S.W.11. (Hon. Sec., B. W. S. Challans, 2AZI.)
2BG.—G. R. Silverthorne, 4, Kimberley Road, Six Bells, Abertillery, Mon.
5CB.—Capt. K. E. Hartridge, 52, Westbourne Terrace, W.2.
5BR.—G. L. Brownson, "Bryning," Hale, Cheshire.
5HN.—R. S. Holden, 115, Glenwood Street, Belfast, N. Ireland.
6BB.—H. Brabrook, 31, Court Lane, Dulwich, London, S.E.21.
6GC.—J. G. Carlson, 28, Johnson Street, South Shields.
6HK.—J. H. Harker, 31, Ruskin Avenue, St. Giles, Lincoln. (Trausmits on 23 and 45 metres, and welcomes reports.) (Inf G6AH.)
6JY.—C. J. H. Joyce, 9, Campbell Street, Paddington, W.2.
6LI.—A. E. Livesey, Stourton Hall, Horncastle, Lincs.
6LR.—L. A. C. Lawler, 67, Lucien Road, London, S.W.17.
6LT.—Portable transmitter for car, belonging to G6QB, L. H. Thomas, 33, Harpenden Road, W. Norwood, S.E.27.
6OQ.—A. H. Broomfield, 54, Harbut Road, Battersea, London, S.W.11.
6PF.—L. Parfitt, "Waverley," King Street, Abertillery, Mon.
6QJ.—H. J. Humphries, Garrick House, 7, Elmwood Road, Herne Hill, London, S.E.24.
6UN.—A. E. Watts, 58, Woodside Avenue, Highgate, London, N.6.
6YF.—C. P. Allinson, 38, Barrow Hill Road, St. John's Wood, London, N.W.8.
GW-19C.—C. R. S. Pennefather, 3, Adelaide Terrace, Summerhill, Cork.

CHANGE OF QRA.

2APW.—Now The School House, Moreton, near Oswestry.
5CB now 52, Westbourne Terrace, London, W.2.
6AU now Nether House, Ranmoor, Sheffield.
SMYU now Welin, Horndal, Sweden. (Inf G6BB.)

CHANGE OF CALL SIGN.

2AWK now G6QJ.
2BPI now G5GR.
BRS12 now G6UN.
BRS35 now G6BB.

CALL SIGNS RELINQUISHED.

2WC by H. Bannister, but 2WB still retained.
5BR by R. H. Smithies.
6GC by H. H. Burbury.
6PA by Lieut. H. O. Pargeter.
2BZT by G. G. Livesey.

QRA's WANTED.

TMBA, S-4TOI.

G6BT,
82, York Road,
Bury, Suffolk.

Patents, Royalties, and Licences.

(*Concluded from p.* 16, *November issue.*)

Further points for consideration and determination between the licensee and the licensor are the questions of prosecuting or defending any infringement actions or proceedings for the revocation of the patent.

In the case of the grant of a licence in respect of a patent owned by two or more persons, it is necessary for each co-owner of the patent to be a party to the licence, otherwise the licensee may be successfully sued for infringement by the co-owners who were not parties to the licence, as in the case of Whitehead & Poole, Ltd. *v.* Sir James Farmer & Sons, Ltd.

A licence to manufacture or use a patented invention is required by the Patents and Designs Acts (Section 71) to be registered, otherwise it will not be admitted in evidence in any Court, unless the Court otherwise directs.

Recruiting Month.

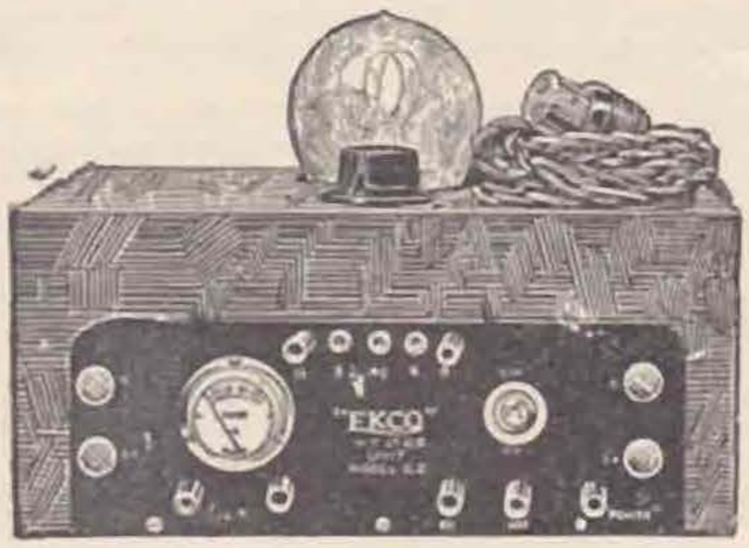
With this issue of the BULLETIN we present to each member a copy of our handbook entitled "What is Amateur Radio." Our reason for this is twofold. First, we would like you to read the book yourself so as to make yourself familiar with our aims, objects and activities, after which we would ask you to pass this to a friend interested in radio, with the request that he should also read it and consider becoming a member of the Society. Do all you can to secure for us at least one new member during the next month and we shall be more than grateful.

It is hoped that this idea will meet with a ready response. Remember that every single member can help us and the movement in this, and that we are now asking you to do that long promised little bit for the Society. If we can get one from each member, then we shall be in a very strong position, but do not commit the usual fault of leaving it to the other man to get the new member. We can do with every member you can introduce. It is the only way to enlarge your magazine and secure a strong position for the amateur in British Radio. May we rely upon you to do your bit? We think so. Thank you.

MAKE THIS RECRUITING MONTH A SUCCESS AND REMEMBER THAT AT CHRISTMAS YOU WILL BE IN TOUCH WITH PEOPLE WHO ARE MOST LIKELY TO JOIN US IF YOU APPROACH THEM.

Trade Notes.

We have received from the manufacturers of "EKCO" products particulars of their excellent high-tension units and units in which are embodied devices for the obtaining of L.T. and H.T. current from the mains supply.



The instruments are of a fine grade of workmanship, and are nicely finished. Model M1 for D.C. mains is a neat and compact model, and is in the form of an enlarged adapter to plug into the electric light fitting, the dimensions being 3″×2″ approximately. The electrical characteristics are such as to be suitable for one- to three-valve sets.

Model C2 provides 60-120 volts for H.T. supply, and L.T. current for 3-, 4- or 5·1-valve filaments, and grid bias at 1·5, 3, 5½, 6 and 9 volts respectively. It is contained in a nicely finished metal case, the size being 10″×7″×4″, and is complete with milliammeter.

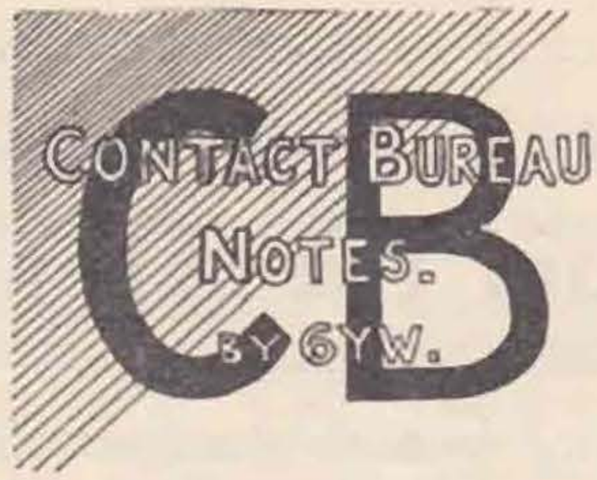
Messrs. Mullard Radio Company have placed on the market a fine example of workmanship and design in their new low frequency resistance capacity coupling unit.

On test the unit gave a good straight amplification curve with absence of "background" and frequency doubling. This latter appears due to a special filter embodied in the unit to keep the high frequency component away from the low frequency amplifier. The unit sells at 17s. 6d., and is designed for speedy mounting and connecting, the various components being dust and weather proof.

Book Reviews.

"RADIO FOR THE MILLION" has reached us and we are thoroughly interested in this journal which should be a great impetus to the valve selling business so far as Mullard Valves are concerned. It is published free of charge but is honestly worth a shilling a copy to the recipient.

"PIONEERS OF WIRELESS," by Ellison Hawks, F.R.A.S. (Methuen & Co., Ltd., price 12s. 6d.), has proved very fascinating reading. Mr. Hawks has taken us back to 100 years B.C. in order to start us on the story of the evolution of wireless and the whole book is so brimful of readable anecdotes that we have no hesitation in saying that it will prove to be one of the most popular of historical surveys that the electrical industry has ever known. Further than that it is readable by the non-technician who cannot fail to learn much from its pages. The modern amateur pioneer will do well to read it in order to realise the vast amount of work that has led up to the efficient apparatus which he is now able to use in his peregrinations in the ether.



There has not been sufficient time since the publication of the November issue and the writing of these notes to judge whether there is a widespread demand for this service, but already the following stations have sent details for indexing at the Bureau:—GI6TB, GI6MU, GI2CN, GI6JA, GI2WK, GI6HI, GI6QD, GI2BB, G6UO and G2YU. Most of these are members who received details of "CB" from me personally before the November issue was published.

I intend to publish a list of the new adherents each month, and I hope that members will accept the publication of their call-signs in lieu of a personal reply, as this Bureau is run in a few spare moments of a busy day.

I also intend to publish the titles of a few problems from time to time, and ask for volunteers to do work on them.

The indexing of problems is done by a modified decimal index system which permits information to be obtained rapidly.

I suggest that the tone system of reports on QSB should be more used by British amateurs, as it is much neater and quicker than the usual "ur sigs dc wid hum slite QSSS" sort of thing. Here it is:—

T1=AC raw 25 and 50 cycles.
T2=Musical AC.
T3=100 cycles AC, and non-filtered AC.
T4=Badly filtered RAC.
T5=Almost DC, well filtered, but unstable note.
T6=Almost DC, well filtered, but stable note.
T7=Pure DC, but unstable note.
T8=Pure DC, stable note, but not similar to T9.
T9=Crystal controlled DC.

For telephony, EAR1 suggests in *Journal des* 8, the following:—

F1=Carrier wave unmodulated
F2=Very rough.
F3=Some words, now and then.
F4=Difficult to understand.
F5=Not clear, bad modulation.
F6=Modulation fairly good.
F7=Modulation good.
F8=Modulation very good.
F9=Modulation perfect.

I think these are worth a serious trial.

I have now got assurances from GI5MO, GW17C, G2YU, G5TD, G2FB and GI6TB that they will not work *any* raw AC, while G5YX and G6TR exempt certain sharply-tuned AC stations.

All communications to this Bureau which require an answer by post must be accompanied by a stamped envelope.

Here is the address again:—59, Marlborough Park North, Belfast, Northern Ireland.

Notes and News from the Areas.

Special Notice to Area Managers and Others.

In accordance with the unanimous decision of the Second Annual Convention of the Radio Society of Great Britain, held September 30—October 1, 1927, the following is the procedure to be followed in future when reporting for these columns :—

Each report furnished by a member will be written on one sheet of paper and shall consist of : (1) The call sign of the station reporting ; (2) the programme of the station as regards lines of experiment and objects ; (3) results of recent work. Special note : The total number of words is not to exceed 27 for each member, and such details as number of QSO's will no longer be published.

The object of the Notes is to keep in touch with one another members who are mutually interested in certain aspects of the work.

Those Area Managers who do not possess a typewriter are requested to write *clearly*.

London Area.

By G. A. Exeter (6YK).

The new style of reporting seems to have disheartened some of the members, as reports this month are very scarce.

I should like to point out that quite a lot of information can be imparted on even 25 words, and as we want space in the " Bull " for articles that are of interest to us all, we must try and keep within bounds. Please do your utmost to report regularly and let us know just what you are doing.

By the time these words are in print we shall have had our third area gathering, and I hope it will be as successful as the previous ones have been.

No Northern Division reports are to hand, and I have just received information that friend Clarricoats is in Barrow-in-Furness on business, which, doubtless, accounts for their absence.

Eastern Division.

By 6LB.

6LB is busy with his Zeppelin feed Hertz aerial tests.

He is carrying out tests regarding aerial coupling and QSS preparatory to QSYing to 23 metres. In the reception line he has heard Australian stations 2ME and 2FC in daylight on the valve.

6UT has now got his Hertz aerial to function on 23 metres, and asks for reports on his sigs. on this wave-length. He recently enjoyed a visit to 2NU.

6LL finds his 8 metre toy very fascinating. He has not yet QSO'd on this wave-length, beyond schedules with 6TA, but hopes to do so when a few more stations climb down there. (A chance for some of the fone merchants.—6LB.)

2BXM reports a blank month. We regret to hear that 2VS has had a long illness, but are glad to hear that he is getting well again. All East London stations wish him a very speedy recovery

Southern Division.

By 6PG.

2AI has been using 1½ watts on 45 metres C.W. and 150-200 metres 'phone, grid control. His best result on 150 was 5OY, of Chelmsford, who gave R3. Power at present is from D.B.'s, but he is hoping shortly to instal a mangle.

6BB has been trying to find an aerial which will skip into NU, but without luck so far. He wants reports from G stations after dark—usual hours 23.30 onwards on Saturdays and 23.00 Mondays and Wednesdays. Best QSO's for month : FM8JO (R2-3), FM8RIT (R8-9) and NI2SH (R4), using 6 watts R.A.C.

5BQ has been rebuilding from L. C. Hartley to T.P.T.G., and has also been testing with aerials on 45 metres. A third harmonic one gives the best consistent results. He is still waiting for a playmate or two on 90 metres.

2NH reports that conditions on 20 metre band have been very bad, so he went back to 45 metres for a bit. Best QSO's for the month were : 1OZ and 8 NU's. A schedule is being kept on 90 metres with 6QT. Input generally about 40 watts.

6QB has been using two different aerial systems and finds the shorter gives a smaller " skip " than the longer. Both give the same strength in Morocco, but nowhere else. Although reception has been very good he finds it quite impossible to raise NU with either aerial.

2CB reports best results for month as being : EU (R5), EA (R7), FM (R7), these being new countries ; also Faroe Isles (R7), using 5 watts from mangle.

2WR has been experimenting with a 46 foot aerial and 22 foot indoor counterpoise very loosely coupled to T.P. T.G., and has also been trying to obtain a good note from a mangle. Results generally have been good.

2BWR has built the T.P. T.G. receiver described in the " Bull " for February, 1927, and reports that this works well on a short indoor aerial and counterpoise. He thinks it is improved by omitting the grid leak. He is now studying the code, as he does not wish to remain three letters. He has also introduced a new member. F.B., OM !

2HP now has the A.C. mains in and will be on the air shortly. He would welcome information on rectification, as his " Chemmy recs " refuse to form or are a long time about it. Reports will be appreciated, particularly giving QSB, etc. He will be on 45 metres and on 90 metres on Sunday mornings.

6NK had a week-end visit from ED7MT, when the transmitter was altered to a Hartley with apparently good results, EU11RA (Siberia) being worked on 4 watts. A schedule is being kept with GI2CN with a view to studying skip effects. Tests are also being made with a chemical rectifier.

6PG has been trying various circuits and has come to rest on a T.P.T.G. Tests are now being made on various forms of aerial systems with a view to applying the principles of the best to a new underground aerial to be made next spring. Reports from any distance will be welcomed. Waves : 23, 45 and 90 metres. Times : Week-days, after 23.00 ; Sundays, after 08.00.

Reports are scarce this month, possibly owing to the new regulations, probably because the rest of the gang are either hibernating or dead. Please note that reports may now be sent on or before the 15th of the month. Jump to it, OM's

Western Division.

By 6YK.

6HU is rebuilding for C.C. and wants reports. Has had an R6 report from Lithuania with 2.5 watts T.P.T.G.

6YK has been off the air getting an 8 metre set and C.C. working.

2MS has worked a few Yanks, getting quite good reports.

Northern Division.

By 6CL.

Reports are sparse this month, for some unknown reason. Why ? Come on, you fellows—you are allowed 27 words to tell your tale. See to it before December 15.

Star station is 6PP. Using 180 accumulators (max. 4.3 watts) has been QSO FM, EP, EU, EJ and EE for first time. Congrats to QRP from QRP !

5GQ has had domestic QRM, but will be QRV in December.

6UN is in the midst of it ! He is starting on 45 metres with a Hartley. Experiments with V.F.H. are being made.

6PN, using C.C. 45 T, had a good month, EP, EA, EE, EJ being added to countries QSO'd.

His " pet " crystal has fractured so R.A.C. comes back for a while.

2YQ is busy at 5SW, but has sent in a useful list of short wave QRH's.

2AXL has been unlucky with his efforts to get a radiating licence. He has rebuilt his R.X. and built F8PY Mesny. He is still experimenting with four electrode valves.

5CD is now in the area and has done a little work on 150-200.

2AX had a good month. He has tried fone on 45, using 5-8 watts, and had excellent reports.

Reports are wanted from distance stations. QRV all mornings from 07.00 to 08.00 G.M.T. No reports from the high-power gang, but presume their reporting days are past. The Tottenham gang also seem to have gone out of business.

6CL had several interesting QSO's with Eric Hogg in Iceland (NI2SH). A battery of 200 volts Hellesin cells have been installed, and it is hoped good reports will be received. Rebuilding going on.

Southern Europe cannot be worked from 6CL. Why ?

Visits : 5BD, 5IV, 6YK, 6NK, BRS13 to 6CL, 6CL to 6QB, 2AX and 6PP.

Northern Notes.

Area Manager: S. R. WRIGHT (2 DR).

Where have you all got to this month? Particularly Yorkshire and Lancashire. It would appear that there is some doubt as to how to turn in the reports in the new form. You would see from last month's BULLETIN the method, so let us see a good showing next month, please.

Conditions this month have been very erratic, but there have been some excellent DX nights. One Saturday, November 5, was certainly the best according to reports. NU's were all R8 to 9, and 2XAF was making the loud speaker chatter on a couple of valves. It is not often one hears NU's jamming each other, but the noise on 40 metres that night was a positive chatter.

Yorkshire.

(Reports to 2DR by the 14th.)

5SZ is continuing aerial experiments and having some rather peculiar results. Perhaps some dope for the BULLETIN will result.

5US is still rebuilding, having changed his QRA. Have you notified H.Q. of this, OM? He expects to be busy before these notes are in print.

6XL is still QRT, but the transmitter has been rebuilt, and a transformer is awaited.

2DR has been QRT owing to heavy pressure of business. A grid meter oscillator is being constructed with a view to some aerial experiments in conjunction with 5SZ, and gear for fading experiments is nearly complete.

6OO is at present trying out a Mesny circuit, using an input of 20 watts, with the object of comparing it with various Hartley circuits. Has done good tests with 1st, 2nd and 3rd district NU's with 8 watts on a Hartley. QRP set is being rebuilt for 23 metres.

6WD is experimenting with a chemical rectifier, and is testing on a ½ wave Hertz with an input of 1½ watts to a P.M.2.

6DR, on 45 metres, is doing good work with America on 10 watts; 23 metres will shortly be tried here. Someone is using 6DR's call or one so similar that it is being mistaken for 6DR.

2YU is trying experiments on 23 metres, and is finding difficulties in finding people to work with. One NC has been worked on this wave.

Will any hams who are interested in holding a hampest please write to 6WD, G. A. Woods, Castle Bey, East Parade, Harrogate?

Lancashire and Isle of Man.

(Reports to 5XY by the 12th.)

2QV states he is also busy with aerial experiments, and it would appear that this subject is receiving the attention of many experimenters.

For some unaccountable reason, 5XY has not sent in any reports this month, so Lancashire is missing this month, 2QV's report reaching me direct.

Notts, Derby amd Lincs.

(Reports to 6MN by the 12th.)

BRS97 reports very little doing on the 20-metre band this month.

2ABA has been trying absorption keying methods. Lost his 40-ft. mast in the great gale, but logged OA3ES on the lead-in wire.

2ADC.—Nothing to report.

6AH is carrying out low power tests with about half a watt, and is also working nightfall tests with 5KU, GI-6WG and 2BI.

6MN is still trying out the Zepp. type Hertz aerial, and has rebuilt the transmitter to a tuned plate and grid circuit.

6UO has had trouble with AC reports using pure DC input and finally traced the trouble to a faulty condenser. A half-wave Hertz voltage-fed tapped direct to the grid coil is being tried out.

BRS34 reports better conditions towards the end of the month. You seem to have an interesting receiver. What about a diagram and a few words for the BULLETIN, OM?

BRS45 also found conditions better at the month end. Has altered receiver to get down to 12 metres.

BRS103 has nothing to report.

5QT is away at Varsity, so is QRT pro tem.

The following failed to report:—2IX, 2VQ, 5BD, 5DM, 5KW, 5OD, 5SP, BRS4, BRS108, 2BPA.

A "Hampest" is being held in this sub-area on November 26.

Cheshire and N. Wales.

(Reports to 6TW by the 12th.)

2SO having completed some months of tests on the current-fed Hertz, as against the voltage-fed type, is now tabulating the results. More dope for the BULLETIN. He is glad to work schedules with any ham.

BRS98 has little to report, having been QRW business.

6TW has carried out various tests on 45 metres and is experimenting with leakage of variable and fixed condensers at certain temperatures.

5PO is working under difficulties with a QRP set in "digs," and finds results none too easy to obtain.

Northumberland, Durham, Cumberland and Westmorland.

(Reports to 2AIZ by the 12th).

6GC (ex-BRS44) is experimenting on the angle of propagation of the ultra-short waves. He is at present working on 8 metres.

6QT is working with 6GC on 8-metre transmission and reception. Some 23-metre work is also being done here.

6YV has nothing to report.

There is a dearth of reports in this sub-area this month and also in the Cheshire sub-area. Revert to the following up, sub-area managers and worry them for reports.

Irish Free State Notes.

By 11B.

Very few stations have reported this month, and, as these had not apparently seen the recent decision as regards the subject matter of Area Notes, I have had to make the necessary extracts from the reports as received. In future it will be understood that any stations not mentioned have failed to report.

12B and 13B have nothing special to report, having been busy with the work of the W.S.I. Temporarily off 23 metres and working 45 metres only from 12B.

14B is transmitting on 45 metres, using a small indoor aerial, and would welcome reports on his sigs.

18B is working chiefly on 23 metres, using tuned plate tuned-grid circuit and getting good reports from NU.

14C has built a C.C. transmitter, but is not yet satisfied with results. He would be glad of reports from stations hearing him.

17C is getting excellent DX on 23 metres, with 5 to 9 watts. Would like DX reports on his 45 metre sigs.

11B is still concentrating on obtaining data for skip distance. Would welcome detailed reports from stations under 1,000 miles distant on his sigs. between 20.00 and 24.00 G.M.T.

We have to welcome a new G.W. station, call sign 12D. His QRA is S. Bourke, 11, Eglinton Road, Bray, Co. Wicklow.

Northern Ireland Area Notes.

NOVEMBER, 1927.

5NJ is carrying out crystal control tests on 32 metre band, also occasional 'phone tests on 45 metres.

6YW has put up a new C.F. aerial with greatly improved results EU08 was worked with old aerial (2 feet high at free end), and signals have been reported in Iceland with new one.

2AFD is now 5HN; 10 watts, C.W. and 'phone, 23, 45, 90 metres. Present input 2 watts. New aerial to be erected shortly; reports welcome.

2IT has been on 23 metres and found conditions not good outside QSO's with NU 1, 2, 3 and 8 districts and South Africa. Tests with half and full wave V.F. Hertz's indicate half wave better.

5WD has got going again on QRP after summer QRT; power transformer under construction.

5HY has nothing to report; QRW rebuilding.

6MG has made a good start on 45 and 90 metres.

6MK.—No special tests, but Egypt worked on 10 watts.

5MO.—About to start on rectified A.C., and will be glad to receive any dope on chemical rectifiers.

6TB.—Too QRW for transmission tests; receiver rebuilt and reception much improved.

6HI.—Tests on effect of weather on skip distance on 45 metres; reports wanted from any distance over 100 miles.

2BB.—Tests on aerial coupling; finds strength and note improved with loose coupling.

2CN.—Tests with V.F. and C.F. aerials on low power; has succeeded in getting steady note from hand generator and finds European conditions improved lately.

6QD has started again after long QRT.

6WG.—Consistent low power work with hand generator; several more Americans worked.

6MU.—Occasional aerial and other tests on QRP and QRO; new motor just installed. WNP worked at 1900 A.M.T. on 32 metres, with five watts at 60-70 per cent. efficiency.

Scottish Area Notes.

Area Manager: 5YG.

Contrary to expectations, October proved to be a very poor month, at least as far as Scotland is concerned, and judging by reports received, conditions have been very "patchy." Total "fade-outs" at unusual times have been fairly prevalent, and the writer had the unique experience one particular Sunday of failing to log signals from a single British station between the hours of 06.00 and 23.00 G.M.T. (This has since been confirmed by other observers.)

I much regret to intimate that owing to serious illness and a pending operation, 6KO will be silent for some considerable time. "Joe" suffers badly from an old shrapnel wound, and this it is which has rendered him temporarily hors-de-combat. I shall look after No. 3 District myself pending his recovery, during which period all correspondence and reports should be forwarded to me at Glasgow.

I have to acknowledge visits from 2VX and 2BRI (a new member).

No. 1 District (by 2WL).

2FV.—After struggling unsuccessfully with a fundamental aerial, it has been abandoned, and in November an aerial operated on one of its harmonics will be used.

2WL.—QRT at present, QRW business.

5XQ.—Very little done in October owing to holiday, etc., QRM transmitter and receiver are both to be rebuilt in November prior to making use of 23 metres.

5ST.—Still located in London without transmitting gear. Can recommend a cheap and good A.C. charger to anyone interested.

5YG.—In October efforts were made to overcome effects of fluctuation of aerial load with a fair amount of success (thanks to 6JV). Hertz and Zepp aerials will be investigated in November and December.

6NX.—Experimenting with various types of transmitter coils. Has got across to Labrador for the first time since changing his aerial system six months ago.

6WL.—On 23 metres minimum distance QSO Denmark, maximum NU 9th District. Both R3 with 10 watts input. Programme immediate future: (1) Relation of barometric depressions to DX; (2) distribution of signals from a horizontal aerial on 23 and 45 metres. "G" reports desired relative to 23-metre transmissions.

No. 2 District (by 6IZ).

2AP.—Results mostly negative; few QSO's, but bothered with QRM. Next month will be devoted to rebuilding receiver with a view to cutting out local QRM (GKR about 200 yards away).

6IZ.—Business QRM in October. Expects to resume in November.

2BQK.—Had pleasure of visiting 6CX, 5JA, 6TY and 2XY while in Leeds, also some DX from 2XY's station.

No. 3 District (by 5YG pro tem).

2SR has been carrying out tests on 23 metres, but complains of difficulty in obtaining reports on this band. Tests will be continued during November.

6KO.—Laid aside by illness, and not likely to resume prior to January, 1928. (Very sorry, OM, and wish you "all the best" for a speedy recovery.—5YG.)

BRS71.—Nothing done during October, but concentrating on S/W telephony reception in November.

No. 4 District (by 2TF).

2TF finds all his spare time taken up at present with training AAIF ops. in respect of instructional exercises.

2BFQ.—QRW Varsity in October. During November wlll be experimenting with aerial insulators (resistance and breakdown voltage—wet and dry).

South-West Area Notes.

Area Manager: G. Courtenay Price (2OP).

I am anxious to meet all the members of this area, and suggest that we hold a dinner or supper at some fairly central spot such as Bristol, Bath, Taunton or Exeter. As this notice will not be in your hands until the middle of December, I am afraid that it cannot be arranged before January or February, but I should be glad to hear from all those who support the idea, and at the same time please let me know what your views are on a Conventionette at Easter or Whitsun. You will appreciate that before I can make any further announcement I must have a certain number of names who will do their best to attend. At the same time (which should be as soon as possible) please let me know which place is most convenient and on what date and time.

There was only one report last month, hence the absence of Area Notes. Stations in this area seem quiet, and I hear little activity.

2GW is now at new QRA and is busy on aerials.

5FS is crystal-controlled on the usual waves and hopes to be on 8 metres ere long.

5MU is installing 300 volts H.T. accumulators.

5PH.—Yes, I am delighted to accept reports from S. Wales, and shall probably be visiting Tenby next summer when I will endeavour to pay some calls.

6JK, now winter has arrived, has given up road DX, and by this time will be in full swing again. Reports visits to 5MU and GC6WL.

6UG.—No report this month. Last heard of, "Not going well."

Lastly, I hope you will all have a jolly Christmas, and I wish you all good wishes for the New Year.

6WI HAS HIS OUTFIT IN A BATHROOM! THUS COMBINING DX WITH CLEANLINESS HI!

Midland Notes.

Area Manager: H. J. B. Hampson (6JV).

This month is the first of the new style reporting. May I ask sub-area managers to help me by seeing that their reports are made in accordance with the details on page 19 of November Bulletin?

The first number of the Wolverhampton Society's monthly paper, "Q.R.W.," made its appearance upon November 1, and is a very readable effort. Midlanders will, I hope, appreciate the opportunity which this little paper provides of catering for the "social side" of our activities, and the Editor will be glad of any items of interest for the "Midland Notes and News" page. Please send your notes to 5UW until further notice. "Q.R.W." will be posted each month to any Midland area member who forwards his annual subscription of 5s. I should like to make it quite clear that "Q.R.W." is complemental to the Bulletin and is in no sense a competitor. With the development of the T. & R., and consequent increase in the numbers reporting in each area, it became necessary to limit the reporting as specified in the October Bulletin. This unavoidably curtails the space available for items of personal and social interest which has gone so far towards consolidating our Midland area, and for this reason could only be a matter for regret if it were not for the fact that "Q.R.W." has come into existence for the purpose of providing this very means of social and personal exchange of ideas which we should otherwise lose. It is for this reason, then, that I commend to Midland members the possibility of making the new paper a real success, by supporting the praiseworthy enterprise of those who have seen and provided for the need.

Shropshire (reports to 5SI).

5SI has turned his attention to 5-metre work and will continue his experiments. He has heard no signals on this wave yet.

Leicestershire (reports to 6WW).

6WW has been working at power amplification (M.O.P.A.) and is testing a novelty of his own with which he will continue to experiment.

Northampton (reports to 6TR).

2CH.—Oundle School will welcome reports on 'phone transmissions on 45 metres, particularly on December 18 next.

Cambridgeshire (reports to 2XV).

5YX intends experimenting with directional aerials and desires experiences, views and ideas of others interested in same problem. Tests will be on 23 metres (also 32 metres if permitted).

5YK is conduct ng series of tests with Master oscillator circuit, of which we may hear details later.

2DB is testing keying methods with 10 watts.

5JO is working at telephony transmission.

6CR is testing valves.

2XV is dismantled. When re-erected DX tests will be made on 23 metres and 32 metres and 50/100 watts, continuously reliable. DX being the objective.

Huntingdon (reports to 2XV).

2BAX will shortly receive his radiating permit and will experiment with "trans-ceivers." He desires co-operation.

Warwickshire (reports to 5GR).

5ML is investigating the effects of weather conditions upon 23 metre transmission and has worked NU 1SZ to schedule at 11.00 G.M.T. Many other NU's in evening.

2BCA is comparing bright and dull filament valves for power work and finds that a good note is easier to obtain from the former.

BRS9 reports poor conditions. He will experiment with Reinartz type receiver.

2BKY is experimenting with remote control and automatic control.

5YS is working at the H.F. choke problem.

5GR has been comparing high and low impedance valves together with appropriate grid-leak valves.

Worcestershire (reports to 6AT).

6AT has been investigating the variation in directive effects of aerials of different length.

Norfolk (reports to 6ZJ).

6JV will attempt total absorption of spacing wave. Using same aerial without counterpoise or earth, he has worked NU, NC, etc., on 23, 32 and 45 metres.

Indian Notes.

By Ai2KX.

General.

India, during the winter, is a splendid country for DX work, conditions from October to March are very favourable. During November, European stations become audible on the 30-33 metre band about 15.00 G.M.T., and gradually mprove. Signals on this band reach maximum strength between 18 00 and 23.00 G.M.T., eventually fading out about 01.00 G.M.T. Signals on the 44-46 metre band are not audible until about 19.00 G.M.T., reaching maximum about 22.00 hours, and remain constant until about 01.00. Unfortunately, the 20 metre band is "taboo" to Indian amateurs at present. Signals on this band are quite strong as early as 13.00 hours, but fade out about 23.00 hours.

2KT, who is located in Central India, reports excellent conditions prevailing for DX work with FO and OA, QSO has been made with 40 FO stations in 28 days, with a power not exceeding 60 watts.

(FB Hi!!) He also reports a QSO with FO on 'phone, the first real DX effort for Ai.

2KW is working regularly on 30 metres and has had excellent results. QSO's with FO and OA are the main features of the month, but conditions will soon permit for European QSO's.

7VX, who is now firmly established on the air, is located in Ceylon, and is putting out a good DC signal on the 30-33 metre band.

2KX is now back in Rawalpindi, and working regularly. QSO's for October are OA, OZ, FO, EI, EK, EF, EG, and AC. Regular working hours are week-ends from 1700 to 2300 G.M.T. on 30 metres.

2BG, 2JY, 2KJ, 2CZ, FHD, 2HT are the other active Ai hams, reports please.

Austrian Notes.

Prepared by Th. Mossig (EA-AB).

The Austrian amateurs are still non-licensed. Disregarding this fact the activities on short waves during the month of October were much greater than in any previous times. There are now many stations in continuous contact with all continents, especially good QSO conditions existing now with New Zealand, Brazil, U.S.A., as report the well-known stations, EACM, EAGP, EAKL, EAMM, etc. The receiving conditions are improving every day; there are several real "DX nights" during this month. The favourite wave-band is still 45 metres, probably because this wave is the most reliable for QSO with English amateurs. Their reports are much appreciated for their reliability and promptness (!) The official QSL service (via RW, that is via Radiowelt, Vienna III, Rueden-gasse 11) is growing bigger and bigger, the ten-thousandth card received being presented (with a transmitting valve) to the well-known amateur, EAKL some days ago! Schedules are wanted. English amateurs please write on this subject to "Radiowelt," Vienna.

German Notes.

By EK4CL, 4AFA.

During the last month receiving conditions for British stations in Northern Germany seemed to be rather peculiar; during the month of October and early November there was an absolute "fade-out" of EG's ere after about 2000 G.M.T. Even the farther stations, as GI, GW and GC's, could not be heard at all on most days, as we noticed with sorrow very often the phenomenon of "l'air bouché," or the skip distance might have increased enormously at that time of day. On the other hand, it was quite easy to work all parts of GB during early afternoon. Now, in these last days, the regular propagation seemed to take place again, as many EG's could be heard and worked again even at 2300 G.M.T. on 45 metres.

Amongst German hams there is a big tendency for telephony with C.C. (please use fone only when C.C., OM, and only use the 45 metre band if it is not too overcrowded), German "Mars," "Uhu," and 4YAE being star stations.

4AAL is very interested in ultra-short wave work, and has developed a circuit, which allows to generate also higher energy—up to several kilowatts—on a WL of 3-4 metres.

4UAO was in touch with FOA8N, of Durban, using 220 volts on the plate of a receiving valve, type Telefunken RE 504.

4UAH (WAC member) found DX conditions rather bad last month; anyhow, continues to work the OZ's and Aussie's.

4DBA uses now practically pure D.C. on the plate, rectifying his A.C. by a big kenotron valve.

The "master voice" of G2NM is here unanimously acclaimed as being of first-class quality and strength on 32.5 metres. Sure F.B., OM!

Danish Notes.

By 7MT and 7EW.

7BB is a newcomer. He is using a RE504 valve and has already worked EA, EB, EF, EG, EK, EM, and EN, average QRK R5-6.

7BX worked EG6DR on 22.9 metres with an input of only 0.15 watts. He intends to QSY to 19 metres and try for U.S.A. on 6 watts.

7EW is experimenting with different aerials and counterpoises on 43.5, 32.0 and 21.0 metres. Reports on 32 and 21 metres will be appreciated.

7FP has done some nice QRP work. He had a QSO with XEK4AP, which is an aeroplane. At the time of working 4AP was in the height of 4,000 feet.

7LO has worked NI2SH and Moscow. He is building a high-power transmitter.

7MT has now returned from his trip and is rebuilding the whole station. He will appreciate reports on his 20 and 30 metre signals.

7NI has some good 20 metres work with 25 watts. He is always QRV for 20 metre tests.

7FJ is on board the Danish M.S. "Panama," bound for Australia; call sign XED7FJ.

Dutch Notes.

Prepared by EN♀CX.

As these notes will appear in the "Bull" somewhat against medio December, we will start our monthly story by wishing all our comrades a "Merry Christmas and Happy New Year." Again it has to be noticed that a few of us were paid a visit by the police, but as far as we know no victims have fallen. A matter of fact is that the Postmaster-General still takes a keen interest in our doings. Hi!

EN♀CY passed an exam., and hopes to be on the air soon.

EN♀WM enjoyed a visit paid to him by ED7MT, who spent some days at EN♀PX.

EN♀DG is often heard working nice DX in Europe.

EN♀TH is QRW exams., so is off the air for some time.

EN♀JK.—We suppose this is a newcomer. Was heard once peeping with a nice D.C. note.

EN♀CX has worked some nice DX with about 3 watts input in a few days worked Moscow EN♀GRA, French-Morocco, and also had a fine test with SAD, the naval floating station at Stockholm.

Calls Heard.

A-2BK, A-2CS, A-3KB, A-2SS, A-2SW, A-3OT, A-3QH, A-3ZO, A-4CM, A-5KN, A-5DA, A-6AG, A-7HL, BB2, BJ2, BP7, BU3, B4YZ, BZ-1AC, BZ-1AP, BZ-2AP, BZ-5AK, CH-2ID, CH-9TC, D-7EC, F-8AIX, F-8BF, F-8CA, F-8GF, F-8JN, F-8NN, F-8OZ, F-8CA, F-8CT, F-8PM, F-8ST, F-8SX, F-8YD, F-8YOR, FM-8MB, G-2HJ, G-2OC, G-2FM, G-2FU, G-2KF, G-2NB, G-2NM, G-2OD, G-2QB, G-2 J, G-5AT, G-5DH, G-5GV, G-5HS, G-5KO, G-5LB, G-5LF, G-5LS, G-5MH, G-5MO, G-5PM, G-5VL, G-6AH, G-6AL, G-6KK, G-6RM, G-6TD, G-6YD, H-9AD, HU-6AFF, I-1ER, I-1AS, J-1SK, OA3B, P-ECO, P-3CB, P-3OB, Z-1AD, Z-1AO, Z-1AX, Z-2AC, Z-2GA, Z-3AF. All cards promptly QSLs'. Madeleine C. Cross (Radio C-3OT), Bolton, Ont., Canada.

EG—2sz, 2nt, 2sc, 2yx, 2kt, 2sw, 2ao, 2vq, 5bv, 5ph, 5yx, 5by, 5bw, 6qb, 6oo, 6no, 6vp, 6dr, 8br (Pirate?). EF—8nox, 8jf, 8ssy, 8ll, 8bri, 8sis, 8xo, 8fd. EK—4sf, 4ab, 4uak, 4dk, 4xy, 4dka, 4aba, 4hf, 4aar, 4abi, 4kt, 4uam, 4abv, 4oa, 4vo, 4ck, 4uz, 4dbs, 4aen, 4uac. EI—1ea, 1xm, 1fg, 1fo, 1fc, 1xw, 1bd, 1ux, 1db, 1cn. ED—7ah, 7kx, 7bb. EP—1br, 3am. EN—owr. EA—eakl. EE—car8. EB—4cc, 4bl, 4ck, 4ft, 4cm, 4zz, 5kr. ET—tptz, 1f. EL—la1s, la1x. EI—1aa, 7qq. ES—1co. EU—10ra, 24ra, ra74. AC—8na. AI—2kw, 2cm, 2kt. AS—4ap. FO—a9a, 3sr. FI—4ar. FM—8ags. 8ri, 8ay, 8rit, 8vx. OA—3bq, 7cw, 3jk, 3ab, 3jj. NU—2aic, 2bbx, 2apb, 2cvi. Miscellaneous—ane ('phone), oxz, waj, 6ag, oho, k7w, hig, ir1, fbq, wjt, xom, b82, slo, ogd, rwn, kzet.—Calls heard by AQ1HF, Baghdad, November, 1927. Receiver o.v.2. QRH., 20-50.

EL—la1x. EB—4zz. ES—1co. ET—tpar. XEP—1ma.

EL—la1x. EB—4zz. ES—1co. ET—tpar. XEP—1ma.

VS—1ac. OA—5cm, 5bw, 4as, 5hg. AI—2kx, 2kw, 2kt. NU—1mo, 1xam (25), kzed, kzet.—Calls heard by AQ1LM (Baghdad). Receiver, o.v.1. QRH, 30-40. November 27.

2gf, 2dn, 2rk, 2xv *, 2hk, 2mg, 2qv, 2hu, 2kd, 2ms, 2ay, 2vq, 2cc, 2cu *, 5cv, 5ml, 5jo, 5pd, 5ja, 5up, 5fs, 5tz, 5sz, 5iu, 5cd *, 5wi, 5ad, 5ku, 5td *, 5pm, 5dc, 5mq, 5za, 5kl *, 6xg, 6fd, 6cl *, 6nf *, 6ut, 6pu *, 6ktd, 6hp *, 6cc *, 6rv, 6yd, 6wo *, 6xp, 6at, 6cy *, 6al, 6yk, 6oo, 6pi, 6qp, 6cr, 6wi, 6no, 6ic, 6rc *, 6wk, 6rw, 6rm, c6nx *, c6wl *, i6mu. *QSO with O5RA. The following did not QSL:—2xv, 2cw, 5td, 6nf, 6pw, c6nx.—EG calls heard by EWO5RA (Moscow).

Eacm, eb4ap, eb4cb, eb4ww, eb4yz, ebwi, eb4zz, ec4aar, eecar6, eecar59, ef8af, ef8ba, ef8brn, ef8cf, ef8cl, ef8di, ef8eo, ef8er, ef8ez, ef8fd, ef8fiz, ef8fj, ef8gi, ef8ix, ef8jc, ef8jf, ef8jj, ef8jn, ef8kn, ef8ku, ef8nn, ef8nox, ef8pm, ef8ort, ef8sm, ef8tis, ef8vv, ef8xis, ef8xo, ef8ycc, ef8vor, eg2aai, eg2al, eg2cc, eg2dr, eg2gf, eg2oo, eg2qm, eg2xy, eg2zz, eg5ad, eg5dh, eg5mo, eg5sz, eg5up, eg5vl, eg5xy, eg6am, egi6mu, eg6mu, eg6rw, eg6td, eg6yq, eiiaaa, eiiay, eiiav, eiibd, eiifo, eiino, eiirk, eiixw, ek4aap, ek4abg, ek4abv, ek4dba, ek4dbs, ek4uah, ek4uu, ek4xv, enoia, enoqq, epiaa, eri3e, ew36b, ewh4.—Calls heard by NU2BFQ, H. A. Jansen, 895E., 38th. St, Brooklyn, N.Y., U.S.A.

October, 0-V-1, indoor aerial.—EG—2nm, 2jp; EF—8sm, 8jf; EK—4ap, 4yo; EB—4zz; EI—1no, 1bd; SA—ba1; SB—1aw, 1br, 5ub, 5nni, fp; SC—1ck, 2ar, 3ak.—QSL to Lieut. Rodman (2kt), Jubbulpore, India.

Calls heard by NU8CFL, C. C. Justice, 433, South Seventeenth Street, Columbus, Ohio—August 6 to October 1.—20 metres: EB—4ww; SA—da8; SB—1aa, 1aw; SC—3ag; SU—1cd; NC—1ap, 1co, 1br, 2al, 2be, 4cp, 4dw, 4fv; NM—cvv; NP—4ach, 4kd, 4sa; XNU—wobd, wnp. 40 metres: EB—4ww, 4zz; EF—8ku; EG—6vq; EN—0ja. FL—1ab; FQ—pm; NC—9aj; ND—hik; NE—8ae; NM—1g, 1k, 1aa; NQ—2cf, 2ac, 2ro; NM—9a; NQ—7cx; NR—cto, 2fg; NZ—ez5; OA—5ax; OH—6dv; OO—bam; OZ—2ac, 2al, 2bg; SB—1ab, 6qa; SC—2bl; SE—1fg; SS—2bn; SV—1xc; KF—zq, lf.

Calls heard by EC1RV from September 1 to 30.—G—2jp, 2cc, 2gf, 2cx, 2qv, 2hk, 2vq, 2nm (phone), 5kl, 5wq, 5wl, 6wk, 6hp, 6rb, 5tv, 6no, 6nf, 6br; GC—6ko; GI—6mu; GW—11b.

Calls heard by EC2YD (T. & R.) from August 10 to October 1, 1927.—40 metre band: G—2bi, 2rk, 2ms, 2qv, 2km, 2cb, 5ih, 5jo, 5vu, 5xq, 5sp, 5pm, 5sk, 6wl, 6wi, 6bb, 6tx, 6cl, 6zf, 6no, 6wk, 6nf, 6za, 6pi, 6yz, 6xh, 6xp; GC—6nx, 6ko; GI—6mu; GW—11b.

30-metre band: G—2nm (phone—fb OB; ere N8-9; equal to PCJJ, congrats!). 20-metre band: G—2nh, 2xv, 2rg, 2cs, 2ool, 5by, 5yk, 5xd, 5yx, 5td, 5ml, 6ia, 6yv, 6oo, 6at, 6vp, 6wn, 6bb; GC—6ko; NC—1ad; GLKY, GKE, GKT. Full details on request.

Japanese Amateurs.

Japanese amateurs are now being officially licensed, and new stations assigned are JX—ax, bx, cx, dx, ex, fx, gx. They are all members of "J.A.R.L." ("Japana Amatora, Radio Ligo").

Shigeo Shima, member of the Executive Committee, has been commissioned to send greetings from J.A.R.L. to all members of the R.S.G.B. on the occasion of their being officially recognised at last.

Correspondence.

Instructions to Correspondents.

We are always glad to hear from members. Correspondence published in these columns should be written clearly on one side of the paper and marked "For Publication."

All correspondence should be addressed to the Editor, T. & R. BULLETIN, *who reserves the right to refrain from publishing any material which is lacking in general interest or for other reasons. Correspondence for publication will* not *be acknowledged.*

Correspondence must be kept reasonably brief.

EMPIRE SHORT-WAVE BROADCASTING.

To the Editor of T. & R. BULLETIN.

DEAR SIR,—I am instructed by the Committee of the Ceylon Amateur Radio Society to offer your Society our heartiest congratulations on the success of your efforts so far, in promoting the establishment of Imperial short-wave broadcasting.

We wish you to know that in these efforts you have the whole-hearted support of all amateurs in Ceylon, who are looking forward eagerly to the day when the British Broadcasting Company will have a 24-hour service of short-wave broadcasting to the Empire.

PCJJ (Eindhoven) is heard here regularly at good telephone strength even on a 2-valve short-wave receiver. This station has become part and parcel of the life of short-wave amateurs here, and we feel sure that the same can be said of the short-wave amateurs in other parts of the world. The quality of the transmission is excellent and the regularity of working is a very attractive feature.

For your information, we might say that the Colombo Wireless Station (800 metres) is doing exceedingly well with the small talent that is available here. For a place of this size it is necessary either to transmit a large proportion of gramophone records or else to relay other stations. It will, therefore, be of great importance to us when Imperial broadcasting is established, and we confidently anticipate that the introduction of short-wave broadcasting by the B.B.C. will increase immensely the interest here.

The only other longer wave broadcasting stations regularly heard are Bombay and Calcutta, but these for nine months in the year are subject to the usual tropical atmospherics, making satisfactory reception difficult or impossible. Short-wave broadcasting, however, is remarkably free from such disturbances.

We have every reason to think that the local authorities will be ready heartily to co-operate in relaying short-wave programmes from home immediately such a service is introduced, so that all our local listeners, whether on crystal or valve sets, can enjoy them.

We wish, therefore, to assure you of the unanimous whole-hearted support of the Ceylon Amateur Radio Society which represents the amateur interest in this island, and we trust that success will attend your efforts in the very near future.—Yours faithfully,

L. POUND,
Hon. Secretary,
The Ceylon Amateur Radio Society.

INCREASING DIFFICULTIES.

To the Editor of T. & R. BULLETIN.

DEAR OM,—If you will be good enough to lend me a few inches for the purpose, I should like to make a nuisance of myself on one or two small subjects. I have decided that it is bad for the health to go on gently boiling internally and am therefore getting rid of the grievances in this way.

The following are the things that have been annoying me most, and they have all been on the increase during the last month:—

(1) The man who sports a new key (generally a fancy kind of "bug" or "sideswiper"), and puts it on the air about three weeks before he has learnt to send on the thing. "O wad some pow'r the giftie gie us," etc.

(2) The man who uses an ordinary key, but makes a habit of trying to send about twice as fast as he really can, and covers up all his blunders by sending each word twice, even when he is working with a local station.

(3) The man who reports an answering signal R8 the first time, and after having received a nice report from owner of said signal says "Sorry OM, QSS R3-4 QRU, QRM, QSL, etc., etc." Why not start a "truth in radio" campaign?

(4) The man who reports any good DC signal as "crystal-controlled."

I think these are the chief grievances, OM, but concerning No. 2, why, oh why will people *persist* in this QSZ business? I never QSZ unless particularly asked to. QRS, yes, by all means, but QSZ *no*, unless there is really vile QRM at the other end. I run a schedule with SMTN, and when sigs. are R3 at both ends we never have to QSZ—there is no need to be ashamed of sending slowly. Perhaps it is that some of these speed fiends with the bug keys find that they *can't* send slowly—it shows up too many faults in their Morse. Listen to 5YX OM's and duly note how it *can* be done!

Finally, I hope the gang will learn and memorise at least this one "z" signal—ZWO: Send each word ONCE.

Many thanks for the space, OM. I am now waiting to receive the kicks.

Best of luck with the BULL.—Yours sincerely,

L. H. THOMAS (6QB-6LT).

A MASTER OSCILLATOR TRANSMITTER.

To the Editor of T. & R. BULLETIN.

DEAR SIR,—With reference to the letter of Mr. A. E. Walker in this month's BULL, and Mr. Pollock's reply, Mr. Pollock appears to underrate the effect of grid current in the amplifier. The grid current of this stage is the only load on the drive if the small losses due to bad dielectric surrounding the grid circuit are neglected. This presupposes the P.A. to be neutralised, which as Mr. Pollock points out is essential for best results.

Mr. Pollock also makes a further slight error in supposing the grid current load to be constant. If the P.A. is properly neutralised, *i.e.*, the coupling between the drive coil and the anode coil of the P.A. is nil, then if the P.A. is alight with no H.T. on the plate the load on the drive due to grid current will be high. On switching on the H.T. to the P.A. with its plate circuit untuned, its grid current will fall considerably (to a half or a third) and the load on the drive will fall correspondingly. On tuning the plate circuit of the P.A. its grid current will increase again, since the anode potential when the grid potential is a maximum positive will be very much less than the nominal H.T. supplied to the valve. On loading up the anode circuit by coupling up the aerial, the grid current will fall, and the load on the drive will be reduced. Any swaying of the aerial will alter the load on the P.A. and by causing variation of its grid current alter the load on the drive.

This variation of load on the drive can be prevented by slightly unbalancing, but this will result in there being coupling between the two circuits and a change in the constants of the one will affect the natural frequency of the other. Hence no normal M.O.P.A. transmitter is dead steady.

The effect of variable P.A. grid current on the drive can be reduced to a minimum in three ways. Firstly, by making the P.A. load a small proportion of the load on the drive, so that changes in the P.A. load result in small proportional changes in the drive load. This is most easily carried out by using a large valve considerably underrun for the drive, and as a result operating inefficiently. This agrees with the remarks of Mr. Walker.

Secondly, by interposing between the drive and the P.A. an amplifier in which no grid current is permitted to flow, and consequently its grid load on the drive is practically constant. This is the "Separator" used at 5GB.

Thirdly, as used at 6AT and also by Mr. Pollock (see his second letter in the BULL) by running the drive at half the frequency of the transmission and interposing a doubler stage such as is commonly used in a crystal controlled set. From reports received here during the last three months this gives a stability of wave as good as crystal with proper adjustment. I would point out that the harmonic should be generated in the doubler stage (whether this also be the power stage or not) and not in the drive itself. Any attempt to pick out the second harmonic of the drive and amplifying up seems to spoil the stability of the set while only very slightly reducing the total power required by the early stages.

I can endorse the remarks of Mr. Pollock, that a drive transmitter considerably reduces the smoothing difficulties of H.T. supply for the P.A. if the supply to the drive itself is pure D.C. This only offers practical advantages if the input to the drive is a small proportion of the input to the (final) P.A.—Yours sincerely,

FRANK AUGHTIE,
(G6AT).

"A MESSY QRA."

To the Editor of T. & R. BULLETIN.

DEAR OM,—What has nu-6RN done to deserve the mess that has been made of his QRA on page 17 of the November BULL? Mr. J. B. Henry certainly owns nu-1CUE at Lincoln, N.H., but does not, and never has, owned nu-6RU. He is nu-6*rn* of 1199, Oak Knoll Avenue, Pasadena, Cal.

Mr. Henry was in London in July of this year when I had the pleasure of a visit from him. At present 6RN is being operated by nu-8JQ, and Mr. Henry and his second operator 6BRY are at Medford, Ore., for the winter, where they hope to get a small set on the air.—Very 73 es DX,

K. E. BRIAN JAY (EG-2HJ).

DO YOU QSL?

To the Editor of T. & R. BULLETIN.

DEAR SIR,—When sending me a QSL card this week —EF-8MAUD, Ef-8DS— (M. Jean Lory, La Crete, Granville, France),
also writes as follows:—

"Would you be kind enough to ask the following OM's to QSL to me, as I did to them:—

2BN, 5Yx, 5SZ, 5TD, 5PH, 2WR, 2DN, 6YQ, 5MS, 6BY	For QSO's with 8MAUD	5IV, 2QV, 5AD, 6UO	For QSO's with 8DS.

"Only 13 per cent. of English OM's do QSL. Do you find it enough? I *did* QSL to all of them."—Your Faithfully.

ROBERT CAMPLING (BRS-101).

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Cheques and Postal Orders should be crossed and made payable to the Hon. Treasurer, Inc. Radio Society of Great Britain.

Printed by Loxley Brothers Ltd., 50, Southwark Bridge Road, S.E.1, and Published by the Transmitter and Relay Section of the Radio Society of Great Britain, 53, Victoria Street, Westminster, S.W.1.