CONVENTION NUMBER

T. & R. Bulletin

Incorporating

The Journal of the Inc. Radio Society of Great Britain

(BRITISH EMPIRE RADIO UNION)

Vol. 4. No. 3. September, 1928 (Copyright) Price 1/6

T&R BULLETIN.

The only British Wireless Journal Published by Amateur Radio Exoerimenters

All correspondence and matter for publication to be addressed to the Hon. Secretary, 53, Victoria St., London, S.W.1
Tel.: Victoria 4412.

SEPTEMBER, 1928. Vol. 4. No. 3.

SOCIETY NOTES

September—the Convention and opening of the Radio Season. This number is, without doubt, the most important issue of the year, for not only is it the one which is in evidence during the Convention and upon our Stand at Olympia, but with the drawing in of the evenings and the closing down of summer sports, the thoughts of many turn to their scientific hobby and its associated literature.

* * *

For our Society, of course, the most important function is the Convention. This will be the third of these gatherings we have held, and we earnestly hope that the increasing interest and success will be maintained. Indeed it will not fail if the programme goes through according to plan for the Committee have spent plenty of time and thought over every detail, and there should not be any hitch of any kind. For the writer of these notes the Convention will always command his attention, for, as chairman of the old T. & R. Section, he was the first to suggest the idea, and mainly with the object of meeting so many of the country members whom we all welcome at these times. The full programme is announced elsewhere in this issue, and we hope you will all turn up and help to make the gathering a great success.

* * *

Please do not forget to visit our Stand, No. 227, in the gallery at the Radio Exhibition at Olympia. There will be the usual visitors' book which must be signed by all, and there you will meet many of your fellow members and make acquaintances who may be helpful to you in your work. Bring along your friends and make them members, assuring them that membership of the Society is the most direct way of gaining admittance to the inner circle of radio.

* * *

Another point we want to impress is the fact that we do not exist for the ultra-technical alone. We are often told by would-be members that they fear they do not know enough about radio matters to justify them joining the Society. A greater mistake was never made. One of the first aims and objects of the Society is to instruct and spread knowledge of the science. We welcome the beginner in radio matters, and can assure him that we will assist him as far as possible to learn the technicalities of our work. Every member of the Society is pledged by its articles of association to assist others by imparting his knowledge, and above all, do not think that we look down upon the beginner.

* * *

Among the shoal of letters which usually follow our quarterly broadcast talk was one from the secretary of a provincial Radio Society, who stated he had been informed some time back that we had ceased to exist. Like Mark Twain, we can only state that such reports are grossly exaggerated. We fancy he must have been thinking of the other societies which have faded out of existence or have wanted a convenient excuse for forgetting to send along the annual affiliation subscription. No, Mr. Pessimists, we have no intention of dying yet, although we are the oldest Radio Society in the world. We have more than doubled our membership in the last few years, and look at this BULLETIN.

The recent legislation relating to valves and radio patents has been important progress for amateur radio. Although we are not concerned in the trade attitude, we have at times had to submit to demands as royalties for various items which appeared somewhat excessive. We justly respect the inventor and wish to see him benefit by his efforts, but we cannot submit to the imposition of unreasonable royalties. The owner of a patent has only sixteen years in which to reap the profits of his brain, and we do not begrudge him a reasonable payment for the benefits he has conferred upon us. But the fact is that most inventors finish up in the Patent Office in a sort of financial gasp, and only too gladly sell out their interest to the first speculator who assails them. It is these latter who frequently attempt to extort unreasonable sums from the actual consumer. We are glad that the new Patent laws have been framed to protect the buying public in such cases.

* * *

An experiment of some importance has been decided upon by the Committee for the autumn session. Two of the meetings are not being held at the usual venue upon the Embankment, but at the City of London Electric Supply Company's restaurant in Ludgate Hill, E.C. These meetings will take the shape of informal discussions, and it is hoped that the less austere nature of the rendezvous will induce many more to join in than usual. The result of the experiment will be carefully to guide the minds of the Lecture Committee in arranging the future syllabus.

* * *

Wanted, a good practical article for the BULLETIN upon the construction of a heterodyne wave-meter to satisfy the requirements of the new licensing conditions. It is pointed out that these demand that every worker is provided with a reliable wave-measuring device, preferably of the crystal control type. As many of the British transmitters are in possession of only an instrument of the absorption type with a simple tuned circuit and a Neon lamp or flash lamp bulb indicator, it is evident that much constructional work in wave-meters will be taking place shortly. Will anybody come forward and guide us ?

* * *

The Society has been endeavouring to get the width of the safety tolerances upon each side of the new wave bands to be used under the new licences reduced, so that more stations could be accommodated. Unfortunately our efforts in this direction have not met with success. The Postmaster-General considers that in view of past experiences with amateur transmitters, he does not consider it safe to allow them to encroach too near to workers upon neighbouring bands. While we are somewhat disappointed at the Authorities' estimate of the capabilities of the amateur transmitter to keep within the limits of his allotted wave, we know that there have been some black sheep in this direction in the past. We have, however, got an admission from the Postmaster-General that if he finds after a year's working that circumstances justify the reduction of the safety tolerance, he is willing to review the situation. It is therefore up to us to be good boys and gain the plum held out to us by seeing that we do not trespass outside our given bounds. It is also to our interest to see that others behave themselves and do not jeopardise the position by careless working.

* * *

We are very pleased to learn that our Norwegian friends have recently organised their own amateur organisation. This is known as the Norwegian Radio Relay League (N.R.R.L.).

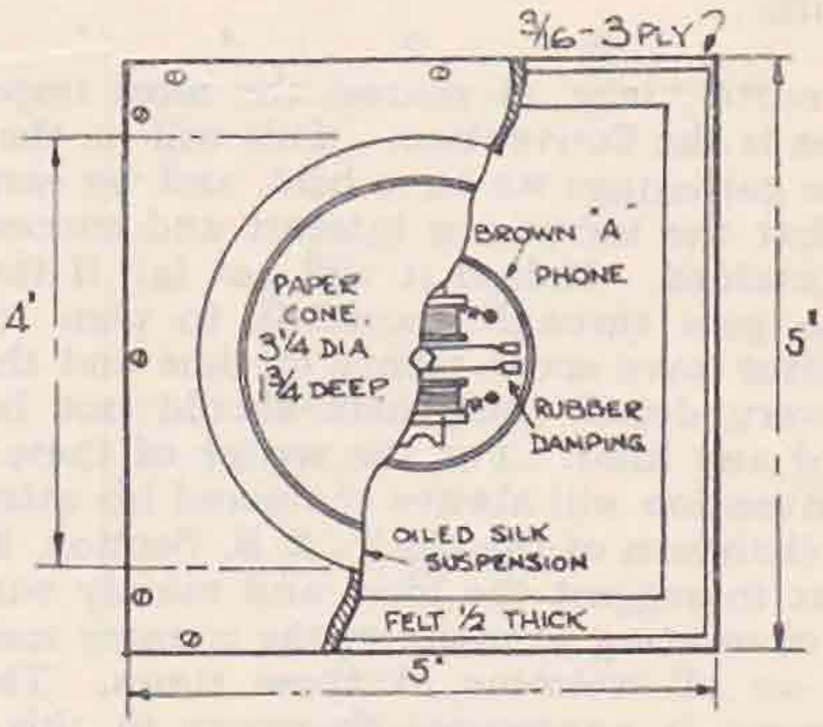
To them we offer our greetings and extend the hand of welcome.

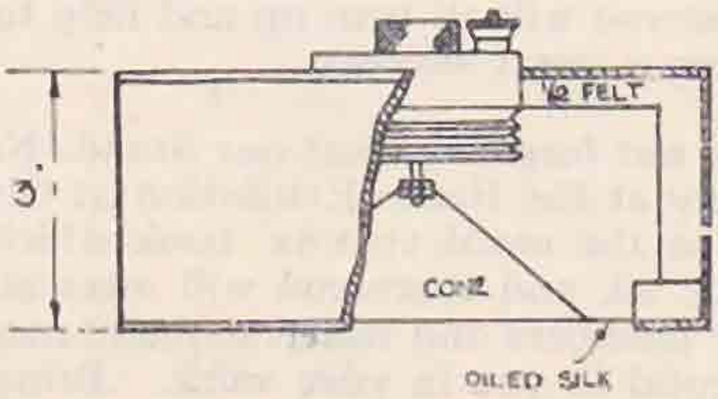
Electro-Static Reproducers.

By W. H. HEBDIGE.

Telephones operating on the electro-static principle have received very little attention, mainly because, in the simple form, at any rate, they are not so sensitive as the electro-magnetic 'phone ; but if you have a pair of " dud " 'phones on hand, and a few moments to spare, it is interesting to convert them into electro-static 'phones.

To enable one to do this one needs only a spare diaphragm ; there is no need to remove the magnets and pole-pieces ; remove ebonite cap and original diaphragm, solder one lead to metal case of 'phone, now take ebonite cap and drill a hole near the edge, tap it and counter-sink ; replace diaphragm and the usual washer, so that the washer comes between the two diaphragms ; if there is no washer one can be made from thin paper, same size as diaphragm, about 1-16 in. wide, place second diaphragm on this and screw on cap ; now insert screw in hole in cap and screw home until it makes contact with upper diaphragm ; solder lead to the head of this screw, and connect leads to set ; signals should now be quite clear, if at all scratchy or faint separate diaphragms a bit more by inserting a further ring between them. Of course these 'phones can only be used with an output filter ; they are very useful in an emergency when ordinary 'phones break down.





Quartz Harmonic Control.

By 5MU and 2BFA.

This article on harmonic crystal control was intended to be part of the joint article on quartz that appeared in a previous BULLETIN.

Owing, however, to the facts that 2BFA was very QRW with his business, and that 5MU had not quite finished his side of the experiments, it was decided that the harmonic part should be cut out.

Before commencing the tale of our trials, troubles and tests, may we thank the many hams who have written us nice letters of appreciation ? Especially do we thank those hams who, asking for further information, very considerately enclosed a stamp in their letters.

Now for the method of harmonic control as tried out at G5MU.

As is well known, the crystal will, if placed on receiver coils, give fairly loud clicks when the coil is tuned to the frequency of the crystal. Carrying this a step further, it is reasonable to assume that these clicks will be reproduced at twice and four times the fundamental frequency. Here it is as well to remind hams that we are writing of " pebbles " that have been ground flat and with parallel faces. A convenient wavelength for the purpose of ascertaining the depth of control, using harmonics of the quartz, is 180 metres.

Most hams are interested in 45-metre work and will probably attempt to get control on this band by using the appropriate harmonic.

They may, or may not, be able to get control without further experiments.

It is strongly urged that the following method be adopted before attempting to get control : it may save the " life " of a good crystal.

Assuming the quartz to have a fundamental of 180 metres, the hams who contemplate crystal control on 45 metres are advised to try every point where harmonics are likely to occur between a wavelength range of 90 to 23 metres.

Every " click " should be noted and then a transmitter is made to oscillate on the frequency corresponding to each separate harmonic of the quartz. (At G5MU, a roughly-made set of transmitter coils enabled this to be done very easily using the artificial aerial.)

In this way the best controlling harmonic can be easily found and, be it noted, it will not always be the strongest " click."

Wherever this good harmonic occurs between 90 and 50 metres, it can always be put into the 45 band with careful grinding.

Should a ham, who, using the 180-metre crystal for 45-metre control, grind too heavily and just miss the 45 band, he can, in most cases, " reclaim " the harmonic by grinding the crystal to 90 metres. Here, in our opinion, rises a very important point, and one which the writers have never seen mentioned in articles on quartz.

It was discovered at G5MU's station that the best quartz for harmonic control had a wavelength of 185 metres per millimeter. The writers were rather surprised, as they were under the impression that the only quartz good for radio to be " T " cut, 150 metres per millimeter, and the " N " cut, 105 metres per millimeter. However, it can be definitely said that this cut, whatever it is, is the best for harmonic control.

The crystal used at G5MU for 45.5-metre control has a fundamental wavelength of 182 metres and is .9 millimeters in thickness.

This cut of quartz has been called " H " cut (harmonic) by the writers. This " H " will not, of course, convey any meaning to the experts who are handling quartz, for various purposes, every day of the week : it is simply used by 5MU and 2BFA for ease of classification in the experiments log.

Harmonic control, using ordinary " T " cut, has been obtained, but the depth of control is not very great ; we have not been able to get any kind of harmonic control with the few samples of " N " cut in our possession.

It may be worthy of note that some " pebbles " will oscillate, even if not ground, without reaction. We have two lenses that were taken from their frames and placed in a crystal control valve panel where they commenced oscillating when the anode coil was tuned to slightly under the fundamental of the quartz. These crystals have a fundamental wavelength of 120 metres per millimeter, and we suppose, are classed as " T " cut.

With the " H " cut one fact outstands—the crystals need not be ground dead parallel if the " click " used for control is slightly stronger than the other " clicks " that will be present.

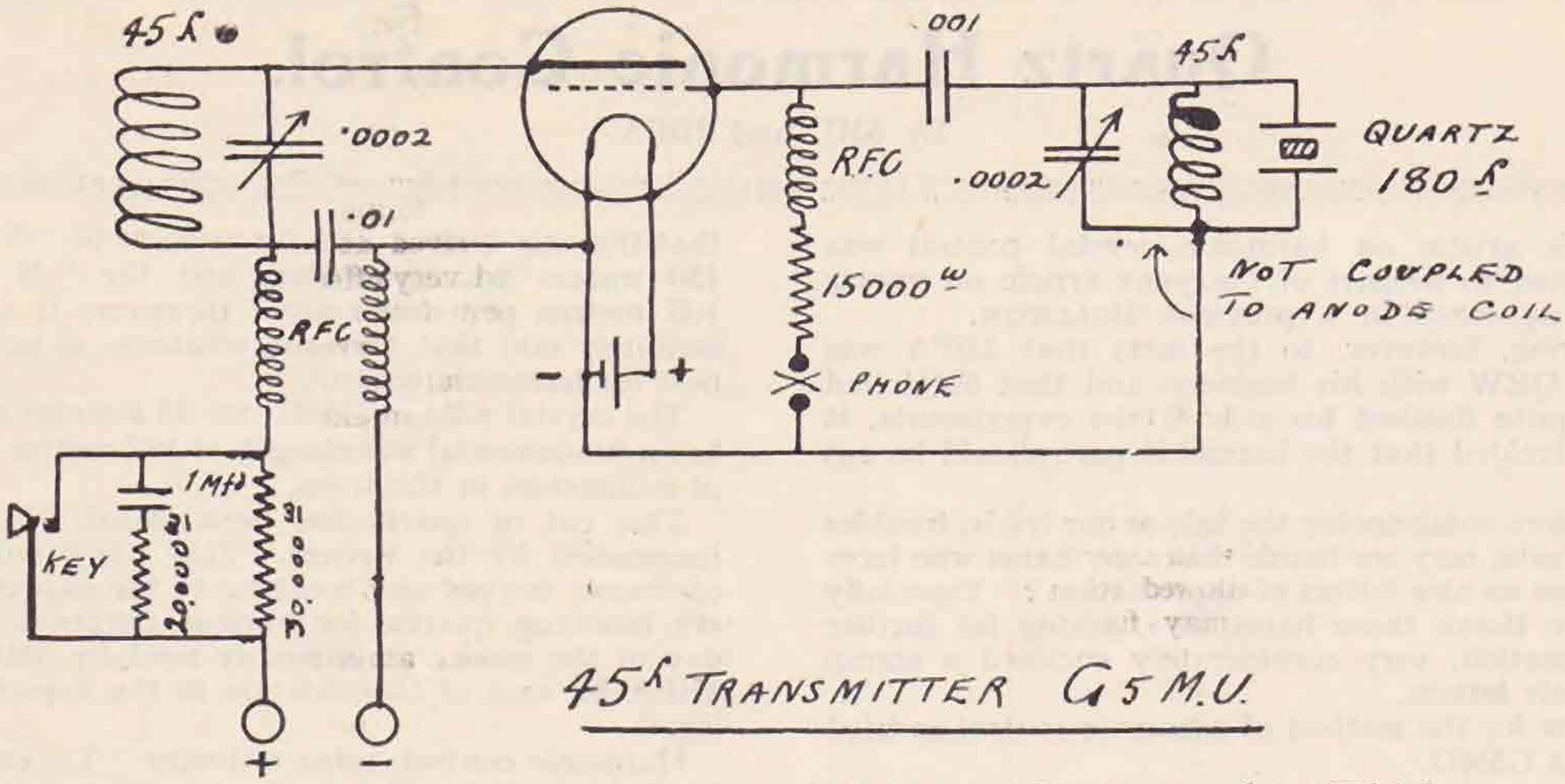
Should two strong " clicks " be very close together, it is probable that the frequency of the transmitter wave will creep from one point to the other : if this happens it will be advisable to take off the " high spots " on the crystal and endeavour to run the two strong " clicks " together, or rather into each other, thus making one strong controlling " click " which will effectively keep the wave dead steady and unaffected by the " host " of little " clicks " which the amateur grinder is likely to produce in his crystal.

The method of removing the " high spots " used by 5MU is not likely to have the approval of the experts, but no matter, it produces the required results. The crystal is measured for " high spots " which, when found, are rubbed with a piece of broken glass—about the size of a 2BA nut—dipped in emery powder. With a little care and testing of the quartz the desired one " click " can be obtained.

Returning once more to our " H " cut, at the moment it appears to be neither " T " or " N " cut ; however, a piece has been given to 2BFA who will endeavour to obtain all the information possible concerning its heat co-efficient, etc.

Any information concerning this cut of quartz will be appreciated by the writers.

We have had so many letters asking for methods of control and politely querying " the valve, OM ? " we will, with the Editor's permission,



45 ft TRANSMITTER G5MU

USING CRYSTAL CONTROL

give our method of control and the circuit diagram. If hams are lucky enough to get a good harmonic control crystal let them take care of it, as it will be worth its weight in gold when the new wave-bands are allotted. As seen from the diagram the crystal is connected across the grid coil of the transmitter. When the ham is satisfied that the controlling "click" is not likely to cause any trouble, i.e., creep in QRH, he should commence operations by measuring the exact QRH of the quartz harmonic on, say, the 45-metre band.

The transmitter should now be tuned to this QRH with the crystal holder, but not containing the crystal. In our case the top electrode is allowed to hang loose while adjusting transmitter QRH. We find it most important to have the anode tuning condenser tuned to very slightly less than the crystal harmonic.

Now the heterodyne wavemeter should be adjusted to enable the operator to hear a very weak beat note in the wavemeter telephones.

We adjust either our RX or wavemeter to about 270 metres.

A D.P.D.T. switch has also been arranged so that we can listen to our note while sending: this switch simply switches on the wavemeter and removes the telephones from RX to wavemeter and vice versa. When certain that the QRH is O.K., screw down the key and keep transmitter oscillating. Now place crystal on the bottom electrode and put top electrode on the crystal. The transmitter will probably stop oscillating. Now reduce the capacity of grid coil tuning condenser slowly, thus compensating for the added capacity of the crystal holder, when the beat note should reappear in the wavemeter, but this time, once the note has appeared, it should be possible to vary the grid coil condenser of transmitter quite appreciably without affecting the QRH of the transmitter note in the wavemeter. In fact, at G5MU's station the condenser, a .0002 can be de-tuned 38° before the crystal stops controlling.

A resistance will be noticed in the H.T. lead and is shorted when the key is pressed. This is used for two reasons: No. 1, the oscillations of the crystal take some time to build up and if keyed without resistance the dots are often missed altogether. No. 2, the sudden application of the H.T. to the anode of the valve sometimes upsets the adjustment of the crystal. It must be remembered that harmonic control is not nearly so deep as when using the fundamental. However, with the resistance the crystal is oscillating continuously, and there is no tendency for the crystal to jump off control when the key is pressed. One or two simple tests can be made to ascertain if crystal is controlling: (1) The spacer should be dead on the marking wave, and it appears to the listener to be a continuous carrier wave. (2) With a really good harmonic crystal it should be possible to place the hand about ½in. from the anode or grid coils without altering the QRH or causing a "whoop" in the wavemeter. At G5MU the aerial lead can be held without any alteration of QRH, the only effect being a species of QSS. (3) Switch off filament of transmitter valve and note if beat note reappears. It is realised that some of this is very elementary, but as some hams have asked for full method, it has to stand. However, if the precautions, advised earlier, are taken much trouble will be avoided when attempting to get control. Here we would "air" our only grouse, and this is it—since the article by 2BFA and 5MU was published in the April BULLETIN, one or two hams have, *very kindly*, told us that they have used "our" method of grinding for some time before the article appeared. In reply to those hams we say: We do not claim to have discovered anything. "There is nothing new under the sun." We do think, however, that the said hams are not over-endowed with the "ham spirit" or they would have shared their findings with brother hams. Now we are not addicted to blowing a "Fanfare on our Trumpets," therefore we trust that the hams who did not use "our" method before publication will forgive this temporary lapse. For nearly nine months before the article appeared, 2BFA was haunting opticians, antique shops daily, in the hope of obtaining anything that resembled quartz. On one occasion he returned with one

coat pocket literally bulging with lenses, but only had three pieces of quartz from the lot. G5MU was using harmonic control, i.e., 180-metre crystal controlling on 90 metres on January 1, 1928. The first station being worked was G6GH ; date and times are recorded in log.

2BFA would like to say *re* " obtaining a polish almost as good as plate-glass, etc."—this can be done but it takes time and patience ; one crystal produced by the writers was so polished that it was almost as clear as an untouched lens ; there was, however, a slight yellow tinge.

2BFA and 5MU have had many arguments *re* making crystals transparent, but we will maintain a discreet silence on the subject of arguments, but let it be whispered that the crystals at G5MU are polished on only one side. In conclusion, we hope that this article will be allowed to creep past OM Editor, and that hams may find something of interest in it, but please remember that the concluding few lines of the April article are applicable to this, and while we are always pleased to " swop " ideas *re* crystal control, we do hope that we shall not receive any pathetic letters from grandmas and grandpas who have mysteriously lost their spare pair of specs.

A Valve Base Coil Holder.

By C. A. Brookes (2CB) and J. Clarricoats (6CL).

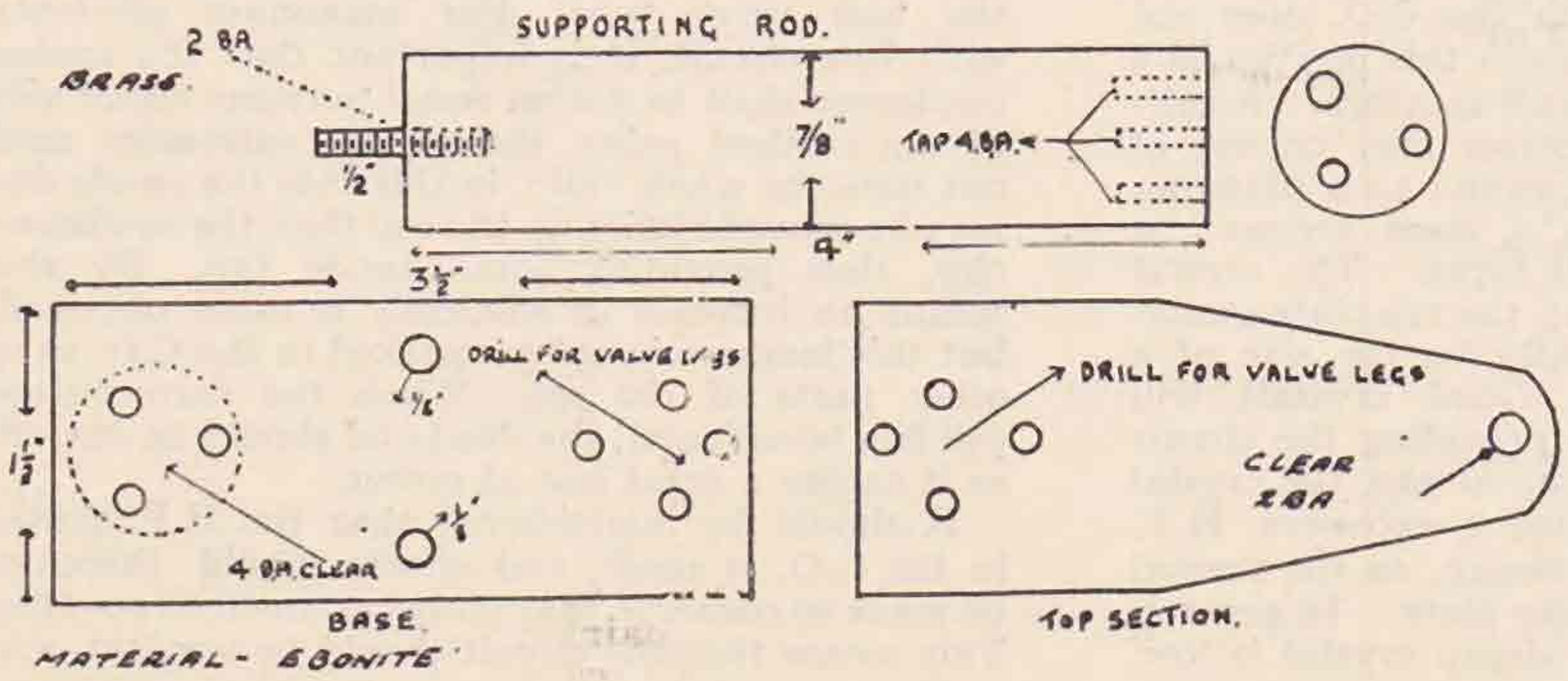
The vogue of the valve base coil appears to have become standard practice among a number of amateurs.

The construction of such a coil is relatively simple, and information on the methods of winding have already appeared in this and other publications.

So far, however, no reference seems to have been made to a means of coupling the aerial to the grid and reaction coil, and in order to overcome this omission this short description of a coil holder for such a use is presented.

The grid and reaction coil holder consists of four valve legs screwed into a bottom plate of ebonite ; an ebonite pillar assembled at the end of this plate carries at its top an ebonite arm, attached to which are a further four valve legs for the aerial coil fitted upside down. The arm is secured to the pillar by means of a 2 B.A. screw spring washer and nut, thus allowing the aerial coil arm to be swung across the grid-reaction coil as required.

The general dimensions are as shown on the sketch.



H.F. Amplification added to an ordinary S.W. Receiver.

By BRS170.

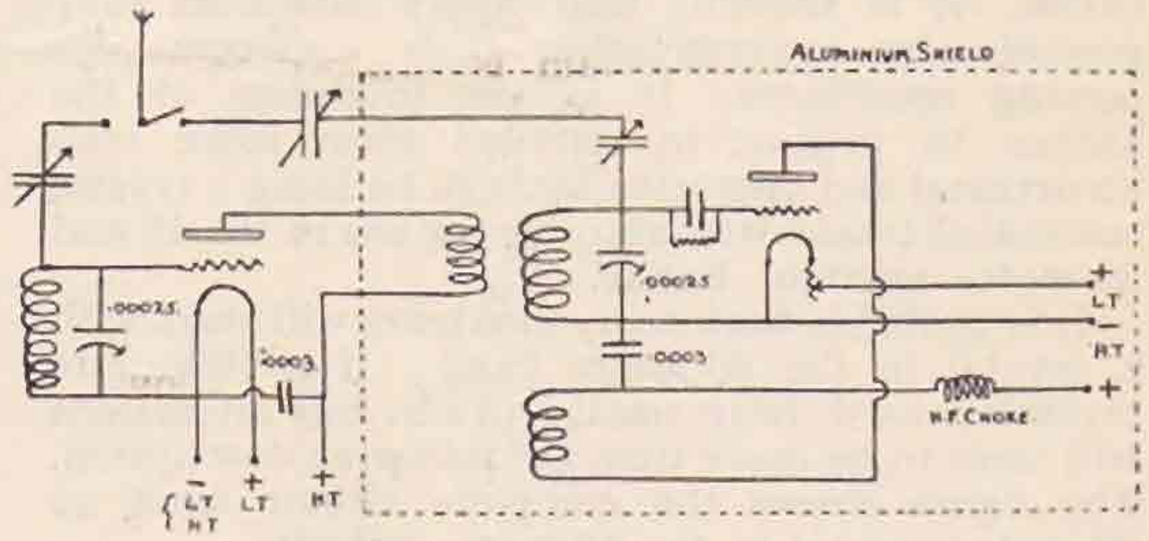
Having spent a month under canvas experimenting with various forms of H.F. amplification, I think I have arrived at an arrangement which is both simple and very effective.

It will be seen from the diagram that separate batteries are used. Perhaps this accounts for the fact that no neutralising is necessary. The coupling coil from the H.F. amplifier to the grid coil of the detector consists of three turns of flex loosely wound over the grid coil.

The coils are spacewound in the usual manner, the number of turns being found by experiment.

The results obtained are very satisfactory. I use only one valve as a rule but a three-valve Igranic resistance coupled amplifier has been used with complete success.

With the switch to the right the set functions as an ordinary short wave receiver and signals are just normal. Changing the switch over to the left brings in the amplifier, and what a difference ! R2 signals on the ordinary set are now easily R4 to R5, and can be easily read through the background of QRM and QRN.



Strays.

News has just come to hand that G6LL has effected QSO with G2FN on 8 metres, signals reported R5 T9, with no aerial. G2FN was reported R7 with a slightly unsteady D.C. note.

For sale, on or before 15 October, complete amateur station. Owner taking up rabbits.

5WH reports that he has given up his call sign on leaving England for Iraq, but that any reports on the reception of his signal from there (call AQ5WH) in the neighbourhood of 21, 30 or 42 metres would be welcome.

Make certain of visiting Stand 227 (in the gallery.)

Practical Crystal Control.

By G. W. Thomas (5YK).

With the advent of 1929 and the new amateur regulations arising from the Washington Conference of 1927, many short-wave transmitting stations will, no doubt, undergo modifications. It will be of supreme importance to use a sharply tuned wave, so as to cause as little interference as possible to stations working on near-by waves; it will be equally important for all amateurs to know exactly where they are in their assigned frequency band, and to remain there. Any off-wave business will not be tolerated by the authorities; any wobbling or spreading waves, whether over-modulated with speech or A.C. ripple, or any station taking up double his portion in the band by the use of marker and spacer keying, must not be tolerated by ourselves.

The ideal form of transmitter which helps to fulfil all the above features has been proved over and over again to be a crystal-controlled outfit. With the advent on the market of the Oscillating Xtal Company's crystals at a price within the reach of everyone, and with the Washington regulations being forced on us at the end of the year if not earlier, it is thought that many amateurs may possibly be reconstructing their apparatus for coming conditions. It is the intention of the author to present in detailed form some constructional and operative hints in building a crystal controlled transmitter suitable for use in the 40 and 20-metre amateur bands.

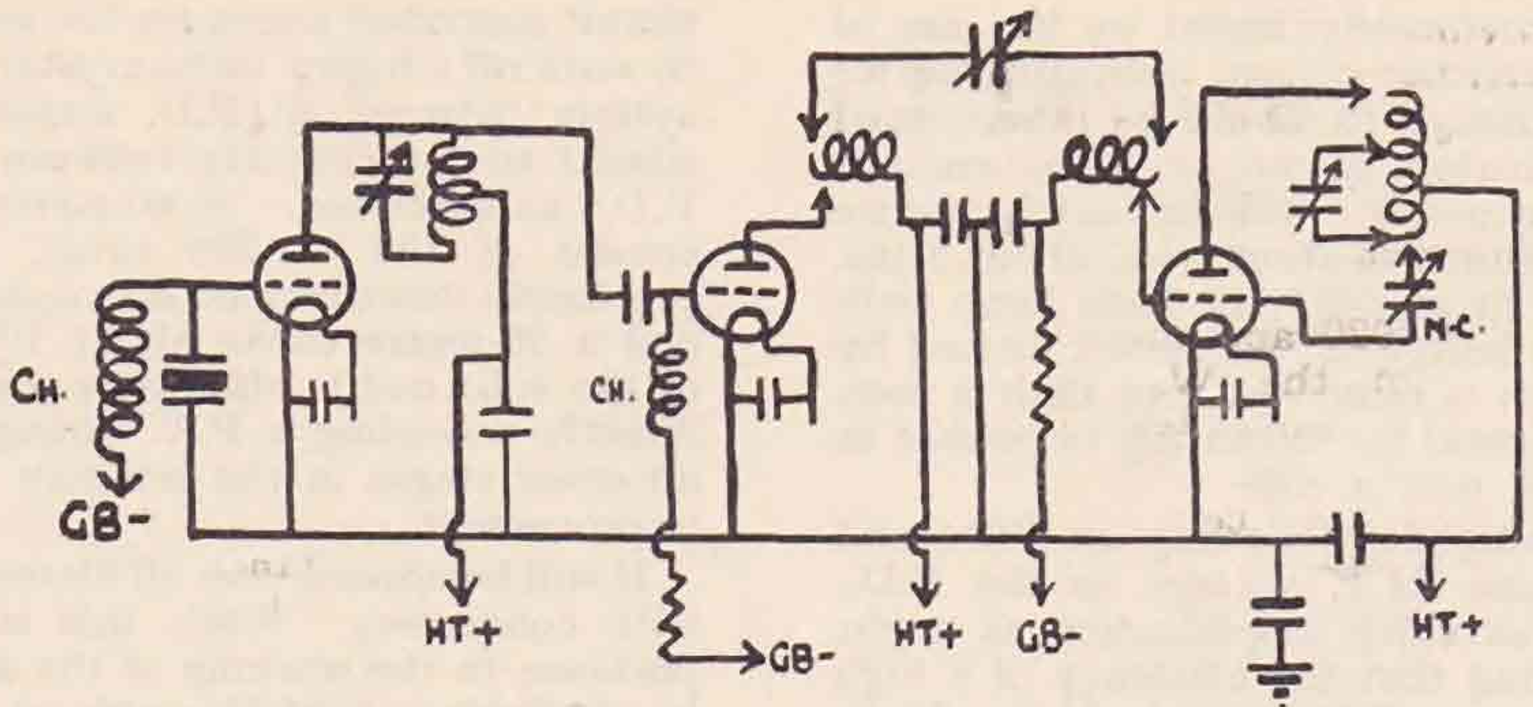
It is probable that many amateurs will start with a crystal in the 80-metre band; if a 160-metre crystal is used, only small and obvious alterations will have to be made from the following description. The figure shows the complete circuit from an 80-metre crystal to the 40-metre output.

Commencing with the crystal oscillator (C.O.), the first point to be emphasised is that no reaction in any form should ever be used with a crystal. A crystal that needs reaction to make it oscillate is a poor one, and the owner is apt to overlook the fact that the control is also poor, and the wave is easily "pulled" when making alterations further on in the set, or when keying or modulating. No reaction should ever be used with even a first-class crystal, as the control will again be poor, and the crystal is liable to crack. Great care should be taken that the grid choke to the C.O. does not resonate, as a resonating choke in this position is a form of untuned (or fixed tuned) reaction. A suitable choke for use on 80 metres may consist of 200 turns of 38 D.C.C. wire wound to a diameter of 1 in., a test-tube makes a good former; a 160-metre choke requires 300 turns. The crystal holder can well be home made; the top plate should be light, and may conveniently be the size of a halfpenny or 1-in. square. Good crystals will always work with an airgap, providing the circuit is low-loss. When used with an airgap, the crystal is less liable to crack when using excessive H.T. than when used without an airgap, as the crystal does not have to move the upper plate. In general, though, the output from an airgap crystal is low, unless the H.T. voltage is raised; also the frequency of oscillation depends on the size of the airgap, and such holders are difficult to construct and expensive to buy.

The valve should preferably be one having a fairly high impedance, and a high mutual conductance. A DE5b is, in the author's opinion, difficult to beat. The H.T. voltage, when using an 80-metre crystal without an airgap, should not exceed 300 volts. It is *very* important that the plate feed to the C.O. should be high, even though the valve efficiency appears to be low: 20 to 30 milliamperes is quite normal here and zero to 15 negative grid volts are satisfactory. A grid leak does not appear to be so good as bias when using a high impedance valve. If the grid is so biased by battery or leak to keep the plate current low, there is great danger of the crystal cracking. A crystal should run cold; if it warms up it is very liable to crack. If the load is taken off a C.O. when excessive H.T. is used, the R.F. on the crystal is increased, with possible damage to the crystal.

It will be noticed that the crystal valve plate circuit, in common with other tuned circuits, is centre tapped and the centre run to an earthed point. As far as is known, this type of circuit is not generally used, though it produces very much greater efficiency than a tuned circuit with one end earthed. In this scheme there is a complete half-wave in the tuned circuit, and not a quarter wave in the plate, working with another quarter wave elsewhere. The same modification may be applied to a T.P.-T.G. oscillator, in which case the grid and plate circuits will each contain one complete half wave, instead of having only a quarter wave each. The effect of this is to allow all the circulating tank current to flow through the coil and back through the tuning condenser, instead of having to complete its path through other stray capacities of poor dielectric. No exact measurements have been made between the efficiency of a centre-tapped circuit and the more ordinary type, although in one particular amplifier, driven from a constant source, the input to the amplifier (with an aerial coupled to its plate circuit) was increased from 40 watts to 60 watts solely by changing from a quarter wave tuned grid input circuit to one of the half wave type. For maximum efficiency with this circuit, it is important that the tuning condenser shall be across equal portions either side of the earthed point, though the condenser need not tune the whole coil; in this case the anode clip may be moved higher up the coil than the condenser clip, thus providing some anode tap. By this means an increase in efficiency is often obtained, but this increase is not so marked in the C.O. as in other parts of the set. When the correct-sized coil has been found, the dead-end should be cut off, as it causes a great loss of power.

It should be remembered that the R.F. power in the C.O. is small, and efforts should therefore be made to conserve that power as much as possible. This means that the circuit should be low-loss, and



because it is on 80 metres, leaves no reason to make it the imitation of a poor B.C. receiver. A better R.F. output can be obtained to drive the grids of the next valves by using high L/C ratios in the plate circuits. A suitable coil for the C.O. plate circuit may be space wound on a 3-in. Becol ribbed former and consist of about 20 turns with a tapping in the centre for the earth point.

The coupling condenser between the C.O. and the next valve, a frequency doubler (F.D.), should be a good mica condenser of fairly large capacity, say .002 mfd. or over, and tight coupling will usually be required. It is not necessary to use a tuned grid input circuit to an F.D., so that grid potential must be supplied through a choke. This choke must be a good one, and the details given for the C.O. choke apply here. With 300 volts on the C.O., the plate coil should be alive with R.F. and light a neon lamp of the Osglim type if the base of the lamp is held in the hand and the glass is touched on the plate coil. This also constitutes an excellent test for the choke on the grid of the F.D. The lamp should light brightly at the top of the choke, and then, as it is brought down to the earthy end of the choke, should dim and finally go out. If the brilliance of the glow is at all erratic, the choke is a bad one and another should be tried. It may be possible to light the lamp off the grid choke of the C.O., in which case the same test can be applied.

The practice of winding an R.F. choke in the form of an unspaced solenoid can be improved upon as follows. Commence by winding, say, 20 turns close, then leave a gap of one-tenth to a quarter inch and then wind another group of turns, this time, say, 30. Continue this system until the required number of turns are on, and let each group of turns be of different size. In this way the self-capacity of the choke is reduced a little and the choke appears to be more efficient.

It will be observed that both grid leak and bias are used on the F.D. The exact effect of this leak is not quite understood, though it very materially increases the efficiency of the F.D. It is definitely not acting solely as a substitute for additional bias, as experiment has shown. The lower end of the choke should preferably be at earth potential, and if the use of the grid leak appears to keep this lower end alive with R.F., a condenser across the leak will cure matters. If high power is being used, and R.F. is allowed to get into the leak, a burn-out of the leak is the result.

LS5b or DE5b are very good F.D. valves, and with 400-500 volts H.T. (for LS5b, 300 volts for DE5b) and driven from a C.O. with 300 volts H.T., a grid bias of 100-150 volts will probably be required with a 10,000 ohm leak, the plate current being 20-30 milliamperes. For a constant plate input to an F.D., the R.F. output on the half wave can be increased by increasing both the R.F. drive and the grid bias. Also, for a constant R.F. input, the R.F. output on the half wave can be increased (within certain limits) by decreasing the grid bias at the expense of an increase in plate input. An LS5b working as an F.D. from 80-40 metres at 12 watts input should not have a hot plate; but as a 40-20 metre F.D., the plate may be just coloured with the same input.

The coupling circuit between the F.D. and the Power Amplifier (P.A.) presents some novel features. Normally, the plate circuit of the F.D. would be similar to that of the C.O., except that it would be tuned to the half wave. The grid of a low impedance valve, such as is invariably used for a P.A., has to be separately tuned and cannot work with a choke, in the same way as the F.D. grid is worked, if good power ratios are to be obtained. It would require another half-wave tuned circuit centre tapped, equivalent to the C.O. plate circuit. The grid of the P.A. would then be connected through a fixed condenser to the plate of the F.D. This means two tuned circuits, which are a trouble. To overcome this difficulty, and yet keep the power ratios high, the coupling circuit shown has been developed. It consists of a single coil split in the centre with two fixed condensers. The other connections to the coil are shown; the tuning condenser must withstand three times the H.T. volts without sparking over. The coupling circuit contains one complete half-wave on a wavelength of half that of the C.O. The use of separate anode, grid and condenser taps on the coil, whilst improving results to a small extent, is not of vital importance, unless one requires the absolute maximum driving voltage. If separate tappings are used the condenser would tune only the centre part of the coil, with the grid and plate clips towards the ends; the tuning condenser must in any case be shunted across equal portions either side of the earthed point. It should be remembered that every separate tap on tuned circuits in amplifiers, means an increase in efficiency to a greater or less degree, providing one has sufficient time to spend tuning up and understands what one is doing. The Hartley oscillator can always be improved by the provision of a full complement of tappings on the coil.

A considerable amount of amplification should be obtained through an F.D. working properly.

This may be approximately tested by the use of the neon lamp or another current indicating device described below, though it should be remembered that all such indicators (lamp or bulb) are not independent of frequency. The indicating device consists of a single turn of stout wire, about 3 ins. diameter soldered to an ordinary flash lamp bulb holder, so that the bulb is in the circuit formed by a single turn. This is more sensitive than a neon lamp and is very useful for indicating resonance in a circuit when held near a coil.

The use of an amplifier following an F.D., and working on the same H.T. voltage as the F.D., does not produce as much amplification as might be expected, showing that the efficiency of a high impedance valve as an F.D. is fairly high. Thus, an LS5 valve driven from an LS5B as F.D. (itself driven hard), and both valves working on the same H.T. voltage, would not produce much amplification, though if the H.T. voltage on the LS5 were raised, the amplification would be considerably increased. An LS5 requires as much power to drive it to ten watts (400 volts) as a D.E.T.1 does to 50 watts (1,000 volts).

A P.A. should be biased so that about five milliamperes are taken by the plate when undriven; a grid leak of about 10,000 ohms is also required, as shown. A P.A. must be neutralized, neutralizing being obtained between the grid and the end of the plate coil remote from the plate tap. It is very necessary to provide a full complement of tappings on the plate coil of a P.A., as the correct adjustment of anode tap goes far to produce high efficiency; the part of the coil that is tuned may possibly be one-half to two-thirds of the whole coil. The neutralizing condenser may or may not need to be on a turn further from the centre of the coil than that on which the lower condenser clip is. The use of more turns between the earthed point and the anode clip than between the earthed point and the neutralizing condenser clip, calls for a larger neutralizing capacity, and makes neutralizing more difficult. The tuned portion of this plate circuit carries very heavy R.F. currents, and apparatus must be so constructed to carry such currents.

All amplifiers can be made to run at the same efficiency, 78.5 per cent. This assumes an unlimited driving power, and the correct H.T. voltage. The higher the mutual conductance of a valve, the less grid power it will require to drive it to a given input (with aerial load on), other things being constant. The mutual conductance of D.E.T.1 is among the highest of any low-power transmitting valves produced. Hence its efficiency as an oscillator, where it has to supply its own grid power. The D.E.T.1S.W. has a lower mutual conductance than the D.E.T.1, and hence requires more drive for a given anode power.

The description of the F.D. applies to all forms of frequency multipliers, though in the case of frequency treblers, quadruplers, etc., there is very often a strong tendency for self-oscillation, which can only be overcome by neutralizing the F.M. stage. This produces an added difficulty, and, further, the use of frequency multipliers other than doublers and treblers is not to be recommended because of the small output obtained. It is usually a saving in the long run to use two doublers than one quadrupler.

If it is desired to add extra F.D. stages to the circuit described above for use on shorter waves, or to work off a higher wave crystal, then the coupling system between all F.D. stages is made exactly similar to the coupling between the C.O. and the F.D., as described. A 40-metre R.F. choke may consist of 150 to 200 turns, group wound, as previously described, on a five-eighths inch former; and a 20-metre choke about 100 turns. The use of the split coil is absolutely necessary only when directly preceding a P.A., though its use between all other stages in the set may constitute a small improvement.

It will be noticed that all filaments are by-passed with condensers. While this is not of vital importance to the working of the set, it does prevent bad flickering of the filaments on keying, and allows a short R.F. path across the filament, thereby preventing the flow of excessive current down one side of the filament only. The use of these condensers is most important when using thin filament valves. The earthed points of all coils should be taken to filaments by a short lead through a large condenser, say, .01 mfd., and the wiring should always provide a short R.F. path direct or through a condenser between one stage and another; it has been found most important that all points of zero R.F. potential be linked together by a short lead and also be linked to filaments. Although theoretically all earthed points should be taken separately direct to earth, it has not been found necessary to provide more than one earth to the set, but this should preferably be at the short-wave end. As neither side of any variable condenser is at earth potential, it is necessary to provide some form of extension handle for tuning purposes.

This would appear to finish the construction of a crystal-controlled set; the next part deals with tuning it. Readers are recommended to re-read the article entitled "The Valve as a High Frequency Amplifier," by 2HK, on page 12 of the December, 1927, BULLETIN.

The correct adjustment of the plate tuning condenser of the C.O. can be found by using some form of R.F. indicating device near the plate coil. As the tuning condenser is increased in value through the maximum point, it will be found that the crystal starts oscillating weakly at first, oscillations building up in strength until they reach a maximum value, after which oscillations suddenly cease. There should be no instability (or overlap) at this maximum point, as overlap indicates either a poor crystal or a bad loss in the circuit; a very heavy load, being equivalent to a loss, will produce overlap.

Tuning amplifiers is very simple; when the grid of a valve (biased) is driven, the plate feed rises; when the plate circuit of that valve is tuned to either the fundamental or a harmonic of the drive frequency, the input falls to a low value, but not as low as it was before being driven. (Theoretically, it falls to the same input as when undriven, but a no-loss no-load short-wave circuit cannot be produced.) A load then causes an increase in input again. A frequency multiplier should be driven as much as possible, but an amplifier will only need to be driven until the plate feed current is equal to the filament emission. (This treatment is too drastic for dull emitter valves, though is quite satisfactory for bright valves. With dull emitter valves a grid current meter should be used; the grid current to a fully-driven D.E.T.1 valve should

be 13-15 milliamperes, with no H.T. on, but with the anode connected to filament.) When the valve is driven and the plate is tuned, the plate feed will drop, and then a load can be put on until the feed reaches 7/22 of the filament emission.

An amplifier is neutralized as follows : Commence with the H.T. off the amplifier, but with everything else connected and the aerial coupled. The object is to find a point on the neutralizing condenser where any indicating devices on the grid side of the amplifier will show no flicker when the plate-tuning condenser is swung through resonance, the grid all the while being driven. The " single-turn bulb," or neon lamp, lit off the grid circuit are very useful indicators, though the grid current meter is ideal. Amplifiers on short waves are often very difficult to neutralize at first ; and the higher-loss the circuit is, the easier it will be to neutralize. Grid and plate coils should be kept small diameter with their axes at right-angles to each other and well spaced. A diameter of 2½ ins. is quite enough for all coils with the exception of the P.A. plate coil, which need never be greater than 4 ins. Tuning condensers have a large field and should also be well spaced from each other. A high C/L ratio will ease neutralization, although it usually produces a lower power ratio.

A very convenient place to key a crystal-controlled set is in the H.T.+ lead to one of the F.D. stages. Choke control modulation can also be effected in the plate lead to the last F.D., though it must be remembered that as the modulation is allowing the H.T. current to the F.D. to fluctuate only below its normal value (when not modulated), that the R.F. output from the F.D. will be smaller than normal. For good modulation the following amplifier(s) should only be worked at 30 per cent. efficiency, otherwise distortion will occur. This, however, should not be taken seriously if the transmitter is not meant to emulate a B.B.C. station. When possible, modulation should be effected on the last amplifier only, but this is often beyond most amateurs. Perhaps 2HK will provide some data from his veritable store of knowledge on modulating amplifiers with apparatus within reach of most amateurs.

If the emitted note from the set is to be perfectly free of all A.C. ripple (which is imperative for good phone), then the C.O. filament should be lit off D.C., and if grid bias is used to the C.O. stage, a separate grid bias battery will be required. If a very little ripple is of no consequence, then all filaments may be worked off A.C. If R.A.C. is used to supply the set, the C.O. H.T. supply should be well smoothed if the best note is required ; the smoothing on the other supplies are not so important, but a crystal will not convert an A.C. note into a C.C. note.

In conclusion, the writer hopes the above remarks will be helpful to anyone about to construct a crystal controlled set. It is hoped that a 10-metre set, built to the lines suggested, will be on view at the Society's Stand at the forthcoming Exhibition.

Stray.

Reports are required by Herr Wiberg (D7HM), Vesterbrograde 125, Copenhagen, on his telephone transmissions made on Tuesday, Thursday and Saturday evenings from 12.30 p.m. to 1.30 a.m.—wave 40–45 band.

The Theory and Adjustment of a Transmitter.

TRANSMISSION LINES.

By F. AUGHTIE (6AT).

THE HOME END.

So far we have not considered what happens when the reflected wave arrives back at the home end, but it is fairly clear that the behaviour of the reflected wave at the home end is similar to that of the main wave at the far end. That is, it is either reflected or absorbed. If it is absorbed this means that energy is restored to the generator, and since we have supposed the lines to be free from all loss, the amplitude of the reflected wave is the same as that of the initial main wave. Thus as much energy is returned to the generator as was taken from it, and the stationary waves are maintained on the system without expenditure of energy. Of course, if there is a load at the far end the returning wave will be smaller than the outgoing main wave, as already shown, and so less energy is returned to the generator than was taken out, the balance being taken by the load.

If the reflected wave is re-reflected, then obviously the same wave runs backwards and forwards and stationary waves persist as before. Two cases must be distinguished, however : (*a*) The generator ceasing to supply energy to the system ; (*b*) the generator continuing to supply energy to the system.

(*a*) The same wave continually runs backwards and forwards ; that is the stationary wave persists at constant amplitude.

(*b*) Energy being continually fed into the system, the amplitude of the stationary wave increases. We must here consider three limitations :—

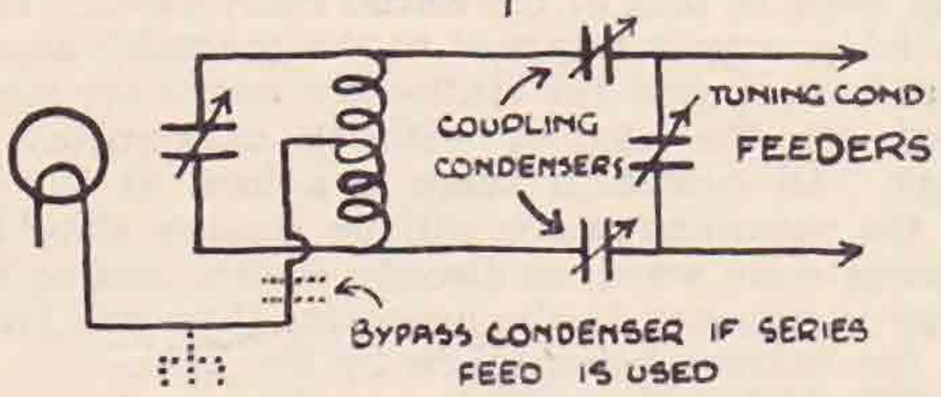
(1) When the generator is connected to the lines at a point where the voltage swing is greatest (voltage antinode) and its output voltage is limited. Here obviously the amplitude of the waves cannot rise beyond the generator voltage, since beyond this point no power is supplied from the generator. Similar reasoning applies to (2), where the generator is connected at a current antinode and the current it can pass is limited. (3) If the coupling is such that neither the voltage nor the current is limited, but only the energy, the amplitude builds up until energy is dissipated somewhere at the same rate as it is supplied.

It will be fairly clear that if our transmission line has no losses, but has a load connected to it, by varying the position at which the generator is connected to the line, we vary the terminal voltage required for a given supply of energy, always supposing that the tuning arrangements are satisfied. Thus we can make the transmission line play the part of a transformer if desired. This is what is usually done in the " Zeppelin " feed arrangement, it being commonly arranged so that there is a voltage node at the home end.

Coupling to the Transmitter.

The problem of supplying the line system with power remains. The usual way is to connect a coil between the wires and induce an E.M.F. into it by bringing it close to the inductance of the transmitter. The coupling can either be loose or tight. In the former case the necessary line tuning conditions must be satisfied separately from those of the transmitter, but this arrangement has the advantage that the coupling can be readily adjusted to optimum, giving maximum energy to the transmitter, without affecting the tuning of either circuit. In the second case there is no need for separate feeder tuning, as, owing to the tight coupling, the primary condenser tunes both circuits. The coupling, however, can only be altered, as a rule, by varying the number of turns in the feeder coil. As it is usually only possible to do this in steps and not continuously, it is more difficult to get optimum coupling.

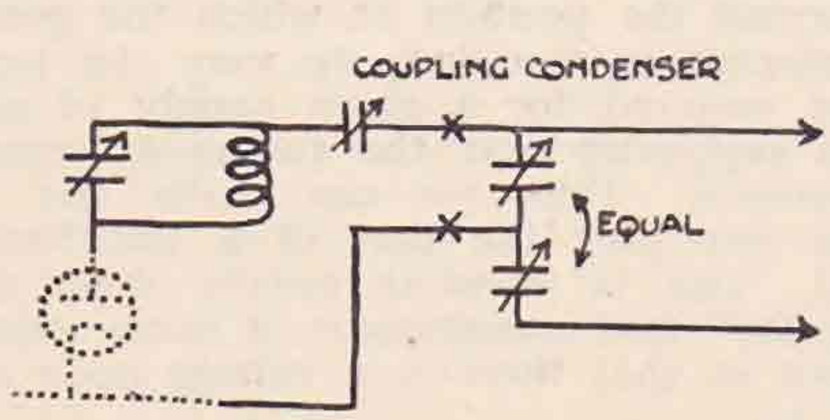
FIG 9



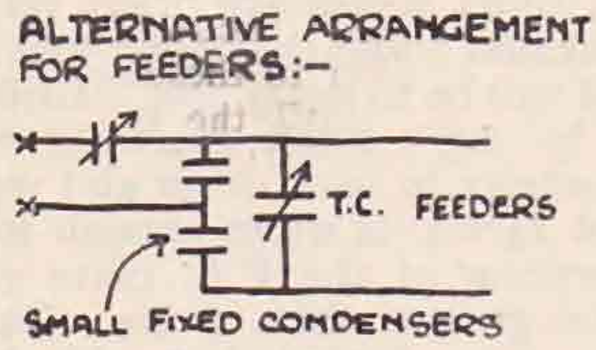
Commonly the latter arrangement is used together with series condensers in the feeders. In the majority of cases these condensers do not affect tuning at all, but form a means of altering the coupling to some extent.

When a half wave Hertz is used with feeders slightly more than half a wavelength long (but less than three-quarters) it will be found that the necessary tuning reactance is a condenser. Many stations commonly insert a coupling coil as well, and this results in the series condensers becoming very small, while at the same time the losses are increased due to the resistance of the coupling coil itself. The following method of coupling will be found more efficient in such cases.

The feeders are joined together through a variable condenser of a suitable size to tune the feeders. The plate coil of the transmitter is arranged to have a centre tap which is earthed (this will already be the case in both the Hartley and Mesny circuits), most other circuits can easily be modified to give this. The tuning condenser must be left across the whole of the coil. Then each feeder is connected through a small condenser—such as a neutrodyne condenser to an end of the transmitter coil, one feeder to each end; see Fig. 9. These small condensers should be variable and provide a means of adjusting the coupling to the correct value. In operation they should be kept approximately the same value.



For those who have not a transmitter with a centre tapped plate coil the arrangement of Fig. 10 is suggested. Here a pair of condensers are connected between the feeders to give a centre tap which is connected to the filaments, a small condenser is then connected between one feeder and the plate end of the coil. Unfortunately, the arrangement cannot be tried in practice at the time of writing. (The writer is indebted to Mr. F. J. Singleton, G5UW, for trying out the arrangement of Fig. 9, which gives satisfactory results in practice.)



A Note on Push-pull Amplication.

By F. Aughtie (6AT).

(This article deals with push-pull for loud speaker operation.)

There are several advantages claimed for push-pull, most of them incorrectly. As used in practice there is only one. The output choke (or transformer) can be considerably reduced in size, since there is no initial magnetisation of the core by the D.C. component. This may represent a considerable saving in cost of this component if high powers are used.

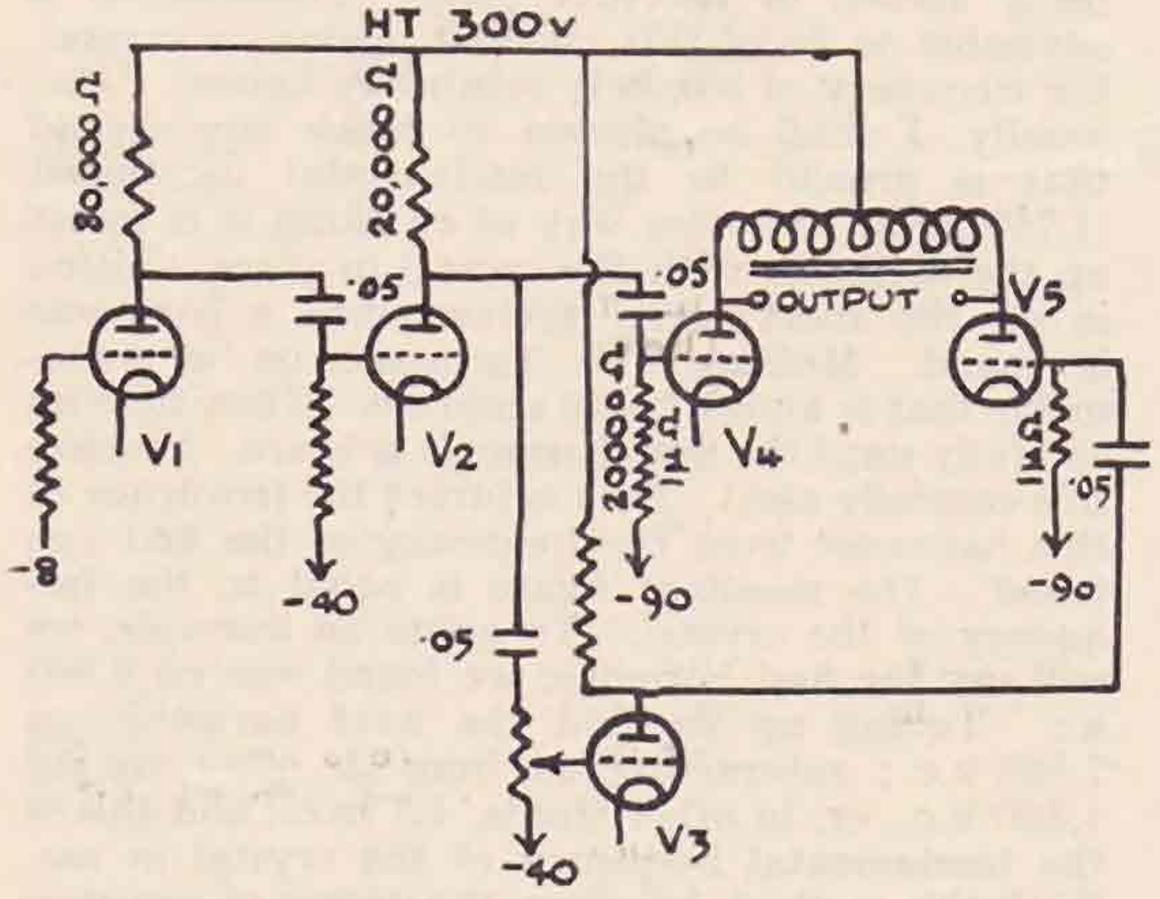
With ordinary commercial valves push-pull does not give any more output than the same two valves in parallel would give. The maximum distortionless output from a valve is limited by the valve and the H.T. used. When two valves are used the power is practically the same whether they work in parallel or in series (push-pull). Further, the push-pull method has the disadvantage of requiring double the total grid swing.

Incidentally, it appears to me to correct a fallacy concerning grid swing. A power valve is commonly said to be " good " if it will " handle a large grid swing."

Now, the primary function of a power valve is to *give sufficient output power to work the speaker.* The smaller the grid swing necessary for this, the better the valve, since it will require less preliminary amplification. In order to get ample output power at reasonable H.T. voltages, low impedance valves must be used, and if the filament characteristics are normal this implies a low amplification factor. Hence, the valve *demands* a large grid swing. Thus it follows that for valves of similar filament characteristics used on the same H.T. voltage, the valve giving the most output will require the greatest grid swing. But it should be realised that a large grid swing *per se* is a disadvantage.

Push-pull then offers an advantage from the point of view of the output choke only. As commonly shown, it requires a centre tapped transformer preceding the output pair of valves. Those who consider the best transformer not good enough, and use resistance coupling instead, may care to try an idea of the writer's shown in the figure.

V_4 and V_5 form the push-pull pair and V_4 is fed in the normal manner from V_2, which is the last stage but one. V_5 is fed from an extra valve V_3, which is fed in turn from the anode of V_2 through a potentiometer. The tapping is so adjusted that the anode swing of V_3 is the same as that of V_2. In practice this adjustment is made by paralleling the anodes of V_4 and V_5, connecting up the speaker to these stages and then adjusting the tapping until the output from the speaker is a minimum. (It is not possible to obtain an exact extinction point.) The centre tapped choke is then connected and the speaker placed across it. It should be noted that in this way any slight difference between the characteristics of V_4 and V_5 is compensated for. This is not possible with the normal centre tapped transformer arrangement.



In the writer's set V_4 and V_5 are L.S. 5a valves. V_2 and V_3 have an amplification factor of 3.5 and an impedance of 3,000-4,000 ohms. V_1 has the characteristics of 7 and 6,000 ohms. The coupling resistances and grid bias values used are as shown.

The characteristics of V_1 and V_2 may cause surprise, but the large grid swing demanded by the L.S.5a requires the use of a super-power valve to feed it. A valve of higher amplification factor used in place of V_2 would not give the necessary anode swing without overloading. (It is obviously most economical to arrange that the last stage is the first to overload.) It might be possible to use a valve of higher amplification factor for V_1, but to be on the safe side a valve having the characteristics given should be used. Many people appear to entirely overlook the possibility of overloading in the last stage but one, but this may easily happen.

A Crystal Controlled Resonator.

By E. A. Dedman (2NH).

Although we cannot be sure exactly what is going to happen under the new regulations of the Washington Conference, which come into force, as far as we are concerned, on October 15, there is one thing that stands out prominently from the somewhat hazy background. That is the fact that we are all going to need a really reliable and accurate wavemeter. Our short wavebands are narrow, but they are exclusive. Therefore, we shall have every right to justly protest if our bands are infringed upon by any station that is not entitled to use them. On the other hand, we cannot expect any mercy if we stray into the bands that are reserved for other services. Now, providing we have an accurate wavemeter of the hetrodyne type, we can be sure of our wave within a very small percentage. However, even the best of hetrodyne wavemeters cannot be expected to remain dead accurate for ever, even if we take all the precautions that are so lucidly outlined by 6CJ in the August number of the Bulletin, but the danger does not lie in the variation, but in the fact that we may not be aware of it and go on relying on the accuracy of our original calibration. Luckily, there is a very simple and extremely accurate piece of apparatus that we can all afford to build that will enable us to keep a check on our wavemeter. I refer to the quartz oscillator.

The sixpenny "Grannies' specs" type of quartz crystal is available to all of us, and with the aid of three fixed condensers, a valve, a B.C.L. coil and a few odds and ends we can construct a crystal oscillator in less than an hour.

Here let us digress for just a moment. Up till the present 99 per cent. of us have referred to the waves on which we work as the "45 metre band," the "23 metre band," and so on. In its way this has been quite all right, as our waves have been fixed on a wavelength basis, but under the new regime our bands have been granted on a kilocycle basis, and it seems to me that now, at the very start, is a most suitable time to change our nomenclature to the more correct kilocycle terms. In fact, surely it will be easier for us to say the "7 megacycle band" rather than the "41-42 metre band." At any rate, through the rest of this article I shall talk in terms of frequency. If you don't like it, I expect you know the conversion formula as well as I do!

Reverting to the crystals, most of them have their fundamentals in the broadcast band, and we will presume that our particular crystal has a fundamental of 1 megacycle, or, in other words, 1,000 kilocycles. If we connect it to a valve in such a way as to make the valve oscillate, we shall get an oscillator that will remain constant on 1 megacycle, no matter what happens to battery voltages, anode load, or indeed anything at all, as long as the valve stays in oscillation. As a matter of fact the crystal has a small temperature co-efficient, but it is so small that for all practical purposes it can be ignored. Now, as we have both the valve and the crystal oscillating at 1 megacycle, we shall have a series of harmonics on 2, 3, 4, 5, 6, 7, 8

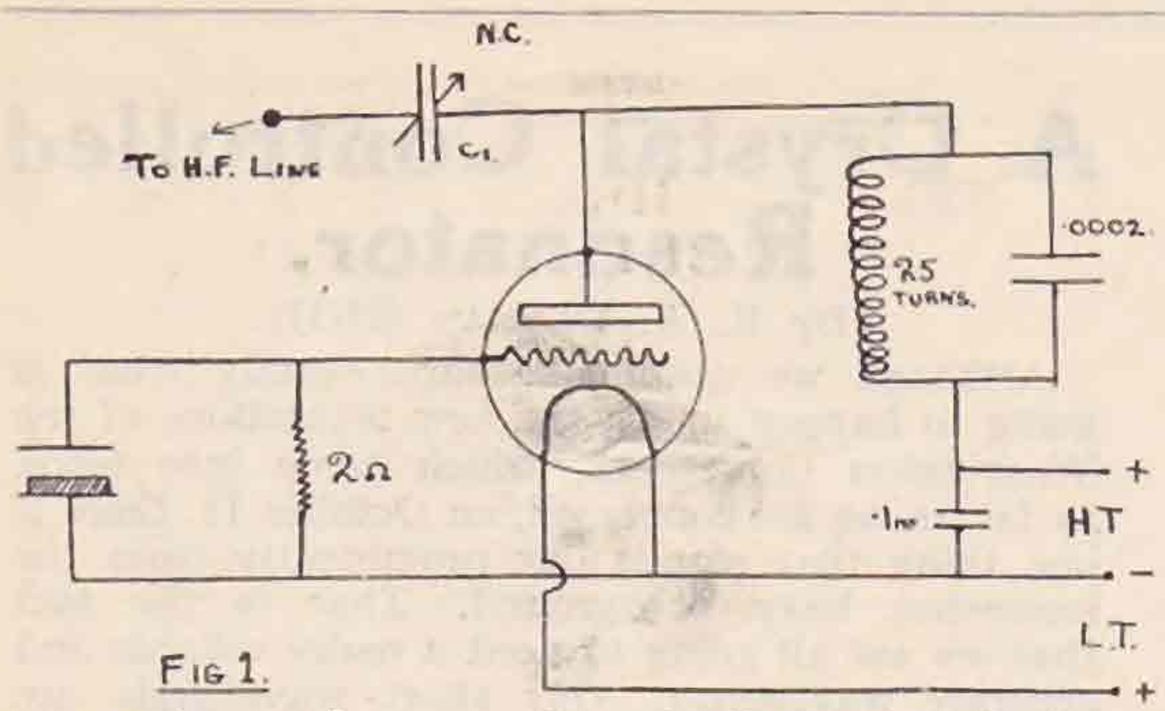


Fig 1.

megacycles, and so on through the scale. It is important to remember that these harmonics are *not* produced by the crystal, which has no harmonics, but by the valve. It is obvious that by the time we get to our amateur bands, these harmonics will be very useful for the purpose of checking our wavemeter, but it is also certain that they will be rather weak by the time we have reached the region of 7 and 14 megacycles, where our principal amateur bands are situated. It is possible to overcome this difficulty by the use of a r.f. transmission line, as will be shown later on in this article.

Turning now to the practical side, we find that there are at least two ways of connecting the crystal in circuit to control the frequency of the valve. The first is to connect the two plates of the crystal holder to the grid and plate of the valve, with a tuned circuit in the plate—H.T. lead. This circuit is perfectly practical and reliable, but it has one great disadvantage, in the fact that if the two plates of the crystal holder are accidentally short circuited, the H.T. battery is also short circuited, through the grid bias resistance. The other circuit is the one that is more generally used, in which the crystal is connected across the grid and filament of the valve, the tuned circuit being included in the plate circuit as before. This circuit is shown in Fig. 1. In this case the plate circuit must be tuned to a slightly higher frequency than the fundamental of the crystal.

At 2NH the whole apparatus is mounted on a baseboard measuring 9 ins. by 7 ins. The practical lay-out is shown in Fig. 2, the value of the components being as follows: The bottom crystal plate consists of a piece of brass or copper plate about 2 ins. square that is screwed direct to the baseboard. The top plate is slightly smaller and is also screwed to the baseboard along one side, although in this case two washers are inserted between the baseboard and the plate so that the plate is about $\frac{1}{8}$ in. higher than the bottom one, and directly over it. The diagram should make this clear, and in any case any type of crystal holder that has been described in the Bulletin or QST is quite as good, if not better! The grid bias resistance is not at all critical, and can be any value between $\frac{1}{4}$ and $\frac{1}{2}$ meg.; in fact, it can often be omitted altogether. The anode coil is an ordinary commercial 25 turn coil, mounted in a baseboard mounting single coil holder. This coil is tuned by a condenser, and as the tuning is not at all critical it is convenient to use a fixed condenser in this position. In my own case I use a Loewe cartridge condenser, as this being a plug-in arrangement allows of a quick change of capacity if desired. The .1 mf. condenser is merely a by-pass condenser across the H.T. battery. It also serves as a convenient place for terminating the flex leads that go to the H.T. The latter is mounted on the baseboard itself, and in my own case is a 30-volt dry battery. The condenser C1 is for use when using a H.F. line to connect the oscillator to a receiver. The capacity should be about .00005 or near abouts. A neutralising condenser is quite suitable in this position.

If desired the whole oscillator can be enclosed in a glass case, such as was described by friend 7MT in the description of his receiver in the July issue of the Bulletin. I have got the glass, but the case is not made yet!

In the theoretical discussion above I suggested the frequency of 1 m.c. for the crystal, but this is by no means the essential or even the best frequency to select. Probably the best frequency is 1,750 k.c., as in this case a harmonic will be found that marks the lower frequency limit of each of our new wave bands, *i.e.*, 3, 5, 7, 14, and 28 megacycles. This, of course, ignores the 56 m.c. band, which, up to the present at any rate, has not been of much use to us, and also the 2 m.c. band. However, in this case the fundamental of the crystal comes within this band, so it is still available for checking purposes.

One important thing to remember is that the whole dependability of the apparatus depends on the absolute correct fundamental of the crystal being known in the first place. Therefore, it is advisable to have this checked against a crystal, the frequency of which is accurately known. Personally, I shall be pleased to check any crystal that is ground to the fundamental mentioned (1,750 k.c.). Another way of checking it is to set up the oscillator with the crystal in place. Listen in on the short wave receiver until a harmonic is found. Measure this harmonic on a wavemeter that is known to be accurate. Then tune up carefully until the next harmonic is heard. Measure this carefully also. Then subtract the frequency of this harmonic from the frequency of the first one found. The resultant figure is equal to the frequency of the crystal. To quote an example, we will say the first harmonic we found was on 9,000 k.c. Tuning up we find the next harmonic on 7,500 k.c.; subtracting one from the other, we get 1,500 k.c., or, in other words, 1.5 m.c., and this is the fundamental frequency of the crystal in use. With this method, however, the degree of accuracy is no better than that of the wavemeter used, so it is better to have the crystal checked against a standard one, if this is at all possible.

Although the method of using the oscillator or

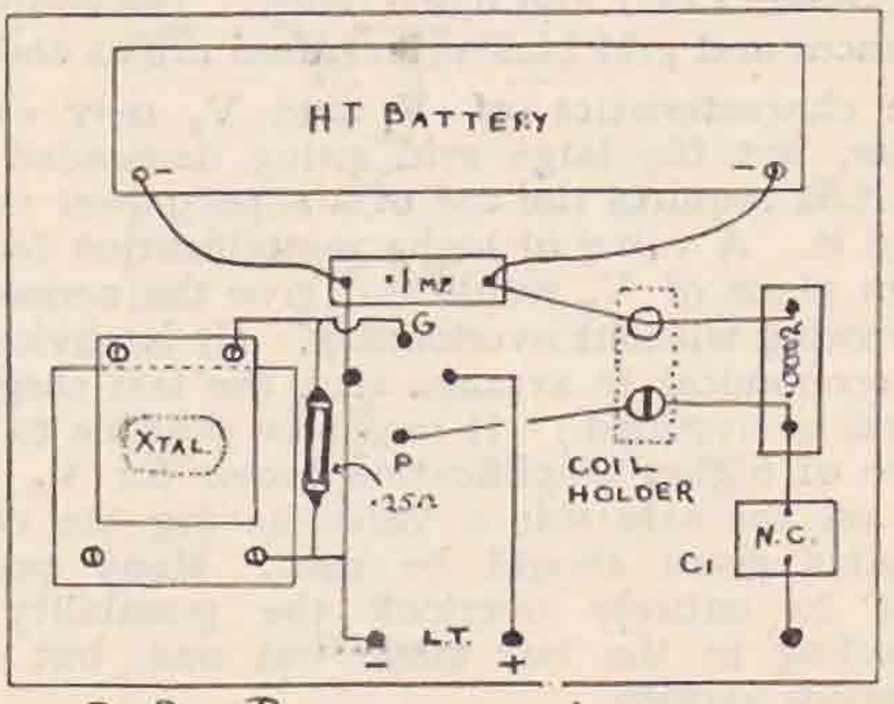
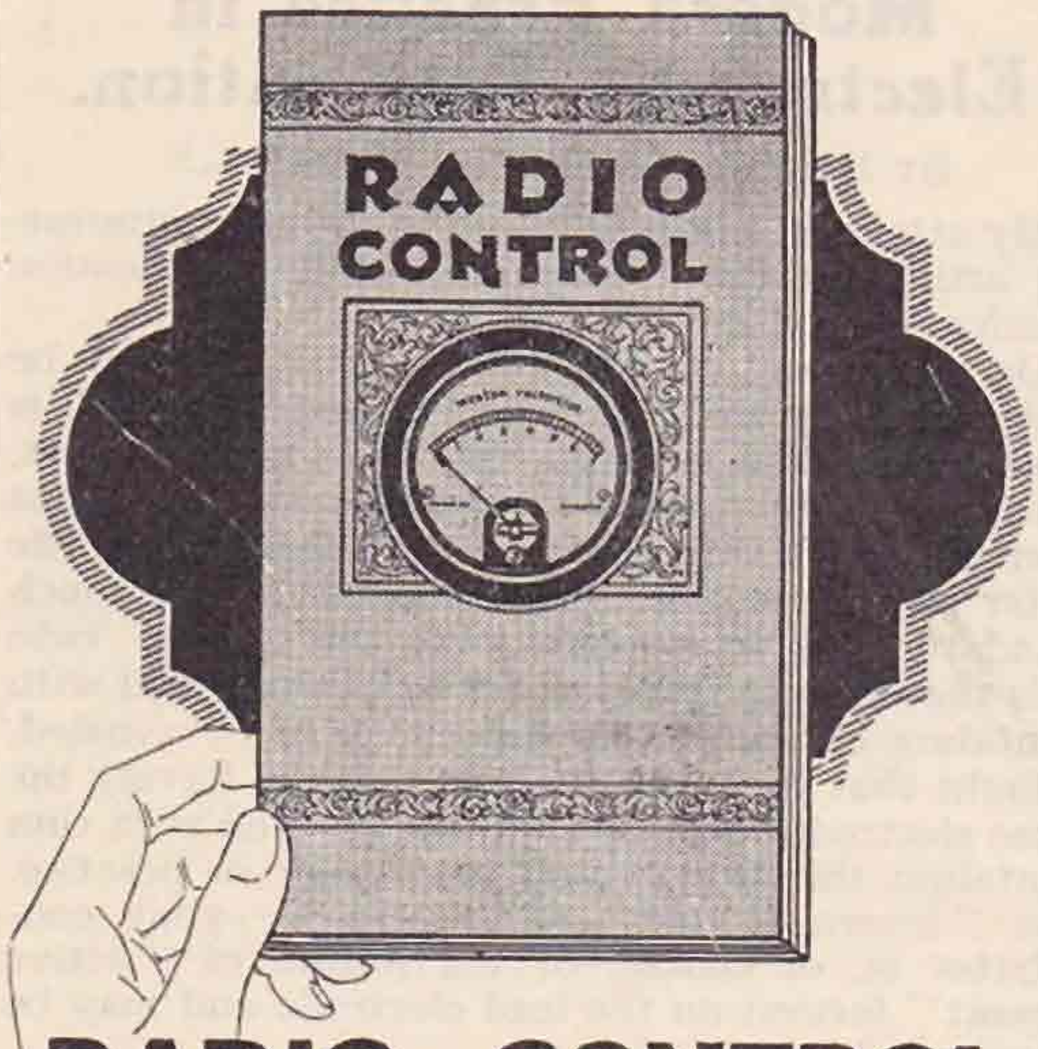


Fig 2. Practical Layout



RADIO CONTROL BOOKLET—Free!

Every radio amateur requires an authoritative guide to the correct electrical operation of his receiver. Here you have the opportunity of obtaining such a booklet entirely free. Just fill in and send the coupon below and a copy will be sent to you by return.

"Radio Control" has been prepared by the Weston Electrical Instrument Co., Ltd., who, for the past 30 years, have been universally acknowledged as the leading manufacturers of accurate electrical measuring instruments. Since the inception of radio the Weston Company have examined carefully every phase in its development and with each succeeding stage of progress have designed and produced appropriate instruments to assist the efforts of radio engineers.

Now the result of many years' radio experience is placed at your disposal. "Radio Control" will show you definitely how appreciable economies may be effected in the operation of radio receivers and how improved reception may be obtained at the same time.

To-day is not too soon—cut out and post the coupon now.

WESTON

STANDARD THE WORLD OVER

Pioneers since 1888

WESTON ELECTRICAL INSTRUMENT CO., Ltd.

15, GT. SAFFRON HILL, E.C.1.

Application for free copy of booklet "Radio Control" from

NAME.....

ADDRESS.....

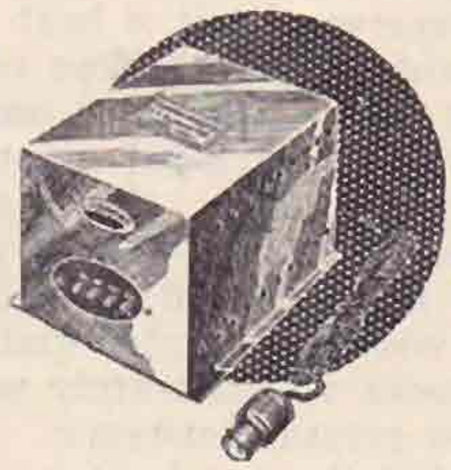
.....

T. & R

SEND US THE COST OF YOUR NEXT H.T. BATTERY!

Dunham De Luxe full wave rectifier 40-45 m/a. 60, 80, 120 volts. 12/6 secures delivery & 12/6 monthly.

Cash Price, 7 gns.



Dunham Senior. ½ wave rectifier, 20m/a. 40, 60, 80, volts. 10/- secures delivery & 10/- monthly.

Cash Price, £5 18 6.

The Dunham Eliminator is supplied for less than your next high tension battery will cost you. It will operate any type or make of set and the amount of current used is negligible.

OUTSTANDING FEATURES:

PROTECTING ISOLATING TRANSFORMER. INTERNAL FUSES PROTECT YOUR HOUSE WIRING CABLES. BEAUTIFULLY FINISHED GLOSSY ENAMELLED IRON SCREENING CASE GIVES FULL SAFEGUARD AGAINST POSSIBILITY OF FIRE AND IS EFFECTIVE SCREEN PREVENTING INDUCTIVE INTERFERENCE TROUBLES.

See these eliminators on Stand 257 at Olympia. Full descriptive leaflet of both eliminators free on application

C·S·DUNHAM

(Late Radio Engineer to Marconi Sc. Inst. Co.) Member of the B.B.C. since its inauguration

ELM WORKS, ELM PARK, BRIXTON HILL, LONDON, S.W.2

ANNOUNCEMENT

The famous Loewe Radio Multiple Valves and Sets will be made at our Tottenham Factory immediately we have trained the necessary staff and labour.

These Valves have been a great success on the Continent and will no doubt be equally favoured by the British public.

Watch for our further announcements in the Radio papers. We will advise you when it will be possible to purchase these Valves

LOEWE RADIO COMPANY, LIMITED,

4, FOUNTAYNE ROAD, TOTTENHAM, N.15.

Tel. Tottenham 2076.

resonator is obvious to most people, I will give a few words of explanation for the benefit of anyone who may be in doubt. First of all the oscillator should be placed about a yard away from the short wave receiver, and then switched on. Search round on the receiver until a beat note with the oscillator is heard. Then slacken off the receiver reaction until it has just stopped oscillating. Now switch on the wavemeter, and adjust the condenser carefully until you hear the wavemeter note beating with the harmonic of the crystal oscillator. Tune carefully until the silent point is reached, and then take your wavemeter dial reading. Let us hope this checks up accurately with the known frequency of the crystal harmonic. If it does not, you will know that the wavemeter is off calibration and you have soon learnt how useful the crystal resonator is going to be to you !

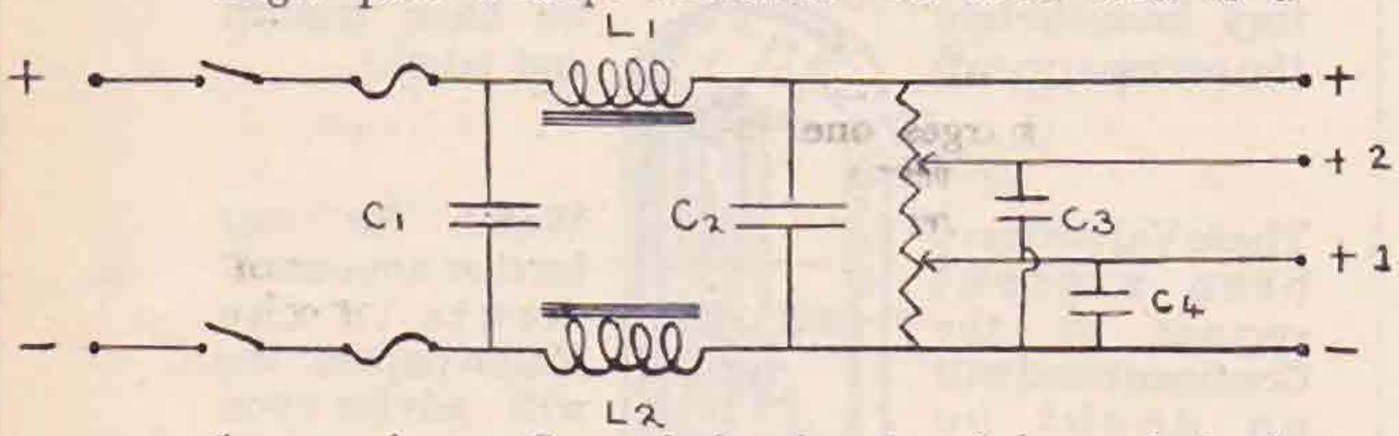
If you find the higher frequency harmonics of the crystal are rather weak in the receiver, it is advisable to use the H.F. line previously mentioned, to bring them up to strength. This is done by running a wire from the neutralising condenser on the oscillator, direct to the grid of the detector valve in the receiver. By transferring some of the energy to the receiver in this way it is possible in my own case to hear each harmonic right up to the 20th, which is the limit to which my receiver will go. Go ahead, OM ; you will never regret the time spent on the job.

Using D.C. Mains for H T. on a S.W. Receiver.

By BRS147.

I have just fitted up my short-wave receiver to work off the D.C. mains. Perhaps an account of the apparatus used and the results obtained will be of interest to some people.

The mains are connected to the receiver via two single pole 3-amp. switches. In each lead is a



1-amp. fuse. One choke is placed in each lead. The chokes L1 and L2 are home-made and have an inductance of approximately 50 henries. Each choke consists of one pound of No. 36 D.S.C. wire. The core is 1″×1″ "stalloy," with an air gap to prevent saturation. The potential divider was obtained from Messrs. F. C. Heyberd & Co., and has a resistance of 25,000 ohms. The condensers C1 and C2 are each of 6 MFD capacity and capable of withstanding 1,000 volts. C3 and C4 are 2 MFD condensers rated 800 volts A.C. test.

The tappings on the potential divider are so arranged that + 1 gives 60 volts and + 2 120 volts, but other voltages may be obtained as desired.

The receiver is an orthodox detector and 1 L.F. using a P.M.4 as detector.

I am rather surprised that there is no trace of hum whatsoever

For safety a 2 MFD condenser is included in the earth lead from the receiver. This is very important.

Modern Practice in Electrolytic Retification.

By Benedict H. Rolfe, M.A., F.C.S.

My attention has been called to the most interesting article on low tension Tantalum rectification which appeared in your July issue.

On the ground covered there is little that can be added usefully to the article in question, which is most concise and most practical. In normal cases, perhaps, the more usual twin cells have advantages over the single three-electrode cell described. The latter is quite current—it is indeed used in much standard apparatus—but with the double twin cells the temperature is easier to control ; and with Tantalum excess of temperature is to be avoided. I doubt that there is any great point in having the three electrodes exactly equidistant—and with thin Tantalum this is not easy to arrange in practice. The "brown sludge" mentioned by your contributor is, of course, of the nature of "active deposit" formed on the lead electrode and may be disregarded.

The article raises one most interesting matter, *i.e.*, the "hum," which is sometimes audible in receiving apparatus when an accumulator is being charged during audition. Assuming (as one would do) that the electrolytic conditions are such as to preclude all possibility of "sparking," this seems to depend on circumstances which are somewhat imperfectly understood. With some main supplies no noise can be detected—even in the head 'phones. With others—having theoretically identical potentials and periodicities—there is a constant rhythmic hum. Other mains, normally silent, suffer from occasional disturbance. The simple remedy is to have a switch on the primary mains circuit, and to cut this out if disturbance is noted.

Your contributor is entirely right in suggesting that modern electrolytic methods have progressed far beyond the simple and most useful case cited by him. Much has appeared in print on this subject—a great deal of which is somewhat discursive and, perhaps naturally, more concerned with the constructional niceties advocated by the author than with the real problem to be undertaken. I do not wish to belittle the importance of constructional detail. But it is quite as important to know, generally, what an electrolytic arrangement

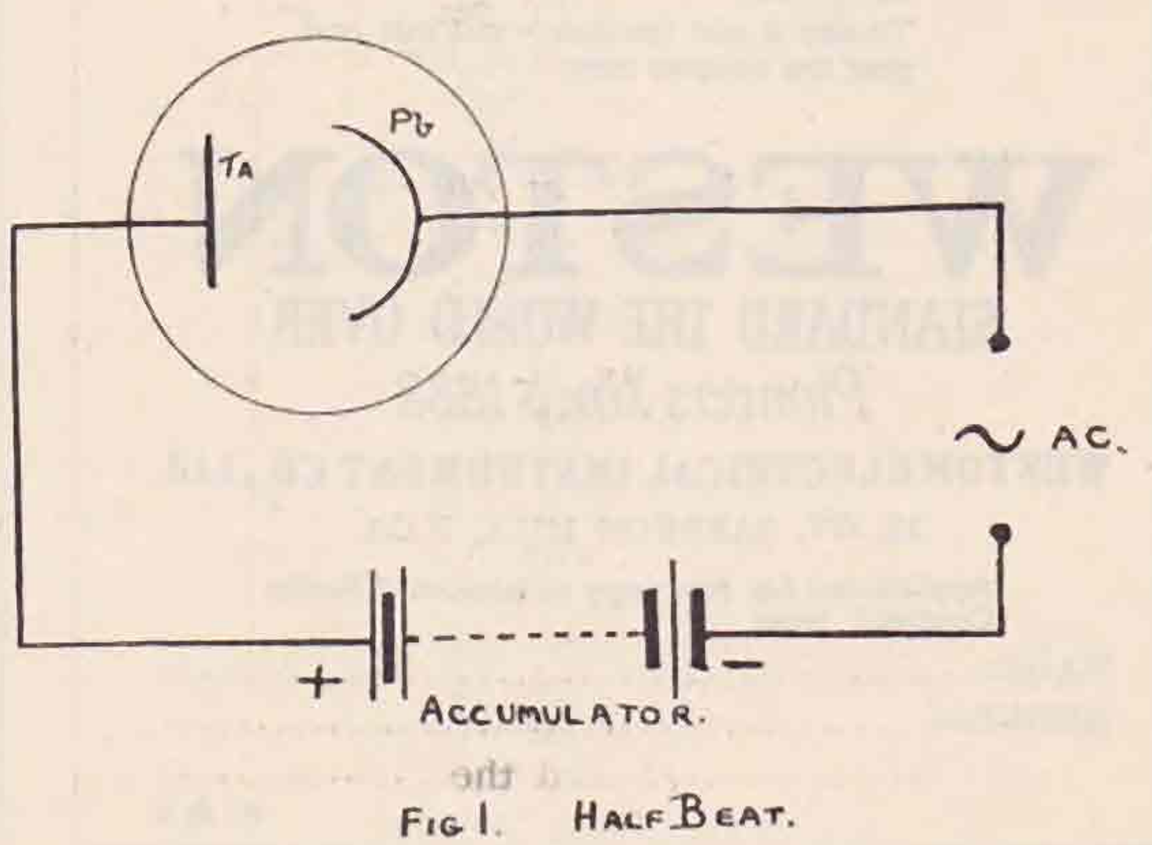


Fig 1. Half Beat.

may, or may not, be expected to do. A short statement of the whole position may therefore be of interest.

As far as the present writer is aware, no really novel electrolytic circuit has been described since the time of Noden. What has been done in recent times is to substitute for the aluminium used by Noden certain other "active" agents which are infinitely more convenient in practice. Aluminium is a first-rate rectifying agent. Unfortunately, it necessitates the use of electrolytes containing large percentages of fixed salts and, consequently, obnoxious in the highest degree. The modern "active" agents, of which Tantalum itself is the best known popularly, permit the use of ordinary dilute "battery acid" as electrolyte. This has no disadvantages, and every accumulator user is accustomed to handling it. Further, and this is again a material advantage in practice, the new "active" agents will pass over twenty times as much current per unit of electrode area as aluminium.

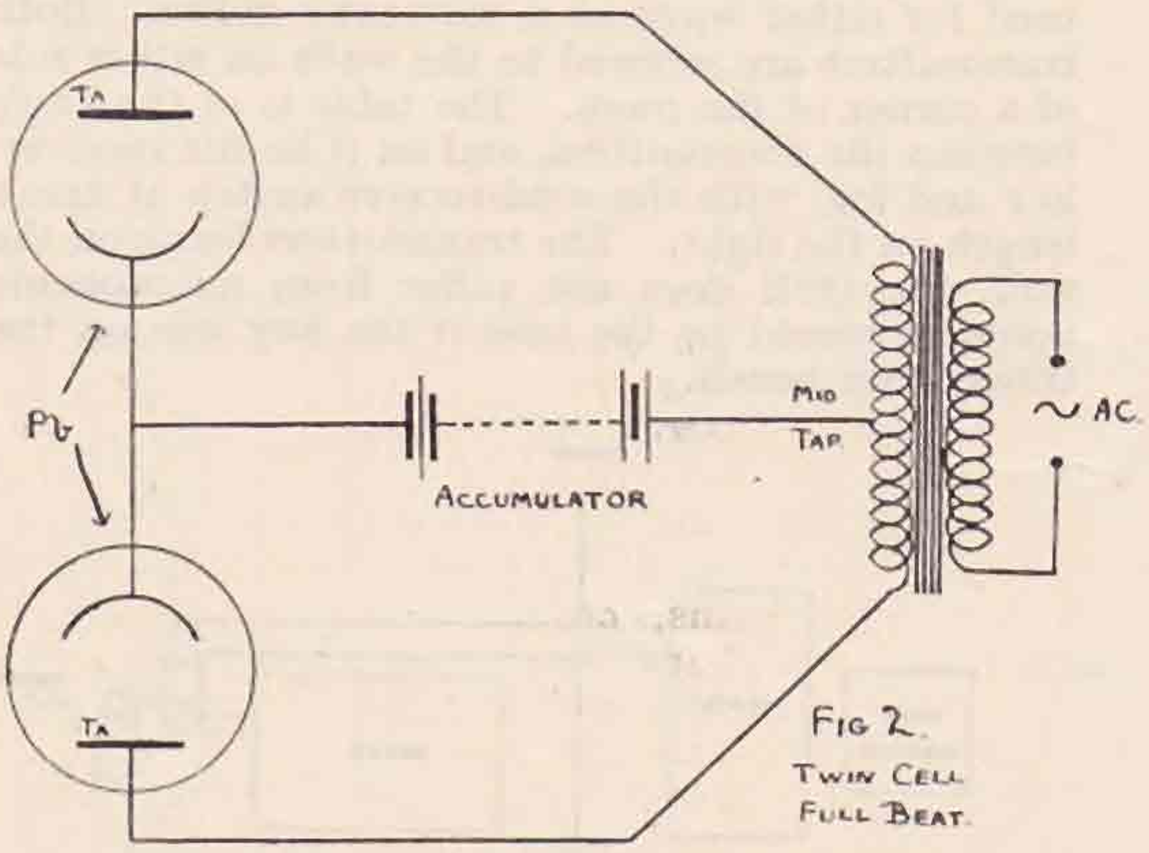


FIG 2. TWIN CELL FULL BEAT

All modern electrolytic cells follow exactly the lines laid down in your article in the July issue, and should observe the prescriptions so clearly enjoined therein concerning the protection of the external portions of the electrodes and connections thereto. The normal cell consists, of course, of two electrodes only—one "active" and one lead—and varies in size according to the volume of rectified current needed. As a rough guide, three-quarters to one square inch (one side) per ampere may be taken, *submerge* area. This is on the generous side, but it is a case in which generosity may save much subsequent trouble.

All circuits in practical use will be found to fall into one of the four main groups typically illustrated herewith. Fig. 1 shows the original "half beat" circuit, little used to-day except for trickle charging and in certain very special cases where small currents at very high potential are required. These special cases cannot be dealt with here. It should be noted that this arrangement offers the maximum opportunity for realising the troublesome phenomenon known popularly, if incorrectly, as "back E.M.F." In all the other arrangements it will be observed that at any moment a double path is open to the current—one of which offers a high resistance to the current and the other a very low one.

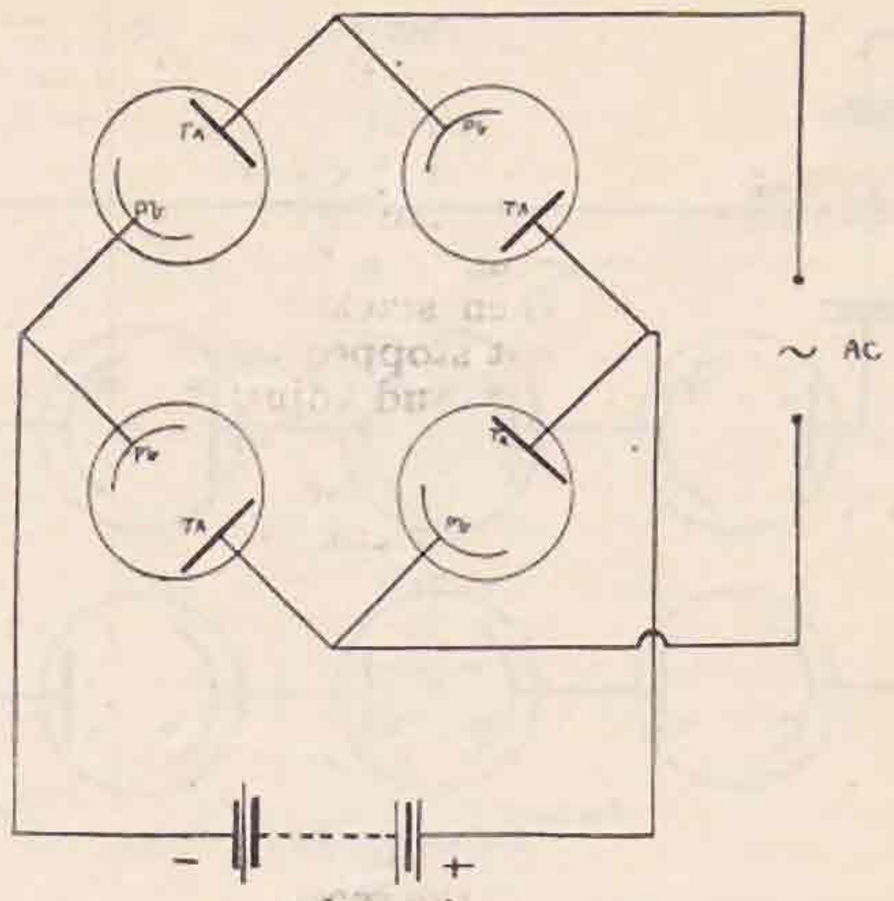


FIG 3. BRIDGE FULL BEAT

Fig. 2 shows the normal low tension arrangement as described by your contributor, but in the more customary twin cell form. This necessitates a mid-tapping on the transformer secondary, which latter must give, over outers, *double* the potential needed for rectification.

Fig. 3 shows the "bridge" system in which the mid-tapping of the transformer secondary is replaced by a suitable arrangement of four rectifying cells. This is extremely useful in certain cases, is very efficient and is much employed.

Fig. 4 indicates the "differential" circuit, perhaps the most widely used of all arrangements employed for the charging of small capacity high-tension accumulators. In this system the rectifier itself is mid-tapped, and also the accumulator block, leads from both these points being taken to the A.C. mains. Three small cells in series on each "leg" of the rectifier are generally sufficient to deal with any ordinary mains supply. In this method both alternations of the A.C. are fully employed in the charging operation, but one alternation charges one half of the accumulator block, and *vice versa*. While this method is, as stated above, in very general use for H.T. charging, most excellent results are reported from the use of the "bridge" method—a sufficient number of cells being placed in series on each arm of the bridge.

In laying down any of the above systems two main considerations arise, *viz.*, safe limit voltage and cell resistance, the latter determining the voltage drop to be allowed for in any necessary calculation.

Limit voltage arises out of an important consideration. All rectifying agents have what is sometimes called a "disruptive" point, *i.e.*, a critical voltage beyond which they cease to rectify partly or entirely. In the case of metallic tantalum this point is generally considered to occur somewhere between 33 and 37 volts. It is a purely physical function varying with the molecular structure of the individual specimen of metal. Where, as in H.T. charging, it is necessary to impress higher voltages on the rectifier resource is had to cells *in series*. It is difficult to lay down any hard-and-fast rule as to the exact number of series cells so required in a given case. It is usually *less* than the theoretical number, and seems to depend somewhat on the characteristics of the mains supply. As a general rule it has been found that

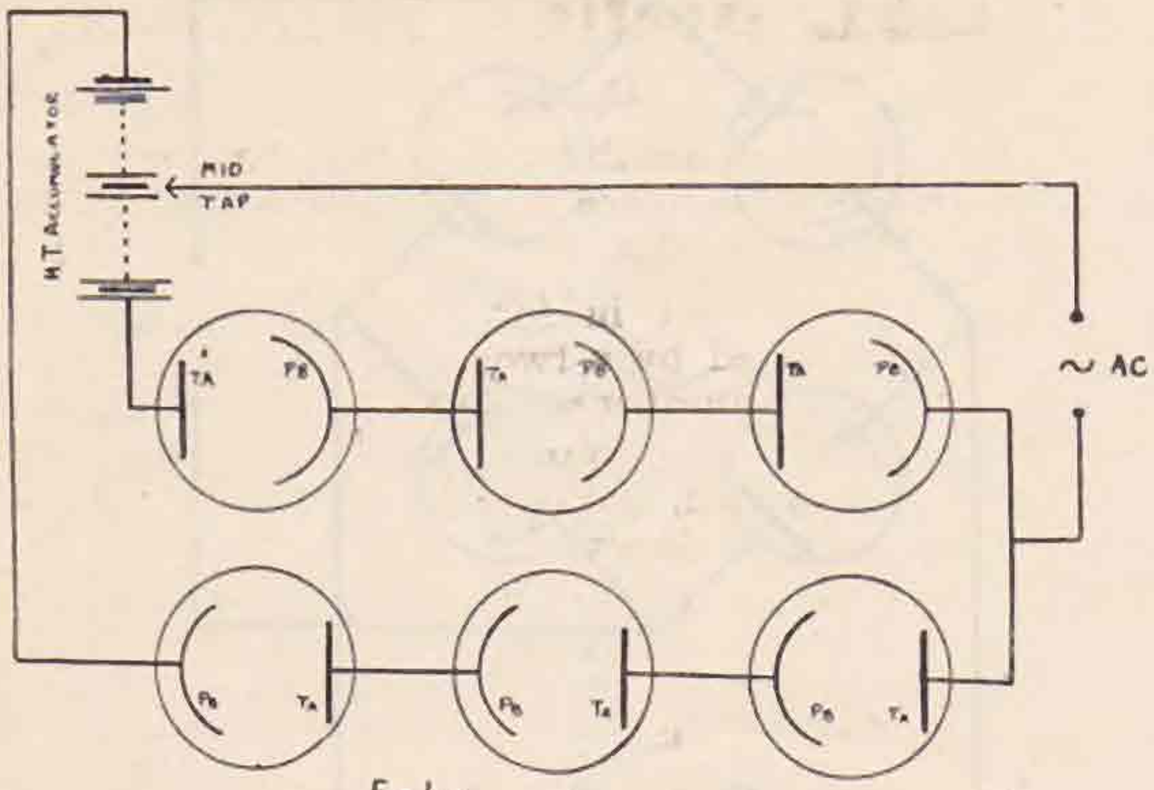


FIG 4.—DIFFERENTIAL BEAT.

three to four cells on each "leg" of a differential system, or six to eight cells on a "half-beat" system, are sufficient to deal with main service supplies in this country.

Cell resistance is important in determining the output voltage in rectified current. The normal Tantalum cell will be found, singly, to entail a drop of about 3.5 volts. When a number of such cells are used in series this figure will fall slightly, probably to about 3.25 to 3.3 volts per cell. Owing to the difficulty of making a first-rate electrical joint between Tantalum and any other metal (at any rate in amateur hands) it is wise to allow a very small further margin. But in no case should such resistance entail a drop exceeding 4 volts maximum.

Electrolytic methods are greatly used now when it is desired to produce, inexpensively, currents having distinctly larger volume than those afforded by "dry" or "valve" methods. Where comparatively large currents are required, and consequently large electrodes, Tantalum may be replaced advantageously with certain alloys which are, incidentally, a good deal easier to handle. Tantalum is a costly material and, no doubt in consequence, the custom of using sheet 0.08 mm. thick is widespread. The use of sheet 0.15 mm. thick would well repay the extra expense.

In conclusion, mention should be made of the use of rectified current for the supply to moving coil loud-speakers, and also of the adoption of the electrolytic system to the supply of high voltage anode current for transmission. The latter is a most useful field for experiment, and much hopeful work has already been accomplished.

Station Layout.

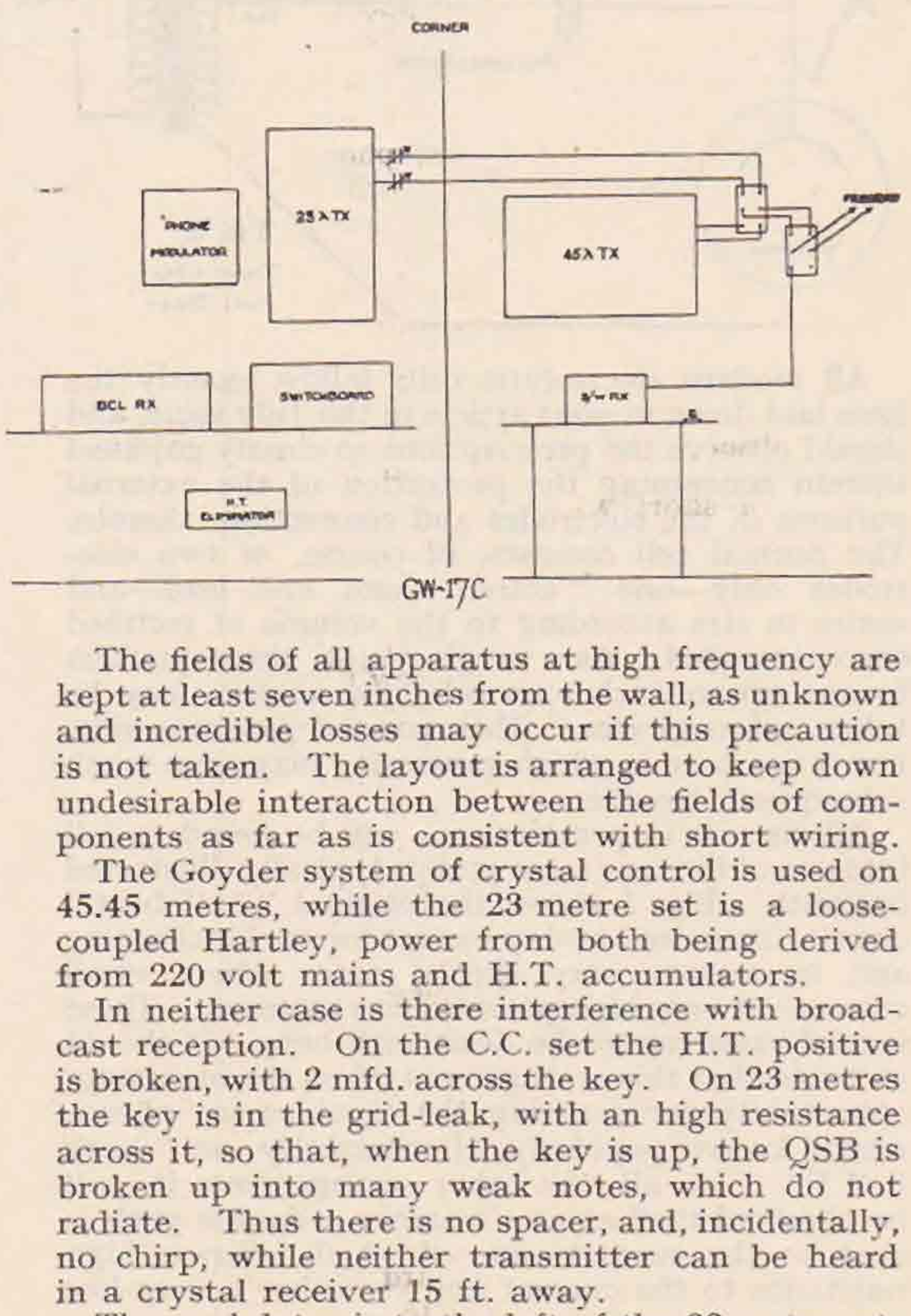
By J. BURLEIGH SCOTT (GW17C).

Awarded First Prize for this subject in the Essay Competition.

Every amateur has somewhere in mind the picture of an ideal station, but there is, and rightly so, a diversity of opinion as to what that ideal should be. If each station was constructed on exactly similar lines to the neighbouring one, there would be no opportunity of showing originality in design: without originality we would be curtailed in our experiments, and many interesting facts one discovers in the ordinary way might never come to light. The writer's ideal station is one where entire control of all apparatus may be had, without moving from the operator's seat, the transmitters and receivers being erected permanently and securely, but in such a manner that they are easily accessible should adjustments be necessary. By "permanent" I mean that the sets are sufficiently well made that they can be relied on to work efficiently when next one sits down to the key.

Most amateurs, unless the proud possessors of a shack, must build their apparatus to fit in with domestic arrangements, as is the case at GW.17.C, but it is hoped to make clear how a low-power station can be designed to occupy a small space and yet lose no efficiency through overcrowding.

The aerial is a half-wave 45-metre Zeppelin, which gives better results than other Hertz and Marconi aerials tried; it can confidently be recommended. The feeders are brought to a D.P.D.T. switch, one side of which goes to the receiver, the other to another switch of similar pattern. The 45 and 23 metre transmitters both are connected to the second switch, and thus the aerial may be used for either wave at a moment's notice. Both transmitters are screwed to the walls on either side of a corner of the room. The table is in the angle between the transmitters, and on it lie the receiver, key and log, with the send-receive switch at arm's length on the right. The transmitters being on the wall, the QSB does not suffer from microphonic noise, as would be the case if the key was on the transmitter bench.



The fields of all apparatus at high frequency are kept at least seven inches from the wall, as unknown and incredible losses may occur if this precaution is not taken. The layout is arranged to keep down undesirable interaction between the fields of components as far as is consistent with short wiring.

The Goyder system of crystal control is used on 45.45 metres, while the 23 metre set is a loose-coupled Hartley, power from both being derived from 220 volt mains and H.T. accumulators.

In neither case is there interference with broadcast reception. On the C.C. set the H.T. positive is broken, with 2 mfd. across the key. On 23 metres the key is in the grid-leak, with an high resistance across it, so that, when the key is up, the QSB is broken up into many weak notes, which do not radiate. Thus there is no spacer, and, incidentally, no chirp, while neither transmitter can be heard in a crystal receiver 15 ft. away.

The modulator is to the left of the 23 metre set,

and, like the actual transmitters, is built into a frame. Underneath is the switchboard, used for changing to telephony, varying the power input, changing wave-length, or switching on the transmitters, all of which may be done from the operator's chair; the change from 45 to 23 metres takes less than 40 seconds.

A slightly modulated DC note is used on 23 metres, and has been found to have better readability than pure DC. The buzzer contact-breaker is connected to a 100-turn high-frequency choke, wound on a 1 in. test tube, and mounted on the frame of the transmitter. A position was found which gave sufficient modulation to take away the dead softness of pure DC. Do not make your note bad ICW, which spreads and causes interference with others! Very slight modulation gives better results, with no QRM!

The 8 metre transmitter is a series-fed Hartley, with which, on an input of 3 watts, some local work of a few miles range has been carried out. The first Inter-GW telephony and CW work was done with GW13D, whose choke-control telephony was as nearly perfect as an amateur could make it. The aerial at 17C is a full-wave 8 metre Zeppelin, the feeders of which are stretched between strips of ebonite on a pole. The set is not permanently mounted like the others, but can be set up in about five minutes.

If one has DC mains in the house, use them for receiver H.T. It is a boon, constant, and not likely to fail. An eliminator, with 10-watt lamps as potential dividers, Ford spark-coils as chokes, and 4 mfd., give perfectly smooth H.T. supply for all receivers at this station, but keep the eliminator some feet, at least, from the receiver.

Jacks are used for the keys, 'phones, H.T. supply, loud-speaker, and in many other places. They permit of rapid changing-over, and look very neat.

The short-wave receiver is a R.F.B., with a variable condenser of 0.00025 mfd. capacity, across the reaction coil. This circuit, after many tests with others, has been found the most flexible, and the easiest completely to remove hand-capacity from, and the results it gives leave the Reinartz receivers that I have heard far behind. To listen on BC or short waves the only switching that is necessary is the aerials, as the two sets have separate H.T. and L.T. supplies.

All QSL cards are stuck to 4-ft. lengths of old wallpaper, and fixed to the wall with drawing-pins. If any change is necessary a few minutes' work will do what would take hours if each card was pinned up separately. In any case, put the cards up straight, not every way, as many photographs of amateur stations show.

I shall conclude by saying that if one builds each piece of apparatus carefully, with as good components as are available, mounted so that the individual parts which go towards making an amateur station can be used again and again with the minimum of trouble, the hobby of short-wave transmission will take a great deal of beating, both from an experimental point of view and also that of making new friends, whom, it is true, one may never shake hands with physically, yet do so regularly through the medium of amateur radio.

Thus GW17C is making many friends, near and distant, and is looking forward to seeing the other operators at some future date.

QSL Section Facilities

By 5AD.

This section is for the use of members only, and it is proposed to place the following regulations before the Convention:—

1. All cards sent in for distribution shall be accompanied by a twopenny stamp, irrespective of the number of cards or their destination.
2. Cards not accompanied by a stamp shall not be forwarded, but returned in one of the sender's envelopes.
3. That envelopes sent in for the forwarding of cards shall not be smaller than 4½ ins. by 6 ins. (This is important, as it saves a considerable amount of time.)
4. In the event of there being no envelopes for a particular member, the cards be filed and a notice sent to him at the end of each month requesting envelopes and a fee of sixpence in stamps.
5. To ensure that this section is used by members only, as far as possible, periodical inquiries will be made as to senders.
6. Non-members sending envelopes for their cards enclose 1d. stamp as fee for each envelope sent.

Now as to how this section is run. At the receipt of each post the cards are sorted into their respective racks. Those for foreign countries are sent off each week. This means every country in the world, except France, with which country an arrangement has been made that the cards are exchanged by hand each month. This saves a considerable amount of postage.

Cards for G members are distributed when there are approximately 200 waiting, as I have found from experience that this is the best scheme, although if a member wants his cards he has only to say so. In the summer, or slack time, this means distribution to G's about every fortnight, but in the busy season about every five days. A word now about the 2d. stamp. It will be realised that if every member can send to every country any number of cards he likes for that one stamp, he saves a lot of spare cash, and also saves the Society a bill of something like £20 a year, which the Society is not in a position to be burdened with.

Several members are good enough to enclose more than one stamp, and if it were not for that the section would not pay for itself, but it is not fair to leave it that way. It must be remembered that postage is not the only expense, good quality envelopes have to be bought to send the foreign cards in.

I do not accept any packet on which excess postage has to be paid. The inland postage rates are: Not over 2 ozs., 1½d.; not over 4 ozs., 2d.; and ½d. for each 2 ozs. after.

Trade Notice.

We have received from the Igranic Electric Co., Ltd., an advance list of some of the components they will be exhibiting at the Exhibition. We hope to refer again to some of the items, particularly those adapted to short-wave working, in our next issue.

Calibration Waves.

Calibration waves will be transmitted from 5YK on September 23 as follows :—

13.00 G.M.T., 46 metres (nominal).
13.05 ,, 45 ,, ,,
13.10 ,, 44 ,, ,,

A similar schedule will be transmitted on October 14 at 10.00 G.M.T. The call is R.S.G.B., DEG5YK, and the exact wavelength announced at each change.

If official permission is obtained, a second schedule will be transmitted on October 14 :—

10.20 G.M.T. 7,050 K.C.
10.25 ,, 7.250 K.C.

At the end of the first schedule listeners will be told whether to expect the second schedule or not.

NOTICE.

Some difficulty has been experienced latterly in obtaining call-sign brooches, owing to our original firm having gone bankrupt. The Sales Department have now obtained a satisfactory tender, and can execute orders at the old price, 2s. 6d. each. Please send your orders to Headquarters.

Social Notes.

No effort is being spared to make the Third Convention a complete success. Applications for the dinner have come in well—the cost is five shillings. This function will be informal throughout, and we hope that our provincial friends will return to their homes feeling that London can still lead the way socially.

* * *

Our appeal for photographs has been most gratifying, and we thank all those who have obliged, but we can still find room for a few more on the Olympia stand, so hurry along all those who have a photo and let us see your hook up.

* * *

It has been very pleasing to meet the various foreign and Colonial amateurs who have been in London recently, and we again draw the attention of all visitors to our country to our invitations to get in touch with us on their arrival.

* * *

The following has been received from 5MU :—

" Whilst testing on 45 metres during the afternoon of July 17 I was asked by 2ZC to QSR a message of greetings to the London Area Hamfest from 2WR and 2CX, who were in Jersey.

" I QSR'd this to 5BZ, who QSR'd it to GC5JB, who sent it to GC6KO, and good old 6KO sent it to P1BX, who put it on to 5BZ again ! !—but 5BZ was now on 23 and the time four hours advanced.

" I don't know how much further the message got, but I mention this case because for over two hours I had tried to raise a London station before I gave it to 5BZ. During that time no Londoner was heard."

We thank all those in the chain for their help, but *we did not get the message !*

J. Clarricoats,
Chairman Social Committee.

Contact Bureau.

By GI6YW.

Despite the holiday season, the number of new members of C.B. is quite up to normal, and I have to report the enrollment of the following :—G2SC, G6CI, G5ML, G6AT, G2HJ, G5YK, G6XP, G5WF, GW17C, G2BQK, BRS142. This brings our total membership to 114.

Group 1B on 10- and 8-metre work has been completed, and has commenced work. It consists of 5SY (Centre), 6RB, 6OH, 6PI, 5VL, and 6LL. 5SY has drawn up a fine scheme of operations, which includes co-operation with Group 1A, and I expect much from these two groups.

5YK will be Centre for Group 1c (8- and 10-metre work), and this Group is being formed at the moment of writing.

5UW's Group on " Hertz aerials " is almost completed, and I hope to have definite news of its composition for next month's Notes.

6XP has been finding many snags in crystal control, but after trying several circuits he found the one shown to be absolutely stable. He writes : " That by keying the H.T. to the PA, one gets rid of the crystal oscillator's carrier wave. Thus one gets a plain marking wave and nothing else."

He would like to have the ideas of others on this subject.

These Notes will appear too late to inform members of 5UW's tests from a motor cruiser on the Norfolk Broads, but I would ask anyone who received XG-5UW to send him a report.

GW17C send (two ops !) me some further experiences on the subject of " threshold howl " (referred to below as T.H.). Their receiver is a Reinartz plus one stage L.F. PM2 valves are used, and no attempt has been made to reduce T.H. by changing valves as signal strength suffered by the use of other 2-volt valves. H.F. chokes, 100 turns on a 1-in. test tube and spaced 1/16 in. or less, in each phone lead cut out T.H. on 25 metres and below if the howl was caused by " flat " L.T. But H.F. chokes in phone leads on 45 metres caused fierce T.H.

H.F. chokes in H.T. battery leads may reduce T.H., and these leads should be as short as possible or " blind spots " may be produced and bad T.H.

Low values of H.T. did not necessarily prove effective in reducing T.H., but a 2 mfd. condenser across H.T. terminals of set (not across battery, but across battery and leads) was very effective.

A 000.3 mfd. condenser and upwards across primary of L.F. transformer may produce, or may cure, T.H. On 23 metres this condenser eliminates hand capacity from tuning dials, but reduces signal strength somewhat, but not seriously.

17C suggests that a " blind spot " about 33.5 metres may give 2BWB his T.H. on 31 to 36 metres, and thinks that looser coupling would eliminate T.H. Possibly a " blind spot " caused by a defective H.F. choke will have the same effect. A variable grid-leak is always used at 17C, and they have never had a noisy one (I could supply one !—6YW.). They recommend a Lissen, and say that a high value reduces T.H.

Again a cheap transformer is recommended, and that the RX should be well separated from the TX. If too near, the circuits in the TX may produce

absorption, and consequently "blind spots" and T.H.

In one case, not at 17C, the reduction of grid-bias on the L.F. valve actually cured T.H., but this was ineffective at 17C!

The ripple from a home-made H.T. eliminator is often a source of T.H. trouble.

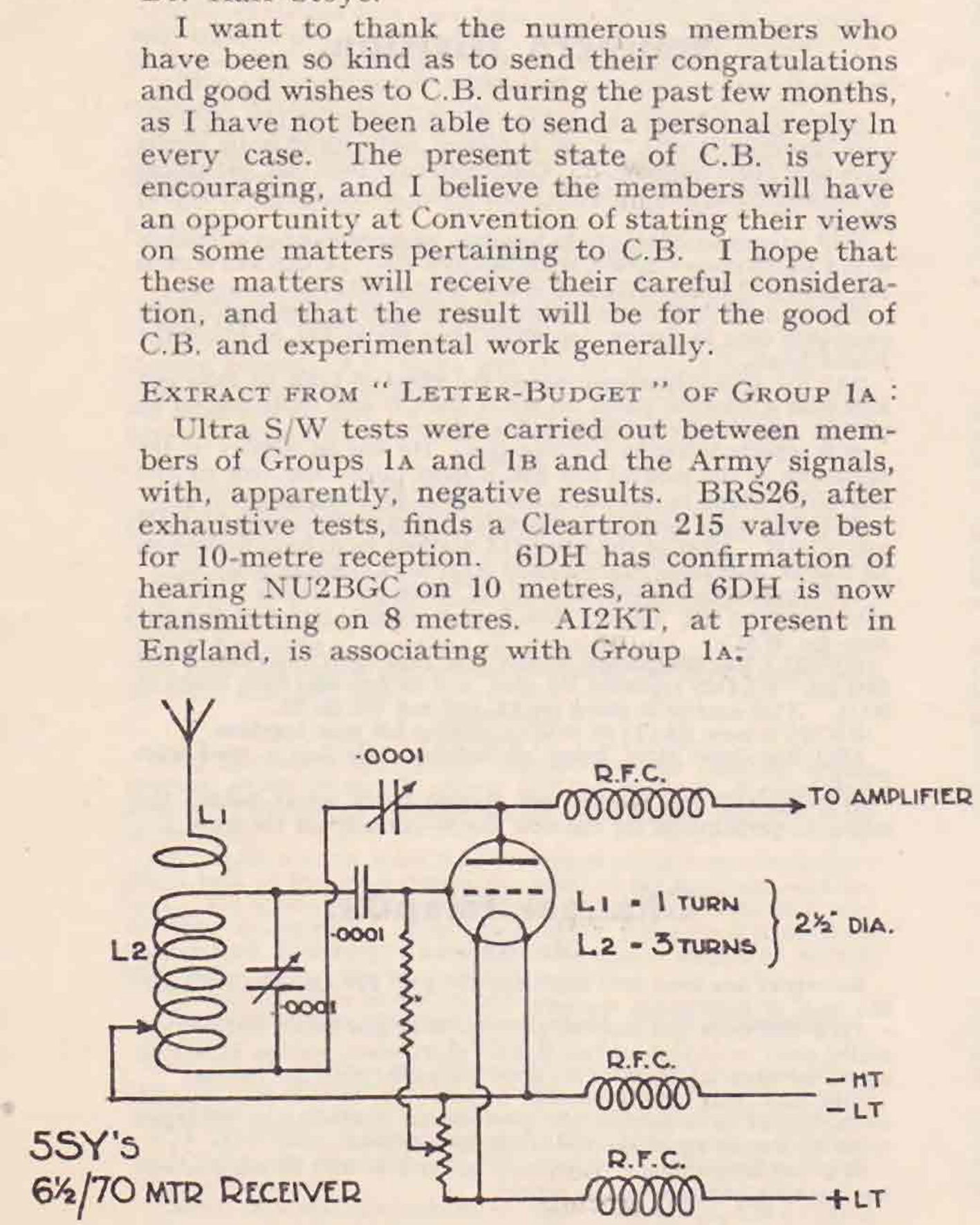
To what is the trouble really due? I want a Group or two to work on T.H., and give us some definite solution, if that is possible, and I think it is. Send your names on "plain post cards to reach me not later than first post on Mon"—"sorry Uncle André"—as you were, OM's—let me have the names for a Group or two and any further information you have on the subject.

5WF hopes to be making regular and frequent transmissions on 8 metres from the middle of September, and promises an article on his receiver which, it is claimed, received efficiently all waves from 5 to 5,000 metres. I should like to draw attention to an article on the effect of the atmosphere on short waves, which appears in the June issue of "CQ" (the D.F.T.V. journal) from the pen of Dr. Karl Stoye.

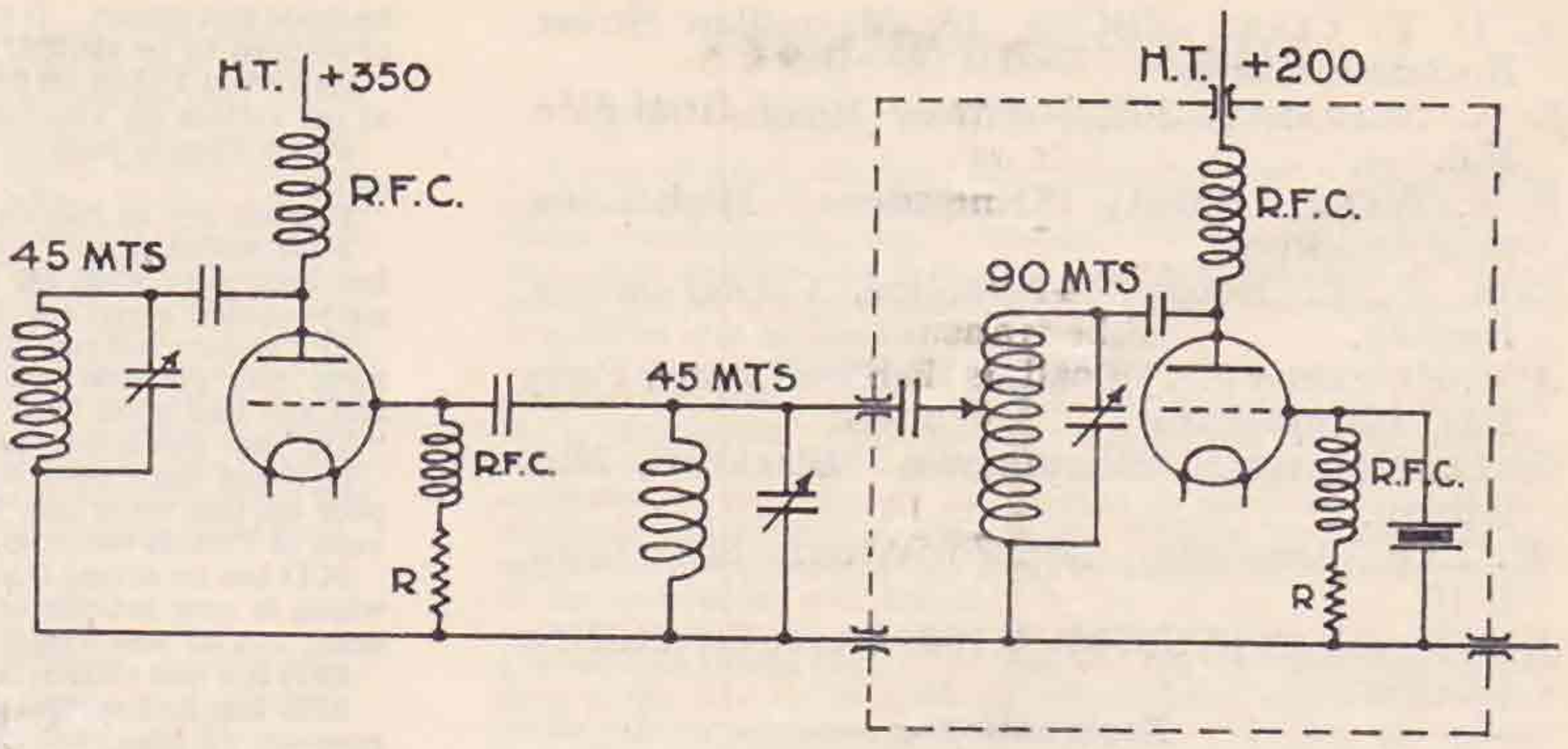
I want to thank the numerous members who have been so kind as to send their congratulations and good wishes to C.B. during the past few months, as I have not been able to send a personal reply In every case. The present state of C.B. is very encouraging, and I believe the members will have an opportunity at Convention of stating their views on some matters pertaining to C.B. I hope that these matters will receive their careful consideration, and that the result will be for the good of C.B. and experimental work generally.

EXTRACT FROM "LETTER-BUDGET" OF GROUP 1A:

Ultra S/W tests were carried out between members of Groups 1A and 1B and the Army signals, with, apparently, negative results. BRS26, after exhaustive tests, finds a Cleartron 215 valve best for 10-metre reception. 6DH has confirmation of hearing NU2BGC on 10 metres, and 6DH is now transmitting on 8 metres. AI2KT, at present in England, is associating with Group 1A.



5SY'S
6½/70 MTR RECEIVER



6XP'S 45 METRE C.C. TRANSMITTER.

EXTRACTS FROM "LETTER-BUDGET" OF GROUP 1B:

Listen on this band for members of this Group at 23.00 B.S.T. every night. 5SY found a split Colpitts very efficient on 10 metres, as well as on 45 and 23 metres; the same transmitter being used on all three bands. He was least satisfied with an ultra-Audion circuit. His receiver, shown in sketch, oscillates smoothly down to 6½ metres and up to 70 metres, and this with ordinary 4-pin valves, but less than 6 ins. of connecting wire in the grid circuit.

6LL uses a TPTG on this band, so that it may be developed into an amplifier for crystal control. He uses a Marconi S.W. D.E.T. 1 valve and likes it. His DX is R7-8 P.D.C. at 14 miles across "thickest" part of London. He found it impossible to neutralise transmitter for use as P.A., but is experimenting with some success on a circuit devised by 5YK for P.A. 6LL uses his normal receiver with smaller coils. 6PI found a split Colpitts' circuit superior to the T.P.T.G. on 10 metres, and is using a ½ wave vertical aerial. He has had threshold howl on 10 metres, but, after unsuccessfully trying all known remedies, found that 13 volts negative bias on the L.F. amplifier cured it (see previous T.H. notes!!—6YW).

BRS98 has heard three Yanks on 10 metres.

6OH finds that his T.P.T.G. goes down easily, and is considering directional aerials capable of giving any required variation of directional effect.

5VL has a S/W superhet going on this wave.

The Group Centre (5SY) is to be congratulated on such a fine Budget, and I hope to see more "dope" about these circuits in their next.

N.B.—Where mention is made in these Notes to "10-metre" work, the 8-metre band is included in this title, and the expression is used merely for convenience. This position will rectify itself in the near future.

More members are wanted for 10-metre Groups.

Membership.

NEW MEMBERS.

L. H. SHERSBY, 41, Reverdy Road, S.E.

R. W. B. HENDERSON (Associate), 59, Canning Road, Highbury, N.5.

G. T. HOYES (Associate), 71a, Elsham Road, W.14.

T. A. WHITELEY (6QA), 13, Haslam Street, Rochdale, Lancs.

A. L. F. CLARE (2BCM), 15, Macmillan Street, Rochdale, Lancs.
S. A. ACARNLEY, 308, Archway Road, Highgate, N.6.
F. F. WARNER (2RA), "Northdene," High Lane, near Stockport.
Capt. F. C. BOOTY, Westholme, Caister-on-Sea, Norfolk.
A. C. EDWARDS (6XJ), 60-62, Wellhead Lane, Perry Bar, Birmingham.
G. O. KOLLIEN, "Berryknowe," Blackhall, Midlothian.
W. LEE (Associate), Minoco Wharf, Silvertown, E.16.
J. A. SWANSON (NU5PM), 7,103, Freret Street, New Orleans.

Resignations.

P. J. BLACKWOOD, 14, Shakespeare Terrace, Canterbury.

BRS Numbers Issued.

177.—L. H. SHERSBY, 41, Reverdy Road, S.E.
178.—S. A. ACARNLEY, 308, Archway Road, N.6.
179.—G. O. KOLLIEN, Berryknowe, Blackhall, Midlothian.

BRS Numbers Relinquished.

88.—C. C. MORTIMER (now 2AJT), 58, London Road, Bromley, Kent.
150.—K. C. RADBURN (now 2ABA), 67, Loudon Avenue, Radford, Coventry.

Notes and News from the British Isles.

NOTICE TO AREA MANAGERS.

Area Managers may appoint an independent representative in the London Area to attend meetings of the Committee and to vote on their behalf. A letter appointing a member to the purpose mentioned shall be addressed to the Hon. Secretary informing him of the appointment.

Members appointed by Area Managers for this purpose shall not already be serving on the Committee as Representative Members.

London Area.

Manager (*Pro tem*): J. CLARRICOATS (6CL).

Owing to the unexpected resignation of Mr. Exeter, I have been asked by the Committee to act as London Area Manager until such time as an election occurs.

I shall be glad if all West London Area members will report direct to me for the present. My invitation to North London stations, particulars of which appear in my Northern Divisions notes, is extended to all other London Divisions.

Northern Division.

By 6CL.

NOTE.—New QRA: "Ciel," 6, Hartland Road, Friern Barnet, London, N.11.

Reports by 20th please.

Vacations have taken most of us from the key, and, as a result, reports are scarce. However, by the time these notes appear the DX-CB season will be commencing, and maybe the two hundred odd stations in the area will be preparing for a fresh attack on the problems of amateur radio, and will have something to tell the world.

With the coming of autumn we look forward to a revival of station visits. It has been suggested that a tour of North London stations be made this winter. If the idea is favourable a rota will be prepared of stations to be visited.

As a start I shall be pleased to welcome North London members at my station on Thursday, October 11.

Please drop a card or telephone me (Finchley 3512) if you are coming.

Reports are as follows:—

5UM writes from "somewhere in France" and says that DX has been very good on 150-200 metres. He has been testing an auto-coupled aerial on the transmitter with 5 watts input.

6PP reports bad conditions generally, but notes a certain improvement over previous month. He has been testing crystal control, and has had good local reports. Most of his reports fail to give "T9," but this is due, he thinks, to the absence of a spacer!

5QF has been QSO Russia again on 45, but reports conditions poor on this wave and 23. He reports good results with his 300 volts of Pertrix batteries, which have been in use at 6CL and 5QF.

5CD has no actual DX, but has been experimenting with crystal, which is now satisfactory. Some local 150-metre fone work was done, but 45 was found to be very poor.

6FH is a new station in the area and hopes to be in action shortly.

6PN has had several European QSO's, but no DX. There are rumours of television experiments here!

2TA has come to light again! Very pleased to hear that he is contemplating starting up again. This will swish. One hundred watts on 23 and 45!! Some start.

5HS writes from Harrogate, where he is station visiting, and, we presume, taking the waters. He has worked all sorts of places thousands of miles away.

5AD and 5KU are, we believe, still owned by Messrs. King and Pollock.

5GU has been QRT most of the month, but wants schedules on 23 metres. from 08.30 to 11.30 G.M.T. daily.

6CL has now settled at his new QRA, and between station building and house furnishing has welcomed D7MT again prior to his departure for Canada. D7GB, NOK1 and K4KD have also visited here, whilst preparations are going ahead for the Ham Party on Covention Sunday. A new transmitter and receiver have been built with the assistance of 2CB and 5QF (one advantage of being an Area Manager!). Valve base coils have been tested and a coupling device constructed (see article).

Southern Division.

By 6PG.

6XP sends his first report this month. Most of his work has been experiments with C.C. on 45 metres, and with 10 watts results have been fairly satisfactory. Conditions have been bad, but appear to be improving, and he hopes to have the Xtal going on 23 metres shortly.

6HP reports conditions to be hopeless, with nothing but a schedule with FK4MS every Sunday, being received R5. FE1ES was worked R9, also EULSKW (R5) and a few near NU's.

2CX and 2WR have just started up again after spending a most enjoyable time in Jersey, for which they would like to thank the Island hams.

2AI has been experimenting on the effect of QSB on DX, and also with a baseless valve, to see if there is any difference on 45 metres. EA has been added to his list.

2CB reports a few local Europeans. He was on holiday at the beginning of the month, and had a most interesting visit to 5JO and 5YK, whom he wishes to thank for their hospitality.

2NH has spent most of the month visiting stations with NC4HM and NU1II. Most of the usual DX stations have been worked on 23 metres, and some experimental Xtal work done as well.

6WY has rebuilt, using valve R.A.C., with good results. OA5HG gave R3-4 on 23, and SB has been worked. He only requires Asia for WAC.

6QB-6LT has completely rebuilt à la 1929 (QST) and raised NU first go. FK4MS reported R5 plus, and he has also been heard in NU5. Xtal control is going on 45, but not yet on 23.

BRS88 is now 2AJT, so is busy getting his gear together.

5BQ has done little, being on holiday. He has a sked with FE1ES.

6PG has still the shutters up, though fairly active behind the scenes in preparation for the new shack—already on the way.

Channel Islands.

By G2ZC.

No report has been sent in during the past few months, owing to the lack of interesting matter.

5WZ and 6OX are inoperative. 5GW is still away, but reports really good reception of the B.B.C. short wave station at Malta, where he says it comes in at good strength, with no fading.

6HZ has been having trouble with BCL's, and so has stopped work, but as he is moving his QRA almost immediately, he hepes to be on the air again shortly at the new address.

6PU has been doing a little work on both 45 and 23 metres, but has nothing outstanding to report.

2ZC continues his schedules on 45 metres, and in the two and a half years' observation, has gathered a lot of useful dope, which he hopes to give to the BULLETIN, when he has continued long enough to be in a position to give some definite information. He is still using a fixed input of 6.6 watts. On 23 metres, with an input of 8.4 watts (which is his fixed power for this wave) he was reported R4 last month in a QSO with OA7CH, which was his first OA QSO, and has also been QSO, FO, FM, NU, NC, etc., with this power.

We had the pleasure of visits from G2CX, 2WR, 6TR and during July, and in August, the twin brothers EF8OLU came over for two days to see us. We thoroughly enjoyed these visits, and only hope that any other ham contemplating a visit will let us know, so will they please write to one of us, before coming. Remember, OM's, we have had a higher sunshine period in July than any other G district, and our shade day temperature in the past six weeks has been over 70. This may account for the lack of work being done!

Northern Area.

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

Yorkshire.

By 2DR.

6OO has had a slack month, but has worked some interesting Continental stations. Poland was worked on 4 watts crystal controlled, 44·75 m. An interesting visitor during the month was NU1BMS, who happened to put into Hull on the Cadet ship Nantucket.

BRS164 reports QRN, especially after 21.00 B.S.T. A few SB's have been heard, and FK4MS was heard on 20 m.

BRS162 has done no DX this month, but has done a little local work on most wave-lengths. A re-build is contemplated here, ready for winter.

6DR reports poor conditions for radio, but good for motoring. When I popped in to surprise him at Howden the other day I thought so too, for he was out! AG and NU have been worked, and this station was also visited by NU1BMS.

6WD has not done much this last month, but is thinking of placing his chemical rectifier in the dustbin and installing a transformer and valves. Has not found conditions on 23 good.

2XY.—Activities here have been confined to a weekly schedule with ME8AE and occasional NU work. Ten-metre apparatus is in preparation, with an input of 20 watts R.A.C.

5UB reports working NE8AZW on 45 m., and has three schedules running. Another station getting ready for 10-metre work.

5LT sends a good report of QRP work, both on C.W. and 'phone, which included break in work. He wants to know where all the Sheffield hams have gone to, as there are 17 licenced, but none on the air! The power used on the above tests was round about 1·5 watts.

Notts, Derby and Lincs.

By 6MN.

BRS103 has little to report, and says conditions have been bad.

5QT also reports bad conditions.

6LN.—Active with schedules and skip distance work with the Contact Bureau. A.C. mains will shortly be available here.

6MN is removing into a shack, and is thus QRT. D.C. mains of 440 volts will be used, so some noise should be apparent. What have you done with the remainder of your sub-area, OM?

Cheshire.

By 6TW.

2SO is rebuilding, so nothing to report except that 2HD, 6LN, 6TW and 5BR came along at odd times to see he kept at the job.

BRS98, owing to removal to a new QRA, has nothing to report.

BRS152, feeling very energetic, tried an all-night sitting. HU 1, 3, 4, 5 and 8, NY and NZ were logged. Considerable numbers of Continentals seem to work all night.

6TW has spent a very interesting month trying R.A.C. against pure D.C. and noting the reports of various stations. Visits paid by 2HD, 6LN and 2SO.

Lancashire.

By 5XY.

5WQ devoted a measure of holiday time to building a new receiver, which he stoutly affirms is "the berries." Experiments with an "Ultraudion" circuit for the transmitter are now being carried out.

5XY is in a sorry state with a broken collar-bone owing to a slight lack of friction between the tyres of his Sunbeam and the road. We hope you will soon be about again, OM. Try using your left hand to key with! A new transmitter, guaranteed to hit itself coming back, is shortly to be put into use here. Visited by NU1II, who was spending the week-end with 5MS.

The rest of Lancashire is on holiday.

Northumberland, Durham, Cumberland and Westmorland.

By 2AIZ.

6GC is now working on 23 and 45 metres, and has had about 150 QSO's on 45 metres. He has been reported R4 in Leningrad with 3 watts on 45 metres, and in Lisbon with 4 watts on 23 metres.

6QT has nothing to report except a little 'phone work on Sundays. He is busy on 10-metre and C.C. oscillators. Various rays are being studied.

BRS171 is a new member in the ranks. Greetings, OM! He is willing to arrange schedules with any one working on 'phone.

Mid-Britain (East).

Manager: H. J. B. HAMPSON (6JV).

It was, of course, no small disappointment, both to 2XV and to myself, that the Conventionette had to be abandoned for no other reason than lack of support. Conditions are, however, very different from those existing last year, and perhaps it is scarcely to be expected that an adequate gathering could have been arranged from so small an area as ours has since become.

This failure seems to me to raise the whole question of area distribution, and I think that the time has come to reconsider the present system, whose inception was due, in the first instance, to a grouping of counties round individuals which had offered their assistance to headquarters rather than to considerations of geographical and numerical expediency. Perhaps we may have an opportunity of discussing this important aspect of our organisation at the Convention next month?

In order to avoid possible misunderstanding of these remarks, I would like to add that, in my opinion, the very best possible was done at the time the area scheme was initiated, and having regard to the existing conditons in those early days, and I am only making so bold as to suggest that our progress has since outdistanced our organisation, and that the time has come to reconsider the matter.

Our reports would make a sorry sight without those two workers, 2XV and 2BWB, to whom we owe the fact that, like Johnnie Walker, we are "still going." The former, too, keeps on raking in new members.

CAMBRIDGE.

By 2XV.

5YX has re-made his C.C. outfit in an economic manner by using jacks in each H.T. circuit whereby the one and only milli-ampmeter may be inserted in each stage of tuning; this also forms a convenient place to plug in the key or even choke control telephony; he also uses his H.T. accumulators for both bias on transmitter and H.T. on receiver ('ware doing this, OM's, until you have checked earthing joints if using mains for H.T.!) AI2KT has been a recent visitor to the station, and was much amused by the aerial switch counterweight which consists of an old DET suspended by string. (It is noted that 5YX's operating table is not underneath.)

6CR has been doing a little DX on his M.O.P.A. set with about 8 watts, and has nearly got his C.C. outfit completed; he has definitely scrapped coil screens.

2XV has rebuilt his transmitter more low loss, and has gained more output with less input, but is troubled with H.F. chokes and wonders whether he should charge the supply company with the H.F. energy he sends back to them down the mains! Only DX done here this month is about 15 local Yanks on 23 metres, some interesting telephony tests on 23 metres QRP have been worked in conjunction with 6CR, using choke control.

NORFOLK.

By 2BWB.

5UF has put up a half-wave 6JV aerial and is getting better reports from Europe on 45 metres. Using 7 watts to an LS5 has been QSO with most of Europe during the last two weeks of July at R6 to R8, and also worked NE-8FD is Labrador. Aerial experiments are continuing.

6JV, it is believed, has not been on the air owing to holiday QRM. Rumour has it that, owing to the house decoration scheme having reached the ground floor, he has been expelled from Eden; and that, in consequence, a shack will arise in a less disturbed corner of the estate.

2BWB has happily escaped from the realms of surgical tortures, and is just strong enough to wield a soldering iron again. He had the great pleasure of a visit from 5YX, from whom much valuable information was painlessly extracted. He (2BWB) is experimenting with a series-tuned receiver which appears promising if some form of resistance-controlled reaction can be incorporated, as capacity control makes it rather difficult to chase the signal on the tuning condenser. Some low loss small field coils (not on valve bases) are being evolved in conjunction with it.

Mid-Britain (West).

Area Manager: D. P. BAKER (2OQ).

I am afraid that holiday QRM has seriously affected the number of reports for this month, but one very interesting event stands out, viz., 5UW's work on the Norfolk Broads. This, I think shows what can be done with low power and an aerial only a few feet high.

I have been up on the 45-metre wave-band for the first time after leaving it for about twelve months, and feel now that we shall have to put our wave metres in good order when the new wave-lengths come into force, as the way signals come in all round the dial at the present moment is simply astounding.

I am looking forward with pleasure to meeting a large number of the members from this area at the Convention.

STAFFORDSHIRE.

Bulletin reports via 5UW.

The appeal to the County of last month, to inform 5UW of individual activities of members seems to have fallen on barren ground, as only the staunch veteran 6SO has forwarded a report, but as 6SO never misses in this respect, it is presumed that the rest of the county have not yet read last month's copy of the BULLETIN. So again, OM's, drop a card as soon as you read this to 5UW, and let him know what you are doing, or contemplating doing, for inclusion with next month's reports, and while you are on the job. please mention if you intend to join up with a party that is going to be formed to visit HQ for the Convention on September 28. Please do not forget, or overlook the 10th of each month.

5UW. GX5UW, on board the m.l. " Alsatian," and holidays have kept 5UW very much occupied during the past month. The portable tests were, taken all round, a real success, and will form the basis of an article for the BULLETIN at a later date. Apologies are extended to 5YX, 6BB, 5UF for the inability of GX5UW to keep the schedules as arranged. Since return home have been QRW straightening things up on the permanent set, and QSO with NU on 23 metres. Preparations are on hand to rebuild the TX in preparation for the new wave bands, and a new circuit will be tried out which may be termed an MO-Reflex-Mesny with capacity aerial coupling.

6SO reports no great DX, but has good phone reports with 6 watts input of Chem. RAC, which is reported pure D.C. Has also been carrying out WX observations with 5PH.

2OQ has gone up to 45 metres again and reports fairly good results, although QRM is bad. He hopes to be down on 23 metres again shortly.

WARWICKSHIRE.

Reports to 6CC.

2AK has been building a new short-wave receiver.

2ZW has been working G's, GW's, CC's, F's, N's, B's, M's, and K's on 45 metres, using 8.3 watts; but cannot raise EA or EI. Why? On July 28 this station worked 7VK, but prefix unknown. Hopes it was either AI or OA. This also on 8.3 watts.

6CC has done nothing but keep the station in order.

6CI is testing crystal control on 45 metres and doing a little DX with 20 metres NU's.

6XJ is starting up on 45 metres for C.W. and 'phone. A receiver with a new circuit (screened grid and pentode) is in use and giving excellent results.

6YD is still alive; now attempting WAC on 5 watts after doing it on 20 watts. So far NU, A and E worked on 45 and 23 metres. The aerial system is being excited by " brute force."

BRS7 is cleaning up the shack for 5 and 10 metres.

Welcome to " Slade Radio," and Erdington Club. Also to 5VM, of Moseley. Hope to hear from you next month, OM.

Station visits. 6XJ to 6CC; 6YD to 2ZW.

Please let 6CC have reports by September 10 for the next issue.

Southern Area

Representative: BY2ABK.

Again I am afraid the Southern Notes will not take up much room, and if you haven't sent up your reports, OM's, it's up to you to see that we have more to show next month.

Now I have a RX, and I hear bags of Southern hams on the air on various bands; just let us know what's doing, as I daresay you enjoy reading the reports of the faithful few who do send them.

5LU, despite tennis and boating QRM, has found time for radio, and gets consistent R5 reports from all Europe, and using a home crystal for C.C.

6FT is carrying out tests with observations on static, and with the help of 2MJ expects to soon have dope for " Bull."

2MI reports nothing much doing recently, but still putting out a good signal on 180 metres.

2MJ is getting out well from his new QRA near Sittingbourne.

2AFG is on holiday in Aigy Clohin, France.

BRS142 sends a good list of stations heard. (I'm sorry I mislaid your card last month, OM.) Has rebuilt shack at foot of 45-ft. steel mast, and also has had his wave-meter calibrated by 6QB.

2HJ has got his station working again, and had 25 local QSO's before going for his vacation in France. He is troubled with intermittent QSSS in his sigs. Please send him your 1ARU reports, OM's.

6NZ says things are going strong. H.T. problems now settled by a Newton D.C. motor and generator, and gets C.C. reports on two transmitters.

2LZ has been very active of late, and has QSO NU1, 2 and 8. Also NC, OZ, SB, OA, and SC, and several QSO's with OZ4AM and OH5HG with C.C. transmitter on 32 metres and push-pull circuit on 23 metres. Has now got C.C. working on 172 metres.

5QK (Op. 2ABK) the Southend Radio Society's portable, has been in action almost every week-end on 180 metres, and a very successful field day was held on July 22. Phone being exchanged with 2MI Broadstairs on a 9-ft. h gh Electron aerial (QRB40). He wants a schedule before 08.00 B.S.T. on 150-200 metres, as other times gives bad QRM.

South-Western Area.

Manager: G. COURTENAY PRICE (2OP).

As one might reasonably expect, most stations are apparently closed down.

5VL, amongst others, is running skeds with FK4MS.

6ZR finds conditions on 45 metres very bad. Wants to know what has happened to the 90-metre gang; also who is XNUYEFF?

2OP is away on military training and will not re-open except a few isolated moments until October.

2ACG is still in the depths of his Igranic S.W. receiver, which is bringing in all NU districts in good style.

2OZ. A welcome newcomer. Is very QRW in summer, but hopes to be on the air shortly.

Scottish Area.

(By 5YG).

MANAGER: J. WYLIE (5YG).

Reports for July produce very little of real interest, and there appears to have been little or no activity in the Area.

I should like to sound a warning, however, to the stations I have the honour to represent. I have been privileged to have the perusal in the past few weeks, of certain letters received by several of our stations with regard to the new amatuer frequencies. These in no uncertain manner make clear our obligations relative to the privilege of operating, expecially on the higher frequencies. A steady wave is to be insisted upon—and rightly so, too—and there is absolutely no doubt that this practically places an embargo on a great many of the " lash-up " self-excited transmitters at present in use.

Further, the G.P.O. definitely insists upon accurate frequency measuring instruments, preferably of the piezzo-electric type, and there are precious few stations in the area possessing apparatus of this nature, or indeed any which will come up to the new requirements of the G.P.O.

It is perfectly clear that we shall have to " set our house in order," and the quicker we go about it the less grief for ourselves.

Those who are unable to face crystal control, I would strongly advise to investigate the M.O.P.A. circuit, which is comparatively easy to handle, entails the use of only one additional valve, and properly handled with a good plate supply, compares very favourably with crystal control. If you are interested, and you will have to be, 2WL will be very pleased to supply any of you with details regarding this circuit with which he has considerable experience.

A new station has started up in No. 3 District. The call sign is 5GK, the station being owned by Mr. W. Gibb, 301, High Street, Kirkcaldy, Fifeshire.

I have to mention with pleasure a visit from GI5WD and GI5MO.

No. 1 District.

(By 2WL).

2MA has worked all Britain with one watt input and not a few stations with point one of a watt. He is in difficulty with regard to plate supply as there are no electric mains at his QRA.

6MS is presently employed on a ship between New York and Brazil ports. Is always on the look-out for " G " stations, and will QSL. He will be in this locality for about a year.

2WL.—Nothing done at own station, but assisting 5YG to rebuild for C.C.

5YG.—Station QRT for rebuilding.

6WL is experimenting with a new type of directional Hertz aerial (sorry cannot produce sketch in these notes, OM; why not a special article?—5YG). Work has been done on the RX with a view to making it " perk " on 5 metres. So far it has not got below 7 metres. R5 reports have been received from U.S.A. when the special aerial (mentioned above) was in use.

No. 2 District.

(By G6IZ).

6VO reports unauthorised use of his call-sign, and would welcome any information regarding the offender. 6VO is meantime QRT.

2BQK has lodged his application for a radiating permit.

6IZ has more or less got his station in order at his new QRA, but has nothing of interest to report except bad radio conditions.

No. 3 District.

(By 6KO).

BRS96 and BRS158 keep in touch, but have nothing special to report.

6KO reports QRW business, but a start has been made to qualify TX and RX for the new amateur conditions.

No. 4 District.

(By 5JB).

6QF has just obtained his radiating permit, but has not done much yet, as holidays have intervened. He uses a Mullard PM2 as oscillator, and derives his H.T. supply from accumulators.

6UU has built a new T.P. T.G. transmitter and is getting good results. He is negotiating with the P.M.G. for use of certain of the new wavelengths. A complete change of aerial system is contemplated.

5JB has just completed a new " push-pull " transmitter on the T.P.T.G. principle and has had fairly good results. He uses 6 watts input to two D.E. 5's. He would welcome collaboration with anyone who is using, or who has used a similar type of circuit. At present on holiday, he has visited 2OP and 6UG.

Northern Ireland.

Manager: GI6MU.

As these notes are being written about a week before the usual date the A.M. offers his apologies to any stations whose reports have not been included on that account.

The past month has been one of holidays or reconstruction for many and the GI ether has been exceptionally undisturbed. There has been, on the average, an improvement in daylight working conditions with the gradual lengthening of the hours of darkness and for the time of year atmospherics have not been very bad. Conditions have however been erratic, particularly on Sunday, August 5, when WIZ was stronger in Belfast in the early afternoon than some of the usually QSA English stations.

I have to record a visit from G5JA who spent a few days in Belfast recently and visited several GI stations. It was a great pleasure to meet such an enthusiastic amateur as Mr. Porter, and we hope he will be able to see more of the GI country and stations when he visits us next.

6MK has been doing regular tests and some suggestions from the A.M. on the subject of keying appear to have effected some improvement. (As these suggestions might be of use to others they have been passed on to the Editor.)

6MG has just completed the installation of his new M.-G. set which is very F.B.

6WG is believed to be working occasionally.

5HN has been effecting some more improvements in his station which is at the moment ultra QRP. The A.M. was very pleased to receive a visit from him recently.

6HI is working occasionally and is understood to have been doing some bench tests.

6MU has started his 1929 rebuilding programme with a universal meter (including frequency and field strength) and a power switchboard. A few tests on aerials and circuits have been made on the 45-metre band. He is about to leave on a three-weeks' holiday.

5WD and 5MO wish to thank 5YG and the other Glasgow transmitters for entertaining them when visiting Glasgow last month.

Notes and News from British Dominions.

Irish Free State.

By Col. Dennis (GW11B).

Holidays and fine weather have again been responsible for the absence of reports in this Area, and I have only received two, or rather one and a half as 13D's was received indirectly through 17C, who never fails me.

17C has been away a good deal and has only worked occasionally on 45 metres, using real QRP, with inputs of 3.5 and 0.5 watts. On the higher input, using C.C. (exact wavelength 45.45 metres), he has worked EU, Moscow, and Crimea, R7 and R4 respectively on C.W. and Munich on 'phone, R5. With .5 watt he has worked all parts of England as well as EF8WOZ. He is easily our QRP star.

13D with input of from 4 to 6 watts has worked EG, EF and ED 'phone, and EU, Moscow, on CW, R4.

11B has not been able to be much on the air. On 45 metres with 6-7 watts he has had only European "DX," the best being ES5NL. He received a welcome visit from 6JV with whom he has a most delightful time, though 6JV could only spare one day from his other engagements, and got a number of useful "tips" and ideas from him, especially on the subject of aerials. As 11B is in the position of a rather lonely outpost he was inclined to get into a groove, and the visit has therefore done him a lot of good. He hopes that it may soon be repeated. Also that any other ham who may find himself in a position to visit him will send a postcard, as he will be made very welcome.

South Africa.

By G. G. Livesey (FO3SRB).

Union of South Africa.

(South African Time is 2 hours ahead of G.M.T.)

Last month, May, the S.A.R.R.L. launched out into production of a monthly magazine—"Q.T.C." This is a very nice little publication, and very much akin to our Bulletin, both in subject matter and size.

This supersedes the typewritten sheets which have been previously issued to all members of the League—once a fortnight. Advertisement support received from the big electrical and wireless firms is gratifying; among others occupying whole and half pages are the General Electric Co., Phillip's valves, Telefunken valves, and Mullard's.

Division 5.—Natal.

It has been suggested by AGN that, as inter-provincial communication is almost impossible after dark on the 35-40 metre band, and will be more so during the winter months following, hams should go up to the 80-metre band, this being satisfactory for local working.

OA, SB, EF, and Africa are all subject to severe, or complete, wipe-out now.

Division 6.—Johannesburg, Transvaal.

A4E has reported that reception during May was very good. Japan, Dutch East Indies and U.S.A. QSO'd on 32-40 metres. Indian 2KW comes over R4 every Sunday at 1400 G.M.T., and was worked by A7L.

Japan JXIX was worked at 1400 G.M.T., and ODIJR at 1600 and 1700. NU strong from 1400 to 1515 G.M.T.

EG, EF, NU, and AI were heard on 20-metre band, signals vy strong. OA right off the map.

After 6.15 p.m., local time, coast stations are wiped out.

A6G is working fone, crystal controlled, on 33.8 metres.

A6R has heard ASRAO3-Radio Laboratory, Universite, Vladivostok, Siberia, at R6 on 36 metres. (Note call AS-RA-Nought three!!)

He is working most nights from Vladisvotok at 2030 G.M.T.

A7V has been QSO NU6HM on 18.4 watts; he was reported R4 on 36.5 metres. Also he worked ODIJR—reported R6—with same input.

Division 8.—British East Africa, Kenya, Uganda.

FK4MS has now begun work—H.T. from a generator. Starting on April 29, he QSO'd in order—FOISR, AI2KW, EI1DY, SB2AZ. Later with U.S.A., Honolulu, Australia, France, and England.

FK2MS, testing on 35, 21.5, and 19 metres, Baby Burgess transmitter, 20 to 40 watts from a T.V.T. unit. On May 2 was QSO AI2KT on 21.5 metres. On 26 metres given R6 in Zanzibar during daylight.

VQG, Nairobi Broadcasting Station, will send regular programmes of a test nature during September, on wave-length 90 metres. Power up to 4 kw. Please QSLL to P.O. Box 777, Nairobi, Kenya Colony, B.E.A.

VQG is working with GBO—telegraphy—by day, 17 metres; by night, 24/28 metres.

FK2MS, Mr. Ball, will be on leave by the time these notes appear in the Bulletin. His QRA will be BM/BAHR, London, W.C.1. Do any hams wish to see him?—3SRB.

FK3MS has carried out a more or less regular schedule with A4V, proving that 35 metres gives reliable communication between Johannesburg, or really anywhere in the Transvaal, and Kenya.

In a QSO on lower wave-lengths between Kenya (3MS) and A3Z in the Union, results were thus: 3MS on 17 metres was given R3 by A3Z. A3Z on 20 metres was given R3 by 3MS.

Look out for 1ZR, a new transmitter, on 33 metres; his QRA is D. Trinidade, c/o Zanzibar Radio (VPZ), Zanzibar.

Mauritius radio will be testing on S.W. soon.

Tanganyika Territory (Dar-Es-Salaam).

Please listen for Dar-es-Salaam Radio; call GZI, perhaps 3DSM, on short waves during the next few months. It is said they are installing a ½ kw. experimental transmitter for work between 15 and 50 metres.

If you hear this any time, QSL to T. W. Storm, Wireless Station, Dar-es-Salaam, Tanganyika Territory, B.E.A.

GZI at present uses a small 100-watt Broadcast/C.W. Morse set on 350 to 450 metres; speech from this set has been received R4 during daylight, in Mombasa.

The station also transmits C.W. on 2000-2400 metres, and 600 metre spark, with ships.

Southern Rhodesia.

No reports from Southern Rhodesia. I think, however, that you may expect to hear 1SR, 4SRA, and 6SRA fairly regularly. This is our best time of the year up here for radio—from May to September is our winter. Clouds are almost entirely absent from the sky, static has calmed down to reasonable limits. There are severe frosts at night; recently I was told that 12 degrees of frost were registered in Bulawayo. The temperature by day averages 70° Fahr. Prevailing S.E. wind—very dry. In October, when the rainy season begins, the whole atmosphere is reeking with electricity. One's hair sparks and crackles at the least provocation.

I discovered one amusing proof of the high state of tension which the atmosphere is subject to; when blotting writing paper and envelopes last November, I noticed that, after I had rubbed them rather vigorously on my blotting paper, they always stuck to it, and had to be pulled up and away from it. One day I picked up an envelope which had just been rubbed on the blotter, and touched my ear with it; a strong crackling discharge from the envelope to the ear explained the phenomenon at once. In the electrically charged atmosphere at that time the least friction produced a strong static charge on a suitable body, which then discharged itself. It is a simple enough thing, but struck me as worth retailing.

The following stations are working telephony: A3Y, A3U, A6G, A9R, A6Q, A3E, A3A, A5B, A7V, A9F, A5L, A6S, A6D, A3T, A7D.

A7E is now C. M. Boni, 135, Breiten Street, Pretoria.

Do you already know these QRA's?

ILM.—C. Fox, Box 635, Nairobi, B.E.A.

IES.—Corpl. W. Corbett, No. 1 Wireless Co., Egypt's Signals, Polygon, Cairo.

FOA3F.—W. H. Browning, 81, 8th Avenue, Mayfair, Johannesburg.

FKIZR,—D. Trindade, c/o Zanzibar Radio V.P.Z., Zanzibar.

Change of QRA.:

FO5SR has left Rhodesia now, is Rev. B. J. Whiteside, St. Aidan's College, Grahamstown.

Notes and News from Europe.

Esthonia.

By ET3CX.

Short wave progress in Esthonia is very slow because there are only one or two active stations. Even the P.O. has only one QRP experimental transmitter. The first Esthonian station was 3CX (ex T2X), which has been in existence since 1926. The operator was at first chiefly concerned with the construction of small portable sets for military purposes, and only started DX work at the end of last year. With inputs up to 10 watts, practically all Europe and also AS and AG have been worked. 3CX is handicapped by a bad aerial, but hopes to erect a better one for the coming winter.

He would be glad if the following stations would answer his cards : 7MD, 7LY, 7FZ, 7OM, 7LK, 7GH, 7XU, 7CG, 7AH, 7AG, 7NA, 7ChR, G5HJ, GFP, and ENOCX.

3XY, 3AZ, 3OW, 3LW, and 3BY are all more or less active, and ask for reports from B.R.S. stations.

Germany.

By E. Reiffen.

During July reception was marred by strong QRN, but in spite of this, some of our stations worked several countries outside Europe. The 40-metre band was chiefly used, as European amateurs do not seem inclined to use 80 metres for inter-European QSO's. The best waves for DX are undoubtedly 30 and 20 metres, and many German amateurs have been using the latter extensively during the summer. 4ABN has worked several NU and SU stations with 40 watts input and 4CB managed to connect with OZ, despite an unfavourable location. All amateurs are looking forward to the good DX conditions which may be expected during the coming autumn and winter, and several EK's will be operating on 30 and 20 metres with QRO. It is also to be hoped that licences will at last be issued to private individuals, when a large increase in the number of EK stations on the air may be looked for. Following on the pioneer work of Prof. Esau, of Jena, on wavelengths of the order of 3 metres, many amateurs have built apparatus for these ultra short waves, and, no doubt, regular experiments will be carried out this winter. The 10-metre band, so popular in America just now, has no habitues in this country.

Holland.

Due to the summer holidays and bad QRN, activities during July fell off in this country. Conditions for DX also proved bad, especially on 20 metres.; 30 metres was good, on some nights. It was on this latter wave that the few Trans-Atlantic contacts were made.

South American amateurs are the only ones still regularly heard. North America comes in very seldom, and then only at very poor strength.

European contacts on 40 metres were very unreliable, although some good nights for low power working were noticed.

The most active transmitters with moderate power were OBC and OCX. The latter succeeded in working the Argentine and Brazil several times with an input of 12 watts.

Some of us have started 10-metre work. It seems that OCX is the only Dutchman who joined the International 10-metre Party, and up to now twenty reports have been received on his tests.

The many registered receiving stations are still very active, several of them specialising in amateur short-wave phone, and as a result of this, much fine phone DX is reported.

Norway.

The Norwegian amateurs have recently formed their own organisation, which will be known as the Norwegian Radio Relay League. (L.R.R.L.). The League will undertake all work in connection with tests, and will represent the Norwegian amateurs in national and international matters.

The President is L. Salicath, and the Vice-President G. H. Petersen, whilst Captain Gottwaldt (the operator of the airship "Norge" during her Polar flight) and Olav Moe (editor of the well-known paper "Norsk Radio") are members of the board.

All correspondence and QSL cards for Norwegian amateurs may be sent via N.R.R.L., the address being : "Norsk Radio," Oslo, or to Radio Lalg, L. Salicath Voksenlia, per Oslo.

Messrs. Lectro Linx inform us that their new season's catalogue is now available, and that copies may be obtained from them upon request.

QRA Section.

Manager : M. W. Pilpel (G6PP), 54, Purley Avenue, London, N.W.2.

It is too early to see what results my appeal in the last issue will have, because I am writing this only a very few days after the appearance of the August "Bull," but I do hope that you will take my words to heart and write to me whenever there is anything you don't like about the QRA Section. I need hardly mention that I am also very susceptible to letters of appreciation, so don't write only when you have a "grouse." This is Convention Number and marks the opening of the DX season with a vengeance, so no doubt lists of OA and OZ hams will be in great demand when QSL time comes. Our lists of QRA's are improving daily, thanks to the efforts of a few willing and enthusiastic members, and I hope the time is not far distant when "QRA unknown" will be a thing of the past, and all stations will consider it a matter of first importance to inform the QRA manager immediately they are allotted a call-sign or change their address.

Two QSL agencies have changed hands, and one its address within the last few weeks, so please note the following amendments :

Estonia.—V. Suigusaar, Höbe t. 4, Pernau.

Lettland.—M. Karklin, Tvarka 34, Riga.

Denmark.—E.D.R., Holmens Kanal 5, Copenhagen K.

C. D. Connerton (AQ1LM) informs me that he will be pleased to forward cards to Iraq stations. His address is Box 117, Baghdad, Iraq.

Programme of Annual Convention.

FRIDAY, SEPTEMBER 28 :

5 p.m. Re-union and tea at the Institute of Electrical Engineers.

6.15 p.m. Presidential greetings.

6.30 p.m. Open Discussion. Subject: "Frequency Stabilisation." Opened by Messrs. Goyder and Simmonds.

8 p.m. Provincial Members to be entertained by London members. Station visits.

SATURDAY, SEPTEMBER 29 :

9.30 a.m. Informal gathering at the Institute of Electrical Engineers.

9.45 a.m. Charabanc party to General Electric Co.

1 p.m. Lunch.

2 p.m. Business Meeting.

4 p.m. Tea.

6.30 p.m. Convention Dinner at Pinoli's Restaurant, 17, Wardour Street (price 5s.) Chairman : G. Marcuse.

SUNDAY, SEPTEMBER 30 :

Station visits arranged by London Area Managers.

Correspondence

To the Editor of T. & R. BULLETIN.

DEAR SIR,—According to the "Wireless World" some American amateurs are starting to use the new "Q" code with confusing results. As the whole lot occupies some half-a-dozen typewritten pages, I cannot undertake to supply copies all round; but I will gladly translate any few groups sent to me if accompanied by a stamped, self-addressed postcard.

I am also willing to try and interpret any new nationality calls that may turn up prematurely. Except G, VE, LA, the old ones will have to be scrapped, but it is not yet possible to predict which letters out of a wide choice will be allotted to amateurs by their respective Governments.—Yours faithfully,

A. HINDERLICH (2QY)

To the Editor of T. & R. BULLETIN.

Sherwood, Meerut Road,
Brockenhurst, Hants.

DEAR SIR,—It is thought that the following might be of interest to other hams.

A Hartley TX, which a few hours ago had been perfectly OK, absolutely refused to oscillate, whatever was done to it. The valve (a Cossor receiving one) with a hollow base, was then put in an Armstrong TX and this too appeared dead. A very close scrutiny of the valve at length showed a moth firmly wedged in between the leads to the valve-pinch.

Since the D.C. plate current remained unaltered, I conclude that dried moth is a good high voltage condenser, and shall always use it in future, as it's so cheap!—Yours sincerely,

A. B. WHATMAH (G6BW).

To the Editor of T. & R. BULLETIN.

DEAR SIR,—Allow me to congratulate the R.S.G.B., in the name of all ET3 hams for its excellent calibration service, arranged by 5YK. Here, in Estonia, no correct short wave wavemeter is available, so the pure, steady signals from 5YK every second Sunday are very helpful to all our amateurs

Can R.S.G.B. arrange the calibration service on all new amateur bands?—Yours faithfully,

V. SUIGUSAAR (ET3CX).

To the Editor of T. & R. BULLETIN.

DEAR SIR,—I have to inform you that the address of our QSL Section, which was formerly 10, Snaregade, Copenhagen K., is now Experimenting Danish Radioamateurs, 5, Holmens Kanal, Copenhagen K.

I take this opportunity of expressing my sincere thanks for all the kindness I have met in your Society, and I regret that I am now unable to send the Danish Notes to the BULLETIN, due to my going abroad, but if you wish a continuation of the notes, I shall ask one of the members of our committee to take over the business.

Wishing your Society every success.—I am, dear Sir,

Yours faithfully,

E. T. POULSEN (7MT).

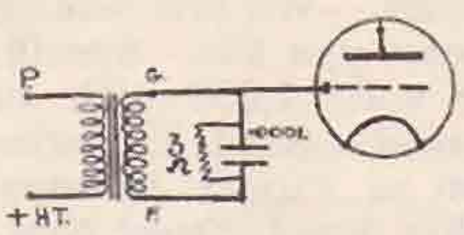
Communications Manager,
E.D.R.

THRESHOLD HOWL.

To the Editor of T. & R. BULLETIN.

DEAR MR. EDITOR,—For some time I have read, with a great deal of pleasure, the articles on "Threshold Howl."

As so many have pointed out, this condition varies with the type of transformer used in the first audio stage (assuming that only one audio stage is used), and it also varies considerably with the tube used *in the audio stage*. For instance, using a UX-201-A tube in the detector and a UX-201-A tube in the audio, the howl is quite pronounced as the set goes into oscillation. But when using a UX-201-A in the detector and a UX-200-A in the first audio the set goes into oscillation so easily that it is hard to tell just where the dividing line is. You will say, of course, that the UX-200-A is a detector tube and should not be used as an amplifier. Try it as an amplifier with 45 volts on the plate, no grid bias, and get an agreeable surprise.



Another way of eliminating threshold howl is to use a variable resistance, of the order of approximately 20,000 ohms (with UX-201-A tube), instead of a radio frequency choke coil. If a good *noiseless* variable resistance cannot be procured then use a fixed resistance. The variable resistance is better, and at one certain point the set will slide into oscillation with just the slightest hiss, no "plop," and absolutely no howl.

Still another way of eliminating threshold howl is to break the grid return connection on the first audio stage. Instead of connecting it to the negative filament lead, bring it back to the grid through a .0001 or .00025 fixed condenser, shunting the condenser with a grid leak of the order of approximately 3 megohms. This value seems to work best here. This method reduces the signal strength to a certain extent, but the ratio of signal to static is apparently much higher and the results are far more satisfactory. With this method the set will go into oscillation so easily you would be surprised. I attach a free-hand sketch showing this connection. Nothing intricate about it, but it certainly does the trick.

Another way to eliminate threshold howl is to place a variable resistance across the secondary of the first audio stage. There is one very critical point, in this method, where the howl disappears. Beyond this point signal strength is reduced to such an extent that the method is undesirable. But at the one so-called "critical point" the howl disappears without loss of signal strength.

E. M. WINTER (NU4HY).

Calls Heard.

Calls heard by NU7EK, Everett, Wash.—2ao, 2nh, 5by, 5hs, 5ma, 6yq, gi6mu.

Calls heard by NU7FE, Portland, Ore. (on 20 metres).—2ao, 2nh, 2od, 5by, hs, ku, ma, ml, ms, vl, 6bd, vp., gi6mu.

Calls heard by NC4FV, Winnipeg, Man. (on 20 metres).—2kf, od, 5by, hs, ma, ml, 6yq.

By FE-1ES in Cairo from July 26, 1928, till August 12, 1928, on 20 and 45 metres :—

EG-5ML, 5BM, 2SC, 2XV, 6BD, 5BY, 6HP, 2NU, 2MS, 6VP, 6RB, 5MS, 6YV, 2XY *, 5GS *, 6UT, 5YX (Per G5BQ). *On 45 metres.

EXCHANGE & MART.

Rates ½d. per word, minimum charge 1s. 6d.

" ALWAYS " RESISTANCES.

PATENTS obtained, Trade Marks and Designs registered, British and Foreign.—GEE AND CO., Patent and Trade Mark Agents (H. T. P. GEE, Member R.S.G.B., A.M.I.R.E.), 51-52, Chancery Lane, London, W.C.2. Telephone : Holborn 1525.

TRANSMITTERS please note.—We are making a Rectifying Valve to cost you 15s. Specifications : Fil. volts 5½, plate volts 1,000 with an output of 50 m.a. Guaranteed.—Send for price lists of new valves and repairs to NORTH LONDON VALVE CO., LTD., 22½, Cazenove Road, Stoke Newington, N.16.

MARCONI H.T. TRANSFORMER, 4,000—4,000 max., 1.5 kw., perfect condition and appearance, £5 5s. ; Mullard 250-watter, £3 5s. ; 150-watter, £3 ; two 250-watt Rectifiers, £3 each ; unused Spares ; guaranteed O.K.—Box 21, THE T. & R. BULLETIN, 53, Victoria Street, London, S.W.1.

FINE Wheatstone Bridge, 4 switch dials, 4 ratios, laminated brush contacts, accurately adjusted manganin coils, double key with platinum contacts for same, lamp-stand and scale, £5 the lot. A. & M. Universal shunt for galvo, £1 ; laboratory outfit, take £6 the lot. Weston triple range ammeter 0–0.1, 0–1.0 and 0–10 amps, £3. Cambridge and Paul unipivot universal instrument, 0–240 microamps and thermal scale. One shunt, 0–12 milliamps, £6, perfect condition. Post Office key, 15/–. —HUSKINSON, 47, Kirkdale, Sydenham, S.E.26.

FOR SALE.—Ten Exide W.H. 24 volt accumulators. Plates shedding paste. Containers, etc., perfect—a real bargain, each 4/-, lot 35/- plus carriage. 6UC, 1, York Edgbaston Birmingham.

SELLING OUT—Large quantity amateurs' transmitting ond experimental gear for sale. Condensers, meters, microphones, resistances, etc. Perhaps I have thot odd gadget you want. Write and see. Reply by return. 5GH, 16, Knockdene Park South, Belfast.

FOR SALE.—Marconi 600 v. 30 ma. Generator almost new, not disposal board ; direct coupled to ⅛ H.P. Crypto D.C. motor (240 v.), brand new. Both perfect. £10. Also Loud Speaker, Amplion Music Master, oak horn, £6 6s. model, 120 ohms, with transformer, £3. Perfect condition. —5TV, 27, Copthall Gardens, Twickenham, Middlesex.

FOR SALE.—Neat, compact, low-power short-wave transmitter (Morse), American components. Tested 1,000 v. £7. Best distance on 300 v., Newfoundland to British Guiana. Proof, photos, particulars upon request. — Stamp, MACHELL, Lobstock Hall, Preston. Ex. C8WM.

A.J.W.

Printed for the Inc. Radio Society of Great Britain, 53, Victoria Street, London, S.W.1, by Loxley Brothers Ltd., 50, Southwark Bridge Road, London, S.E.1.