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THE T. & R. BULLETIN

OFFICIAL JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

DEVOTED TO THE SCIENCE AND ADVANCEMENT OF AMATEUR RADIO

Hon. Editor: A. O. MILNE

Secretary-Editor: JOHN CLARRICOATS

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Vol. XIV. No. 9. MARCH, 1939

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QUEER CUSTOMS

IT is curious how certain habits and customs seem to gain acceptance for no particular or apparent reason. Why for example are such a very large majority of telegraphy stations operated on the last few kilocycles at the high frequency end of the 14 Mc. band? Surely our allocations are narrow enough as it is without squeezing ourselves into one corner.

In a piquant letter published in this issue one of our prominent DX operators draws attention to this condition, proving by actual figures that during the B.E.R.U. Contest the number of successful contacts resulting from calls made to stations working in the L.F. end of the band far surpassed those from calls made at the crowded high frequency end.

High scores in the B.E.R.U. Contest were not built up by "edge of the band" operation, nor would anyone in his sane senses operate on edge frequencies during the American DX Contests. British amateurs do not crowd into the last five kilocycles of the 1.7, 3.5 or 7 Mc. bands, so why should the practice be followed on 14 Mc.?

It's a puzzle to us and we don't profess to know the answer; it must be in our blood like the habit of everyone crowding into the first coach on the 8.30 a.m. and leaving the last three empty!

* * *

AMATEURS TO THE RESCUE

Once again a group of radio amateurs has demonstrated to all who have eyes to see and ears to hear that besides indulging in small talk they can tackle a man's job when the need arises. Our cousins in Australia faced with the complete breakdown of all communications, due to fierce bush fires, lost no time in getting out to the scene of danger with portable gear.

Their splendid work has already received the praise it deserved in Australia. It is our pleasure to tell a little of the story in this issue.

* * *

SOCIETY AWARDS

The news that the Council has decided to allow non-members to claim R.S.G.B. Certificates will be welcomed throughout the world. These unique awards, with a British Empire theme, are intensely popular and have been much sought after, but until now it has not been found possible to make them available to all amateurs.

Although the rules governing the issue of these certificates have been sent to all I.A.R.U. Member Societies, it is possible that some Amateur Radio Groups may have been missed. We

would therefore urge our members at home and abroad to bring the Council's decision to the notice of any of their friends who are not at present members of the R.S.G.B.

As evidence of the popularity of the W.B.E. Certificate, records show that to date over 660 have been issued. We forecast a great increase within the next few months.

* * *

NATIONAL FIELD DAY

Once again our most popular summer-time event is close at hand. The rules for the 1939 Field Day appear in this issue and as will be noted extra points are to be awarded for contacts with British Empire portable stations.

When N.F.D. first began to arouse general interest overseas, several B.E.R.U. Groups undertook the task of erecting and operating portable gear " out of the wilds," but in more recent years this interest seems to have fallen off.

We would especially appeal to our members in Africa, India, Canada and Oceania to give their support by operating portables during the week-end June 3 and 4.

* * *

PROVINCIAL DISTRICT MEETINGS

The P.D.M. season is approaching, and within the next three months meetings will be held in Birmingham, York, Weston-super-Mare, Chester and Southsea. The object in arranging these meetings is to enable members to get together in a social atmosphere to discuss their problems, and to hear a little about the work which is going on behind the scenes at Headquarters.

All too frequently the P.D.M.'s are supported by the same people year after year with scarcely a new face on show. We who attend as official representatives not only want to meet our friends of yester-year but also the newer members who are just breaking into Ham Radio.

Our experience of these meetings is that they are most enjoyable functions, and we know that view is shared by the many hundreds of " regulars."

Those responsible for the five P.D.M.'s which are being arranged particularly desire that they shall be supported by new as well as old members.

Make a point of putting in an appearance at your nearest P.D.M., and if you possess means of transport arrange a party from your town. Above all, let the District Representative who is in charge of the meeting, know of your plans.

J. C.

FORTHCOMING SOCIETY MEETINGS AND CONTESTS

MARCH

31. I.E.E. Meeting. Lecture and Demonstration by Mr. E. L. Gardiner (G6GR). Subject : " Band Pass Crystal Filters."

APRIL

2. Provincial District Meeting in Birmingham.
16. Provincial District Meeting in York.
18. Council Meeting.
28. I.E.E. Meeting. Lecture by Dr. C. G. Lemon (G2GL). Subject : " Communication Receivers."

MAY

7. Provincial District Meeting in Weston-super-Mare.
9. Council Meeting.
21. Provincial District Meeting in Chester.

JUNE

3-4. Seventh Annual National Field Day.
13. Council Meeting.
18. Provincial District Meeting in Southsea.

JULY

2. Conventionette in Cambridge.
9. Third Annual 56 Mc. Field Day.
11. Council Meeting.

A Modern Selective Receiver Featuring Mullard Red E Valves

By J. N. Walker (G5JU)

RECENT developments in valve design have opened up a field for the improvement in performance of amateur bands communication receivers. Since the performance of any receiver, whatever the actual circuit used, is largely governed by the valves incorporated, it will be appropriate to first discuss the advantages to be gained in this direction.

Red E Valves

The *Mullard* Red E range represents an important advance in the technique of valve construction and design, for they offer many advantages over present types without any increase in cost.

A noticeable characteristic is their small physical dimensions. The electrode structure inside the envelope is also of smaller dimensions than in normal types, and this fact leads to one of the major benefits obtained. The time taken by the electrons to cross from the cathode to the anode and other electrodes has little or no effect on broadcast frequencies, but on the high frequencies, when the transit time is comparable to the time occupied by one complete oscillation, it introduces a damping effect which, with the normal type of valve, can become quite serious. In the E series the transit time has been reduced to an extent which results in a performance at frequencies of the order of 56 megacycles intermediate between the existing series of English valves and the Acorn type.

The Red E valves are fitted with a side contact base which reduces both the capacities between and the inductance of the leading out wires. These three factors alone make them extremely suitable for use on short waves, but, in addition, the reduced size of the electrode structure ensures a greater degree of mechanical stability. As a consequence, noise and microphonic effects due to mechanical faults are reduced to a negligible amount.

The heater voltage has been standardised at 6.3 volts, and, with a few exceptions, the current is .2 amp. Despite the reduced wattage, the cathode emissivity has been increased, enabling a high mutual conductance to be realised throughout the range. The heating-up time is only 10 seconds, and, due to improved heat radiation, the bulb temperature is low, eliminating the necessity for spacing the valves widely from each other and from other components.

Considerations of Type of Receiver

It will be obvious, from the above, that the substitution of the E series for existing valves will result in an improved performance, although adjustments will, in all probability, be necessary to allow for the reduced inter-electrode capacities, etc. However, to make the most of the benefits obtainable, it is better to build a receiver designed specifically around the valves, and the question then arises as to which circuit to use—T.R.F. or Superhet. Both have their advantages; therefore, before weighing the odds, it will be as well to briefly outline the characteristics essential in a modern communication receiver. They are numbered in order to facilitate comparisons later.

(1) Primarily, it must possess a high degree of sensitivity in order to make the most of weak signals.

(2) Bound up with sensitivity is the factor governing background level noise—high amplification will certainly bring up signal strength, but if it also increases the amount of noise in the same proportion, little or no benefit accrues. Background noise comes from two chief sources—firstly, atmospheric "mush" due to natural influences beyond human control; and secondly, valve noise, due to irregularities in the flow of electrons between the electrodes.

(3) Good selectivity, by which is meant the ability to differentiate between signals on frequencies very close to one another and at the same time the ability to be unresponsive to strong local signals on any frequency—an essential feature in these days of crowded amateur bands. The selectivity of a receiver depends on the number and on the "goodness" (low losses and high dynamic impedance) of the tuned circuits incorporated.

(4) General stability and ease of handling throughout the usual range of frequencies employed by amateurs.

(5) It is desirable that the construction and preliminary adjustments be not unduly difficult, in view of the restricted amount of equipment available for these purposes.

Summing Up

Let us consider these points in order:—

(1) If we assume the use of older type valves, the superhet undoubtedly scores, since the gain obtainable from such valves on the higher frequencies is considerably less than on broadcast frequencies. Converting the signals to a much lower frequency and accomplishing the amplification at the new frequency enables a greater degree of amplification to be secured, with a resultant higher overall sensitivity.

This argument does not hold with the new series of valves, with which the gain is well maintained into the ultra-high frequencies. Whilst it is not proposed to include the 56 Mc. amateur band and the television band in the receiver to be described, the E series of valves are to be highly recommended for work on such frequencies.

(2) The noise level of a superhet is invariably greater than that of a T.R.F. receiver, due to the inclusion of the frequency-changer valve. The injection of two frequencies and the inherent modulating action gives rise to greater irregularities in the electron stream. Such irregularities in themselves produce output voltages on the anode of the valve, the frequency range being very great, whilst, in addition, various subsidiary frequencies are produced from the combination of the input signal voltage and the local oscillator voltage

and from their harmonics. These various frequencies are amplified in the later stages and then rectified to give a steady background noise which will be independent of atmospheric conditions. The valves in a T.R.F. receiver are called upon to handle one radio frequency only, the noise level in consequence being lower.

(3) The superhet is usually superior on the score of selectivity, partly on account of the number of tuned stages incorporated, but chiefly because it is possible to obtain high "Q" in the intermediate frequency tuned circuits, operating on a comparatively low frequency. At the same time, if additional stages are used in a T.R.F. receiver, and especially if regeneration is applied to them, the selectivity can be made sufficiently high for modern requirements.

(4) Stability and ease of handling arise from careful design and construction—there is little to choose between the T.R.F. and the superhet, provided each is built on proper lines.

(5) It is when we come to discuss the last point that the advantage of the T.R.F. receiver becomes apparent. In a superhet with one R.F. stage three coils are necessary for each band, unless it is arranged to cover two bands in one range. If the coils are of the plug-in type, as many as fifteen may be required to cover the five most popular bands. If the coils are switched, it is a problem to accommodate them all and the wiring and switching becomes complicated.

The oscillator coils must be wound to fine limits and carefully adjusted, both for inductance (to keep the receiver in trim over a wide range) and for amplitude of oscillation. The final alignment again must be carefully carried out or several annoying troubles are liable to occur. The correct intermediate frequency is obtained at points on each side of the oscillator frequency so that stations in the band may be received at two settings, whilst commercial stations actually outside the band will appear to be inside the band. If the early stages are slightly out of tune, the response of the receiver to a station slightly different to the desired signal will be greater than it should be and powerful local stations will be liable to break through.

The superhet possesses advantages in that such items as A.V.C., a crystal gate and an S meter can be incorporated, but these refinements are not essential.

The foregoing remarks are not intended to disparage the superhet—far from it. They are to emphasise that the building of a communication superheterodyne receiver is no simple business. If the constructor wishes to go to the trouble and expense involved, and he possesses a fair amount of skill and experience in the adjustment of superhets, together with the possession of the necessary equipment, this class of receiver will prove the more satisfactory. The new *Mullard* E series of valves includes types for use in superhets, from which a superior performance may be expected, a typical example being the ECH2 (a low noise triode-hexode frequency-changer). On the other hand, if the foregoing facilities, etc., are not available, the performance of an amateur-built superhet is likely to be unsatisfactory. Probably on one particular band results will be really good, but will fall off seriously elsewhere.

Bearing all these factors in mind, it was decided to construct a receiver, of the T.R.F. type, which would have a wide appeal. The number of coils and other components required have been reduced to a minimum consistent with satisfactory performance. Naturally, as the valves are indirectly heated and intended for A.C. or D.C. operation, the receiver is of the all-mains type, but, at the same time, due to the low heater consumption, it could be run economically off batteries, especially if the output stage were to be omitted.

The Circuit

We can now turn to a discussion in detail of the circuit employed. The normal T.R.F. receiver utilises one tuned R.F. stage, which, in the interests of selectivity, is usually lightly coupled to the aerial on the grid side, and to the detector stage on the anode side. Under these conditions it is difficult to secure complete stability, especially when modern high-gain valves are employed. Although the small capacity existing between the anode and control grid of the screen-grid valve produces negligible effect on broadcast frequencies, this is not the case on high frequencies. To avoid trouble from that source, the tuned R.F. stage is isolated from the detector by means of an untuned buffer valve, which, incidentally, adds appreciably to the overall gain.

Coupling the aerial direct to the input circuit of the R.F. stage is equivalent to shunting a resistance across it. The selectivity and gain would suffer, and, moreover, would vary according to the degree of aerial coupling. Another buffer valve is therefore placed before the tuned R.F. stage, which has only a light and constant load imposed upon it. The aerial is impedance coupled to the grid of the first valve, although a different method may be employed if desired, to suit the needs of the user.

Noise Level

It may be thought that the inclusion of three R.F. stages would give an undesirably high noise level. This would undoubtedly be the case if ordinary valves were used, but matters are different when the *Mullard* type EF8 is employed.

The noise produced by the internal electron stream of a screen-grid valve has been found to be approximately proportional to the ratio of screen current to total cathode current, so that it is essential to make the former as small as possible. This could be achieved by reducing the number of turns of the screen-grid whilst retaining the same thickness of wire, but this would result in the screening effect of the grid being reduced by too great a degree—that is, the anode/control-grid capacity would be considerably increased.

The method adopted in the low-noise valve EF8 for reducing the screen-grid current is based on electron optics. Between the screen and control grids is placed an auxiliary grid, maintained at cathode potential, the turns of which are exactly in front of the turns of the screen-grid. Consequently the electrons which pass through the auxiliary grid are grouped together to form a beam and only a few of them reach the screen-grid, the action being illustrated in the sketch, which is reproduced by permission of *Mullard Wireless Service Co.* It will be seen that the majority of the electron paths follow the turns of the screen-grid windings. The screen-grid current of the EF8 is only 0.2, mA. a value so low that no purpose would be served in attempting to reduce it further.

Regeneration in the R.F. Stage

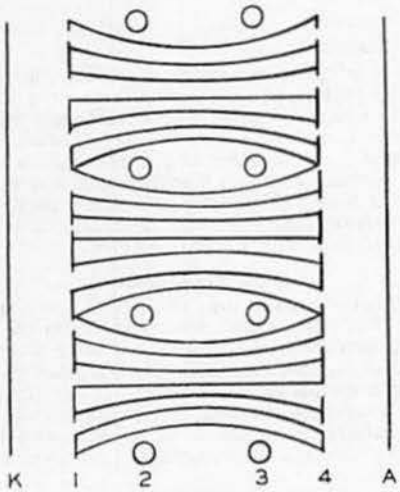
Since the R.F. stage is completely isolated from external variations, full benefit may be secured from the addition of regeneration, which will be under better and more complete control than would otherwise be the case. The method of control adopted is to place a variable resistance between the cathode tap on the coil and earth, this having less effect on the operation of the valve in other ways. Due in part to the phase inversion which takes place in the buffer stage preceding the detector, the stability is excellent.

Gain Control

Varying the bias on the control grid of a valve varies the density of the electronic space charge surrounding the cathode, and this in turn causes a change in the inter-electrode capacities. To avoid the consequent de-tuning effect which would result if the variable bias were applied to the tuned R.F. stage, this stage is operated with a fixed bias, the first (untuned) valve being controlled.

The Detector Stage

Sensitivity in the detector stage is obtained by the use of a screen-grid valve, the type EF6 being chosen for this position. This valve has a high input impedance and the mutual conductance is fully maintained at high frequencies, enabling



[Courtesy Mullard Wireless Service Co.

A section of the Electrode System of the EF8 valve. The symbols represent:—K—Cathode; 1—Control Grid; 2—Screen Grid; 3—Auxiliary Grid; 4—Suppressor Grid; A—Anode.

oscillation to be easily attained. Reaction is controlled by the potentiometer method and is very smooth. Coupling between the second buffer valve and the detector is inductive, whilst in previous stages it is capacitative.

The audio output from the EF6 is ample when telephones are employed, a jack being included at an appropriate point. The audio voltage is automatically transferred to the grid of the power output valve when the plug is withdrawn.

It has been deemed advisable to include a power output stage to allow of loud-speaker operation. The valve employed is the *Mullard* EL3 pentode, which is capable of giving, with low distortion, an output of 4½ watts with an input signal voltage of 4.2. Suitable precautions have been taken to prevent radio-frequency currents reaching the output stage.

Monitor and Frequency Meter

A monitor and frequency meter may well be combined in one instrument, and should be considered an essential part of a station's receiving equipment. An instrument which combines both functions has been included in the present receiver, and as a result of the use of an electron-coupled circuit, together with the low drift characteristics of the EF8 valve employed, it is very reliable and constant in operation.

In addition to its normal functions, the monitor has a further application in enabling severe interference from a signal on a frequency alongside the one being copied to be considerably reduced or eliminated. The desired signal is tuned in at zero beat and the reaction control backed off so that oscillation just ceases. The monitor then becomes a beat oscillator and is tuned so that its harmonic (preferably) beats with the incoming signal on the side away from the interfering signal, which will be greatly attenuated. Whether special coupling between the detector and the monitor is necessary will depend on the amount of screening employed—if, as in the present case, the monitor is left fairly open, none is required.

To permit this mode of operation, the audio output of the monitor is not inter-connected to the normal output jacks, but is provided with a separate jack. A separate switch in the high-tension lead is also fitted.

Noise Silencer

There are a number of noise silencing circuits available, but the majority of them are unsuitable for inclusion in a receiver of this type because of the complication involved in the adjustments and the loss of signal strength. In districts where "man-made" static is bad, and especially where cars run close to the aerial, some form of noise silencer will prove of benefit. A simple form utilising a double-diode has therefore been incorporated and has much to recommend it, although it must be pointed out that it will not remove *all* the noise, but only those peaks which rise to a greater level than the signal being received. These are converted to troughs which pass unnoticed, thereby preventing the ears being distressed.

The Power Supply

A power supply is built on the same chassis as the receiver, and, to ensure freedom from hum, ample smoothing is incorporated. If desired, a smaller chassis may be employed and the power supply built as a separate unit. R.F. filter condensers are included to prevent modulation hum.

The equipment as a whole employs seven valves (or, including the rectifier, eight), and it may be thought that this number is excessive. It should be remembered, however, that the additional circuits lead to the receiver being complete and up to date in every respect. The cost of the additional R.F. stages is small, and the improvement effected in the overall performance is well worth it.

The construction and operation of the receiver will be dealt with fully in the next issue.

(To be continued.)

An Omni-Directional Low-Angle Aerial

By C. A. HEATHCOTE* (G3JR)

THE newly-licensed amateur, hopefully in search of W.A.C. and W.B.E. on a modest input, is often faced with a keen problem in the selection of a suitable radiation system.

Since the considerations involved at the author's station are typical of those encountered at many others, the following article will illustrate how the question has been tackled from first principles, and, it is believed, solved with a fair degree of success.

Practical Requirements

Let us first of all examine the requirements of an efficient yet practical aerial system. For consistent DX work on low-power, low-angle radiation is of primary importance, always providing that the aerial does radiate a substantial proportion of its energy at these angles—*i.e.*, has good low-angle *directivity*. Fig. 1 illustrates how a vertical dipole a half-wave high, commonly considered a low-angle aerial, actually wastes most of its energy in long-distance work on 14 Mc., where the most useful angles are in the neighbourhood of 15°. Whilst low-angle radiation is certainly present, low-angle directivity could be better, even though the aerial is omni-directional.

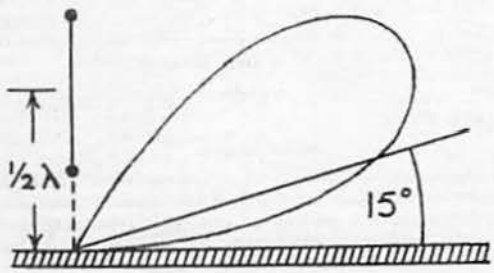


Fig. 1.
Vertical Polar diagram for vertical Dipole above poorly conducting earth.

Good low-angle directivity is more readily obtainable in horizontal designs, where it takes the form of deep lobes in the radiation pattern, though to satisfy this condition at reasonable heights a flat-top system should be *at least* a full wave in length.

Beam systems, fixed or rotary, were disregarded from the start on the grounds that (1) they are generally complicated and expensive to erect; and (2) they give an "artificial" boost in a confined direction, which, in the writer's opinion, puts an entirely false value on the apparent efficiency of a low-power station. To illustrate the latter point more clearly, W.A.C. with 5 watts to a high-gain rotating beam would not cause a low-power enthusiast undue excitement.

Reverting then to simple, fixed systems, a glance at a great circle map (essential for serious aerial work) reveals that for satisfactory coverage the aerial must be practically omni-directional. At least five good lobes are required to take care of (1) North America; (2) South America; (3) Africa; (4) India and VK; and (5) The Far East, for J, XU and ZL. To do the job properly a sixth lobe is desirable for the West Indies and Central America.

*Marlow Cottage, Lostock Hall, Preston.

From the above it will be seen that the person who possesses a lengthy garden running North and South is fortunate indeed, for all that is necessary on 14 Mc. is a 99-ft. top, centre fed for preference, with 72 ohm. cable. However, when erected in certain directions, the radiation is largely wasted, and so this is clearly a "special case" arrangement, possible only for the privileged few.

In view of the fact that the majority of amateurs use simple aerials in the single wire, horizontal top category, it is interesting to note at this point that unless the system is two full waves long, or longer, there is quite a likelihood of insufficient coverage being obtained. With a full-wave or half-wave arrangement this condition can scarcely be avoided.

It was therefore argued that if a simple system was to be found which would produce satisfactory results on low power when erected in a random direction, it must possess:

(1) Omni-directional coverage.
(2) Low-angle radiation.
(3) Low-angle directivity, as far as is compatible with (1).
(4) Reasonable height.
(5) Reasonable length.

To the best of the writer's knowledge, no orthodox, non-rotary system satisfies more than four of the above conditions. A simple half-wave vertical fills the bill admirably on 1, 2, 4 and 5, but is rather poor on 3. At the other end of the scale a "long wire" satisfies 2, 3 and 4 excellently, and is good on 1, but is out of the question on 5. Clearly the ideal system must combine the characteristics of both horizontal and vertical designs.

Initial Experiments

No great stretch of the imagination was required to see that experiments with some form of "T" construction might be fruitful. Shortly after this conclusion had been reached, Mr. Wardman (G5GQ) published details of an end-fed "T" system, and credit should go to him for a fine aerial. The writer interested himself in it at once, and found it highly efficient for reception. As soon as his

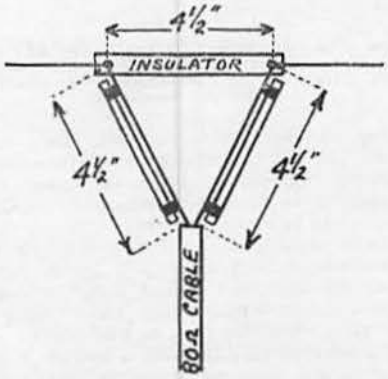


Fig. 2.
Matching Triangle for 14 Mc. Note strengthening dowels, bound on with tape.

radiating permit arrived, it was tested out thoroughly on 14 Mc., and proved very effective in certain directions.

However, the aerial in this form left much to be desired, and a fresh design was contemplated. In the writer's case it was quite impossible to end feed at the base of the "T" without pulling this considerably out of the vertical, and such will be true in the case of the majority of users of this system. In practice the vertical part of the "T" was at about 35° to one side of the top, and this naturally affected the symmetry of radiation. The aerial thus assumed the shape of a narrow "Y" upon its side (≻).

The original dimensions used for end-fed experiments were a 66-ft. top, centre tapped and connected to a 37-ft. downlead, this being tapped on to the tank coil *via* a series loading coil to obtain resonance and impedance match.

Realising that serious physical distortion was probably producing an electrical unbalance, field-strength measurements were taken. These indicated that for optimum radiation the connection to the downlead had to be moved no less than 4 ft. in the direction of the shack. Clearly the design would have practical shortcomings in the majority of locations. Further, the sloping downlead was restricting the height of the top to considerably less than 30 ft., and in any case the best height obtainable with end-feed to a half-wave vertical could not be much greater from a ground-floor operating position.

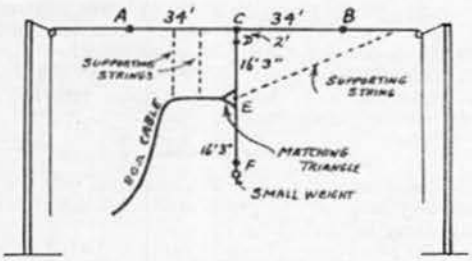


Fig. 3.
The aerial, as described for 14 Mc.

Adopted Design

It was therefore decided to erect a perfectly right angled "T" and to attempt to current feed it with low impedance cable. Such a design, if successful, should exhibit symmetrical radiation and an improved low angle performance, depending upon the maximum height available. In other words, the characteristics of a "T" system would be given the fullest possible scope.

In order to familiarise himself with low impedance line and thereby obtain efficient operation, the author first constructed a simple half-wave horizontal doublet fed with *Belling Lee* 80 ohm cable. This was erected 30 feet high on a direction 55° East of North, thus putting maximum radiation into Africa and Northern Canada respectively. Numerous experiments were then made with various sizes of matching triangle, in conjunction with a field strength meter. In practice the centre impedance of a horizontal doublet often approximates more closely to a figure of 100 ohms than the 70-80 ohms presented by the feeder. This produces a slight mismatch which can, with care, be eliminated.

The optimum arrangement finally used (correct on 14 Mc.) was an equilateral triangle of 4½ins. sides, constructed as shown in Fig. 2. These dimensions may only be taken as a guide in individual cases, however, since the size of the triangle will depend to a certain extent on local conditions, nature of the ground, frequency, etc. On 28 Mc. the dimensions of the triangle will be roughly half those given for 14 Mc.

It should be mentioned that when testing with a temporary triangle of variable size, the aerial must be kept perfectly resonant for each check, since the difference in indications on a local field strength

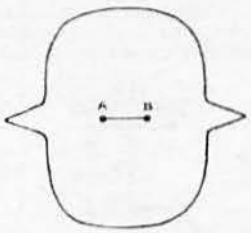


Fig. 4.
Measured field strength distribution on 14 Mc.

meter are extremely slight. Similarly, in radiation tests, the optimum match produced no difference whatever in East Coast U.S.A. contacts, but seemed to raise signal strength from a half to one "S" point in W6 and ZS.

Coupling

As regards the coupling to the transmitter, this was also found to be worth attention. A 2-turn pick-up coil of insulated wire, similar in diameter to the tank coil, terminated the feeder and intermeshed with the two final turns at the cold end of the tank. It has been the writer's experience that the aerial is more truly resonant when, in the test for no de-tuning, the tank is first tuned to minimum dip with the 2 turn coil *still in position*, and the feeder disconnected from same. This appears to remove, to a large extent, the de-tuning error due to the capacity effect of the coupling coil upon the tank, as tests with a Faraday screen have indicated.

Further, it is a big advantage when making trimming and coupling adjustments to have a crystal in each half of the band, for the double check may bring to light some important effects which will not otherwise be noticed. If, for example, the aerial draws more on one frequency than on the other, it is probable that the feeder is approaching a resonant length. Accordingly, this should be trimmed until the inputs on load are equal, though such an adjustment may have a marked effect upon the degree of coupling that is ultimately necessary.

Trimming

Having now obtained satisfactory results with the horizontal doublet, this was turned vertical and a 70 feet horizontal top was erected, centre tapped and connected to one end of same.

Extreme difficulty was experienced in getting the aerial to trim properly between the writer's two frequencies, in spite of endless juggling with the lengths of both horizontal and vertical components. A state of affairs was reached when an "artificial" mid-way trim was apparent, the tank de-tuning

indicating that the system was too long for the lower frequency and too short for the higher. Whilst the aerial was radiating surprisingly well, it was evident that a state of unbalance existed, and the whole thing was pulled down—with patience at a premium.

A fresh vertical doublet was now erected on its own, the horizontal top being temporarily replaced by rope. This was trimmed in the usual manner to exact resonance, mid-way between frequencies. Here it was noticed that the difference in length between a horizontal and vertical doublet was sufficiently great as to have caused the previous unsatisfactory operation.

The vertical was then taken down and a length of about 2 feet soldered to the upper half to take care of the " end effect " which will disappear on this quarter wave when the horizontal top is connected. (A " T " aerial with full wave top and half-

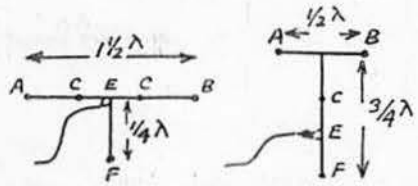


Fig. 5.
Suggested variations of the aerial shown in Fig. 3.

wave vertical behaves as two full-wave inverted " L " aerials back to back, *i.e.*, in parallel.)

A 75 ft. top was then centre tapped, connected to the vertical, and carefully trimmed by equal amounts from each end. Perfect balance and trim were now obtained when the top reached a length of 68 feet, and this is the dimension retained by the author.

Construction

Constructional details of the system finally developed at G3JR may be seen in Fig. 3. It should be noted, however, that this aerial should not be erected according to " book lengths " or unbalance will obtain. The following order of erection procedure is essential for efficient operation :

(1) Replace AB temporarily with rope.
(2) Erect vertical doublet DF and trim exactly.
(3) Add 2 feet DC to top of DF for vertical " end effect."
(4) Commencing with 75 feet, centre tap and erect horizontal top AB, and connect to CF.
(5) Trim AC and CB simultaneously until perfect resonance is obtained.
(6) Adjust CD, if necessary, until AB re-trims at 67-68 feet.

A point to watch is that *on no account* must the length of the lower half of the vertical be touched after its original trim as a vertical doublet, or the balance and trim of the whole system will be upset. If it is desired to increase the upper half, however, approximately the same amount must be trimmed off *each* end of the flat top to restore resonance, and *vice versa*. Thus, if the top is found to trim at 70 feet, about 1 to 1½ feet should be added to the upper half of the vertical, and the horizontal should then resonate at 67 or 68 feet. This ensures that the junction of the " T " is roughly a current node, which *may* confer better efficiency, though this has not yet been verified.

Field Strength Measurements

Employing horizontal pick-up, a field strength check was first of all made on the size of the matching triangle under the new conditions, and in the writer's case no alteration was found to be necessary. Measurements were then taken at an average distance of 60 yards from the aerial, using the A.R.R.L. two-stage double diode pentode field strength meter. Luckily very little local distortion of the radiation pattern was encountered, and the polar distribution for 14 Mc. is shown in Fig. 4.

It will be seen that in addition to being practically omni-directional, a certain amount of end fire exists. This in practice is of rather higher angle than the broadside distribution, and the system may be regarded as omni-directional for long distances, with a very slight preference to broadside radiation.

The first thing that strikes one after testing this aerial is the effective manner in which it fulfils all five of the requirements previously referred to. This fact is proved by consistently good reports from all directions using quite low power. As an illustration of the low angle directivity, a comparison of results was made with those obtainable on the horizontal doublet, from directions broadside to the latter. The same height was, of course, employed with each aerial, and reports received from long distances were generally an S point higher using the aerial described. Similarly, an S point increase was noted in all directions over reports obtained with a half-wave vertical.

More recently, a pair of 52 feet masts have been installed, thus enabling the height of the aerial to be increased by about 16 feet. No great difference in signal strength has been experienced, though the station puts out a more consistent signal over long distances. This seems to indicate that the angle of radiation must have been quite low at the previous height of 35 feet.

Results Obtained

A brief summary of results obtained will not be out of place, for the proof of the pudding is undoubtedly in the eating.

North America.—S7 reports are regularly received from W6/7, with S7 to 9 from the remaining U.S. Districts and from VE1, 2, 3. S5 from K7, VE4 and 5.

Central and South America.—S6 in VP1, HH, CM, HK4, CX, and LU. S7 from K4, S8 from PY.

Africa.—S4 from CR6. S5 from ZE, ZD2, 4, VQ2, 3, 4, 8 and regularly from all districts of ZS. OQ5's give S6, and ZS3F reported S7.

Asia.—S5 from XU, FI, VU, and VS7. S6 in J and U9. S8 from ZC6.

Oceania.—S4 from PK. S5 in VK 3, 4, and 5. S6 from ZL2, 4, and KA. S7 from VK6, sometimes after midnight.

In less than six months' operation, the aerial has

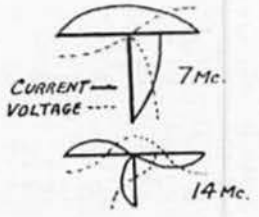


Fig. 6.
Current and voltage distributions.

raised 35 American States and 70 countries situated in 32 zones, using a 6L6g crystal oscillator with an input of 10 watts. The present transmitter employs the same power to an RK25 final, but beyond increased flexibility, there is no advantage over the simpler gear. As was recently stated in "The Month on the Air," G3PS has been testing the design described and is obtaining similar results. Those using higher power than the author, who adopt the suggestion, should have little difficulty in contacting anything they please during good conditions.

Future Experiments

An interesting field for future experiment would be the effect of altering the relative proportions of AB and CE between the extremes shown in Fig. 5, noting the field strengths and radiation patterns obtained. It is possible that the end fire properties of the system might be enhanced by some such adjustment, at the expense of broadside directivity. Alternatively, an optimum ratio of AB to CE may exist for omni-directional working which is different from that employed in the present design, *i.e.*, 4 to 1.

Evidence is forthcoming that the aerial is also very efficient on 7 and 28 Mc., and it should therefore be worth a trial on 56 Mc. No field strength patterns have yet been taken for these frequencies. Without altering the dimensions substantially, the aerial can be converted for use on these bands by simply choosing a current loop position for the 80 ohm feed. The method of erecting the vertical first, will apply in all cases save on 7 Mc., where the aerial becomes 2 half-wave inverted L doublets in parallel. Here, of course, the feeder connects between the upper end of the vertical and the centre of the horizontal top.

The writer is far from being an authority on phasing matters, and will therefore express no definite opinion as to the manner in which this aerial works. He will, however, be pleased to hear from anyone competent to supply this information, and in passing suggests that on 14 Mc. the two half-waves appear *out* of phase on the "full wave" top, though he has heard some convincing arguments to the contrary. Fig. 6 illustrates the possible current and voltage distributions for such an arrangement on 7 and 14 Mc. respectively.

The author finally expresses the hope that any amateur testing this system will be kind enough to inform him of the difficulties encountered or results obtained.

Australian Amateurs to the Rescue

From Gordon Ragless (VK5GR) we have received particulars of the yeoman services rendered by a group of Adelaide amateurs during the disastrous bush fires which occurred in Australia during January.

As a result of the fires, telephone and telegraph poles were sent crashing to the ground, and vital lines of communication were cut until Adelaide amateurs filled the breach. With the aid of portable gear they rapidly restored communications with the National Safety Council in Adelaide.

Surrounded by smoke, and with flames dangerously near to them, the amateurs were able to inform the authorities in which direction the fires were heading and where fire-fighters were urgently needed. Later they were granted permission to send urgent private telegrams for transmission from Adelaide.

Frank Holsten (VK5LX) and Clarrie Castle (VK5KL) had a narrow escape when a burst of flame swept down on them. They just had time to start the engine of their car and drive off, leaving their aerial to the mercy of the fires.

Mr. J. Kilgariff, President of the South Australian Branch of W.I.A., operating a central receiving station, acted as a forwarding channel for all messages sent out from the fire areas.

Messrs. Holsten and Castle worked on 7 Mc. with an input of 7 watts. A 9-valve receiver was also in use. Later in the week VK5DW joined the operators of this station.

W. Lloyd (VK5HD), G. W. Bruce (VK5GB) and A. R. Anderson (VK5GM) established contact with Adelaide from other strategic points in the hills, whilst eight amateurs from the Adelaide Electric Supply Co. furnished another portable which operated from the Gumeracha area.

When bad fading occurred, amateurs in other States acted as relay channels.

In giving publicity to the fine work accomplished by our Australian colleagues, we can but express the hope that the licensing authorities in Australia, and elsewhere, will appreciate that the Radio Amateur is to-day, even as he has been in the past, ready to give of his best when the interests of the community are at stake.

Well done, VK5. Well done, W.I.A.

Co-operation Invited

G3SB, Beaconwood Private Hotel, Minehead, Somerset, and G5KT, 33, Howard Road, Westbury Park, Bristol, are carrying out tests in connection with the weather. Transmissions in the International Weather Code are sent out every Tuesday and Thursday at 21.30 G.M.T. Reports are welcomed and if a stamp is enclosed will be acknowledged. Frequencies in use are 1775 kc. (G5KT) and 1745 kc. (G3SB). Transmissions begin from the latter station and the procedure adopted is WX, WX, WX Test de G3SB.

D.C. Mains for Transmitter Operation

Mr. H. J. Withers (G6XA) informs us that in addition to the valves recommended by G3XA and 8OT in their recent article, he finds the 6V6G an exceptionally good valve for use in D.C. operated transmitters. This valve requires a heater current of only 0.45 amps., whilst the maximum plate voltage is 350. The 6V6G makes an excellent C.O. valve in either a straight or Tritet circuit, and a pair will handle efficiently up to 30 watts input.

The 6V6G can also be used successfully as an audio amplifier. With 250 volts on the plate, over 4 watts of audio can be obtained when worked in Class A, whilst a pair in Class AB will give nearly 9 watts of audio which is sufficient for plate modulation of a 20-watts carrier.

The 6V6G is now available from the *British Tungsram Valve Co.*

Workshop Practice

By "SHACK"

PART 4.—TOOLS AND THEIR USES

THE amateur workshop varies from a corner of the sole table in lodgings to a large separate room with a bench, lathe, drilling machine and innumerable hand tools. The writer suffered the first for nearly ten years and has also revelled in the latter. The range of equipment naturally depends upon the space available, but it is surprising how much work can be accomplished with even a small box of tools.

Choosing Tools

Before proceeding to describe the various tools and their uses, there is one golden rule which applies when purchasing any tool, and that is, buy the best that can be afforded. Many tools can be bought for a price varying from sixpence to more than a pound, and to the novice the difference is so slight that he is tempted to buy many cheap tools rather than a few first-class ones. Wood saws are an excellent example. The cheap type may cut wood for a time, but it usually requires "driving," whereas a good saw should cut with practically its own weight. If it binds, the cheap saw will probably buckle, while the blade itself may be too soft to keep a cutting edge or too hard and crack. A good workman cannot do good work with a bad tool, whilst the beginner has no chance to improve.

Wood Saws

Wood saws can be divided into many categories. For example, the "rip" saw used for cutting along the grain, the "crosscut" saw for working across the grain, and the "panel" saw all come within the handsaw class, and all have long, thin, tapering blades varying from 20 ins. to 28 ins. in length. The only practical difference between them is in the pitch of the teeth, therefore a handsaw about 26 ins. long, with 6½ teeth per inch (or, as it is called in the trade, 6½ points), will do all our work. "Dovetail" and "tenon" saws are smaller, with rectangular blades ranging from 8 ins. to 16 ins. long, and made with a steel or brass back to stiffen the blade. These are used for making fine cuts across the grain, such as dovetails or tenons for joining two pieces of wood. They have much finer teeth than those in the handsaw class as they have to make a cleaner cut without tearing the fibre. Brass-backed types are the more expensive, but a good steel-backed saw is an excellent tool. For amateur radio work a steel-cutting hacksaw will do most of the jobs which require the use of a wood tool.

Like all other tools, saws will not give of their best unless they are well looked after. Keep the blade clean and polished, smearing it with a film of vaseline after it is used. A rusty saw is an abomination.

Hold a saw with the last three fingers and thumb, the first finger being extended along the handle pointing towards the end of the blade in order to guide and control its operation. Maintain a steady, even motion of about 65 strokes per minute for a handsaw and a little faster for a tenon saw. Don't try to saw fast. Saws need sharpening from time to time and, as this is an expert's job, it is as well to let a good joiner do it.

The two horns at the end of the handle are placed there so that pressure may be brought to bear on either the heel or toe of the saw.

Metal Saws

The "hacksaw" is the universal metal-cutting saw in the amateur workshop. The replaceable blades can be obtained in lengths from 8 ins. to 12 ins. and with varying numbers of teeth. Special fine tooth double-edged blades are made for cutting tubes. The coarse blades with 14 or 18 teeth per inch can be used for ebonite or bakelite, but the medium blades, with about 22 teeth per inch, are best for most metals except thin sheet, when fine blades with 32 teeth per inch should be used. As a general rule harder metals demand the finer blade.

A "fretsaw" is a particularly useful tool, especially when used with metal blades for cutting out dial and meter holes. When operated properly the surrounding metal is not marked.

Another handy tool not often seen in an amateur workshop is a jeweller's "slitting" saw, which is like a miniature brass-backed tenon saw having a very thin blade about 4 ins. long with correspondingly fine teeth. The blades are replaceable and cost about fourpence each. Yet another useful jeweller's tool is the "piercing" saw. This is a small rigid fretsaw which takes material up to about 4 ins. inside the frame. Incidentally, both these tools are excellent for cutting screws in inaccessible positions.

When replacing saw blades, remember that hacksaw blades must have the teeth pointing *towards the tip of the saw*, whereas fretsaw blade teeth should point *towards the handle*, in order to keep the work pressed on to the cutting table.

Hammers

Hammers vary slightly in hardness: the softer types are inclined to mark on the face, a disadvantage when sheet metal has to be flattened, since the hammer then marks the material, whilst the very hard types are liable to chip or split. There is an old trick for testing the hardness of a pair of hammers by taking one in each hand and hitting them together to see which is marked. The latter is discarded as being soft.

Hammers are sold according to the weight of the head, a useful size being a 1-lb. "ball pane." Ball pane refers to the knob, and this is used for riveting. Beyond the "claw" hammer, which is useful for removing nails, the other special hammers need not concern us, although it is interesting to mention that special hammers are made for nearly all trades requiring them.

When using a hammer, grip the shaft at the end. To the trained eye nothing looks worse than to see a person grasp a hammer shaft half-way down. Those who have served an engineering apprenticeship will not need to be reminded of this point, for the foreman will have done that already—usually most effectively! Don't try to "force" a hammer: let the head follow through like a golf club and let the wrist be loose and supple.

Files

A file is one of the simplest tools and, without doubt, the most difficult to use skilfully. The most exacting test for a fitter is to ask him to file a surface flat. If you think it is easy, try it!

Good files are cheap; therefore there is no excuse for buying inferior ones. Go to a first-class tool dealer and explain to him your wants. Hand-made files are considered superior to those made by machine since the former type has a very slight irregularity in the teeth which makes it cut better; but, naturally, they are more expensive. Files are sold in lengths from about 14 ins. to 4 ins. long and in various cuts. These cuts are defined as rough, middle, bastard, second cut, smooth and dead smooth. The shapes also differ, being parallel or taper, and in cross-section they may be flat, three-square or triangular, round or rat-tailed, knife, half-round, or square. When one edge is left uncut the file is said to be "safe-edged."

Special files are made for special trades. The rougher cuts are only made in big sizes and are not likely to be used for radio work, the second cut and bastard cut being rough enough for our work. There is available a very useful set of files which are sold on a card and called needle files. These are particularly handy for small jobs.

File handles are always sold separately and no file (except a needle file) should ever be used without a handle since there is always a danger of the file slipping and causing serious injury. To fix a file handle, drill a small hole in the centre to give the tang (or pointed end) a start, place the tang in the hole and bring the file handle down on to the bench with a smart smack so that it drives its own way into the handle. Do this two or three times until the handle is secure. Never hammer a file into its handle because there is a danger of the file splitting. Further, never heat the tang as this will inevitably draw the temper and ruin the file.

In using a file, grasp the handle firmly in the right hand, with the thumb on top, and let the left hand rest on the tip to guide it. As the file proceeds across the work in the forward cutting direction, pressure must be eased off the left hand and transferred to the right hand. Draw the file back with the minimum of pressure. Always clean a file with a wire file brush after, and often during, work, in order to remove the filings which stick in the teeth. Filings which are firmly lodged in the teeth can be removed with the corner of a piece of tinplate. It is useless to expect a clogged file to cut; even if it does, the work will be badly scratched.

Screwdrivers

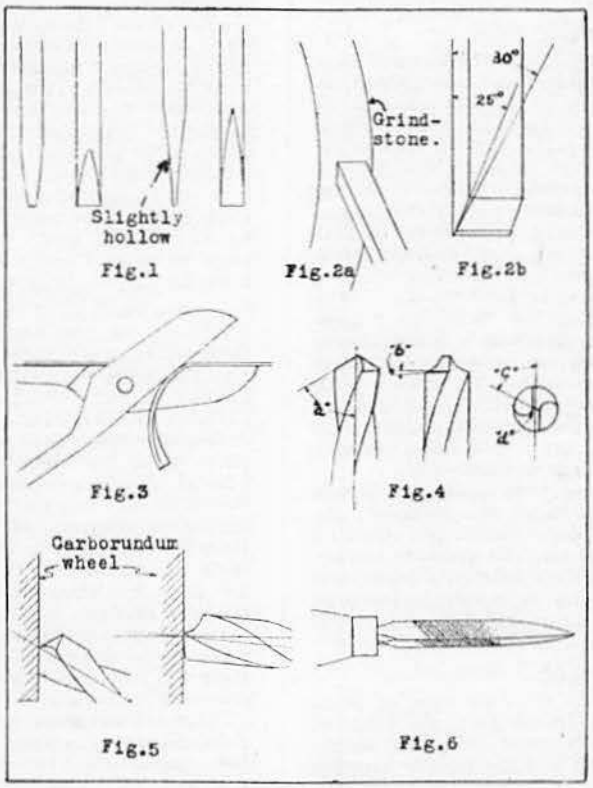
Screwdrivers call for little comment, but the tip is of importance if the screw heads are to remain undamaged. The tip should fit the screw head properly, so that the turning moment is evenly distributed. As these are relatively cheap tools it pays to buy a number of different sizes, including a ratchet screwdriver. The blade can be sharpened with a smooth file, care being taken to see that the end is square and the tip nearly parallel. If the tip is filed to too great an angle it will tend to jump out of the screw, damaging the sawcut. On the other hand, if it is filed too thin it will be weak and liable to break under force. (See Fig. 1.)

Wood Chisels and Gouges

Wood is not used a great deal in radio work to-day but it is just as well to have one or two chisels handy and to know how to look after them. Once again it pays to buy only the best and to take care of them. There is no tool which gets quite so much ill-treatment as a wood chisel. The cutting edge must be kept sharp and the back of the chisel must be ground flat and *kept flat*, otherwise it will be impossible to pare wood.

Most amateurs "funk" sharpening chisels, yet it is not difficult even if it demands some skill. Let us assume that we have a chisel which is badly chipped. The first step is to grind out the chips on a *wet* grindstone till the edge is square and true. (See Fig. 2a.)

Never attempt to grind wood tools on



Tools and Their Uses.

Fig. 1 shows the wrong method (left) and correct method (right) of grinding the tip of a screwdriver blade.

Fig. 2a shows how to sharpen a wood chisel.

Fig. 2b illustrates the method of grinding a wood chisel.

Fig. 3 shows the correct method of using metal shears.

Fig. 4 shows angles of the cutting edge of a twist drill. Angle "a" is 59°, angle "b" is 4°, angle "c" is obtained automatically. The centre of the line "d" must coincide accurately with the centre line of the drill.

Fig. 5—Grinding a twist drill. Top view (left), side view (right).

Fig. 6—A triangular file, ground as a scraper.

a high-speed carborundum type of wheel since the grinding produces intense local heat which destroys the temper of the tool. The water on a wet grindstone keeps the tool cool, preserving the temper. Having removed the chipped edge, grind the bevel evenly until there is the thinnest hair line of untouched metal at the very tip of the tool. Now give the bevel of the chisel about a dozen rubs along the whole length of a *Washita* oil stone which has been covered with a film of thin, non-drying oil, holding the chisel at a slightly greater angle than was used for grinding. (See Fig. 2b.) If the finger is now run down the blade the edge should feel as though it has been rubbed over. This is called the " feather edge " and must be removed by rubbing the *back* of the chisel three or four times along the oil stone, taking great care to keep the chisel flat on the stone. Some of this feather edge will have vanished but the remainder will be felt on the bevel side. To remove all traces, and also to give the final, lasting cutting edge, the chisel must be stropped on the palm of the left hand. Hold the chisel in the right hand and draw the blade across the palm of the left hand, first the bevel side and then the back. Watch a joiner sharpening his chisel and you will soon see how it is done.

Planes

Wooden planes are practically obsolete and have been replaced by adjustable steel planes, which are easier to use, especially in inexpert hands. A British-made steel smoothing plane with a 2½-in. blade is about the most useful size for general use because it is heavy enough for large jobs, yet not too clumsy for small work. Plane irons are sharpened in exactly the same way as chisels, but the edge should be very slightly rounded so that the corners of the blade only just touch the wood without marking it. Don't try to take a heavy cut, especially when finishing hard woods. " The lighter the cut the better the finish " is a good adage to adopt. When finishing a board always plane " with " the grain, otherwise the fibres will be torn out, leaving a very rough surface. With some woods, particularly mahogany, the grain is apt to run in different directions in the same piece, in which case it is necessary to plane first one way and then the other. This demands skill.

To make a steel plane work easily rub a wax candle along the bottom to act as a lubricant. In the same way wooden planes should be rubbed on a pad soaked in linseed oil. To preserve wooden planes and make them work sweetly, a joiner first removes the iron, plugs up the mouth bottom and then fills the rest of the mouth with linseed oil till the plane body will absorb no more oil.

Drills

Twist drills, which are the only type of metal cutting drills we need discuss here, are made of either carbon steel or high-speed steel. The former are much more common and are usually supplied unless high-speed drills are specified. The latter, as their name implies, are designed to run at high speeds but they have the further advantage that they are harder and will retain their cutting edge much longer than the other type. Naturally, being better, they are the more expensive.

Twist drills can be purchased in fractional inch sizes, advancing by $\frac{1}{64}$ in. or, in a numbered and lettered series, starting with the finest, No. 80 (.0135 in.) to No. 1 (.288 in.) and starting again with the letter " A " (.234 in.) to " Z " (.413 in.). The most useful set is from No. 1 to No. 60, which can be purchased in carbon steel on a stand complete for about 20s. High-speed drills cost more than twice this price.

Wood-working bits are of many types, the two most useful being centre bits costing about sixpence each, which are satisfactory for shallow holes, and twist bits costing about 1s. 6d. each, which will drill long holes true. An adjustable bit costing about 7s. 6d. will drill any size from ½ in. to 1½ in., and this can often be made to replace a series of cheaper bits and is therefore a good investment.

Hand Drills

If there is one tool with which this country would appear to take second place to the U.S.A. it is the hand-drill. American drills are neater and better finished, yet quite strong enough for light work. One of the best known to the writer is the *Goodall-Pratt* No. 5½. Although it is rather expensive, it has two speeds, will take up to ⅜ in. in the chuck and has a useful amount of leverage in both the large gear wheel and handle. The *Millers Falls Company* make an excellent range of smaller drills.

The brace for the wood bits should have a ratchet, since this is invaluable for working in confined spaces. Square shank twist drills can be obtained to fit the brace and are particularly useful for sizes over ¾ in. A screwdriver bit to fit the brace is very handy for persuading stubborn screws to move. Few screws can resist such an instrument; they either turn or break.

A small hand-operated drilling machine is not to be despised for the larger workshop, as jobs can be done with it which would be quite outside the scope of a hand-drill, particularly if the machine takes up to ¾ in. or even ½ in.

Pliers, Metal Shears and Spanners

A good selection of pliers are very useful but these can be accumulated over a period. One good type is the long-snouted pliers, which are invaluable for picking nuts out of a mass of wiring. A pair of heavy, insulated 7-in. square-nosed pliers, a pair of 6-in. side cutters and a pair of 4½-in. round-nosed pliers would do to commence with.

Metal shears are frequently dispensed with in favour of the household scissors, but this is hardly fair to the scissors! Buy a pair of shears not less than 9 ins. long with straight blades. There are some fancy shears with curved blades but these are best left alone and smaller shears are not powerful enough. When using shears see that the cutting face of the bottom blade lies flat along the piece of the sheet which is being cut. The waste piece will then curl away nicely, leaving a straight, true edge. (See Fig. 3.)

Spanners, not pliers, should be used for tightening nuts and it may be news to some readers that B.A. box spanners can be obtained in sets of three double-ended spanners to take nuts from 1 B.A. to 6 B.A., whilst *Terrys* sell a set of five double-ended B.A. steel spanners at about 2s. per set.

Vices

The choice of a vice depends upon the kind of bench available. A good stout bench demands a 7-in. quick-release joiner's vice and a 4-in. engineer's parallel vice, preferably on a swivel mounting. For the temporary workshop there is nothing to

beat a *Record Imp* vice, which can be clamped on to a table when required.

Vice jaws are serrated in order to hold the work firmly, but for small delicate work a pair of clams should be put over the jaws to protect the work. These clams can be made from two pieces of sheet brass each about 2 ins. long and the width of the jaw. Grip the two pieces of brass in the jaws about the half-way line, bend one over the moving jaw and the other over the fixed jaw, hammering them down to the contour of the jaw. Clams can also be made from sheet lead in the same way and are also made of fibre, but these latter need special clips made to fit over the jaws. Vices for light work should be fixed at a height so that the operator's elbow comes on a level with the top of the jaw, but this demands a very high bench. Vices for heavy work should be slightly lower so that more pressure can be brought to bear on the tool.

Taps and Dies

Taps and dies are probably a refinement, except for the inveterate constructor, but there is no doubt that a much better and neater finish can be given to a set if components are fitted with screws tapped into the panel or chassis instead of the inevitable nut and screw. Tapping holes takes longer, but the result is well worth the time spent. To hold properly, the length of the tapped hole should be at least equal to the diameter of the screw, but for very light work a $\frac{1}{16}$-in. aluminium panel will stand a No. 6 B.A. thread quite safely.

All B.A. dies are made in the $\frac{13}{16}$-in. diameter "button" type, which is a standard size. Taps are made in three types—taper, second and bottom. A taper and second or bottom of each size are quite sufficient for all radio work. The taper is used to start the thread, which is then finished off with the second or bottom tap.

Taps should be used in an adjustable tap wrench but for light work they can be used in a drilling machine or even a hand-drill if care is taken not to strain the tap. Since taps are tempered very hard in order to be able to cut hard material, they are very brittle and snap under the slightest bending. When tapping thick material, taps must not be rotated but given half a turn, then a slight move back to dislodge the swarf, then half a turn and another slight turn back.

Rules, Squares and Scribers

When buying steel rules choose those of the rustless variety as they are much easier to read after they have been in use for some time. Get accustomed to working in metric dimensions as well as in inches. It is only a matter of practice but once the method becomes familiar it will be found more convenient than the awkward fractional scale. If it is remembered that 1 in. equals approximately 2.54 centimetres and that 4 ins. is very nearly 10 centimetres, conversion from one to the other will be easy.

For marking out it is essential to have some means of drawing lines at right-angles and a proper engineer's steel square with a 5-in. blade is a convenient tool to start with. Here there is no need to purchase a "precision tool," since this can cost about £2. Quite a good square can be bought for about 3s. 6d., which is accurate enough for our work. A large joiner's square with a 12-in. blade is handy for marking off panels and chassis. The writer once, in his earlier days, went to purchase a 12-in. engineer's square, but the price asked (48s.) caused a hurried exit, consequently the joiner's square is still in use.

A pocket scriber, a pair of spring dividers and, possibly, a pair of outside calipers are about all the marking-out tools required. The calipers and dividers should be of the nut adjustable type, since they are easier to use than the old-fashioned friction model. A micrometer reading up to 1 in. is a luxury which few will want, but is essential for crystal grinding.

Oil Stones

It is essential to have some means of sharpening wood tools and there is a considerable range of abrasive stones to choose from, some natural stone and others synthetic. A *Washita* oil stone is the best for giving the final finish to a tool, whilst a double-faced *Carborundum* stone with one coarse and one medium side can, at a pinch, be made to do much of the rough grinding which should be done on a wet grindstone. Carborundum is probably the sharpest cutting material known, but the finish from an oil stone lasts longer.

Always see that the stone has a film of thin non-drying oil on it when it is in use and wipe this off after use to prevent the accumulation of dirt. Keep the stone in a tight-fitting box, preferably of wood. Plane irons should be sharpened along the whole length of the stone, but small chisels should only be sharpened at the ends in order that they should not wear grooves and hollows in the stone.

The sharpening of twist drills has not been discussed and this is best done on a small high-speed Carborundum type of wheel. Although this task is not difficult, it is far from simple to describe or to follow. In large machine shops, twist drills are ground on a special machine made for the job, but they can be ground on an ordinary wheel grinder. The three sketches (Fig. 4) will probably give a clearer idea of the various angles of the cutting edge. The angle "a" is the cutting edge and this has been found from practice to be 59°. The angle "b," called the "back rake," need only be sufficient to prevent the tool from rubbing, about 4° is ample; a greater angle will weaken the tool. The angle "c" is obtained automatically but the centre of the line "d" *must* coincide accurately with the centre line of the drill, otherwise the drill will tend to make a larger hole than intended. Hold the drill up to the side of the wheel as shown in the two sketches (Fig. 5) and rotate it slowly for about $\frac{1}{8}$ turn, taking great care not to let the other cutting lip come into contact with the wheel. Grind slightly more off the back than the cutting edge in order to produce the back rake. Grind a little off one cutting lip, then do a little to the other until the drill is sharp and ground central.

Sharpening twist drills is not difficult with a treadle-operated wheel, but is next to impossible single-handed with a hand-driven grinder. An old sewing machine treadle and a jeweller's polishing head make an excellent cheap grinding equipment, whilst, if a fairly stout polishing head is selected, it can be used for innumerable operations quite beyond the intentions of the maker. The writer uses one of these simple tools as a circular saw (which will cut $\frac{1}{2}$-in. wood, $\frac{1}{16}$-in. aluminium, ebonite, etc.), as a disc grinder, a simple lathe, a drill, a grinder, a coil winder and for many other uses, yet it only cost 18s. 6d. The opposite end of the treadle table is used for the drilling machine.

Sundry Tools

During many painful interviews with the dentist longing eyes have been cast on his beautiful little mirror, which is just the thing for poking about inside sets. An inquiry as to price closed all hopes of possession, so a piece of mirror was cut about 1-in. square and fitted with a thin tinplate back and a soft copper-wire handle. This does the work quite as well and the copper wire can be bent to any angle.

No mention has been made of a tank cutter, which is an adjustable metal-cutting tool to fit in a brace and cut varying sized holes in sheet metal. They are much quicker to use for meter holes than drilling a series of small holes.

A triangular scraper has already been described in the first article in this series (" Soldering," November, 1938) and a sketch of this tool (Fig. 6) is given here to assist readers who may decide to make one. In the writer's opinion it is one of the most useful tools in the workshop.

Soldering irons have also been described in the first article but it will not be out of place to suggest the purchase of a good British-made electric iron. The very cheap foreign articles are hardly worth carrying home, never mention using.

General Notes

It is quite impossible to learn how to use tools from a printed description ; the only way to attain perfection is through constant practice. Hints and tips can be picked up from books but much more can be learned by watching a practical man at work and from asking him questions. Almost anyone will be pleased to supply information if he realises that the questions are asked honestly and not with the idea of being clever.

Returning to files, these should be used first on copper and brass, then when they are too dull to cut brass they can be used on iron and steel, but if they are used on steel first they will be next to useless for brass. A dull file is quite satisfactory for aluminium. Ebonite has a certain amount of semi-abrasive material in its composition and plays havoc with files and drills, so that " elderly " files only should be used. Aluminium has a nasty habit of sticking in the file teeth, but if it is lubricated with turpentine there will be much less difficulty in removing the filings. Unfortunately, turpentine oxidises in contact with the air so it is as well to keep one or two special files for this material, rubbing them as dry as possible after use.

Some people are as terrified of wood splitting as they are of a horse kicking, but both wood and horses only show these bad habits if they are inherently bad or if they are ill-treated. Find out what can and what must not be done with them and they will do all you want. Sawing wood is a case in point. Some people have the utmost difficulty in sawing down a straight line, but if they only took it easily and made up their minds that they *would* make the cut follow the line, it would soon become quite a simple operation.

Trade Review

We have received from *Hamrad Wholesale* samples of three types of feeder cable. These consist of two flat twin feeders rated at 72 and 350 ohms respectively, and one concentric type rated at 150 ohms characteristic impedance.

The insulating material used in these cables is one of the modern plastics which have been specifically designed for such purposes, and has very low dielectric loss at the highest frequencies.

The 72 ohm cable consists of 14 strands of 38 S.W.G. tinned copper wire moulded into the insulator, whilst the 350 ohm cable is similar but has greater spacing between wires. The concentric cable has 14 strands of 40 S.W.G. tinned copper wire supported in the centre by four radial webs in a tube of the insulator, thereby giving a high proportion of air dielectric. A single tinned copper braid covers overall to a diamteer of about 5/16".

The cables are sufficiently flexible for all ordinary purposes yet strong enough to withstand wear and strain, and are said to be capable of standing up to all climatic conditions.

We are of the opinion that an outside layer of some weatherproof material would be an improvement in the case of the concentric cable as the rubbing of the metal braiding against guy wires, gutters, etc., can sometimes give rise to objectionable effects, whilst the braiding itself might suffer serious corrosion in a town atmosphere.

Measurements have been made of the loss in these samples at several frequencies between 5 and 30 Mc., and their characteristic impedance obtained. The measurements were made by means of an instrument similar in principle to the one described in THE T. & R. BULLETIN for August, 1938. Results are tabulated below.

Type	Characteristic Impedance.	Average loss per Wavelength	λ length (feet)
72 ohm	86 ohms	1.5 dB	180/f
350 ohm	310 ,,	.45 dB	210/f
Concentric	88 ,,	1dB	172/f

The loss has been rated in dB per wavelength, as this is substantially constant for a given cable. The 72 ohm cable has the highest loss as this has the greatest ratio of dielectric to air, but this is a good figure for a cable of its dimensions, and represents quite a small loss in the lengths usually required for amateur aerials, since a wavelength of cable is about 60 feet at 14 Mc. frequency.

The velocity of the wave in the cables was also determined by finding resonant lengths, and from these figures the last column in the table is obtained. This gives the length in feet of a resonant quarter wavelength of the cable, the factor given being divided by f, the frequency in Mc. These factors are less than those used for aerials, as the introduction of insulating material reduces the velocity, but are given for the benefit of those who may wish to use lengths of the feeder for matching stubs, etc.

F. C.

Reports Wanted

G4DK (Liverpool) on his 7 and 14 Mc. C.W. and telephony transmissions.

G3SI (New Malden) on his 7038 and 7126 kc. C.W. and telephony transmissions. All reports will be acknowledged.

The "Osglim" Neon Lamp as a Phone Monitor

A Monitor which can be used for indicating the quality of modulation produced on an R.F. stage, without the use of a tuned circuit, or a thermionic detector, is a great convenience for experimenters in telephony.

By A. D. Gay (G6NF)

THE neon lamp is an invaluable R.F. indicating device for tuning-up crystal oscillators, frequency doublers, and P.A. stages, the intensity of the ionisation and the striking distance being to some extent a measure of the efficiency of the circuit. These lamps contain, in addition to two electrodes, a small amount of neon gas with a trace of helium at a few millimetres pressure, and when ionisation occurs the positive ions, which are darting about at a high velocity inside the glass bulb under the influence of the electric field, bombard these electrodes. Owing to their difference in area, the bombardment of one electrode is greater than the other, which creates a difference of potential between them. On connecting a pair of telephones in circuit it will be found that a current, averaging about 1 milliampere, but according to the intensity of the ionisation, will flow through the telephones (see Fig. 1).

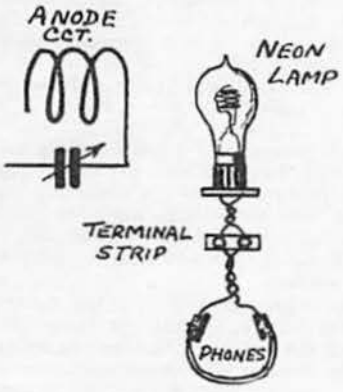


Fig. 1.—Circuit of Phone Monitor.

Owing to the asymmetry of these lamps they therefore act as detectors or rectifiers. Their efficiency is not good, because a few watts of R.F. are absorbed in producing the ionisation which is necessary to produce the electrode bombardment, but as a quick means of judging the quality of a radiotelephone transmitter they are ideal. They can be mounted in an ordinary lamp holder in proximity to the transmitter output circuit, and the bulb removed when not required. Where high power is used care should be taken to prevent too intense an ionisation taking place for prolonged periods. The velocity of ionic bombardment will be so great that particles of metal, from the electrodes, will become disrupted and deposited upon the glass. This will have a gettering effect upon the gas contained in the lamp with the result that it will eventually become hard and refuse to ionise.

A method of demonstrating the asymmetric character of these lamps on 240 volt 50 cycle A.C. mains is shown in Fig. 2.

The D.C. current obtainable with a standard "Osglim" lamp was 200 microamperes.

A current limiting resistance of approximately 3,000 ohms is provided in the base of all 240 volt lamps, but they can be obtained without this resistance if desired, although its presence does not affect their operation for monitoring purposes.

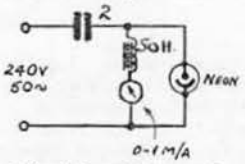


Fig. 2.—A method of demonstrating the asymmetric character of "Osglim" Lamps on 240-volt 50-cycle mains.

The 0.5 watt type of neon lamp, which is used for indicator purposes, has been tried for monitoring, but the results are slightly inferior to those obtained with the larger 5 watt type. This is no doubt due to the smaller size electrodes, and the limited current produced by bombardment.

"Standard Telephones" Radio Apparatus

Although catering more for the commercial services than amateur radio, this firm are now marketing a general purpose short-wave receiver which should prove ideal for amateur communication purposes.

The nine valve super-het circuit used incorporates two R.F. stages, a first detector, separate H.F. oscillator, three I.F. amplifiers, double diode triode for signal rectification, A.V.C. and beat frequency oscillator, and an output valve.

The wave range covered is 13 to 250 metres in four bands by coil switching; the illuminated dial being calibrated in megacycles.

Three degrees of selectivity are provided, i.e., broad, normal and crystal. The normal selectivity position is stated to give a suppression of 10,000 times (80 dB) for a signal 20 kc. off tune, while suppression of second-channel interference is at least 60 dB over a considerable portion of the tuning range and never less than 40 dB.

The sensitivity of the instrument is such that an e.m.f. of 1 microvolt modulated 30 per cent. at 400 cycles will give an output of 50 milliwatts; the power output of the receiver being 1 watt.

Other noteworthy features of the receiver are "Fast," "Slow" and "Off" positions for the A.V.C. (the output does not vary by more than ± 3 dB for a 60 dB change of input voltage), an optional "crash limiter" designed to protect the operator from acoustic shocks, and a variable pitch control for reception of CW signals.

A mains unit is incorporated and this is designed to work from 110, 200, 220 or 240 volts A.C. supply. Alternatively, the receiver may be worked from two batteries (12 volts and 200 volts), the consumption in the latter case being 2.4 amps at 12 volts and 100 milliamps at 200 volts. The change-over from mains to battery operation is accomplished by means of a switch on the front panel.

Further details of this model—Type RMX 1—together with interesting details of other short-wave apparatus, may be obtained from *Standard Telephones & Cables, Limited* (Radio Division), Oakleigh Road, New Southgate, London, N.11.

The Cathode Ray Tube and its Applications in Television and Oscillography

Part II

By S. West

IN the preceding article in this series (January, 1939) it was shown that a Cathode Ray Tube, by reason of its inherent features, is an extremely valuable accessory for the study of oscillatory potentials and the analysis of rapidly repetitive phenomena.

In order to appreciate the methods entailed in placing a tube into commission for any particular purpose, it is desirable to understand why and how a single cycle of a repeated phenomenon is rendered visible as a stationary image on the screen. An appreciation of the manner in which a simple figure is produced enormously assists in securing the utmost use from a C.R. tube oscilloscope and, moreover, is essential for a correct interpretation of results obtained.

We have already stated that a light spot, influenced by the fields resulting from the application of potentials to either deflecting plates (electrostatic deflection) or to inductances (magnetic deflection) will move upon the screen, and with a reasonable rate of repetitive synchronised movement will be manifest as a stationary image. Let us, figuratively speaking, look into this more closely.

The Deflecting Plates

First an apparent anomaly must be cleared up, if confusion is to be avoided in understanding that which follows. There are four deflecting plates in an electrostatic tube, which are disposed at right angles to one another, in parallel located pairs, and these are termed respectively the "X" and "Y" plates. As a rule the pair closest to the screen are the "X" pair, because it is usually easier to generate sweep potentials of adequate amplitude for full deflection with comparative ease, whereas it is not so easy to amplify the waves to be investigated, and, as we shall see later, the pair of plates remote from the screen are the most sensitive.

Now why the appendages "X" and "Y"? This nomenclature is easy to appreciate if it is remembered that the vertical co-ordinate in a graph is termed "Y," and the horizontal "X." In brief, the application of potentials to the "X" plates, causes a horizontal deflection, conversely vertical deflection will result when potentials are fed to the "Y" plates. The terms "X" and "Y" serve quite well but in practice it is customary to refer to the plates as either "vertical" or "horizontal." This is more apt and descriptive nomenclature as will be seen later, but it results in the anomaly mentioned earlier. It is most necessary therefore to understand which plates are referred to when employing these terms. In all that follows, the pair that are vertically disposed, structurally, are described as the horizontal plates, as the application of potentials to them causes a horizontal deflection. Similarly the horizontally disposed pair will be referred to as the vertical plates. Fig. 3 will render this plain. The terms "Horizontal" and "Vertical" allude to the electrical functions of each pair of plates.

Deflection Sensitivity

One other part concerning these plates requires some comment. For obvious reasons of design the pairs of plates are not equally disposed radially in respect to the screen (see Fig. 4), as a consequence the deflection sensitivity for each pair of plates will differ, those nearest the screen being the less sensitive pair. This is readily appreciated when it is realised that for a certain angle of deflection at the beam's fulcrum, the larger radius beam will traverse a greater distance across the screen. Incidentally the deflection sensitivity varies inversely with the final anode potential, and the higher this is in value the greater will be the velocity of the beam, consequently higher deflecting potentials are needed to influence it. The deflection sensitivity for a given tube is usually in the form X/V=mms. where X is a constant denoting the deflection sensitivity and V is the final anode voltage. For example a typical tube may have a deflection sensitivity of 500/V mms. per volt for the horizontal plates, which means that with a final anode potential of 1,500 volts the sensitivity will be $500/1{,}500=0.33$ mm. per volt. That is for each volt p.p. applied to the deflecting plates the light spot will move 0.33 mm. In general the deflection sensitivity of the vertical plates will be somewhat higher, the calculation being made in identical manner.

The above knowledge is of value, for it permits the approximate calibration of the tube, besides influencing the design of the time bases and associated apparatus. The deflection sensitivity for

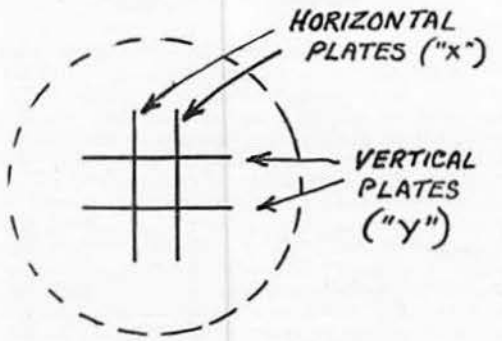


Fig. 3.

Above is shown the labelling henceforth employed for the deflecting plates. Viewed from the front of the screen the plates vertically disposed structurally are termed "horizontal." The horizontally disposed pair are termed "vertical."

magnetic types is not so readily arrived at, and for that reason we shall deal with this class of tube later.

It should be apparent from the foregoing remarks that the lower the value of the final anode potential the greater will be the deflection sensitivity, but, as the size of the light spot largely depends upon this potential, being small (thus giving superior trace definition, with high values), it is necessary to compromise in the two conflicting requirements.

Practical Arrangements

We have now sufficiently considered the theory of a C.R. tube to warrant the setting up of apparatus, thereby securing some practical experience in its operation.

A short list of parts required is given in the Appendix and it is emphasised that all of these have been chosen with a view to their utility for future needs. Without exception they, together with additional components, will be employed in a complete, versatile oscilloscope, constructional details of which will be included in a later article in this series. However, apart from this fact, the tests made possible with this simple apparatus are extensive and a new fascinating extension to amateur radio is rendered possible. The ability to see what is taking place in various circuits has an absorbing interest and needless to say is of great value.

Fig. 5 shows a circuit suitable for these preliminary tests. This is so simple as to require no further explanation other than is conveyed by the diagram and the accompanying photograph. It is desirable completely to enclose the socket end of the tube together with the H.T. supply arrangement, because comparatively high and therefore dangerous potentials exist at these points and at the potentiometer terminals. If these precautions are not observed, then it is stressed that adequate care must be taken in handling the gear, particularly as (contrary to conventional radio practice) it is the cathode circuits that are at high potential with respect to earth. This is necessary because of the desirability of having the deflector plates at earth potential, for it is to these plates that connection is made for circuit investigation. The four terminals for this purpose can be seen accessibly placed to the left of the unit in the photograph. This arrangement also retains short connections to the deflecting plates which is important if losses at high frequencies are to be kept reasonably low. In addition, interference due to induced stray potentials is minimised.

The tube is supported in a small cradle easily fashioned from a strip of aluminium and fastened to the baseboard with short lengths of 2 B.A. studding. This method also allows vertical angular movement of the tube thereon, permitting convenient observation of the screen. The metal support fulfils no electrical function and any convenient alternative arrangement can be adopted.

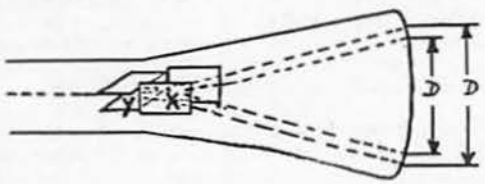
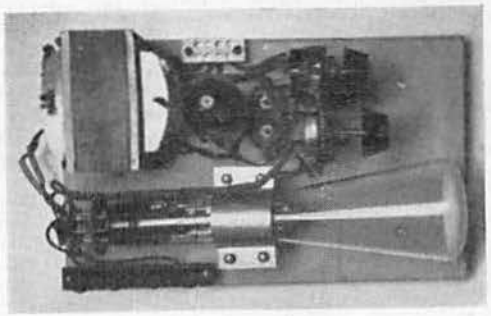


Fig. 4.

A study of this diagram shows that the pair of plates nearest the screen will have lower sensitivity than the remote pair.

Some bewilderment may arise from a study of the circuit diagram and the specification for the mains transformer. The later item comprises a high voltage and two heater circuit secondaries which are not for the present employed. The purpose of these is to permit heater and H.T. current supply to be obtained for a linear time base, a suitable design for which will be given later. If construction of this unit is not contemplated then these windings may be omitted from the specification. The values assigned to the potential network of the electrode are not critical and where similar items are already in the possession of the constructor they can of course be used. The ratio of the potentials specified by the tube makers must however be adhered to.

In passing it may be added that the values shown for this network in the diagram are in accordance with those specified by the C.R. tube maker. The writer found it necessary with the particular sample supplied to increase the value of the bias potentiometer to 50,000 ohms and this was achieved



Suitable layout for the unit described in the text. The four-way terminal block at the back is fitted to provide regulation of the mains transformer secondary if this becomes necessary.

by the simple expedient of including a resistance of 20,000 ohms in series with the potentiometer. If the light spot cannot be extinguished with this control, its value must be increased or an additional resistance can be added. It should be noted that it is necessary to include this series resistance at the cathode end of the potentiometer.

Similar changes may be required to the focus potentiometer. Adjustment of this control should permit fine focus of the light spot to be secured at some mid point in the adjustment. Failure to achieve this will necessitate some slight change to the potential network in which case the potentiometer is moved slightly up or down the network by including a series resistance. The required direction of movement is of course revealed by observing toward which end of the potentiometer correct focus is approached. It should be particularly noted that this adjustment is not approached at the point providing the highest illumination.

With the apparatus set up according to these particulars, a rough preliminary check can be made to ensure that all is in order.

A warning is interposed at this juncture. If there is no alternating potential at the deflecting plates, a stationary spot is produced upon the screen, if this spot is permitted to remain thus for any appreciable period the screen will almost certainly be burned at this point. It is important therefore that the preliminary test should be brief.

Immediately it is ascertained that a spot can be produced it should be extinguished with the brilliance control (R1). It is a good plan to acquire the habit of always extinguishing the beam in this manner for, even when, as is usually the case,

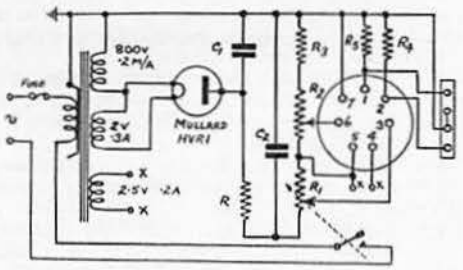


Fig. 5.

A preliminary set up of apparatus for C.R. tube experiments. Components are listed in the appendix.

sweep potentials are applied to the horizontal plates, continuous illumination of the screen at high illumination levels along the same track will result in a line being burned. The alternative scheme often adopted of throwing the light spot out of focus is, for several reasons, undesirable. R2 is the focus control. One further small point requires mention. Throughout, reference has been made to a *small* light spot, but no particular concern need be felt if the spot assumes a somewhat elongated form, as this will be due to stray fields and will disappear with appropriate circuits connected.

The potential available for the final anode of the C.R. tube when employing the arrangement shown is in the region of 1,000 volts. This ensures excellent trace characteristics, but it is permissible to operate at considerably lower voltages, thereby effecting some economies. For example the reservoir and smoothing condensers C1 and C2 can have a lower working voltage factor, also the HVR1 rectifier specified may be replaced with a lower priced type. An American 1V will withstand appreciable voltage overload because the current demands of the arrangement are negligible. Conversely by operating at the maximum final anode potential permitted by the makers, the trace characteristics are enhanced and this can be of particular value where the pattern to be examined is of involved nature.

Some of the more general uses to which this apparatus, in its present form, can be put will be described in the next article, but in the meantime constructors can secure some useful and interesting experience by applying various L.F. and H.F. voltages to the deflecting plates. For example, the secondary winding of a spare mains transformer (giving about 100-300 V) can be applied to one pair of plates and the output of a radio receiver to the other pair. It is preferable to isolate the plates with fixed condensers having a capacity of approximately 0.1 μF, although this is not always required. A little consideration will reveal when this arrangement is necessary bearing in mind that one of each pair of plates is earthed.

(To be continued)

Appendix

Components required for Cathode Ray Oscillograph Experiments

Mains Transformer :
- Primary : to suit mains voltage and frequency.
- Secondaries : 850-0-425 V. at 2 mA and 12 mA
  2 V. 0.3A (insulated 1,000 V. from frame).
  6.3 V. 0.3A.
  2-0-2 V. 4.5A.
  2.5 V. 2.0A (insulated for 1,000 V. from frame).

1 4 pin baseboard type valveholder, Clix.
1 7-pin wafer type, Clix.
1 0.1 μF. 1,000 v. working, T.C.C. (C1).
1 0.5 μF. 1,000 v. working, T.C.C. (C2).
1 50,000 ohms resistance 1 W., Dubilier (R).
1 0.5 megohm resistance 1 W., Dubilier (R3).
2 5 megohms resistance ½ W., Dubilier (R4, R5).
1 0.2 megohm potentiometer, Varley (R2).
1 20,000 ohms potentiometer with switch, Varley (R1).
4 Terminals, Clix.
1 CR3 Cathode Ray tube, "Hivac."
1 HVR1 rectifier, Mullard.

Cosmic Notes

Sunspots

Cloudy skies were responsible for lack of observations in the first half of February, and with the exception of a small group which crossed the central meridian on February 1, no groups of spots were observed until February 20, when a rather small spot was on the central meridian. Between February 22 and 28 groups crossed the meridian almost daily, the largest being on the 28th. Tokio reported a high prominence on February 1.

Magnetic Elements

In contrast with the quiet conditions of January, February produced several magnetic disturbances. The first of these occurred on February 1 and 2, and was followed by another on the 6th. This second disturbance began during the evening of the 5th, and continued into the 7th. B.E.R.U. competitors probably noticed the absence of U.S.A. signals on 14 Mc. during the evening of February 6. Magnetic conditions were also slightly disturbed on the 10th.

The morning of February 17 was characterised by moderately disturbed conditions, and on the 24th the elements became greatly disturbed during the late afternoon, and remained so through the following day. This storm was accompanied by an Auroral display, and had a marked effect on radio conditions. Members who made observations during the period February 23 to 27 are asked to let the Propagation Group of RES have details.

The Ionosphere

Critical frequencies measured at Washington, U.S.A., for vertical incidence for F2 layer and extra-ordinary ray at noon local time were as follows : February 1, 12,700 kc. ; February 8, 13,300 kc. ; February 15, 12,900 kc. ; the magnetic storm prevented reception of the data for February 22.

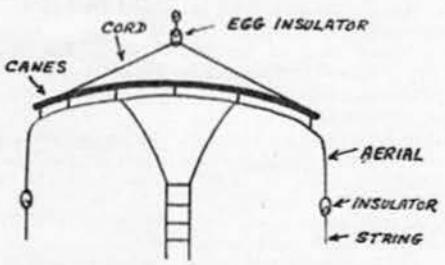
G2XC.

Folded Aerial Experiments

By H. J. Hunt (G5HH).

THE writer has always had a liking for the "Y" type matched-impedance aerial, and, contrary to general opinion he claims that provided it is erected properly, it will give good end-radiation. As proof, the aerial at G5HH which runs due North-South has given hundreds of contacts with many parts of the African continent, but to do so it has to be sloped to the South. If, as in the case at this QRA, it can be erected over ground sloping to the South, so much the better. The writer is of the opinion that anyone erecting this type of aerial with a flat top is wasting a good radiator, although it is realised that this statement is open to argument!

When ZD2H and ZD4AB commenced activities in Nigeria and Gold Coast, contacts with them were keenly anticipated, particularly as they would have completed B.E.R.T.A. for the writer. However, after some weeks had passed with no contacts having been established, it became clear that the signals were not getting there at all, and the conclusion was reached that there was a very narrow zone, right in line with the tip of the aerial, which was "blind." This view is in accordance with the theory advanced by G6CJ in his recent article "DX to Order."



Method of arranging Folded Aerial.

The obvious thing to do was to vary the slope of the top but this gave negative results.

Then a full wave single wire fed aerial was erected, as the longer top gave more scope for increasing the slope. This eventually finished 40 feet high at the North end, and 20 feet high at the South, but, as was more or less expected, it was still impossible to contact the desired stations. Next a couple of bamboo curtain poles, 9 feet long, were obtained, and a "cradle" constructed with the aid of sundry lengths of string. The half-wave top was slung from corner to corner, thus throwing it right off the N-S line. This erection was very clumsy, consequently it was only left in place for a matter of two hours, as there were signs of strong winds coming along. During this short period both ZD2H and ZD4AB were called several times without result, although it is possible that contacts would have been possible had the erection been safe enough to leave up for a few days.

A Folded Aerial Tested

By this time it became apparent that the only way to work these West African stations was to erect an E-W half-wave aerial but as the QRA is an ordinary suburban house with a narrow garden, this presented difficulties. Eventually some bamboo canes, 8 feet long, of the type used by gardeners, were obtained for twopence each! Three were tied together in "series" with an overlap of 2 feet, thus giving a cane 20 feet long. The matched impedance top was then slung along this support, using insulated hooks, giving a length of 6 to 7 feet hanging down at each end. The normal top was replaced by rope, and the above erection was tied to this with a piece of thick string and an egg insulator, and hoisted into place in an E-W position. The canes bent in a most alarming manner, and presented an appearance somewhat like that shown in the sketch. In spite of its "haywire" appearance however, ZD2H was worked within half an hour of its erection. Although a far from satisfactory report was obtained (RST 349), this was expected as conditions on the evening in question were very poor. The aerial was left in place for a week in the hope of contacting ZD4AB, but to the writer's disappointment, this station only made one very brief appearance during that period, and no QSO resulted.

By tying strings on to the ends of the aerial, it was possible to rotate it through an angle of about 90°, and some good DX was worked, including ZS, VK and W. On one occasion G6GT (QRB 2 miles) stood by with his receiver while the aerial was rotated, and he reported very marked differences in QRK as the direction was altered. Although no tests were carried out with a DX station, it would seem that it is well worth while making up a simple half-wave aerial capable of rotation.

Although these notes do not contain a great deal of technical information, the writer feels that they may have served some purpose if they encourage others, particularly those who have to contend with very confined spaces, to carry out experiments with folded aerials. Later it is proposed to test this idea with the top hanging down from the points where the two feeders join. If this is a success it will make a very compact aerial, particularly on 28 Mc., and it may even be possible to add a close spaced reflector or director, also folded. It is doubtful whether the standard formula would give perfect matching, as the folding is bound to alter the effective length and the impedance of the top. In the case described, however, the aeria was made to formula.

The author would be pleased to hear from any reader who is carrying out experiments with folded aerials.

R.S.G.B. Certificates and Awards

FOR some time the Council has been giving consideration to oft-repeated suggestions that the W.B.E. and B.E.R.T.A. should be made available, on payment of small fees, to non-members of the R.S.G.B.

At a recent Council meeting it was decided to allow these certificates to be claimed by non-members, but in making this decision it became necessary to revise the rules to cover the case of applications from such persons. Certain other minor changes have also been considered necessary in order to enhance the value of the various certificates.

To make clear the meaning of the phrase " British Colonial Areas " in rules for the B.E.R.T.A., it has been decided to include in Appendix II a list of places which are considered for the purposes of this award to be " Colonial Areas."

Rules Governing the Issue of Worked the British Empire Certificates—W.B.E.

1. W.B.E. Certificates will be awarded by the Radio Society of Great Britain, to any fully licensed radio amateur who has satisfied the Council of that body that he or she has effected two-way communication, on amateur frequencies, with at least one British Empire amateur station located in each of the five recognised Continental areas as defined by the International Amateur Radio Union (North and South America shall count as one Continental area).

2. W.B.E. certificates will be issued free of charge to members of the Radio Society of Great Britain.

3. In the case of non-members of the Radio Society of Great Britain, each certificate will be issued on payment of 2s. 6d., or an equivalent amount in other currency.

4. Separate W.B.E. Certificates will be issued for :—

(*a*) Two-way Telegraphy working on any band except 28 Mc.
(*b*) Two-way Telephony working on any band except 28 Mc.
(*c*) Two-way Telegraphy working on 28 Mc.
(*d*) Two-way Telephony working on 28 Mc.

5. In forwarding a claim the applicant shall give a guarantee in writing that his or her licensed power was not exceeded in effecting the contacts upon which the claim is based.

6. A minimum readability report of 3 shall be recorded on each card submitted.

7. Applications shall be forwarded by registered post to the Secretary-Editor, Radio Society of Great Britain, 53, Victoria Street, London, S.W.1, and each such application shall be accompanied by documentary proof in the form of cards or letters showing that two-way working has taken place.

8. In the case of claims for telephony awards the cards or letters shall show clearly that two-way telephony communication took place.

9. Contacts with British mobile stations (excluding ships) located in the British Empire will be considered as British Empire contacts, providing the exact location of the station at the time of contact is clearly given in the evidence submitted.

10. British Mandated Territories and Protectorates shall be considered, for the purpose of these awards, as forming part of the British Empire.

11. Contacts with Iraq made prior to January 1, 1936, and with Egypt made prior to August 1, 1937, shall be considered as British Empire contacts for the purpose of these awards.

12. Persons to whom W.B.E. Certificates have been issued are permitted to use the letters " W.B.E.(C.H.) " on personal correspondence. The letters (C.H.) signify certificate holder.

13. The Council of the Radio Society of Great Britain may, at their discretion and on receipt of formal application, authorise the Secretary or Honorary Secretary of a recognised overseas amateur radio society to approve claims from non-members of the R.S.G.B. In this circumstance the Society in question would be held responsible for forwarding to the R.S.G.B. an official certification, together with the necessary monies.

Rules Governing the Issue of the British Empire Radio Transmission Award—B.E.R.T.A.

1. The B.E.R.T.A. will be awarded by the Radio Society of Great Britain to any fully licensed radio amateur who has satisfied the Council of that body that he or she has effected two-way communication, on amateur frequencies, with at least 25 of the British Dominion Districts given in Appendix I, and with at least 15 of the British Colonial areas given in Appendix II.

2. The B.E.R.T.A. will be issued free of charge to members of the Radio Society of Great Britain.

3. In the case of non-members of the Radio Society of Great Britain the certificate will be issued on payment of 2s. 6d., or an equivalent amount in other currency.

4. In forwarding a claim the applicant shall give a guarantee in writing that his or her licensed power was not exceeded in affecting the contacts upon which the claim is based.

5. A minimum readability report of 3 shall be recorded on each card submitted.

6. Applications shall be forwarded by registered post to the Secretary-Editor, Radio Society of Great Britain, 53, Victoria Street, London, S.W.1, and each such application shall be accompanied by documentary proof in the form of cards or letters showing that two-way working has taken place. Evidence of two-way contacts made during the annual B.E.R.U. Contests may be submitted, providing full details are given and that the contact or contacts were made not more than two years prior to the date of the application.

7. Contacts with British mobile stations (excluding ships) located in the British Empire will be considered as British Empire contacts, providing the exact location of the station at the time of contact is clearly given in the evidence submitted.

8. British Mandated Territories and Protectorates shall be considered, for the purpose of this award, as forming part of the British Empire.

9. Contacts with Iraq made prior to January 1, 1936, and with Egypt made prior to August 1, 1937, shall be considered as British Empire contacts for the purpose of this award.

10. Persons to whom the B.E.R.T.A. has been issued are permitted to use the letters " B.E.R.T.A. (C.H.) " on personal correspondence. The letters (C.H.) signify certificate holder.

Appendix I

For the purposes of the British Empire Radio Transmission Award, the British Dominion Radio Districts are regarded as :—

Australia : VK 2, 3, 4, 5, 6 and 7.
British Isles : G, GI, GM, GW and EI.
Canada : VE 1, 2, 3, 4 and 5.
Newfoundland : VO.
India : VU.
New Zealand : ZL 1, 2, 3 and 4.
South Africa : ZS (or ZT or ZU) 1, 2, 4, 5 and 6.

To qualify for the award, contacts must be confirmed with 25 out of the 27 radio districts listed above.

Appendix II

For the purposes of the British Empire Radio Transmission Award, the British Colonial Areas are regarded as :—

AFRICA.	
Anglo-Egyptian Sudan	ST
Ascension Islands	ZD8
Cameroons (British Mandate)	ZD2
Chagos Archipelago	VQ8
Gambia	ZD3
Gold Coast (Ashanti)	ZD4
Kenya	VQ4
Mauritius	VQ8
Nigeria	ZD2
Nyasaland	ZD6
Rhodesia, Northern	VQ2
Rhodesia, Southern	ZE
St. Helena	ZD7
Seychelles, including Amirantes	VQ9
Sierra Leone	ZD1
Somaliland, British	VQ6
South-West Africa	ZS3
Swaziland,	
Tanganyika Territory	VQ3
Togoland (British Mandate)	ZD4
Tristan da Cunha	ZD9
Uganda	VQ5
Zanzibar, including Pemba	VQ1
ASIA.	
Aden, including Perim	
Bahrein Island	VS8
Burma	XZ
Ceylon	VS7
Cyprus	ZC4
Federated Malay States	VS2
Hadramaut	
Hong Kong	VS6
Maldive Island	VS9
Non-Federated Malay States	VS3
Palestine	ZC6
Straits Settlements	VS1
Transjordania	ZC1
EUROPE.	
Gibraltar	ZB2
Malta	ZB1
NORTH AMERICA.	
Bahama Islands	VP7
Barbados	VP6
Bermuda Island	VP9
Cayman Island	VP5
Honduras, British	VP1
Jamaica	VP5
Leeward Islands	VP2
Turks and Caicos Islands	VP5
Windward Islands	VP2
OCEANIA.	
British North Borneo	VS4
Brunei, including Labuan Island	VS5
Christmas Island (off Java)	ZC3
Cocos (Keeling) Island	ZC2
Cook Island	ZK1
Ellice Island	VR1
Fanning Island, including Christmas and Washington Islands	VR3
Fiji	VR2
Gilbert Island, Ocean Island	VR1
Lord Howe Island	ZK1
New Guinea Territory	VK9
Niue	ZK2
Papua Territory	VK4
Pitcairn Island	VR6
Samoa, Western	ZM
Sarawak	VS4
Solomon Island	VR4
Tonga (Friendly) Island	VR5
SOUTH AMERICA.	
Falkland Islands	VP8
Guiana, British	VP3
Sandwich Group	VP8
South Georgia	VP8
Trinidad and Tobago	VP4

To qualify for the award, contacts must be confirmed with 15 of the areas listed above.

Trade Notice

Quartz Crystal Co., Kingston Road, New Malden, send us their 1939 price list of Frequency Control Units. These units have been built up around a totally enclosed, crystal holder (type U) of new design incorporating every modern improvement.

The calibration accuracy of all units has been increased to 0.025 per cent.—a notable achievement.

The Type Q5 Unit brings to the amateur a degree of accuracy and stability hitherto unattainable without complicated temperature control equipment. The temperature co-efficient is less than 4 cycles per megacycle per degree Centigrade change, and the new cut used, produces a powerful highly active crystal. The maximum R.F. crystal current is 150 mA.

This unit can be supplied to within 5 kilocycles of specified frequency in the 1.7, 3.5 and 7 Mc. bands.

The demand for a highly accurate frequency control unit has been met by an improved version of the well-known Q.C.C. 100 kc. bar. The crystal is mounted in a modified form of type U holder with a fixed air gap to provide constancy of calibration. The crystal is ground to within 25 cycles of 100.00 kilocycles.

Stray

G5ZT is on 56020 kc. with C.C. telephony and I.C.W. between 2100 and 2200 G.M.T., and is anxious to arrange schedules.

56 Mc. During N.F.D.

Mr. G. Brown (G5BJ), who intends to work on 56 Mc. during N.F.D., will be pleased to arrange schedules with other 56 Mc. stations co-operating during this event.

A Combined Monitor and Frequency Meter

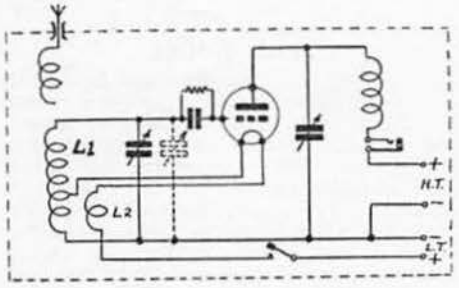
By J. P. Hawker (G3VA)

THE meter to be described can be employed equally well as a meter or monitor, and by its use, the operator can listen to the carrier wave or the modulated signal. The instrument is intended primarily for use on the 1.7 Mc. band, but it can be adapted for operation on other frequencies, by making use of harmonics.

Circuit

It will be noticed that the circuit differs from the usual frequency meter circuit in that a small pre-set condenser of .0001 μF. maximum capacity is included in order to avoid grid howls. Further, the usual 15,000 to 100,000 ohm grid leak is replaced by one having a value of 2 megohms. The coil in the filament lead may be replaced, if desired, by a commercial filament choke.

It is, of course, necessary to employ a coil and condenser that will ensure the band being well spread over the dial. The dial should be of a type which enables readings to be effected within fine



Circuit of Frequency Meter and Monitor
L_1—95 turns 30 S.W.G.
L_2—30 turns 30 S.W.G.
Other component values given in the text

limits. One way of accomplishing this is to incorporate the band spread and trimmer outfit manufactured by *Eddystone*, but this method has the one drawback, that a continuous calibration curve cannot be plotted, because the tank condenser is graduated in sections, each of which is fully covered by the trimmer. If it is decided to make use of a single condenser, a value of .0001 μF. will be found suitable.

Construction

The meter should be built into a metal cabinet of such dimensions that the necessary batteries for its operation can be fitted inside. The coil L_1 consists of roughly 95 turns of 30 s.w.g. wire on a 1-in. former, with the filament tap made 30 turns from the "earthy" end. In order that the centre of the band shall fall at a point where the condenser vanes are half enmeshed, a few extra turns should be added during winding, and when the meter is under test, a turn or two removed until the L.F. edge of the band occupies a point at the end of the scale. A small aerial and pick-up coil should also be fitted.

The number of turns on the pick-up coil must be determined by experiment, as they will vary according to the power employed, and with the distance between transmitter and meter. The coil L_2 which consists of 30 turns of 30 s.w.g. is wound on the top of the tapped portion of the coil L_1 and in the same direction. The choke is of the medium-wave type, whilst a .0003 μF. grid condenser will be found satisfactory. The jack in the H.T. circuit can be employed for the purpose of bringing 'phones or a low reading milliammeter into circuit. The meter can also be used to ensure that the current is kept within fine limits. Any valve having similar characteristics to the H.L. type will give good results.

Operation

To operate the meter, all batteries should be connected and the valve inserted. A pair of 'phones should be plugged into circuit and the H.T. tapping set in the region of 60 volts. The pre-set condenser should then be increased in capacity by screwing down the adjusting screw until oscillation takes place. At this point the locking nut of the condenser must be tightened up and not touched again.

For use as a 'phone monitor, the only alteration required is a slight decrease in high tenson voltage. This is effected (without opening the cabinet), by fitting two insulated sockets at the front, one being joined by flex and a wander plug to the 60-volt tapping and the other to the 40-volt tapping. A third hole is drilled below the sockets and a flexible wire brought out from the jack, to which a plug is fitted, in order that it may be inserted in either voltage socket. A rubber grommet should be fitted in this hole as chafing may fray the insulation from the wire and so cause a short to the metal cabinet. It only remains for calibration to be effected and in doing this, it will be found that harmonics of medium wave stations are of great assistance.

National Field Day, 1939

By C. J. Greenaway (G2LC)

WE print below the rules for the Eighth Annual R.S.G.B. National Field Day. Due consideration has been given to the various suggestions made by members, but most have proved impracticable. As a result the rules are little changed from last year. Suggestions of a practicable nature are always welcome.

Amendments to the Rules

(*a*) It was felt that no useful purpose is to be gained by the use of 'phone during a contest of this nature, so the Tests Committee has inserted Rule 13, making the use of C.W. compulsory.

(*b*) In order to encourage contacts with the operators of Empire portables who in the past have supported us in this event, the scoring has been amended to favour such contacts as compared with other portables outside Europe.

General Comments

Once again an appeal is made that all the gear, including masts, be made truly portable.

All stations must be licensed for the actual bands upon which they are operated. The D.R.'s must ascertain that this is in order before sending in the applications for permits to operate during N.F.D., which must reach Headquarters not later than April 1, after which date no application will be considered.

Certain members may reside at a place far removed from their District Station, in which case they may prefer to operate at a station in a neighbouring district. In this case a member should first obtain the sanction of his own D.R. before putting himself forward as an operator of the other station.

Co-operation is earnestly invited from overseas amateurs and provided the R.S.G.B. is advised prior to April 25, a list of these portable stations will appear in this journal.

Particular care should be taken in ascertaining that the report logged is correct in every detail. Too often in past contests incorrect reports have cost a station points. *It is, therefore, necessary for both stations to acknowledge receipt of the report before commencing another call.*

If crystal control is not used, a reliable form of frequency stabilisation is necessary, together with a means by which the frequency may be accurately checked.

Rules

1.—The event will commence at 18.00 G.M.T. (19.00 B.S.T.), June 3, and conclude at 18.00 G.M.T. (19.00 B.S.T.), June 4, 1939.

2.—The event is confined to the English, Welsh and Scottish Districts, and to Northern Ireland and Eire (Northern Ireland and Eire count one district each).

3.—Each district taking part will be permitted to place into operation four stations—A1, A2, B1 and B2, which must be located at points within the District. An exception to this rule will be permitted in the case of the four London Districts and Scottish Districts, A and E, who may erect their stations in counties adjacent to their District. Station A1 will operate on 1.7 Mc., Station A2 on 3.5 Mc., Station B1 on 7 Mc., and Station B2 on 14 Mc.

Optionally, a District may put into operation *three* stations in which case Station A will operate on 1.7 and 3.5 Mc., and Stations B1 and B2 on 7 and 14 Mc. respectively.

Optionally, a District may put into operation *two* stations, in which case Station A will operate on 1.7 and 3.5 Mc., and Station B on 7 and 14 Mc.

4.—In the case of a District operating four stations on four different sites, only one transmitter may be installed at each station.

In the case of a District operating three stations, Station A may employ one transmitter for each of the two bands (1.7 and 3.5 Mc.). In the case of a District operating two stations, both stations may employ a pair of transmitters (1.7 and 3.5 Mc. at A; 7 and 14 Mc. at B).

5.—All transmissions must be signed off with the band in use. The following numerals must be used to identify the four bands :—

1.7 Mc. ...	1	7 Mc. ...	7
3.5 Mc. ...	3	14 Mc. ...	14

6.—No station may be operated on more than one band at any one time.

7.—Each station must be licensed to use a different call sign; the D.R. is responsible for forwarding to Headquarters an application for such permission, together with the exact location of each station not later than April 1, 1939.

8.—The input to the valve or valves delivering power to the aerial must not exceed 10 watts on 1.7 Mc. and 25 watts on the other three bands.

9.—The power supply must not be derived from either public or private supply mains.

10.—The height of the aerial at any point must not exceed 45 ft. above ground level, nor may the point of suspension exceed 45 ft. from ground level.

11.—Stations must be operated from a tent.

12.—No apparatus may be erected on site prior to 10.00 G.M.T. (11.00 B.S.T.), June 3, 1939. This rule includes aerial and aerial fittings.

13.—The event is restricted to the use of C.W. only.

14.—Points will be scored for established contacts on the following basis :—

Between all Districts and Fixed Stations :—

(*a*)	Outside the District but within the British Isles	1
(*b*)	In Europe	2
(*c*)	Outside Europe	3
(*d*)	In the British Empire...	6

Between G and GW portable stations on the one hand, and—

(*a*)	Portable stations outside the District but within the prefix Zones G, GW ...	3
(*b*)	Portable stations in EI, GI and GM ...	4
(*c*)	Portable stations in Europe	4
(*d*)	Portable stations outside Europe ...	6
(*e*)	Portable stations in the British Empire	12

Between EI, GI and GM portable stations, on the one hand, and—

(*a*)	Portable stations in their own individual prefix zone, but outside their own District	3
(*b*)	Portable stations outside their own individual prefix Zone, but within the British Isles	4
(*c*)	Portable stations in Europe	5
(*d*)	Portable stations outside Europe ...	6
(*e*)	Portable stations in the British Empire	12

15.—In addition to the National Field Day Trophy, which will be awarded to the District obtaining the highest combined score, a miniature replica will be awarded to the stations scoring the highest number of points on 1.7, 3.5, 7 and 14 Mc.

16.—An exchange of reports (R.S.T.) shall be made before points can be claimed; proof of contact may be required.

17.—Contacts with ships or unlicensed stations located in countries where licences are obtainable will not be permitted to count for points. The decision as to whether a station is to be classed as unlicensed will rest with the Tests Committee.

18.—The British Isles for the purpose of this event shall include England, Scotland, Wales, Northern Ireland, Eire and the Channel Isles.

19.—All entries must be submitted and signed by the D.R., who will be solely responsible for the conduct of the event in his District.

20.—The official entry form must be signed in full by the station operator *at the time of each contact.*

21.—Entries must be made on the approved form issued by Headquarters and must reach that address not later than June 19, 1939.

22.—The N.F.D. Trophy will be held by the winning District for one year and will be handed to the D.R. concerned at Convention. The D.R. will be solely responsible for its custody during the year.

23.—Persons operating a portable station, which is competing, shall be members of the R.S.G.B.

24.—Council reserve the right to amend or alter these rules at any time prior to the commencement of the event, and their decision will be final in all cases of dispute.

BOOK REVIEWS

THE RADIO MANUAL (Third Edition). By George E. Sterling. 1,120 pages, 443 illustrations, many plates and tables. Published by Chapman and Hall, Ltd., London. Price 25s. net.

The author of this husky volume is the Assistant Chief of the Field Section, Engineering Department of the Federal Communications Commission, and the previous editions have had many reprints.

The book is intended for engineers, inspectors, and operators. It is a small encyclopædia of the practice of radio engineering. Much of the descriptive material may be of indirect interest to amateurs, but the principles are the same in all branches, and the author treats these with a very practical bias.

The early part of the book starts the reader right at the beginning of electrical theory, and takes him up to motors, generators, and batteries before reaching the valve. The valve chapter lays down the principles and immediately deals with applications. Then a chapter of considerable length covers the use of the valve as an amplifier and as an oscillator. There is a wealth of practical detail and the treatment includes all the main methods of R.F. and A.F. amplifications in addition to self-excited and crystal-controlled oscillators.

The chapter on modulation systems includes methods and types of monitoring equipment, and precedes a chapter on studio and control room apparatus. The treatment of radio measurements is largely concerned with the principles and operation of precision apparatus of the commercial type. A short chapter gives a useful survey of aerial resistance and field-strength measurements. Then follow chapters dealing with commercial broadcast, marine radio-telegraph, and aircraft apparatus.

Marine direction finders and air navigation are two extremely interesting sections, and here also, after dealing with principles, modern gear is described in detail.

A section on U.S. auto-alarms will interest the marine operator.

A chapter which may prove of great interest to police operators in this country is that on police transmitters and receivers.

The book concludes with extracts from the U.S. radio laws, F.C.C. regulations, procedure, etc.

The foregoing should make it clear that this book is primarily concerned with the professional radio technician and with American apparatus. There is much practical information especially of the adjustment, maintenance and fault-locating sort, and a minimum of mathematics. The book is exceptionally well illustrated and the style is fluent and attractive.

Despite the fact that much of the apparatus and information on regulations is of interest only to American technicians and operators, others will find very much of value and interest in this most practical manual. T.P.A.

THE RADIO HANDBOOK. By the Editors of "Radio." 592 pages and about 600 illustrations. Published by Radio, Ltd., Los Angeles, U.S.A. Obtainable from R.S.G.B. Sales Department, price 6s. 6d. to members, and 7s. to non-members, post free.

A peculiarity of these Handbooks is that a new edition takes its place *beside* the old one rather than in its stead. Probably this is because the greater part of the book is of a practical nature, and each edition describes new apparatus. Certainly this latest edition presents a real galaxy of new gear, and this is true of all sections.

A new chapter dealing with the workshop incorporates many tips hitherto given in the appendix, and also deals really instructively with the drilling of metals, soldering, etc.

The antenna section, always a feature, is better than ever, and some 17 pages bigger; many changes have been made, and new material added.

Radio receiver theory also is much enlarged. The additional information on the adjustment of modern superhets and the use of A.F. peak limiters will be very useful.

The section on receiver construction includes the following: an "Ultra-gainer," with new mixer circuit, improved noise limiter, more stable H.F. oscillator, and an extra A.F. stage for speaker operation; an ambitious super-selective phone receiver with 12 tuned I.F. circuits; a super-sensitive 10-20 metre phone receiver using two stages of acorn R.F. amplification; a 5-metre "super-gainer"; an advanced 5 metre superhet, and a high-gain pre-selector.

The transmitters cover a range from 50 watts to

(*Continued on page* 564)

The 1.7 Mc. Contest, 1939

By J. M. S. Watson (G6CT)

OVER 5,000 contacts were made, and some 300 stations located in four continents were active during one of the most enjoyable "Top Band" contests ever organised.

Practically every entrant expressed his pleasure in the contest and praised the skilful operating and excellent quality of the signals heard.

On perusal of the record entry of 97 competitors we find that 227 G's were logged, 18 GW's, 12 GM's, W1AW, W1BB, W1BLK, W1DIZ, W1ERX, VE1EA, FA8BG, F8RJ, EI5J and OZ2PX. As in previous years the calls of both new and old hands are to be seen in the list of competitors.

Order of Merit

No.	Call.	Location.	Score.	No.	Call.	Location.	Score.
1	GW6AA	Colwyn Bay	87	49	G8JR	Highgate, N.6	37
1	G6WY	Beckenham	87	49	G2UJ	Tunbridge Wells	37
3	G5RI	Hexham	86	52	G2FO	Stockton-on-Tees	36
4	G8AB	Loughton	85	53	G3AH	Manchester	35
5	G6YR	Southport	80	53	G6OM	Manchester	35
6	G5BM	Cheltenham	77	53	G2WS	Ilkeston	35
7	G5MY	Long Eaton	76	56	G2QM	Bradford	34
8	G6GL	West Kirby	75	56	G3XS	Chingford, E.4	34
9	G2MI	Bromley	74	58	G5IJ	Ealing	33
10	G8NF	Manchester	71	59	G8QZ	Nottingham	32
11	G6GM	Holsworthy	68	60	G6MC	Bingley	31
12	G5PR	Horam	66	61	G3BY	Manchester	30
12	G5JU	Downend	66	61	GM2LQ	Glasgow	30
12	GM5ZX	Glasgow	66	61	G8VN	Rugby	30
15	G6BQ	Gravesend	65	61	G5HS	Thame	30
15	G8WF	Royston, nr. Barnsley	65	65	G8PI	Perivale	29
17	G2HW	Darwen	64	65	G6KS	Liverpool	29
17	G5TO	Sheffield	64	67	G2GN	Chelmsford	28
19	G6GH	Boston	62	68	GM3UA	Dunoon	27
20	G8NV	Golders Green	59	68	G8MD	Samlesbury, nr Preston	27
21	G2XC	Portsmouth	57	68	G3JU	Sanby, Bedfordshire	27
22	G2RC	London, S.W.18	56	68	G2ZZ	Poplar, E.14	27
23	G2NJ	Peterborough	54	72	G3PJ	Preston	26
23	G5WW	London, N.2	54	72	GW8WU	Whitchurch	26
23	G2XP	Ilford	54	74	G3GD	Stoke Newington, N.16	25
26	GM6JJ	Burntisland, Fife	52	74	G5GT	Taunton	25
26	G6UT	Little Hallingbury	52	74	G3OA	Thundersley	25
26	G6VD	Leicester	52	77	G2GZ	London, S.E.1	24
29	G5IL	Gravesend	51	77	G5JH	Hardwicke	24
29	G5KT	Bristol	51	77	G8DV	London, N.W.11	24
31	G8JM	Chingford	49	80	G8GG	Blackpool	23
31	G3ZJ	Charlton, London	49	81	G3SB	Minehead	22
33	G4AU	Charlton, London	46	82	G3PM	Ashton-under-Lyne	20
34	G8ML	Cheltenham	44	82	G2IX	Leicester	20
34	G8NL	Manchester	44	84	G3FN	Sheffield	19
36	G3LZ	Evesham	43	84	G3GH	Knowle, nr. Braunton	19
36	G8MW	Tibshelf, nr. Alfreton	43	84	G2SO	Leigh-on-Sea	19
38	G6CT	Westcliff-on-Sea	42	87	G2JB	London, S.E.17	18
38	G2CF	Charleton, nr. Kingsbridge	42	88	G8ST	Cambridge	16
40	G2JK	Upper Tooting	41	89	G2GA	Bury	15
40	G6LF	Sheffield	41	89	G5JL	Hayes	15
40	G2ZP	Yeovil	41	89	G3PZ	Northampton	15
40	G5XH	Croydon	41	92	G8JP	Sheffield	13
44	G6VC	Northfleet	40	93	G2BI	Calne	12
44	G5ZQ	Ramsgate	40	94	G2MN	Norwich	10
46	G5KV	Tunbridge Wells	39	95	G3AI	Forest Gate, London	9
46	GW5FI	Cefn Coed, Breconshire	39	95	GM3QM	Glasgow	9
48	GM8SV	Birse by Aboyne	38	97	G6TS	Andover	8
49	G2CD	Seven Kings	37				

The Leaders

We congratulate Mr. D. S. Mitchell (GW6AA) and Mr. H. A. M. Whyte (G6WY), for two outstanding entries which share first place with a score of 87. Actually, GW6AA worked 94 stations in the British Isles (a considerable operating achievement), so it was with regret that the Tests Committee were compelled to disqualify several contacts because they did not correctly check with other logs. In this connection GW6AA complains that many stations did not confirm reception of a report and went straight on with a test call. What a pity he did not hear the W who frantically called him, for then an easy winning score would have been to his credit. He tells us that three masts were blown down at 04.00 G.M.T. by a terrific gust of wind and that temporary aerials were erected, which reduced his signal strength.

G6WY worked W1ERX, W1AW, W1BB and W1DIZ, and so with only 71 contacts obtained a leading score. His operating skill deserves special mention because practically every other entrant lost points with errors in the RST received, etc., but no fault could be found in 6WY's log. GW6AA and G6WY used CO-PA transmitters and single-signal super-het receivers with separate aerials.

Third place was taken by Mr. F. Ritson (G5RI), with a score of 86, which included contacts with W1BB and VE1EA. The score is truly praiseworthy for consistent operating and the fact that the whole station is battery operated. Last year 5RI was 9th, with a score of 62. There is no doubt thar the excellent signal from his CO-BA-PA transmitter and a 150-ft. Marconi aerial with its three-wire counterpoise, were responsible for this year's advanced position.

It was pointed out last year that many points were lost by stations not waiting to ascertain whether the station worked had received the report given. We would again stress this fact, and as a guide in future events we tabulate our reasons for deducting points :—

(*a*) Contact not confirmed in the log of the station worked.

(*b*) More than one contact with the same station (Rule 13).

(*c*) Incorrect recording of the R.S.T. report sent by the station worked (Rule 12). *Note.*—A contact is only disqualified when the *incoming* report is incorrect.

General Observations

The weather was particularly kind to those who had to spend the night in outside shacks and even those who operate indoors appreciated the mild conditions. One entrant was delighted because a " 15-20 amp. wind " was blowing ; at first we thought that this was a new meteorological code but on reading further found that it referred to a wind charger !

It seems that the 12-hour operating period is favoured by nearly everybody, and with the improved conditions the most remote station did not find it hard to effect contacts right up to the last moment.

The frequent use of QHL, etc., saved much time and " break-in " was more often employed than in any other contest. In past years the H.F. portion of the band has been rather neglected, but this year it was possible to effect some 50 contacts without using the L.F. end at all. The one or two bad notes were shown up by the excellent quality of the other signals.

All competitors say " Thank you " to the telephony stations who either came on with CW or waited for the contest to finish. There were only three stations recorded using 'phone and they were not on for long.

We thank all those who sent in check logs. These were of great assistance in checking the entries, but in future we should prefer to see all logs submitted as entries, however low the score may be.

The following entries were disqualified as their logs arrived at Headquarters after the closing date, Tuesday, January 17 (Rule 5) : L. W Jones (G5JO), J. Partington (G5PX), C. Herod (G3JK) and H. Jones (G5ZT).

There has been an overwhelming request for a second CW Contest and this will be held during the period November 4 and 5 next. Full details will appear in a later issue of the BULLETIN.

F.O.C. Notes

In the example of procedure given at the end of the paragraph dealing with " Long QSO's " published last month, the abbreviation " QLH " was inadvertently omitted. In its corrected form, the example should read " QRZ ? de G1AA QRU ? QLH (or QHL) then QRT AR K."

Mullard Red E Valves

The Mullard Valve Co., 225, Tottenham Court Road, W.C., inform us that they will be pleased to send full details of their new Red E Valves to Society members.

It is essential, however, when applying, to refer to this journal.

56 Mc. Flash

PK2WL will be on 28 Mc. from March 12 onwards looking for contacts with British stations. When contact has been established, he wishes to QSY to 56 Mc. with a view to a report on his 56 Mc. signals or a 56 Mc. QSO. This news was received via G5ZT. PK2WL will use a input of 250 watts.

British Calls Heard

M. W. Soplop, 54, Chestnut Street, Allegany, N.Y. (about 300 miles inland) QRK reports as taken from R meter of RME69 receiver, used with DB20 pre-selector :

7 Mc. telephony November 29, 1938, to January 12, 1939 : G2pu r8, 2is r9 plus, 2vg r6, 2ko r8, 2hn r6, 2il r9, 2xv r7, 2fx8, 3si r8, 3nl r7, 3ac r6, 3tn r6, 3jp r8, 3gs r6, 3iv r8, 3pr r5, 3ky r7, 3cd r5, 3rk r5, 3bg r8, 3as r8, 3yj r6, 3cr r7, 3qs r7, 3yk r7, 3ph r4, 5yv r6, 5lk r7, 5gn r7, 5wg r8, 5fa r8, 5cp r7, 5ja r8, 5ok r7, 5oy r6, 6tw r9, 6vq r8, 6kb r7, 6ux r9, 6sr r9 plus, 6hf r6, 6hv r9, 6bw r9, 6gl r6, 6jq r6, 8na r7, 8gm r8, 8aw r6, 8kr r6, 8pt r8, 8fp r6, 8oc r7, 8it r6, 8kq r6, 8lv r8, 3wj r8.

THE HELPING HAND

By J. N. WALKER (G5JU).

PART XIX—FURTHER APPLICATIONS OF THE OUTPUT METER

Preceding articles have dealt with the construction and some of the possible applications of an Output Meter. Further uses of the Meter are now described.

THE previously described applications of the output meter have been mainly concerned with effecting improvements to receiving equipment. We will now turn to methods by which, with its use, improvements can be made to the performance of a transmitter and its associated radiating system. It need hardly be said that the employment of an external measuring instrument for the purpose in mind will lead to much greater reliability.

As far as the transmitter itself is concerned, one can carry out many experiments on it and discover the results thereof without the use of a radiating aerial. Indeed, it is highly desirable to use an artificial aerial unit during such experiments in order to avoid unnecessary interference and to enable quantitative measurements of output to be taken on an R.F. ammeter in the A.A. unit.

The position is altered when one attempts to secure the maximum radiation for a given input. It is difficult to secure a reliable comparison between the effectiveness of one aerial system and another, or one type of feeder and another, unless some means is at hand for measuring the field strength in the neighbourhood of the aerial.

Field Strength Measurement

As has been previously pointed out, the type of field strength meter employing a diode (or, what amounts to the same thing, a strapped triode) valve is very insensitive. The power actuating the meter is derived solely from the energy picked up from the transmitting aerial, and readings are only obtainable in close proximity to the aerial. This is not altogether desirable as radiation off the feeders and distortion of the field, due to nearby objects, will give rise to misleading readings.

Desirable Equipment

Equipment sufficiently sensitive to enable readings to be taken some distance from the aerial is therefore required. This can take the form of a simple reacting two-valve receiver, which, by the omission of the refinements usually incorporated in a normal receiver, can be made compact and portable. A suitable and self-explanatory circuit is shown in Fig. 1. Of course, the " shack " receiver can be pressed into service if it is desired, but the handling involved in carrying it around during tests may do it no good.

The sensitivity will depend on two factors—the value of H.T. voltage and the length of pick-up aerial employed. Since the output meter gives a full scale reading of 10 milliwatts on its lowest range, and readings of less than one milliwatt can be accurately made, an 18-volt grid bias battery will often serve as the H.T. supply, although it will be better to use 36 volts. Experiment will be necessary with the length of pick-up wire, which, in practice, will take the form of a stiff rod or wire a few feet long, connected directly to the grid end of the tuning coil. The output meter will be attached to the receiver in the manner described in the article dealing with its construction.

The receiver is operated in an oscillating condition, the audio-frequency beat note being utilised to actuate the meter.

Carrying Out Tests

If it becomes necessary to switch on the transmitter, make a little journey to take a reading, and then return to make an adjustment, the process will be slow and will involve operation of the equipment over a comparatively long period. To obviate this, the co-operation should be sought of a fellow amateur who can take readings on the receiving equipment. A code of signals should be arranged to indicate increasing, decreasing, and peak signal strength. If both operators possess suitable licences, use can possible be made of 56 Mc. transceivers for keeping in touch, thus enabling readings to be taken at a considerable distance from the transmitter.

The tests which one is now in a position to carry out are very numerous. The controls of the transmitter itself should not be touched whilst experiments are being conducted, once suitable adjustments have been made. As a general rule, the input should be maintained at a constant level by adjustment of the degree of aerial coupling, although, under certain circumstances, such as during the trimming of an aerial to resonate at a particular frequency, the input may be allowed to rise.

One of the first experiments should be to discover the effect of different types of coupling between

the aerial (or feeders) and the transmitter tank circuit. Many different systems come to mind, including direct tapping, inductive (either direct or *via* a link), capacitative, and Collins Coupler. In this class of experiment, and in many which follow, the operating frequency will quite likely be a deciding factor, in that one particular system may be found very poor on the U.H.F., for example, but excellent on the lower amateur frequencies.

Next, various types of feeder may be compared, and it is in this connection that the field strength meter will be found of great service, as it often happens that the P.A. anode current meter shows that a good load is being drawn, but it does not always follow that maximum energy is being radiated. Currents may be circulating in the feeder, and because of these, or possibly because of a mismatch at the aerial termination, the radiation may be poor.

Different makes of low impedance feeder can be compared one against another whilst an interesting test would be the trial of the recently produced 350 ohm feeder, having a solid dielectric. It is sometimes possible to either series or parallel tune Zepp feeders, depending on the frequency and lengths of wire. The one which is the more effective from the point of view of actual radiation can be readily and definitely ascertained.

Another important matter is the termination of the feeder at the far end. In the ordinary way, it is difficult to ensure that a correct match has been effected, especially in cases where fanning out of the feeder is necessary. Trial and error tests are probably the best, and will quickly enable the correct distance for the fanned-out portion to be determined. Adjustments can be similarly carried out to the tapping point of a Windom feeder, to matching stubs (both as regards their length and the feeder tapping points), and to a Y match feeder system.

Then comes the determination of the correct length of the radiator proper, *i.e.*, the aerial wire —whether this be a simple half wave or the elements of a beam array. There is no necessity to go into this subject at length—the chief point to remember is that an aerial cut exactly to a frequency in one particular band will not give maximum radiation on the harmonic frequencies, and some compromise may be called for to secure best all-round results.

On the higher frequencies it is usual to employ aerials carrying one or more half waves, and this occurs even when a counterpoise is used, as with the W3EDP type of aerial. Experiments can be carried out to determine if the lengths of counterpoise specified by the designer are correct at the reader's station—it is probable that some improvement in radiation can be effected by alteration of the lengths and this without the necessity of giving the aerial a prolonged trial on the air. On the lower frequencies a counterpoise is very frequently employed, and usually at least on 1.7 Mc., the longer it is the better the radiation. Tests will show if this is actually the case, and further, it is interesting to try the effect of running the counterpoise in different directions away from the line of the aerial.

In a case where an aerial is not quite a half wave in length, as, for example, a 100-foot wire on 3.5 Mc., one may employ either a counterpoise and series tuning, or, alternatively, inductively load up the aerial to a half-wave and couple it as an end-on. The latter method is well worth trying, and, with the aid of the field strength meter, the correct amount of loading can be determined and a note made as to whether the radiation has increased or otherwise.

Opinions vary on the best gauge of wire to employ in the construction of an aerial. The difference between say 12 and 16 S.W.G. wire, is likely to be small, but those interested in this particular problem have a means at hand of definitely discovering what difference exists in practice on the various amateur bands, and also of comparing stranded against solid wire, and enamelled against bare wire.

The F.S.M. will enable the alignment of a multi-element beam aerial to be carried out with great exactitude. The effect of alterations to the lengths of, and distances between, reflector and director wires will show up clearly, whilst measurements of the radiation off the sides and rear of the beam will finally ensure that the system is working as it should.

It sometimes happens, especially on the higher frequencies, that one has the alternative of erecting the aerial near the house, when a short length of feeder can be used, or of placing it well away, necessitating a long feeder. It is problematical which system will be the better, since so many

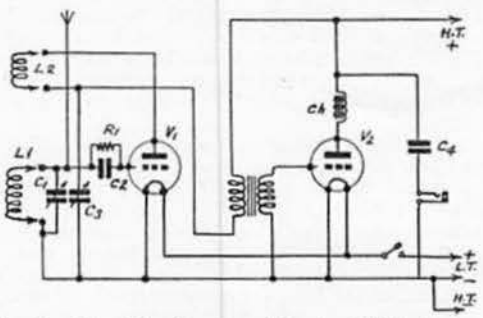


Fig. 1.—The Circuit of a Simple Field Strength Measuring Set.

C_1.	*40 μμF for high frequencies; 100 μμF for low frequencies.*
C_2.	*.0001 μF mica tag type.*
C_3.	*.0003 μF preset.*
C_4.	*.02 μF paper type.*
L_1 and L_2.	*Plug-in coils on valve bases wound to cover bands.*
V_1 and V_2.	*Midget Hivac valves, types XL or XD.*
T.	*3/1 or 5/1 ratio transformer.*
Ch.	*Low-frequency choke of 20 henrys or more.*
R.	*2 megohms.*

factors will exert an influence. A practical test, under identical conditions, to discover which gives maximum radiation, will prove most interesting.

Reduction of Harmonic Radiation

As is well known, a modern transmitter, adjusted to operate at high efficiency, has a tendency to produce outputs on harmonic frequencies some of which may not fall within the amateur bands. It is very important that these harmonic frequencies should not be radiated, and methods of suppressing them were described in the November, 1937, issue of THE T. & R. BULLETIN. Whether the method adopted in any particular case is proving thoroughly effective, can be ascertained by using the F.S.M. on the harmonic frequencies. Since the energy radiated will be much less than on the fundamental,

the meter will have to be used in a situation close to the aerial, but nevertheless, reliable indications will be secured. Preliminary tests should be conducted without any precautions in use to suppress the harmonics, in order to gauge the degree of suppression finally obtained.

Plotting Lobes of Maximum Radiation

The procedure to adopt when it is desired to plot the lobes of maximum radiation from any particular aerial system was outlined by E. Shackleton (G6SN) in an article which appeared in the August, 1938, BULLETIN. As was pointed out therein, one cannot expect to obtain the symmetrical curves which are given for aerials assumed to be set up in free space, but those obtained in practice will certainly show to which areas of the globe signals are being radiated.

It may happen that the experimenter is confined to the erection of an aerial following one particular direction—for instance, due north-south—and that the major lobes are being radiated over sea areas instead of over land masses. This can easily occur, since the land areas only occupy about one-fifth of the total surface of the earth. This fact may account for the difficulty sometimes experienced in raising DX, despite the fact that the transmitter and aerial appear to be functioning properly.

It is necessary, then, to turn to the several available methods of altering the direction of the lobes. The simplest, if space permits, is to adjust the length of the aerial, either adding to or reducing the number of half-waves on it. The angle of the major lobes to the line of the aerial will decrease as the number of half-waves increase.

Phasing coils, or, alternatively, "folded-up" half-waves, may be inserted at distances equal to one half-wavelength, resulting in strong broadside radiation. The double doublet or double Zepp types of aerial may be given a trial. The phasing can be reversed at the transmitter end, and the change-over will give rise to a big alteration in the directional properties of the aerial. Further tests are possible with vertical and semi-vertical aerials, the direction and degree of slope of the latter being varied to increase the radiation in the desired direction. This test may also be tried on an aerial normally horizontal.

The meter will not, unfortunately, measure the angle of radiation (unless an auto-giro is available !) but sufficient information has been given to enable the reader to make the most effective use of the space available for aerial erection.

We will conclude these articles dealing with the output meter with a few more indoor applications to which it may be put.

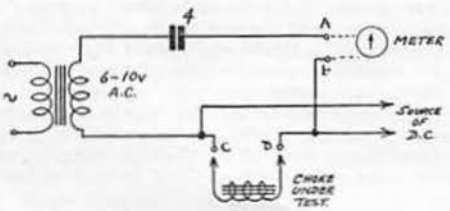


Fig. 2.—Circuit for Measurement of Inductance.

Measuring A.C. Voltages

In practically all the foregoing applications, great accuracy has not been necessary, as a comparative reading only has been called for. The meter may be usefully employed in two further ways, the accurate measurement of (*a*) A.C. voltages, and (*b*) audio power output, providing resistances of a high degree of accuracy are fitted. Such resistances are available from *Dubilier*, the values required being 8250 (made up of two separate resistances of 8,000 and 250 ohms), 90,000, and 450,000 ohms. The special one-watt type, guaranteed to possess a tolerance of plus or minus 2 per cent., are priced at 2s. each, and, although the cost is more than that of the standard type, their use is recommended in view of the fact that the instrument is thereby rendered very dependable.

The first range will read up to 10 volts full scale, the second up to 100 volts, and the third up to 500 volts. The variable resistance should be maintained at its maximum value. When measuring voltages in excess of 400, only instantaneous readings should be taken, since the dissipation of the resistance will be exceeded, resulting in its becoming overheated if left continuously in circuit. The low range will be found very useful for checking filament and heater voltages, but it is important that these should be fully up to the manufacturers' ratings if the best results are to be secured. This applies particularly in the case of the larger transmitting valves. The third range will enable measurements to be made of the output voltages of transformer secondaries and of the regulation of a transformer under load.

When measuring power output, it is first of all necessary to adjust the variable resistance until a maximum reading is obtained, at which point the valve is delivering maximum power into the load. Measurement of the amount of variable resistance in circuit will give the value of optimum load resistance required by the output valve.

The three ranges available give full-scale readings of 10 milliwatts, 5 and 25 watts, respectively, and, as before, readings above 15 watts on the third range should not be maintained for any length of time.

Incidentally, checks can be made with regard to modulation, line and high impedance output transformers to discover whether the matching is approximately correct. Any serious loss will show up when the meter is transferred from one circuit to another.

Another useful feature is the ability to ensure a correct match between a modulator and an R.F. power amplifier, particularly when a tapped (variable matching) modulation transformer is employed. The working equivalent D.C. resistance of the P.A. valve can be easily calculated from Ohm's Law—it will rarely exceed 10,000 ohms—and the variable resistance in the meter is then set at a value as nearly as possible identical. With the meter connected to the secondary of the transformer (in place of the transmitter), the connections to the tappings on the modulation transformer are varied until a maximum reading is obtained, a steady tone being fed into the input stage of the modulator.

It is a big advantage to be able to measure power output when constructing Class B (and similar type) audio-frequency amplifiers. A certain specified amount of audio power is required to drive the

output valves and time and trouble will be saved if it can be quickly ascertained that the preceding valve (or valves) is capable of giving the requisite power without being unduly "pushed."

Measuring Inductance

It frequently happens that chokes of unknown inductance are on hand, and doubt exists as to what class of service they can be put. With the aid of the meter, and provided two or more chokes of known (rated) inductance are available, it is possible to arrive at an approximate value of the inductance of an unknown choke. The method is admittedly somewhat rough, but it will serve to indicate the purpose for which the choke was intended, especially if the D.C. resistance is also measured.

The circuit shown in Fig. 2 should be set up. The A.C. actuating voltage can be readily obtained from any spare transformer secondary giving between 6 and 10 volts. The 4μF condenser is inserted for the purpose of isolating the meter from D.C., which would otherwise affect the readings. The output meter, set on its lowest range, is connected across the points A and B, whilst the choke to be tested is placed across C and D. In order that the test may be made under conditions similar to those obtaining in practical service, a source of D.C. is connected in parallel with points C and D. This D.C. supply can be conveniently obtained from one of the transmitter power packs. The writer simply connects to the keying terminals of a buffer stage passing some 40 mA.—or to an independent source. In any case, there should be a fair amount of resistance (or its equivalent, *e.g.*, a valve) in circuit, otherwise the inductance of the choke will be reduced partly by the D.C. flowing, and partly because of the effect of the shunt resistance—if the latter is high it will have little effect.

The first step is to insert the chokes of known ratings across C and D, and take note of the readings with and without D.C. flowing. A word of warning—the switching on and off of the D.C. supply will cause voltage surges which should not be allowed to reach the meter. Disconnect the range plug of the latter, therefore, each time a reading is taken.

In Fig. 3 is shown a chart of the results actually obtained with three chokes, and it is interesting to note the differences which occur in the readings with and without D.C. "A" is a nominal 8 henry input swinging choke, and it can be clearly seen that whilst the value of inductance is moderately high with no D.C. flowing, it drops to a low value when the current of 100 mA passes through it. 'B' is a large 40 Henry choke, of the gapped core constant inductance type—the small difference between the two readings indicates that it comes up to specification admirably. The third choke, "C," is a small one rated at 20 Henrys, and, whilst the inductance is high with no D.C., it is evident that it falls off considerably as the current rises.

A.C. Volts 6.2

	Rated Inductance Henrys	Meter No. D.C.	Readings With D.C.	Current in mA.
A	8	.26	.59	100
B	40	.3	.34	40
C	20	.34	.4	40

Fig. 3.—Inductance Table.

Readings can now be taken with the chokes of unknown inductance connected across C and D, and, by interpolation on curves drawn from the previously obtained figures, a very fair idea of the inductance and of the purpose of the choke will result. If the amount of D.C. flowing through the choke can be regulated within limits of, say, 25 and 150 mA., it will be possible to judge when the maximum current which the choke was designed to carry is being exceeded, this being indicated by a rapid rise in the meter reading, owing to saturation of the core.

A.C. Volts 6.2

Condenser Capacity	Meter Reading
2.0 μF.	.58
1.0 ,,	.49
0.5 ,,	.34
0.1 ,,	.07
0.05 ,,	.03
0.02 ,,	.02

A.C. Volts 300

.01 μF	.46
.005 ,,	.23
.003 ,,	.14
.002 ,,	.06
.001 ,,	.03

Fig. 4.—Capacity Table.

The principle involved in this particular application is that the choke presents an impedance to the flow of alternating current depending on its inductance—the lower this is, the greater the voltage applied to the meter. Low and not high readings on the latter indicate a good, or, at least, a high inductance choke.

Condenser Measurement

The same principle will enable rough measurements to be made of condenser capacity. The circuit will be similar to that shown in Fig. 2, except that the 4 μF condenser and the D.C. supply will be omitted. The range of measurable capacity will depend entirely on the A.C. voltage applied, and some indication of the readings obtainable in practice is given in Fig. 4, the figures shown in the chart being those actually observed with condensers of known capacity. From a similar set of readings a curve can be plotted and it will then be a simple matter to insert across C and D a condenser of unknown capacity, the value being read off on the curve.

Care should be exercised when applying 300 volts or more, and the test prods or clips should be well insulated. Also since, with a high voltage, a faulty condenser would allow an excessive current to flow, with consequent risk of damage to the meter, a preliminary test for shorts and leakages should be made. This can conveniently be done with the meter plug set for the highest range, under which condition only the slightest kick should be observable.

(*Continued on page* 564)

Experimental Section

Manager: A. M. H. FERGUS (G2ZC).

WITH the Section settling down under reorganised conditions, it would be well for each member to keep in mind what Amateur Radio stands for, and what use the Section can be to him individually. Collective work along defined lines of experiment can only better one's knowledge, but there is a deeper value, which may not be obvious to everyone.

In about a year or two we shall be faced with the International Convention at Rome, and while happily the relations between the G.P.O. and the R.S.G.B. are cordial and mutually understanding, the outcome of Rome will not rest on the British or the American authorities. If a case has to be stated, it should be a strong one, and on what better foundation could British amateurs build their case than on the work of the Experimental Section, which if freely used and supported, could marshal arguments and evidence of experimental work done by amateurs in this country?

The individual may be at a loss to understand how an International Convention can be influenced by his (or her) work, but where this is part of a collective scheme, along defined lines, then they must see that by giving of their best they are adding strength to the whole cause of Amateur Radio.

In 1940 it will be too late to start setting our house in order, but if each of us, keeping the above thoughts in mind, were to start now in earnest (and thereby getting a return for our efforts) we shall not only have a case ready, but most of us must benefit individually from the knowledge shared and gained.

Membership

Membership renewal discs have been sent to all known active members, and an appeal is made for an early reply from those who have not yet returned their forms, indicating in which group they wish to work. This applies to those who previously belonged to more than one group. Will any member who has reported regularly and who has not yet received a disc, please communicate with the Experimental Section Manager?

Change of Address

The E.S.M. has moved from Hindhead and all communications should now be sent to him at: Churt House, Churt, Surrey. Telephone No.: Frensham 173.

New Propagation Group Manager

It is with regret that we have to report the resignation of Mr. W. N. Craig (GM6JJ) as Group Manager of the Propagation Group, in whose place we welcome Mr. Philip Malvern (G8DA), 10, Selkirk Street, Cheltenham, Glos. All communications regarding the Group should in future be addressed to him.

G2ZC.

Aerial Group

Group 1 (56 Mc. Transmitting Aerials) are conducting experiments with long wire, half, and full-wave radiators over 40 feet in height, and a square beam is being tested on 57 Mc.

Group 2*A*, which has recently been formed, has a vacancy for two members interested in transmitting aerials for 28 and 14 Mc.

Group 4 are studying 56 Mc. receiver type aerials and find on test that horizontally polarised waves are received better on vertical aerials than are waves of vertical polarisation, a marked difference being noted. Experiments continue.

There are vacancies in Groups 5 and 6, which deal with receiving aerials on 28 and 14 Mc., and 7, 3.5 and 1.7 Mc. respectively.

G2IM.

Propagation Group

The 3.5/1.7 Mc. Group continues to investigate the peculiarities of conditions at sunrise and sunset. Data on flutter fading is being collected by G5KT. G8NL, another member of this group, is working on a theory regarding the origin of static disturbances which will form the subject of a BULLETIN article in the near future.

Members of the Magnetic Group have noticed that South American signals are better received than are those from South Africa before and after magnetic storms. This is not in accordance with theory, which favours the North to South route. It is suggested that signals from South Africa are reflected by a land mass, possibly the Sahara, which provides a less efficient reflecting surface than the Atlantic Ocean, which probably reflects signals coming from South America.

2AXP (56 Mc. Group "B") sends an interesting report on the propagation of 56 Mc. signals over hills.

GM6JJ.

Receiver Group

Following the Editorial in the December issue of the BULLETIN, many readers may be interested to know more about the Receiver Group. At present there are four Sub-groups, studying T.R.F., Superhets, and U.H.F. problems. These sub-groups by no means cover all the ground open to the Receiver Group, and the all-important subject of measuring apparatus is not catered for by a special sub-group, due to lack of interest.

The two U.H.F. sub-groups are studying aerial couplings and matching systems; also the effect of accurately adjusting aerial lengths on signal strength. In the past much has been discussed concerning by-pass condensers on U.H.F., and this subject is being investigated with a view to tabulating the relative efficiency of various makes and types of condenser.

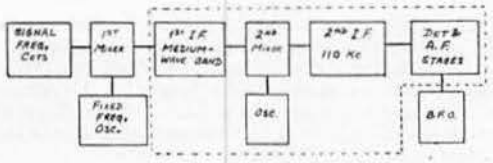
Other subjects under investigation by the Group are:

(*a*) A double frequency superhet in which tuning is effected in the first I.F. stage. The sketch shows the general arrangement and it will be noted that the part enclosed by dotted lines can be a medium wave broadcast receiver of the superhet type. Advantages claimed for this arrangement are elimination of tracking difficulties and constant voltage injected into the mixer grid. The oscillator can be designed for extreme stability, and it is also thought that image response is greatly reduced.

(*b*) A U.H.F. Wavemeter of the absorption type whose accuracy and sensitivity compare favourably with meters of the E.C.O. type. This result is brought about by means of a special indicating system attached to a normal resonant circuit.

(*c*) A simple method of calibrating receiving aerials in signal strength by transmitting a standard signal, whose intensity may be calculated. The receiving system as a whole can then be calibrated in dB or microvolts/metre as desired.

It is hoped to publish the results of these and other experiments in the course of the next few months.



Block diagram of double frequency superhet under investigation by Receiver Group.

It will be realised that work is greatly handicapped by shortage of active members, and results are therefore slow in coming. The G.M. will be very pleased to correspond with any member of R.S.G.B. who may be interested in the Receiver Section, and who wishes to have more details. There may be many members who would like to join, but who, due to some small difficulty which might be overcome, do not care to write. Please send all queries to 404, Victoria Avenue East, New Moston, Manchester 10. There are facilities for all types of members, whether experienced or not, provided they are keen.

Transmitter Group

The G.C. of each Transmitter Group has been provided with a list of set problems, and one or more of these have been selected and submitted to the Group for co-operative investigation, according to the particular subject in which the Group members have signified their interest. It must be admitted that the problems, in the main, are far from new, and, as one G.C. has pointed out, it is possible that they have all been solved in commercial laboratories. That may be the case, but it does not follow that they have been solved in a way which can be inexpensively applied by amateurs. The commercial laboratories rarely pass on to the amateur and radio-engineering fraternity the results of their investigations, and then only after a lapse of years.

There are unquestionably many matters still not definitely and satisfactorily solved. Take, for instance, the controversy regarding the use of metallic *versus* wooden chassis construction for ultra-high-frequency apparatus. Are the losses possibly resulting from the proximity of masses of metal sufficiently serious to offset the advantage gained in increased stability? Does the argument hold good for lower frequencies, and does a turning-point occur at a frequency above which it is undesirable to use metal chassis, etc.? Or is it possible to evolve a wooden-cum-metal construction which will lead to maximum stability with minimum losses?

The above is only one example of many matters requiring further investigation, and it is obvious that co-operative investigation will be far more satisfactory than isolated experiments. Each different band presents its own problems, and the solution of a problem on one particular frequency may be quite different to that found satisfactory on a frequency far removed.

Another example which may be quoted is the design and construction of a moderately simple, reliable and inexpensive "signal shifter," involving, as it does, the adjustment of ganged tuning controls. Little information has been published in England on this subject, and a design incorporating British valves and components would meet with general interest.

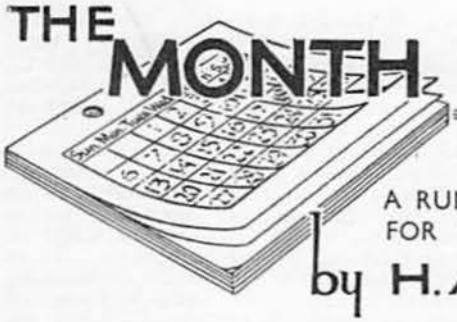
As mentioned in last month's editorial comments, it is sincerely hoped that members who are nursing a problem affecting transmitters, of an unusual nature, will come forward and let us have their ideas, which, needless to say, would be very welcome. Those who have ideas which show every indication of good promise and wish to pursue them further, but lack the facilities for so doing, should join the Transmitter Group of the Experimental Section, and communicate with the G.M., when it is probable that arrangements can be made to assist them.

It is here necessary to point out to intending members, and also to certain present members, that application for membership of the Transmitter Group (or any of the others for that matter) indicates a real interest in technical subjects connected with transmitting apparatus. That being the case, each member should consider it his duty to pursue some particular problem to the bitter end, and evolve some really useful data concerning it, to the benefit of the amateur community at large. Further, he (or she) should report progress regularly to the Group Centre, and, emphatically, it should be quite unnecessary for the latter to get into touch with his members at intervals to discover what is being done, as is only too often the case. The work of the Group Centre is to take part in the experiments to correlate and circulate the reports, and to pass on to the G.M. matter which warrants publication. It is undesirable that lengthy correspondence be entered into except in cases where two or more parties particularly wish to do so. The best medium for keeping members of a group in touch with one another is a Letter Budget—ideally, its form should take that evolved by H. H. Phillips (2BQB), who duplicates a synopsis of reports, and circularises them to all members of the group. This method is only possible in rare instances, for obvious reasons, so normally a letter budget consisting of the members' actual reports is circulated around the group. For the successful running of a group, it is essential that all members (*a*) contribute *something*, however small, to the L.B., and (*b*) see that it circulates in the shortest possible time.

An old proverb says that it is wise to know something about everything and everything about something—how true this is in the case of a radio amateur. Everyone will agree that to concentrate on a particular subject and collect some definite

(*Continued on page* 564)

THE MONTH ON THE AIR



A RUNNING COMMENTARY OF RADIO CONDITIONS FOR THE MONTH OF . . . . . FEBRUARY, 1939

by H. A. M. WHYTE (G6WY.)

THE month of February proved that 1.7 Mc. may still be considered a DX band between 04.30 and 06.30 G.M.T. in the winter. VE1EA has been received every Sunday morning since January 8, and as far as we know has worked Great Britain on every Sunday except one. This is a record that, we should imagine, has not previously been equalled. It is most noticeable that location seems to play a large part in this low-frequency DX work: for instance, G2PL received W1, 2, 3, 6, 9 on 1.7 Mc. *phone* on February 25, and W1, 2, 3, 8 on CW on the following day—these were the dates of the A.R.R.L. W.A.S. party. On February 26 twelve W's were heard on CW in W1, 2, 3, 8 and one W4 on 'phone in South Carolina by G6WY, whereas G6XL was unable to hear any W's at all. The reception of telephony from a W6 by G2PL must surely be an outstanding record—he was unable to receive the full call but is writing for particulars as he has the frequency and the time of reception.

G5RI sends in his recent results on 1.7 Mc. DX as follows: January 29, QSO VE1EA; February 5, VE1EA, W3BJU, W1ME worked and W2FJY heard; February 12, HA8H, FA8IH; February 16, W1AW, W1ME worked, W1BB, W2CAY heard. He reminds us he *did* work VE1EA in the Contest. G6WY worked VE1EA three times during the month on 1.7 Mc. and on February 19 he had contacts on 5 bands with him in 8½ hours. G2PL has also 5BTOC with this station and believes he has now achieved the same with W1ME, besides working VU2AN on four bands. With reference to our remark last month that no Transatlantic contacts were known on 1. 7Mc. last winter, G2PL reminds us that he worked W1BB several times and was also heard by W1EZ.

The 3.5 Mc. band continues to produce good DX and contacts with VE3 and W9 were recorded during the month, while we learn from PA0SS that YI2BA has been heard as well as FA8BG and 8IH. ZL4BR worked G6ZR on February 19 and heard G2PL and G6WY. The Aurora put an end to the utility of the low frequencies towards the end of the month; in fact, it affected all bands alike, but VE1EA did work one G on February 26 on 1.7 Mc., much to his surprise, as he was heard grumbling to a W2 that there was no DX and he was going to bed!

Following the results of G5FA on 7 Mc. given last month, we have received a lengthy letter from GM6IW supporting the work of GM6SJ, who has worked at least two W's per morning on this band, including all districts except W6 and one VK. A total of 70 W's were raised, as well as VP2AT, VO, K5AM and ZC6RL. In GM6IW's opinion, DX is "child's play" on 7 Mc., and he scorns the type of mentality that considers DX can only be worked with QRO, which is the reason so many G's use telephony, as they feel DX is impossible. With 8-10 watts from batteries, GM6IW has himself worked over 20 W's with a "miserable half-wave doublet 30 ft. high." He appeals to those 'phone operators who ruin the DX in the early morning to try and see what they *can* do on CW, and requests more 1.7 Mc. operation. We are afraid that many of these "40 metre phone" stations will never oblige, as their receivers cannot receive CW and their knowledge of the code is almost negligible—one station was heard to give the exchange part of his telephone number in code and the actual figures on 'phone, because, as he explained, "I don't know the figures in morse." Incidentally, G5FA and 6CL worked YI2BA during the month and G6WY was QSO Montana and New Mexico, all on 7 Mc.

G3WW was astonished to receive a report on his 10 watt 7 Mc. 'phone from a listener in Dunedin, New Zealand, at 15.30 G.M.T. on December 3, and G5JO was also heard at the same time. M. W. Soplop, of Allegany, N.Y., sent a list of British 'phone stations heard on 7 Mc., which will be found in this issue. He will willingly stand by for tests with any G 'phones, the optimum times being 06.30 to 10.00 G.M.T. He has logged over 100 European 'phones and listens part of every morning. British stations are advised to choose a frequency *well inside* the band for these tests, as the edges will be most used by CW stations.

Eric Trebilcock, of North Australia, spent 20 hours *per day* on the B.E.R.U. Contests in an endeavour to "bring the bacon back to VK." (2AOU please note!). He has now heard 168 *genuine* countries and received 134 confirmations—TG9BA, VQ8AS and VS2AL being the last three. He reports a new West Indian on 7 Mc.—VP2SA—and would like details of his QTH, while others on this band include VP6MR, 6FO ('phone), CR6AF, FA8ZZ, FB8AA, HI1T, K7FLP, LY1AP, MX3A, VP6RB, 6MY, ZC6EC and 6RL. On 14 Mc.: FB8AH, TG9BA, VQ4ECJ ('phone), AC4YN, J5DC, 6DU, KC6CKM, KF6DHW ('phone and CW), YU7DX, YV2CU and ZC6EC. PK6XX, who was originally scheduled to close in March, is to continue till June, but we do not anticipate a contact being made with Europe. BERS195 hopes to have a QRP portable battery rig on the air to give a few lucky stations a contact with VK8—more of this later.

2AOU informs us that the VP1ZA, 2ZA, etc., series belong to the ship attached to the West

Indian Commission sent out from this country. W. Edwin Davey, of Radio Club GI6YM, gives us some additional information about Uganda activity. VQ5ELD has returned to Kampala, while VQ5KLB is back in Entebbe and is on the air now. His call was extensively pirated between July, 1938, and January, 1939. This pirate is believed to be in U.S.A., judging by the cards received, and it is unfortunate for stations who worked him between these dates. According to W3FRY, AC4YN is now on 14292. XU4XA (14297) relayed this news and runs a schedule with him at 11.30 G.M.T. We have no reports of G contacts with AC4YN for some months. Those stations who still require Nevada for W.A.S. will be interested to know that W6KEV and W6MRB are taking a portable into this State for CW operation between April 6 and 9. Frequencies will be 14030, 14370 and 28,060 for DX working, with 300 watts input and particular attention will be given to those who need Nevada.

Some excellent results from QRP working have been obtained by G3JR, who certainly seems to have a marvellous location. Due to a transformer burn-out, he had to fit a temporary power supply and borrowed a BCL pack from a friend. With an input of 4½ watts he *worked* ZS2AL, CT3AB (14060, 16.30), ZC6EC and VE5ZM! After the transformer rewind his best contacts included LZ1ID (14300 T6 07.45), VQ4CRE (14275 21.40), VP4TO (14275, 20.00), FQ8BS (14310 T6 21.40), VS7BD (14165, 18.00) gave his QRA, Radio Police, Colombo Lane, Colombo. Heard but not worked were AR8AO (14430 T8 19.00) and CR4HT (14420 T6 01.30). Details of these last two stations and FQ8BS will be appreciated, although CR4HT states he can be QSL'd as follows—Henrique Torres, Praia, Cape Verde Is.

28 Mc. has been fairly good during the month with W5, 6 and 7 reappearing. G8NY went on this band for the first time on 'phone and immediately worked VP6MR, K4EZR and PK2WL, the latter telling him that he intends to use 250 watts on 56 Mc. and requests British stations to keep their ears open on this frequency. ZC6AQ is now back in G using his British call, G2KK, and he tells us he has sent a card to every station worked, but if anyone has not received one, he will be glad to send another as he has his full log for Palestine contacts. We feel that every DX-minded amateur will applaud this action on his part.

G6XL managed to work VE1EA on "160," thereby completing 5BTOC as well as seven new countries on 14. This is certainly fast work for one month. The new ones were: VS2AS, ST6KR, VQ3TOM, LY1AN, HH2ES, VP4TO and VU7BR, thus bringing his total to 97 with 83 confirmed. His best otherwise included VQ2JC, 2AG, 16 ZS's and 46 different VK/ZL's, the latter on a two-section W8JK beam. G3AH has worked PK1TM, (14356 14.40), VU2EB (HF 14 1400), CX1CB (14295 23.00), J2KG (14400 08.15), VP2AD (14410 11.25) and VU7BR, and has now reached a total of 61 countries in 25 Zones—good going for a G3. G3BS added VP2AB, and VU7BR after waiting for him to finish 26 contacts! His score is now 84 with 69 confirmed. Interesting stations heard included VR1AP, FQ8BS, FM8AD and VQ8AL.

In a final burst of activity, ZD2H raised the following on the HF side of 14 Mc.: CP1AA, CR6AI, HC1FG, K4RJ, 4DTH, K6NVJ, M1SS (off Verdi Is.), U1AD, UK3AH, U5KN, VQ8AI, VK2, 4, 5, 6 and ZL2CI. He is now QRT at Buea, British Cameroons—a new country for everybody if he can get on the air!

G2AT is anxious to know if ZB2T, heard with a poor note on 14 Mc., is genuine—we don't think so! G2JK informs us that UXK5KJ is the same as UK5KJ, the "X" denoting portability. G3YU tells us that he worked XX1AA from G5YC on 7 Mc. at 17.45—no QRA given however. There seems to be some doubt as to which G was really the first to contact VK9. G5BD was credited with the first contact in last month's notes, but GW5MD worked VK9BW on January 15. We learn, however, that G5BD and 6GH worked VK9VG many months before this date. GW5MD would like to know what reputation J's and XE's have for sending cards. As far as our own experience goes, J's are very good and XE's only fair. He is particularly anxious to get confirmation in view of the fact that J and XE were both worked with 250 volts on the plate of a Pen 220A in a CO tri-tet circuit, which little transmitter gave him W.A.C.! He now uses higher power with a converter.

ZC6RP gives us the latest news from Palestine. 6AA and 6RP are still active in Sarafand, while 6RL is carrying on from Haifa. 6EC is now home with hundreds of cards to send out! He made 193 contacts in the Senior BERU Contest!

G2YB has a legitimate grouse. He deprecates the use of senseless chance calling; as an example, he cites the case of his contact with VU7BR, which was continually interrupted by stations using ECO tuning their transmitters to VU7BR's frequency and calling in the vain hope that he would hear them, when actually he was not listening on his own frequency. As G2YB says, "What earthly good did such an action do other than cause useless QRM?" Of course, we know that this sometimes happens in all innocence by a station making a rather long call, and it may happen that his frequency is the same as the called station, with the result that he may reply to someone else and be still jammed by the long-winded amateur. However, please make sure that the station you are calling is not actually in contact when you commence to call. Chance calls used judiciously, frequently "land the fish," as long as the fish is not dragged out of someone else's net before he has finished with him.

BRS3319, of Thurnby, Leics., sends a long list of good 'phone DX. VP7NS, K4FAY (calling PK6XX), ZS4H, PK3WI, HH2B (14080), VP4TH, W5BEK (at 22.20), HK1AG (21.50), VP9L, 3AA, 6MR and many YV's and South Americans. LX1TW and 1SI are still active on 14 Mc. 'phone for those who want this country. G4AU has worked 32 countries since starting up in January, and six of them were on 1.7 Mc.! ZC6EC was worked on February 12, giving him W.B.E. (unconfirmed), and he is wondering if he is the first G4 to claim this distinction. VK, ZL, VE, VO, VQ3, VQ4 were the others represented in this claim. Incidentally, his power supply is from an old BCL receiver transformer, whilst a W3EDP aerial is used on all bands. G2NJ records a 7 Mc. contact with SM7QD aboard the s.s. *Monark* off Oporto.

G6CL reports that during the "dud" period on

HAMRAD

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2.5v. × 10a. Secondary **11/6**
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Rugged, X cut jobs. A pleasure to have one

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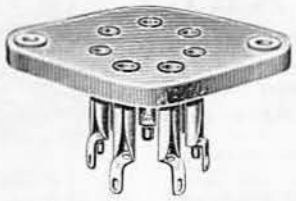

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HENLEY-ON-THAMES—R. G. W. Page (G5TP), Stoke Row.
HIGH BLANTYRE, Lanarkshire—D. R. L. Duthie (GM6IW), The Park.
HOVE—Bondmag, Ltd. (2ACU), 9a, Mortimer Road, Hove, 3. Hove 6472.
IPSWICH—Wakelins Wireless, Ltd. (G2AN), 66, Norwich Road, Ipswich. Ipswich 3856.
KENFIG HILL—Sid Waters (GW3GO), Radio Relay Station, Kenfig Hill 48.
LANCASTER—W. E. Ostle (2DYU), 49, King Street, Lancaster. Lancaster 641.
BOURNEMOUTH—Radio Winton (G8BW), 415, Winton Road. Winton 2574.
LOWTON St. MARYS—J. Ince & Sons, Ltd., 74, Newton Road.
RUGBY—Benn Radio (G3DI), 96, Lower Hillmorton Road. Rugby 2342.
SALISBURY—Southern Radio & Electrical (2ACC), 85, Fisherton Street. Salisbury 2108.
SMETHWICK—Midland Ham-Radio Services (G5FH & 6CG), 303, Oldbury Road. Broadwell 1338.
SUTTON-IN-ASHFIELD — Wilfred Henstock, 29-39, Forest Street. Sutton-in-Ashfield 90.
THORNE, YORKS.—Benson & Farmer (G5GJ), 51, King Street.
WEST HARTLEPOOL—R. W. Stewart (G3LS), 8, East View Terrace, Seaton Carew.
BROMLEY, KENT—National Radio Hire Services (ex-G5HX), 191, High Street. Ravensbourne 5601.

Hamrad Wholesale, 32 St. Lawrence Terrace, Kensington, W.10. LADbroke 1166-7-8

February 25 he and presumably dozens of other G's were astonished to hear SU1RH and SU1JM putting in splendid 'phone signals on 14 Mc. between 23.00 and 24.00 G.M.T. At the time no other DX was audible.

On the same day the 14 Mc. band suddenly opened for U.S.A. around 14.30 G.M.T., but as far as we have been able to discover no 28 Mc. U.S.A. signals were heard on the 25th. That band, however, remained open until nearly 21.00 G.M.T. on February 26th.

HH2B was logged by G6CL on about 14050 during the period 07.30-08.00 G.M.T. February 27. G5JO gave the YL operator a contact that morning.

By the time this is in print, many will be feeling weary after long hours spent in working W/VE stations. As a tailpiece, we appeal to all who make contacts (however few) to send in a log to the A.R.R.L. as this will help in checking. Too few logs have been sent in in the past by British amateurs, and as over a hundred were known to have participated last year it is hoped that most of this year's entrants will do their part.

In Search of B.E.R.T.A

Call.	Dominion Districts.	Colonies.	Total.
G8IG	24	15	39
G6XL	25	13	38
GM8HA	25	11	36
G3BS	24	11	35
G5ND	24	10	34
G6ZO	21	13	34
G3BI	24	10	34
ZS6BT	18	15	33
G8KP	23	8	31
G2GK	23	7	30

Please send only the total of *confirmed* contacts for listing in the above table.

THE 28 Mc. BAND

By NELLY CORRY (G2YL).

As usual during February, conditions were not reliable enough to encourage B.E.R.U. Contest entrants to spend any appreciable time on 28 Mc., and they were, if anything, poorer than in 1937 and 1938. Probably this month's A.R.R.L. Contest will lead to the usual period of intense activity, and be followed by a gradual deterioration of DX conditions until next autumn.

The most consistent Oceanic stations were PK1VM and 2WL, who worked many Europeans, and were often S8 'phone signals in the middle of the day. PA0FB had 23 PK QSO's during the month, and reports that on February 9, 22, 23, and 24 their signals had noticeable echoes on them. VK5KO, 5IT, and a few other Australians were audible at week-ends. BERS195 reports reception of Europeans every Sunday in January, and excellent signals from VS6AO, VU2AN, and VU2FO. He also heard VS2AS on 'phone and C.W. on January 11. On January 8 and 15 he logged the following Europeans at S6 or louder: G2CR, 2HK, 2IS, 6DH, 6QX, 8DM, 8GQ. 8JV, F8RJ, ON4FX, and PA0FB.

VU2AN reports little weekday activity, apart from his daily sked with G6DH, but he and VU2FO were called and worked by numerous Europeans on Sunday mornings. On January 29, at VU2AN, the band was open until 1430 G.M.T., i.e., two hours after sunset. G2CR worked VS6AO at 1100 G.M.T. on February 12, and BRS3003 heard UK6AA at mid-day on the 18th.

Twenty-six African stations were reported during the month, a good proportion being CN, FA, and FT stations active in the R.E.F. Contest during the last two week-ends of the month. SU1CH, 1GM, 1GP, 1MW, and VQ3TOM were regular signals, and South Africans heard active were ZS1CN, 4H, 5T, 5BE, 5CS, 6EG, 6S, 6T, and 6W.

There was a marked improvement in South American signals, and a dozen different stations were reported, in LU, PY, VP3, and YV. LU9AX was an exceptionally good signal on the evening of February 19, and BRS3179 heard PY1HP almost daily, around 1030-1100 G.M.T. From Central America and the West Indies BRS3003 and 3179 logged 22 'phone and 4 C.W. stations, in CM, HI, HR, K4, K5, TG, TI, VP4, VP6, VP9, XE, YS, and a good many of these were worked from the British Isles.

North Americans usually came through after 12.00 G.M.T., but on February 2, 3, and 6 they were two hours later, and on February 6, 7, 24, and 25 were very erratic. G6YL worked "K7ND," when W6 and 7 stations were audible, on January 27, but thinks the call is rather suspicious.

Signals from nearly every European country were heard during the month, and a few Eastern European stations, e.g., SV1CA, were almost invariably about S8. A new ship station is LA4U, worked by PA0FB on February 2 and 3, when near Port Said. G6DH achieved another "WAC in one day," on February 5, when he had QSO's with VQ3TOM, VU2AN, ON4NO, VK5KO, W8FGV, and VP3AA. All continents were audible on a good many days, and on February 22 BRS3003 heard them all in 43 minutes.

G2XC, PA0FB, and BRS3179 all comment on the poor conditions during the afternoon and evening of February 24, and on the 25th. On the 24th, W's were late in coming through, and suffered from severe "flutter," and weak signal strength. At 2150 G.M.T. G2XC found that all stations above 6 Mc. were either inaudible, or affected by severe flutter fade. The next day the band appeared to be very dead; the two PK stations, FB8AA, SU1MW, and VQ3TOM were the only signals reported. In this connection it is interesting to note that a severe magnetic storm occurred on February 24, and the Northern Lights were visible as far south as Devonshire that evening.

Many thanks to G2CR, 2XC, 6TG, 6YL, 8JQ, BRS3003, 3179, BERS 195, PA0FB, and VU2AN for their useful reports.

British Calls Heard

Eric W. Trebilcock (*BERS*195), *Powell Creek, North Australia, January* 5-31, 1939.

7 *Mc. CW:* ei6m, g2yw, 3qd, 3zj, 5lw, 5mx, 6pk, 6wy, 8ip, 8jj 8nh 8ns 8om, 8rl, 8tk, gi3kv, gm3rl, 6sj, 8kq.

14 *Mc. CW:* ei4j, g2nn, 8jv.

28 *Mc. 'Phone:* g2hk, 8dm.

28 *Mc. CW:* g2at, 2cr, 2xc, 2zp, 5ux, 6cw, 6dh, 6ks, 6nf, 6qx, 6qz, 6rb, 6xa, 8gi, 8gq, 8ip, 8jv, 8mh.

THE 56 Mc. BAND

By J. M. R. Sutton (GW2NG)

THE announcement in the February issue of THE T. & R. BULLETIN that application can now be made for 56 Mc. portable permits was a welcome one. It foreshadows the opening of the summer season on the higher frequencies and we feel that the moment is propitious for the repetition of some well-worn appeals.

A condition for the issue of a permit is that apparatus shall be of the stabilised type. May we add the plea that this apparatus be *keyed* and that the accompanying receiver be one capable of receiving *only* stabilised CW or 'phone? We see no object in selecting an elevated site and transporting a complete station, if only local 'phone contacts are made. Surely the whole aim in choosing a better radiating position is to radiate signals to a greater distance. Then why not use CW, which no one can deny gives greater readability on signals of the 56 Mc. type, with their low signal levels and fading? We hope that this 56 Mc. summer season will be one of CW and straight receivers, and we venture to prophesy that if this is so some astonishing distances may be covered.

British Activity

G2UJ sends some very interesting news from F8QM received in contacts on the 1.7 Mc. band. Stations wishing for Continental contacts on 1.7 Mc. are advised to look for F8QM around 1,800 kc. most nights from 21.00 G.M.T. onwards, as he is a regular user of the band with 60 watts input!

The 56 Mc. news concerns the station F8DG, operated as the station of the S.A. des Industries Radioelectriques in Paris. F8DG transmits regularly on approximately 58 Mc. every Tuesday at 22.00 G.M.T. The transmitter is master-oscillator controlled, so the frequency varies slightly from schedule to schedule. The normal input is 1 kW., but a temporary transmitter with a mere 200 watts is being used at present pending modifications to the large transmitter! In the near future this laboratory station will use 4 kW. The receivers are very sensitive superhets, and while no 56 Mc. DX has been heard, American police transmissions have been logged on 6.15 metres.

G2UJ commends the 1.7 Mc. band as eminently suitable for inter-communication work in connection with 56 Mc. Contacts can be made with low power and are quite consistent. This method has been used with great success by G2UJ and 2AO. A recent test with F8ZF on 56 Mc. was reported back on 1.7 Mc., but nothing was heard on 56 Mc. owing to poor receivers on the French side. 2AO receives F8AA on 56 Mc. at strengths up to S8, while 2UJ is heard at S7/8. 2UJ cannot hear 2AO on 56 Mc., although only one mile away, on top of the hills: 2AO is S8/9. 2UJ is badly screened to the south and south-west, and cannot understand why he radiates so well in those directions. He is building a six-valve superhet and hopes to do something then.

G. W. Bagshaw, "Newfield House," Newfield Lane, Dore Moor, Sheffield, operator of G8KD and G8KF, submits a 56 Mc. schedule which should interest Southerners wishing to radiate to the north. The transmissions will be C.C., with inputs varying between 25 and 50 watts, and follow a weekly schedule as below:—

On Tuesdays, at 20.00 G.M.T., 8KD will transmit until 20.05 with 50 watts input on a long wire horizontal aerial on 58.068 Mc. The listening period will be from 20.05 to 20.10. At 20.10 transmission will be continued on a vertical dipole with 35 watts input on 57.232 Mc. The listening period will be from 20.15 to 20.20. This procedure will be repeated for the next 20 minutes, with the schedule concluding at 20.40 G.M.T. General 56 Mc. work will then continue until 22.30 G.M.T.

On Sundays the same schedule will be followed commencing at 11.30 and 20.00 G.M.T. Possible alterations to the Sunday transmissions will be announced on the preceding Tuesday. Information as to the aerial system and other details will be given during the transmissions, which will be telephony unless a particular request is made for CW or I.C.W. We venture to suggest that the call-sign be given at the commencement and conclusion of each transmission, *on CW*. This will further the avowed aim of DX contacts. The long-wire aerial is eight wavelengths long, 80 ft. high, and lies east and west. By this time a similar aerial lying north and south has been erected. The vertical dipole has an unfed reflector and the system is rotatable. It will be aimed at the south of England during the tests. Several sensitive superhet receivers are available for reception. All reception reports outside a ten-mile radius of Sheffield will be acknowledged.

2BIL reports that his new QRA is no better as regards position for 56 Mc. listening than the old one. To counteract this he has decided to do more listening at a point on the Sussex Downs from 11.30 to 17.30 G.M.T. every Sunday from April 8 until September 10. A variety of portable beam aerials will be tried, including a W8JK beam which has been designed to be rotatable in both the vertical and horizontal planes. He suggests a "Number of counties worked or heard" contest or certificate, and qualifies this by stating that he has heard 14 counties from either the Devil's Dyke or Ditchling Beacon. Twelve of these have been verified and the other two were quite genuine, but reports were not sent. He hopes to announce some portable activity very shortly.

G6VF is helping to keep the 56 Mc. flag flying in Bristol. He is using 6L6 Tritet on 7,100 kc., 6L6 FD and T20 Power-doubler, link-coupled throughout. He has used as aerials a half-wave dipole, a 66-ft. end-on and a 33-ft. vertical, and worked his best DX on the last-mentioned. The input has never exceeded 10 watts during all transmissions. The perpetual complaint of users of the 56 Mc. band comes yet again from him. He hears very weak 'phones that sign off without giving their call in CW. He is positive that a contact could have been made if the operators concerned had signed in CW and, more important still, listened for CW replies. May we again issue an appeal for all users of this band to terminate their transmissions with their call *in CW* and to use straight receivers and listen for CW? This procedure will repay itself over and over again in increased contacts, both in distance and number.

American Equipment

The present trend in receivers is towards the use of concentric lines as inductances. Various experimenters have used 26 to 28½-in. lengths of aluminium or copper tubing, with either another smaller tube or a piece of No. 12 gauge wire mounted in it. Gains of up to three S-strengths over coil inductances have been reported. These are used with acorn R.F. stages. An exciter unit with efficiency equal to that on 14 Mc. has been designed by W8OKC, consisting of a 6J5G 28 Mc. CO, a 6L6 FD and a T40 buffer amplifier. This would make a compact complete transmitter for the average British station, but is used as an exciter unit in the American station!

Various experiments have also been made to compare the gain of Acorn valves and the new Television pentodes. The Acorn valve operated with good stability, but there was considerable trouble with the 1851 from oscillation. This was overcome by tapping the grid and plate leads down on their respective tuned circuits. With this device the 1851 gave considerably louder signals, but this was due to regeneration taking place. This regeneration was a great help in overcoming the inefficiency of the receiver at 56 Mc., but it contributes nothing to the signal-to-noise ratio. It would be better to have two good R.F. stages with high gain and no regeneration than one stage with regeneration. American practice seems to be entirely towards the superhet receiver, while British practice seems to favour the straight type.

Contemporary Literature

BY L. FRYER (GM2FR).

A KILOWATT ON THE NEW 810's. *Radio*, January, 1939.

A brief description of a C.W. final amplifier using a pair of 810's which supply an output of 750 watts for unmodulated C.W. operation, with 1,000 watts input. The new valves operate at high anode efficiency with low driving power and comparatively low anode voltage. Tables of operating data are included.

* * *

AN INEXPENSIVE 25-WATT MODULATOR. Ray L. Dawley (W6DHG). *Radio*, January, 1939.

The author describes a modulator delivering about 25 watts power output with voice frequency input, ample to modulate fully any transmitter with 40 to 60 watts input to the modulated stage. The line-up is:—Pentode connected 6J7 R./C. coupled *via* the gain control to a 6C5 which is in turn R.C. coupled to a triode connected 42 driver coupled by a 1.7/1 transformer to a pair of pentode connected 42's working into a multi-match transformer. The power supply uses a 5Z3.

* * *

ON THE CARE AND FEEDING OF 807's. W. H. Smith (W6BCX). *Radio*, January, 1939.

The 807 beam tetrode has found many applications in amateur transmitters because of its tremendous power gain, high efficiency as a doubler, and because it need not be neutralised. However, certain problems are encountered with this valve which are not encountered with triodes, and the author deals with several of these problems in his article.

* * *

200 CRYSTAL WATTS ON 56 MC. *Radio*, January, 1939.

A description of an extremely simple push-pull amplifier for 56 Mc.

A pair of type 24 Gammatrons are used in a conventional resistor-biased circuit with circuit balance provided by an earthed rotor grid condenser.

All components with the exception of the filament transformer are mounted on an 11" × 7" × 2" chassis and it is claimed that the unit operates with the ease of a 7 Mc. outfit.

* * *

IONOSPHERIC SOUNDINGS FOR AMATEURS. Albert Wiley Friend (W8DSJ-W8KIU). *Radio*, January, 1939.

The author after a brief review of Ionosphere studies to date, proceeds to a complete outline of the entire ionosphere, discussing the various regions and the phenomena associated with them, and continues his article by drawing attention to the use of ionosphere information, concluding with a brief description of the basic equipment necessary for ionosphere soundings.

* * *

FEEDING VERTICAL ANTENNAS. Arthur Lynch (W2DKJ). *QST*, January, 1939.

The author discusses methods of using vertical elements singly and in combination to form simple directive aerial systems. The article contains valuable hints for amateurs with limited space for aerial experiments.

* * *

ANOTHER METHOD OF KEYING WITH CONTROLLED RECTIFIER TUBES. Byron Goodman (W1JPE) *QST*, January, 1939.

The author describes a fairly simple way to retain the desirable characteristics of rectifier keying with only one controlled rectifier instead of the usual two.

* * *

SELECTIVITY WITH THE 2-TUBE REGENERATIVE RECEIVER. Fred Sutter (W8QBW-QDK). *QST*. January, 1939.

The writer, after stating that the secret of improved selectivity with simple regenerative receivers is a small aerial, proceeds to describe a small two-valve receiver using as an aerial a 12-inch length of copper tube, which has given surprising results.

The valves used are a 58 as regenerative detector, followed by a 56 audio stage.

* * *

A DUAL-FREQUENCY CRYSTAL CALIBRATOR. F. A. Lennberg (W8CQQ). *QST*, January, 1939.

The author describes an inexpensive device for indicating 100- and 1,000- kc. points in the high-frequency spectrum. The instrument, which is capable of a high order of accuracy, is built around one of the new dual-frequency crystals and uses a 6F6 as oscillator, with a 5W4 in the power supply.

(*Continued on page* 543.)

Techniquesans

From time to time Technical questions will be set and members invited to supply answers. Mr. J. N. Walker, who is organising this feature, will be pleased to receive suitable questions, which should be of general interest. Questions should be drafted in a clear and concise form.

The first Techniquesan appears below.

* * *

The Question

VACUUM condensers of very small dimensions are now being manufactured, their chief application being to load up transmitter tank circuits (which employ variable condensers of low capacity) in order that optimum L/C ratios may be achieved over a wide range of frequencies.

The question has been asked—how can this device be a condenser if the electrodes are sealed *in vacuo?* Is it not true to say that when a condenser is charged by an applied E.M.F. the dielectric is strained, and stores electrical energy? If the dielectric, be it air, mica or oil, is removed, then will not the capacity of the condenser be reduced to zero, notwithstanding the amount of metal in, or the distance between, the electrodes?

This leads to a consideration of valves. Many valves possess high inter-electrode capacities, yet the electrodes are sealed *in vacuo* and there is no dielectric between them, so that the actual capacities, one would assume should be only those existing between the leading-out wires in the base. What, then, is the explanation of the phenomenon?

The Answer

An electric field can exist in free space regardless of the absence of any solid or gaseous dielectric, such as air. There is a basic difference between sound waves, which must have a material medium for their propagation, and electro-magnetic waves, which can travel through empty space. That this is so, is illustrated by the fact that radio waves travel through the ionosphere, in which the atmospheric density is almost aero. Since an electro-magnetic wave possesses both electric and magnetic fields, intimately associated, it is not surprising to find that they can exist independently in free space, *i.e.*, in a vacuum.

The actual definition of an electric field of unit strength is that which exerts a force of one dyne upon a unit charge *in a vacuum*. This force is reduced by a factor known as the dielectric constant when the field exists in a field other than a vacuum. Thus, the dielectric constant of a vacuum is 1. When a condenser is formed with its dielectric of some physical material, its capacitance is increased by the value of the dielectric constant. It so happens that the dielectric constant of gases, including air, at normal temperatures, is practically unity.

Thus it will be seen that (*a*) there is no such thing as a condenser without a dielectric, even if there is literally nothing between the electrodes; (*b*) the capacity of a condenser will, for practical purposes, be unchanged whether the dielectric consists of air or a vacuum. It is only when a liquid or solid dielectric is substituted that the capacity will be appreciably increased.

It was the difficulty experienced in understanding how electric energy could be stored in empty space, that led scientists at the end of the last century to postulate the theory of the hypothetical medium called the "ether," which was supposed to permeate all space. Modern theories of wave mechanics have rendered the presence of such a medium unnecessary.

Finally, the whole matter can be summed up in the statement, that the dielectric constant of a vacuum is not *zero* but *one*.

A GM Lament

By JAMES GOUCK (GM3NH)

Oh, brither hams did ye ever ken
Jist hoo' we look tae ither men,
Ye didna? Weel I'll tell ye then
So jist staund by . . . . . .

NEEBORS PAIRTED

Frae the attic ower the road a licht
Fair stabs the gloom o' the darkest nicht
Wi' a ray that's sometimes unco' bricht
An' gars me wunner,
Jist whit's the reason that can heep
An honest man frae gettin' sleep
Wi' soonds that fairly mak' ye creep
The man's a scunner. . . .

I tholed this lang wi' growin' anger
Until I couldna' thole it langer
An' swore I'd cure this midnicht banger
Or shift ma hame,
So I ups and pits on a' ma claes
Determined that he'd mend his ways,
Or I wid surely end his days,
And wha's tae blame?

I clim'd richt up on tae his tiles
An' found the skylicht open miles
(I kent he didna close it whiles)
An' glowered doon,
He didna ken that I was there
An' jist as weel, for I was fair
Ta'en up, and sorry for the puir
Misguided loon.

He was sittin' there regairdless o' whether
The noises he made were disturbin' anither
Chappin' twa bits o' brass thegither
For 'oors on end;
An' noo I saw the lad was clean daft
If I hadna kent that, I think I'd ha' laughed
For the brass he was hommerin' wisna sae saft,
It wouldna' bend.

So I crept back tae bed and made up ma mind
I coudna be hard on a lad o' that kind
An' decided next morning that I'd try tae find
Anither abode.
The funny thing is that noo' when I see
An' take a glance at him wi' a kindly e'e
He looks jist as sane as you or me
But he's no ower the road!

Nuptials

We offer hearty congratulations to our New Zealand representative, Mr. Bob Stanton, ZL3AZ, who was married on February 7.

Mr. Stanton's new address is 193, Ashgrove Terrace, Christchurch, S.W.1, from which QRA he hopes soon to be renewing regular schedules with G stations.

HEADQUARTERS CALLING

Mr. H. Bevan Swift

The Council has pleasure in announcing that Mr. H. Bevan Swift (G2TI), Past-President and until recently Hon. Editor of THE T. & R. BULLETIN, has been elected an Honorary Member in recognition of his services to the Society which have extended over a period of nearly 20 years.

The announcement of this honour will be welcomed by his many friends throughout the country, and on their behalf we offer sincere congratulations.

Our new Honorary Member, Mr. H. Bevan Swift (G2TI), A.M.I.E.E., Past President R.S.G.B.

I.E.E. Meeting

At the next London meeting to be held on Friday, March 31, at the Institution of Electrical Engineers, London, Mr. E. L. Gardiner, B.Sc. (G6GR), will deliver a lecture on "Band-Pass Crystal Filters." Mr. Gardiner has recently carried out prolonged investigations in connection with the subject of his lecture, and it is hoped that a large number of members will attend to hear at first hand details of this important work.

The meeting will commence at 6.45 p.m., being preceded by tea, served free of charge, at 6 p.m. The I.E.E. will be open for informal discussion from 5 p.m.

A cordial invitation is extended to recently elected London members.

National Service

Although a number of members have joined the R.N.V.(W.)R., the Royal Corps of Signals, T.A., and the R.A.F.C.W.R., it is understood that vacancies still exist in all three Services.

The authorities are anxious to fill these vacancies from men who possess technical radio qualifications and operating skill, but it should be remembered that however skilled a person may be in Amateur Radio, the Services will require, in an emergency, personnel already trained to Service conditions and procedure. This important training, to be of value, must be carried out in peace-time, and for that reason it is hoped that those who are eligible will offer their services without delay.

For those who are not at present in a position to volunteer for any of the above-mentioned Services, we understand that a National Wireless Register is being prepared, showing details of the radio qualifications of those enrolled. Copies of the enrolment form in this Register may be obtained on application to the Secretary, Wireless Telegraphy Board, care of Admiralty, London, S.W.1.

1.7 Mc. Contest

The Tests Committee has been authorised by Council to organise another 1.7 Mc. Contest during the week-end November 4-5, 1939. Rules will be published in the September T. & R. BULLETIN.

It has been decided not to arrange a 1.7 Mc. Telephony Contest.

Congratulations

To David Mitchell, GW6AA, and Ham Whyte, G6WY, who tied for first place in the recent 1.7 Mc. Contest.

Third Annual 56 Mc. Field Day

Council has decided, as a result of taking opinions from the Tests Committee and the organisers of past 56 Mc. Field Days, to organise the 1939 event (which will take place on July 9) on similar lines to the 1937 and 1938 Field Days.

The suggestion has been made that the "GW Trophy Contest" (which is privately arranged), and the 56 Mc. Field Day be merged, but the Council is of the opinion that the latter event should continue, as in the past, to be non-competitive.

A further suggestion to confine N.F.D. to 56 Mc. operation only has found no support from Council, the Tests Committee or from the organisers of the 56 Mc. Annual Field Days.

Unlicensed Operation

From time to time we are asked by members to insert a notice in this Journal to the effect that their call sign has been pirated. We would again point out that no useful purpose whatever is served by giving publicity to this information. The correct procedure is to inform the G.P.O. of the facts, submitting such evidence as may be available.

Before hastening into writing we urge members to satisfy themselves fully that it is *their* call which has been pirated. Misread telegraphy calls, and, more frequently, incorrectly logged telephony calls, are responsible for much of the supposed illegal operation.

R.A.F. Wireless Operators

"A Life for Men" is the title of a free booklet which is available on request from the R.A.F. London Recruiting Depot, Victory House, Kingsway, W.C.2.

The R.A.F. are in urgent need of wireless operators between the ages of 17½ and 35, and within the pages of this booklet, which is referred to in one of our advertising pages, are set out the requirements, and some of the advantages of choosing this branch of the Air Force as a career.

W.B.E. and H.B.E. Certificates

The following W.B.E. and B.E.R.T.A. certificates have been issued to members:

W.B.E.

	Name	*Call Sign*	1939
J.	Drudge-Coates	VU2FO ...	Feb. 3
C.	G. Allen ...	G8IG	,, 4
C.	Watson ...	G3CW ...	,, 6
J.	H. Caldwell ...	G8US ...	,, 13
G.	D. Belling ...	W6CTG ...	,, 14
L.	H. Peplar ...	G2JD	,, 28
C.	T. Malkin ...	G5IV	,, 28
W.	C. Holley ...	G5TN	,, 28

28 Mc.

A.	J. Perkins ...	G6KP	Feb. 7
R.	Jardine ...	G6QX ...	,, 18
C.	A. Butler ...	G2YB	,, 24

B.E.R.T.A.

34	H. W. Scott ...	G5DR ...	Jan. 4
35	R. S. Cross ...	G2FZ ...	,, 18
36	H. J. Hunt ...	G5HH ...	,, 23
37	A. H. Mackenzie...	VK4GK ...	Feb. 14
38	R. J. Beatson ...	VK4BB ...	,, 14

R.S.G.B. Slow Morse Practices

Details appear below of the slow Morse practices organised by the Society for those members wishing to learn or improve their code. As usual, test matter will be taken from recent issues of THE T. & R. BULLETIN. The page number and month of issue will be given at the end of each test by telephony. A telephony announcement will also be given at the commencement of each test, to assist those interested in tuning-in the sending station. It is emphasised that reports will be appreciated and are desired in order to ascertain useful range and numbers utilising the service. If, however, a reply is desired, a stamp should be sent. Included in the schedule below is a new sending station—G4AU, Mr. A. W. Gover, 11, Rolfe Road, Charlton, S.E.7, Kent. Will stations in areas not at present served offer their services to Mr. T. A. St. Johnston (G6UT), "Normandale," Little Hallingbury, Essex. (Telephone: Bishop's Stortford 785.)

	G.M.T.	kc.	Station	Location
Sundays ...	0900	1755	G8NF	Manchester.
	0900	1865	G3LP	Cheltenham.
	0930	1792	G8AB	Loughton.
	1000	1800	G8PR	Staffordshire.
	1015	1920	G6VC	Northfleet.
	1230	1758	G6VD	Leicester.
Mondays ...	2230	1925	G2CF	S. Devon.
Tuesdays ...	2200	1934	G3GH	N. Devon.
Wednesdays	2215	1865	G3LP	Cheltenham.
	2230	1813	G4AU	Charlton.
Thursdays...	2200	1934	G3GH	N. Devon.
Fridays ...	2230	1925	G2CF	S. Devon.

Tests Committee

Mr. H. V. Wilkins, G6WN, West London D.R., has been appointed to serve on the above Committee in place of Mr. A. O. Milne, who has resigned.

NEW MEMBERS

HOME CORPORATES.

WM. HERRING (G3CL), 223, Newark Road, Lincoln.
C. H. EDLIN (G3QC), 10, Pembury Road, Wollaton, Nottingham.
H. H. HALLUMS (G3RN), 7, Abbotts Lane, Camberley, Surrey.
J. HOLDEN (GM3SF), 3, Urquhart Place, Aberdeen, Scotland.
D. E. BLOW (G3TL), 87, High Street, Stevenage, Herts.
CAPT. J. WITHERS (G3TW), Wynberg, Harborough Road, Oadby, near Leicester.
H. V. PRINCE (G3UF), 408, Willow Field, Burnley Road, Halifax, Yorks.
R. V. BEEKAR (GW3WY), Bryn Eglwys, Llangwstenin, near Llandudno Junction, N. Wales.
E. J. BUICK (G3XJ), 84, Oatlands Drive, Slough, Bucks.
A. W. GALE (G3XN), Victoria Street, Alderney, C. Islands. (Temporary QRA).
G. A. KENYON (G3YK), 32, Emerson Avenue, Middlesbrough, Yorks.
C. T. FAIRCHILD (G3YY), 1a, Dover Road, Brighton, 6, Sussex.
G. W. NEVILLE (G4AZ), The Rookery, Fenstanton, Hunts.
W. G. CADMAN (G4BV), Catlips Farm, Chorley Wood, Herts.
H. E. HUGHES (G4CG), 57, Kingswood Road, Wimbledon, London, S.W.19.
R. BUCKSTONE (G5JR), 90, Pams Way, Ewell, Surrey.
S. H. CHAPPLE (G6SC), 7, Rutherwyke Close, Ewell, Surrey.
D. MAYES (GM6SJ), 9, Chapel Street, Hamilton, Lanarks.
G. T. OTTLEY (G8BK), "St. Helens," Grasmere Road, Gloucester.
G. H. STANTON (G8QY), 71, Coverdale Road, Sheldon, Birmingham, 26, Warcs.
F. E. LANE (2AGZ), 9, St. James Road, Handsworth, Birmingham, 21, Warcs.
W. LISHMAN (2AKK), 95, Vernon Street, Darwen, Lancs.
F. H. LAWLEY (2APD), 6, The Walk, Beccles, Suffolk.
J. GARNER (2BGG), 60, Croxteth Road, Liverpool, 8, Lancs.
J. H. H. KNIGHT (2DGL), 1, Hunter Road, Wimbledon, S.W.20

J. B. Atcheson (2DMM), 15, Merrick Gardens, Glasgow, S.W.1.
A. J. Herridge (2DRK), 33, St. Paul's Hill, Winchester, Hants.
B. H. Slatter (2DUA), 5, Cumberland Road, Southport, Lancs.
F. L. Wood (2DUI), 14, Fore Street, Kingsbridge, Devon.
W. G. Johnson (2DVW), Pinchbeck Hall, Spalding, Lincs.
R. H. Kelsall (2DZV), Cragg Cottage, Troutbeck, Windermere, Westmorland.
H. E. LeDain (2FDJ), Burcott, La Mare, Samares, Jersey, C.I.
J. Weaver (2FFT), 34, South Road, Beccles, Suffolk.
C. Hutchinson (2FIB), 23, South Bank Terrace, Runcorn, Cheshire.
P. E. Taylor (2FJP), 134, High Street, Barnet, Herts.
L. A. Yaxley (2FLC), 1, Matlock Road, Thorpe Road, Norwich, Norfolk.
H. H. Clarkson (2FLW), 14, Clyde Street, Blackburn, Lancs.
F. P. Bramley (2FMX), Oakleigh, Moira, near Burton-on-Trent, Staffs.
F. Knight (2FPQ), 6, Bramley Street, Bramley, Leeds, Yorks.
E. B. H. Woolley (2FRO), 8, Third Avenue, Sherwood Rise, Nottingham.
W. G. Wakeham (2FRX), 27, Carfrae Terrace, Plymouth, Devon.
E. H. P. G. Wrightson (2FVO), The Manor House, Horspath, Oxford.
R. L. Timms (BRS3517), 283, Wellingborough Road, Northampton.
R. F. Harper (BRS3518), 50, Westbourne Road, Luton, Beds.
H. R. Hatch (BRS3519), 1, Delcombe Avenue, Worcester Park, Surrey.
S. W. Malin (BRS3520), Heather Hey, Oldfield Road, Heswall, Ches.
S. C. Ekberg (BRS3521), 100, Abbey Road, Grimsby, Lincs.
G. S. Constable (BRS3522), 18, Reepham Road, Norwich, Norolk.
F. W. A. R. Powlesland (BRS3523), Trood House, Alphington, Exeter, Devon.
N. J. Brundle (BRS3524), 11, Gunton Drive, Lowestoft, Suffolk.
C. N. R. Ross (BRS3525), The Braes, Kincardine, Fife, Scotland.
G. H. Ball (BRS3526), 13, Conington Avenue, Grovehill Road, Beverley, E. Yorks.
R. Hall (BRS3527), The Firs, Fordlands Road, Fulford, York.
J. Oakes (BRS3528), 6, Gresty Terrace, Crewe, Cheshire.
W. I. L. Rae (BRS3529), 6, Cramond Road South, Davidsons Mains, Edinburgh, Scotland.
H. A. Jones-Butler (BRS3530), 21, Dover Road East, Gravesend, Kent.
B. Houston (BRS3531), 47, St. John's Crescent, Whitchurch, Glam.
J. Otter (BRS3532), 30, Belmont Street, Lincoln, Lincs.
A. Fisher (BRS3533), 153, Queenshead Road, Handsworth, Birmingham, Warwick.
H. Goodover (BRS3534), 17, Huntley Road, Higher Crumpsall, Manchester, Lancs.
F. G. Holloway (BRS3535), Brook House Road, Walsall, Staffs.
A. S. C. Mathews (BRS3536), Wharfedale, Pulteney Road, Bath, Som.
C. Tamkin (BRS3537), 80, Ashford Road, Brighton, 6, Sussex.
I. F. Heybyrne (BRS3538), 38, Chamberlain Road, Highfield, Southampton, Hants.
C. Fisher (BRS3539), Upper Tankersley, near Barnsley, Yorks.
T. Parton (BRS3540), 115, Brockhurst Road, Ward End, Birmingham, 8.
H. Anderton (BRS3541), "Glen Lyon," Beacon Lane, Whipton Exeter.
G. R. Griffiths (BRS3542), 38, Worcester Street, Wolverhampton, Staffs.
C. F. Peers (BRS3543), 58, Belgrave Street, Wallasey, Cheshire.
F. Cresswell (BRS3544), 29, Woodland Avenue, Breaston, Derby.
B. J. Worboys (BRS3545), 58, Burnside Drive, Levenshulme, Manchester, 19.
C. Richardson (BRS3546), 33, Hall Croft, Beeston, Notts.
N. Turner (BRS3547), 288, Plymstock Road, Plymstock, Plymouth.
J. W. Eccles (BRS3548), 50a, Huntly Street, Inverness, Scotland.
M. J. Heddle (BRS3549), 33, Park Road, Southend-on-Sea, Essex.
W. F. Leivers (BRS3550), 9, Beardall Street, Mansfield, Notts.
W. A. P. Young (BRS3551), "Fyldon," Hill Crest Park, Exeter, Devon.
B. Johnson (BRS3552), 35, Heath Road, Barming, Maidstone, Kent.
L. Weldon (BRS3553), 24, Hillside Road, Erdington, Birmingham.
D. G. Frost (BRS3554), 59, King Street, Potton, Beds.
H. H. Lowe (BRS3555), Sharrington Rectory, Melton Constable, Norfolk.
S. Webster (BRS3556), 32, Bowling Green Road, Hinckley, Leics.
A. F. Trinder (BRS3557), 265, Oldfield Lane, Greenford, Middlesex.
L. R. Richardson (BRS3558), Buxton Road, Aylsham, Norfolk.
R. E. Crispin (BRS3559), 57, Limesdale Gardens, Edgware, Middlesex.
F. W. Golding (A.), 22, Sandringham Road, Willesden Green, N.W.2.

Dominion and Foreign.

M. Berardi (I1MB), Via Tacito 41, Roma, Italy.
J. K. Moller (SM5XH), 54, Norr Malarstrand, Stockholm, Sweden.
R. O. Strock (W2GTZ), 178-15, Henley Road, Jamaica, Long Island, New York, U.S.A.
G. D. Belling (W6CTG), 6,243, Broadway Terrace, Oakland California, U.S.A.
D. A. Macdonnell (XU8DI) (S.S.M.R. Signals), Shanghai Signal Section, Army Post Office No. 1, Shanghai, *via* Siberia.
R. Gozen (FRS43), 1, Richfield Avenue, Yonkers, New York, U.S.A

Station Descriptions

We shall be pleased to consider for publication photographs and brief descriptions of British Isles amateur stations. Photographs should show a general view of the station.

The Society would be prepared to pay for the cost of professionally photographing suitable stations, providing a description and an *amateur* photograph is *first submitted*.

CONTEMPORARY LITERATURE

(*Continued from page* 539)

A Signal-Metering Valve. H. O. Talen (W9PYQ). *QST*. January, 1939.

The experimental circuit described opens up a different approach to the limitation of signals and noise peaks in receivers. Unlike most noise-reducing circuits, the method described is not confined to super-het circuits but can be used with super-het or autodyne receivers. The circuit uses a type 6Z7g double triode valve but the author suggests that with a pair of R.F. pentodes less trouble due to feed-back will be experienced.

NOTES and NEWS from the BRITISH ISLES

DISTRICT REPRESENTATIVES.

DISTRICT 1 (North-Western).
(Cumberland, Westmorland, Cheshire, Lancashire.)
Mr. J. NODEN (G6TW), Fern Villa, Coppice Road, Willaston, near Nantwich, Cheshire.

DISTRICT 2 (North-Eastern).
Yorkshire (West Riding, and part of North Riding).
Mr. L. W. PARRY (G6PY), 13, Huddersfield Road, Barnsley, Yorks.

DISTRICT 3 (West Midlands).
(Warwick, Worcester, Staffordshire, Shropshire.)
Mr. V. M. DESMOND (G5VM), 199, Russell Road, Moseley, Birmingham.

DISTRICT 4 (East Midlands).
(Derby, Leicester, Northants, Notts.)
MR. W. A. SCARR, M.A., (G2WS), Wharfedale, Heanor Road Ilkeston, Derbyshire.

DISTRICT 5 (Western).
(Hereford, Wiltshire, Gloucester.)
Mr. J. N. WALKER (G5JU), 4, Frenchay Road, Downend, Bristol.

DISTRICT 6 (South-Western).
(Cornwall, Devon, Dorset, Somerset.)
Mr. W. B. SYDENHAM (G5SY), "Sherrington," Cleveland Road, Torquay.

DISTRICT 7 (Southern).
(Oxfordshire, Berkshire, Hampshire, Surrey.)
Mr. E. A. DEDMAN (G2NH), 75, Woodlands Avenue, Coombe, New Maiden, Surrey.

DISTRICT 8 (Home Counties).
(Beds., Cambs., Hunts and the towns of Peterborough and Newmarket.)
Mr. S. J. GRANFIELD (G5BQ), 47, Warren Road, Milton Road Cambridge.

DISTRICT 9 (East Anglia).
(Norfolk and Suffolk.)
MR. H. W. SADLER (G2XS), "The Warren Farm," South Wootton, King's Lynn, Nortolk.

DISTRICT 10 (South Wales and Monmouth).
MR. A. J. FORSYTH (G6FO), 29, Stow Park Avenue, Newport, Mon

DISTRICT 11 (North Wales).
(Anglesey, Carnarvon, Denbighshire, Flintshire, Merioneth, Montgomery, Radnorshire.)
MR. D. S. MITCHELL (GW6AA), "The Flagstaff," Colwyn Bay, Denbighshire.

DISTRICT 12 (London North and Hertford).
(North London Postal Districts and Hertford, together with the area known as North Middlesex.)
Mr. S. BUCKINGHAM (G5QF), 41, Brunswick Park Road, New Southgate, N.11.

DISTRICT 13 (London South).
MR. J. B. KERSHAW (G2WV), 13, Montpelier Row, Blackheath S.E.3.

DISTRICT 14 (Eastern)
(East London and Essex.)
MR. T. A. ST. JOHNSTON (G6UT), "Normandale," New Barn Lane, Little Hallingbury, Bishops Stortford.

DISTRICT 15 (London West).
(West London Postal Districts, Bucks, and that part of Middlesex not included in District 12.)
MR. H. V. WILKINS (G6WN), 539, Oldfield Lane, Sudbury Hill, Greenford, Middlesex.

DISTRICT 16 (South-Eastern).
(Kent and Sussex)
Mr. W. H. ALLEN (G2UJ), 32, Earls Road, Tunbridge Wells.

DISTRICT 17 (Mid East).
(Lincolnshire and Rutland.)
Mr. W. GRIEVE (G5GS), "Summerford," New Waltham, Lincs.

DISTRICT 18 (East Yorkshire).
(East Riding and part of North Riding.)
Mr. E. MITCHELL (G5MV), 40, North Marine Road, Scarborough

DISTRICT 19 (Northern).
(Northumberland, Durham, and North Yorks.)
MR. R. J. BRADLEY (G2FO), "High Crest," Yarm Road, Eaglescliffe Co. Durham.

SCOTLAND.
MR. JAMES HUNTER (GM6ZV), Records Office, 51, Camphill Avenue, Langside, Glasgow.

NORTHERN IRELAND.
Mr. J. A. SANG (GI6TB), 22, Stranmillis Gardens, Belfast.

NEW MEMBERS ARE CORDIALLY INVITED TO WRITE TO THEIR LOCAL DISTRICT REPRESENTATIVE.

DISTRICT 1 (North-Western).

BLACKBURN.—Congratulations to G4DG on obtaining his full call. At the last meeting G6BH displayed components manufactured by firms from whom he has obtained agencies for the sale of amateur apparatus. Further arrangements were made in connection with the section's Field Days, when the new NFD transmitter will be tested under the call G2HWP.

G2PB is making a radio-controlled boat and would appreciate information on the subject from any amateur who has conducted similar experiments.

Bury.—Eight members attended the monthly meeting held on February 14. Two newcomers, G3BN and 3YJ, were present. Details of the group "Hamfest" were discussed and it was decided to run another portable station in conjunction with N.F.D., as the station operated last year was such a success.

Reports have been received from G3CJ, 3ZN (who would like contacts with South Coast and Scottish stations on 1.7 Mc.), 8NL, 2BDA, 2GA, 8NF, 8QS, 3BN, 3YJ and BRS3008.

Burnley.—All members are active and have a multi-way QSO by radio every Monday night. 8TD finds his ECO unit very helpful for 28 Mc. 'phone to the States and he is nearly ready to claim W.A.S. The double doublet at 3VO is putting a steady signal into U.S.A. We are sorry to lose 2FIA, who has removed to Huddersfield. Inter-station visits are taking place quite frequently. The following are active: 2RB, 5ZN, 8TD, 8UA, 3HK, 3IY, 3KT, 3SJ, 3WU, 3VO, 2BFB and 2FBI.

Manchester.—An attendance of 32 was recorded at the last Manchester meeting at which G2HW delivered a talk about his activities and described the apparatus used at his station. This was followed by another talk by 5YD on push-button

and motor-driven tuning as applied to modern receivers. A practical demonstration followed, and members are indebted to 5YD and the C.W.S. for the loan of apparatus for demonstration purposes.

Another sale of disused apparatus realised additional funds for the section, and it has been decided that instead of deducting 25 per cent. from the proceeds of these sales towards the section's fund, 10 per cent. only will be deducted.

A welcome was extended to G6KS, the Liverpool T.R., who made one or two remarks about N.F.D. Since this meeting 6TW has stated that our allotted band is 1.7 Mc.

The following report active: G2HW, 2DH, 2BDA, 2DVQ, 2BZX, 2LIS, 2WQ, 2FRN, 2DRR, ex-BRS3174, 201, 5WR, 2RA, 3BY, 3DL, 3JB, 3DH, 3IR, 3LB, 3DC, 3SR, 3AO, 5OZ, 5HF, 5YD, 6GD, 6TL (a speedy recovery to you, OM), 8BI, 2ARC, BRS3008, 3228, 2918 and 2974. Local 56 Mc. tests are carried out every Friday from 22.00 to 23.30 G.M.T. Those participating are G2RA, 2OI, 8BI, 6TL, 5HF, BRS3228, 2ARC, 5MQ (Liverpool) and 2CIN (Liverpool). More stations are wanted, both transmitting and receiving. Any offers? G3DH is operating portable and would welcome contacts.

Liverpool.—A meeting was held on February 15 and 21 members attended. A discussion of N.F.D. arrangements took place and members were informed that they have been allotted the 14 Mc. station this year. It is possible that the site will be at Woolton, near Liverpool, although this has not yet definitely been decided.

The T.R. requests all members, other than those who attended this meeting, to notify him by card, letter or call whether they wish to help during N.F.D. so that he can complete a list of operators.

Liverpool stations equipped for 56 Mc. (receiving and/or transmitting) are asked to look for G2RA, 2OI, 6TL and 8BI (Manchester area) on Fridays between 20.00 and 23.30 G.M.T., and to report via 6KS or direct.

DISTRICT 2 (North-Eastern)

All members are asked to make a special note of the Provincial District meeting which will be held at York on Sunday, April 16. The venue is the same as in the past years, and particulars are to be found in an announcement in this issue. It is requested that all members who intend to attend should send a card to the D.R. (G6PY) to that effect and to give him several days' notice in order that suitable accommodation may be reserved. An invitation is particularly extended to the newer members who have not previously attended: they are assured of an enjoyable day out.

Barnsley. — Huddersfield members will visit Barnsley on March 23. The following are active: G2BH, 2WX, 3PG, 3YA, 5UA, 5KM, 5DW, 5IV, 6LZ, 6PY, 6XG, 8NM, 8IJ, 8TZ, BRS3068, 3207 and 2DQL.

Bradford.—At a recent meeting of the Bradford Radio Society, Mr. James gave a lecture on Psychic Phenomena in Relation to Radio. This was much appreciated and was reported in the local press. The last meeting was addressed by Mr. Milnes, who gave an interesting demonstration on running an all-electric receiver from gas mains using a thermo-couple device. The following stations are active: G2QM, 2SU, 3HA, 3KB, 3VR, 5VC, 6AZ, 6BX, 6KU, 6MC, 6PL, 6QS, 6XL.

Doncaster.—The Doncaster and District Amateur Radio Society, which was formed in January of this year has now been accepted for affiliation by the R.S.G.B. and consists of 21 paid-up members of whom at least eight are members of the parent society. As previously stated, the Society meets at Chamber's Café, Waterdale, Doncaster, each Thursday at 7 p.m. Morse classes occupy the first hour of each meeting and instruction has been facilitated by the use of two-valve oscillators, one mains driven and constructed by 2CKR, the other battery driven, supplied by G4DP. Both have a variety of notes. Any information regarding the Society will be gladly supplied by any member or by the Secretary (G4DP), 111, Sprotoboro' Road, Doncaster. On February 16, Mr. Ketley, a prominent electrician in the town, brought along a "Sky Champion" receiver which was well demonstrated, in spite of local interference. On the same evening and also on the 23rd inst., G3DA, who is visiting the town, gave interesting talks on 56 Mc. work and station equipment. 2FJO, who is now operating under the call G4DP, will welcome reports on his 7 and 14 Mc. transmissions. All will be acknowledged. Active stations are: G3NJ, 3VG, 4DP, 2AMT, 2BCQ, 2CKR, 2FTO, BRS193 and 3494.

Halifax.—Attendances at the Halifax Radio Society have been better of late, although better support from R.S.G.B. members would be appreciated. The following are active: G3UF, 3UI, 3ZK, 4DB, 8CB, 8GM, 8SJ.

Harrogate.—G8UQ, 8UY, 2DRA, 2BPI and BRS3269 are active. G8UQ is getting going again after changing his QRA.

Sheffield.—Several stations took part in the 1.7 Mc. contest. 2DTJ is now G4AI. We welcome Mr. Bartlett (BRS3501) as a new member. Plans are in hand for N.F.D., when the Sheffield Group will be operating the 3.5 Mc. station. A demonstration of the transmitter was given recently by G3FN. G5HK is again active after a long period of inactivity, similarly 2JY after a shorter period. Will members unable to attend meetings please send a card stating activity to 3FN? The following are active: G2AS, 2JY, 3FN, 4AI, 5HK, 5TD, 5TO, 6LF.

DISTRICT 3 (West Midlands)

Details appear on page 546 of the arrangements made for the annual Midlands P.D.M. The D.R. and T.R.'s hope that a good attendance will be recorded from District 3, and that local Birmingham members will arrange for their stations to be visited by those coming from other areas.

Once again we have to record the absence of District news. It is known that dozens of stations are active, but little information is forthcoming.

From *Rugby* we hear that G8FJ is leaving to take up a position at the G.P.O. Receiving Station in Kent, whilst G2JN, 3DI, 3FQ, 3IL, 3IS, 8RI, and 8VN are active.

Cannock.—A hearty welcome is extended to G4CP, ex 2FAP, and G4CN, ex 2FAH, who were licensed early last month. The C.D.A.R.C. is flourishing and the programme of out-of-door activities for the summer will soon be arranged. A transmitting licence has been applied for. G2YV, 3HB and 6SW are active.

Stafford.—The Stafford Radio Club has been offered a licence. Parts are being collected for the transmitter and an aerial has been erected at the club-house. G4CT is building a 60 ft. lattice mast. 3CP is using various 8JK beams and runs schedules with K6, ZE, and ZS. 8FQ is on 29 Mc., using a 3-element rotary beam.

Shrewsbury.—All local stations are concentrating on 1.7 Mc. with a view to becoming conversant with conditions on the band, N.F.D. being the final goal. Frequencies are 1875, 1796 and 1765 kc.

MIDLAND PROVINCIAL DISTRICT MEETING

SUNDAY, APRIL 2, 1939

AT

Hope and Anchor Hotel, Edmund Street, Birmingham

Assemble	...	...	... 12.30 p.m.
Lunch	...	...	... 1.15 p.m.
Meeting	...	...	... 2.45 p.m.
Tea ...	...	...	... 4.30 p.m.

Lunch 3/6 Tea 1/6

Reservations to Mr. V. M. Desmond, G5VM, 199, Russell Road, Moseley, Birmingham 13, not later than March 30.

DISTRICT 4 (East Midlands).

The most important item this month is the announcement of the annual Midlands P.D.M. which is to be held this year at Birmingham. The cost is 3s. 6d. for lunch and 1s. 6d. for tea. The success of the meeting depends on a good attendance from Districts 3 and 4, and it is hoped that everyone who possibly can will attend from No. 4.

The next District meeting is in the hands of G6VD, and will be held at the Royal Hotel, Leicester, at 3.30 p.m. on Sunday, March 19, 1939. After tea, a number of members will give short talks on "My Aerial System and Why I Use It." Further volunteers for these talks will be welcomed; please bring large-scale diagrams.

The Nottingham meeting held last month was attended by 34 members, and we were fortunate in having with us Mr. J. Threlfall (2CGY), of *Messrs. Ericsson, Ltd.*, who gave an interesting talk on the design of speech amplifiers. A successful junk sale followed.

T.R.'s are reminded that lists of N.F.D. operators, as well as details of sites, must be prepared at once, and must be available by the next District meeting on March 19.

Activity on 56 Mc. increases, and the Wednesday evening tests from 1900 to 1930 G.M.T. are well maintained. G8KD (Sheffield) is very active on the band, and provides a useful DX signal for Midland receivers. Two-way working is being carried out every few days between this station and our own stations G6CW, G8JV and G2WS. G3PZ, of Hucknall, a new signal on the band, is chiefly to be heard on C.W.

G2SY reports the continued allegiance to the District of Northampton members, and promises their support at the P.D.M.

Mansfield.—There were fifteen members at the local meeting arranged by the T.R. (G8SA) on January 29. N.F.D. was further discussed, and it was arranged that the 7 Mc. station allocated to this area should be operated from Warsop Windmill.

Worksop and Retford.—The following stations report active: G8ON, 8PO, 8SD, 2CAJ and BRS3436. The monthly meetings and weekly morse practices at G8ON have been well supported of late, and it has been decided that the March and April meetings shall be held in Retford. Further particulars may be obtained from 8ON.

DISTRICT 5 (Western)

Bath.—Activity is well maintained. G2IW is now using a *Meissner* Signal Shifter and finds it of great value in avoiding interference. G8HW is leaving for Poole shortly and hopes to be more active there than he has been of late. The effects of the Aurora Borealis were noticeable but no one in Bath or Bristol reports having actually seen it.

Bristol.—A good attendance was recorded at the Bristol February meeting, when Mr. C. R. Beaven (2BVD), who was previously with Sir Alan Cobham's Air Circus, gave a talk on his experiences, some of which were thrilling and others amusing.

The T.R reminded B.R.S. and A.A. members of the offer made regarding the B.E.R.U. Listening Contest, but in spite of this it would appear that the response has been poor. 6GN also asked members to refrain from using 'phone on 14 Mc. for local and European contacts, keeping this band for DX work.

The guest of the evening, Mr. Proctor Gregg, whose previous visits regarding the Civilian Wireless Reserve have been interesting, advised everyone to use their radio ability in National Service.

A visit to the Radiological Department of the Bristol General Hospital took place on February 21, members turning up in numbers to show their appreciation for the time and effort expended in arranging this visit.

Activity in the B.E.R.U. Contests was maintained by G6RB, 5WI, 8TC and 6GN. The going was hard, but in spite of that, those taking part had the satisfaction of working new zones.

Active stations include our first G4, whose A.A. call 2DVX becomes G4CM, and BRS3469, now 2BVD. All stations reported last month are maintaining their activity. G6VF has contacted 2BI of Calne on 56 Mc.

Cheltenham.—A meeting of R.S.G.B. and C.W.R. members was held on February 17, a good attendance being recorded. The D.R. (G5JU) and Mr. Procter-Gregg travelled up from Bristol, and were warmly welcomed to the meeting. Earlier in the month a party visited the Droitwich B.B.C. station, and came away wondering what could be accomplished in the way of DX with a pair of CAT14 valves!

Other Areas.—Mr. C. W. Kirk, late ZB2A, of Gibraltar, has been allotted the call G4CL. Local members are invited to visit him at his new QRA, which is 9 "F" Block, Married Quarters, Bulford Camp, Wilts. 2FAG, of Westbury (Wilts), is awaiting his two-letter call.

Members resident in or near Stroud are invited to get into touch with G5HC with a view to the appointment of a T.R. for that town and the arrangement of regular meetings.

The Crystal Register is progressing well. Will all those who have not yet given notification of their frequencies please do so with as little delay as possible ?

DISTRICT 6 (South Western)

Attempts have recently been made to get support in Dorset for the Conventionette which we had hoped to hold at Somerton and Dorchester. Unfortunately there have been no offers of help so far from that area and unless they are forthcoming very soon we shall have to abandon the idea. Under such circumstances we hold out the suggestion of a Conventionette at Taunton for the consideration of the members. We should be glad to hear from those interested.

G3ZL, of Rodwell, Dorset, is operating regularly on 1.7 Mc., and would like to arrange skeds. He also reports that G2XQ and 3PU are active on 7Mc. with aerial and propagation tests.

N.F.D. is now being discussed at great length by the members in South Devon, and we hope that those who agree to run stations will get to work early so that everything is ready and tested well beforehand.

Torquay.—At the monthly meeting held on February 16 there was an attendance of 14. N.F.D. was discussed very fully, and certain arrangements were made. It is impossible to single out individual members as regards activity, as evidently all members are decidedly active.

We welcome G2UO as a new member to the town.

The meeting on March 16 should be the last of the season, but it is hoped to arrange a visit in April to take the place of the usual indoor meeting. Details will be announced later.

Taunton.—At a meeting of the Somerset members held on Sunday, February 12, at the QRA of G6LY, twelve members were present, including the T.R. and Scribe. The T.R. informed members of the information contained in General Circular No. 14, and it was admitted that many members, particu-

FORTHCOMING EVENTS

Mar.	15	District 1 (Liverpool Section), 8 p.m., at 56, Whitechapel, Liverpool.
,,	16	District 15 (W.L.S.), 7.30 p.m., at G3UQ, 70, Wormholt Road, W.12.
,,	16	District 6 (Torquay Section), 8 p.m., at G5SY, "Sherrington," Cleveland Road, Torquay.
,,	16	District 13 (Central Areas), 8 p.m., at Brotherhood Hall, West Norwood.
,,	17 *	District 12, 7.30 p.m., at The Orpheum Cinema, Temple Fortune, N.W., Debate on "E.C.O. *v.* Crystal Control."
,,	17	District 14 (Brentwood Section), 8.15 p.m., at G3MV, Upwey, West Park Hill, Brentwood. Lecture by 2DRI on "Audio Amplifiers."
,,	20	District 6 (Plymouth Section), 7.30 p.m., at 2DLJ, 21, Rosslyn Park Road, Plymouth.
,,	20	District 13 (Woolwich Area), 8 p.m., at Memorial Hospital Hall, Woolwich.
,,	21	District 1 (Bury Section). Monthly meeting.
,,	22	Scotland "H" District, 7.30 p.m., in District Clubroom, Bank Street, Kirkcaldy.
,,	22 *	District 15, 7.30 p.m., at The Anchor, Uxbridge Road, West Ealing.
,,	22	District 14 (East Essex Section), 8.0 p.m., at G2SO, 44, Lindisfarne Avenue, Leigh-on-Sea.
,,	23	District 6 (Exeter Section), 8 p.m., at Y.W.C.A.
,,	25	Southend Radio Society, Supper-Dance. 7.30 p.m., at Westcliff Hotel, Southend-on-Sea.
,,	26	Southend Radio Society, 8.0 p.m. Lecture and Film Exhibition by Mr. Nixon, of G.E.C.
Mar.	26	District 11, 6.30 p.m., at GW5FU, 27, High Street, Rhyl, Flintshire.
,,	28	District 14 (East London Section), 7.30 p.m., at G3XS, 23, Mornington Road, Chingford, E.4.
,,	29	Scotland "A" District, 7.30 p.m., in Room "A," Institution of Engineers and Shipbuilders, 39, Elmbank Crescent, Glasgow.
,,	29	District 15 (W.L.S.), 7.30 p.m., at 2CSD, 48, Fordwych Road, Shootup Hill, N.W.6.
,,	31	London Meeting at I.E.E. Commence 6.45 p.m. Tea from 6.0 p.m. Lecture and Demonstration by Mr. E. L. Gardiner (G6GR). Subject: "Band Pass Crystal Filters."
Apr.	3	District 14 (Chelmsford Section), 8 p.m., at G2KG, "Manton," Sandford Road, Chelmsford.
,,	5	District 15 (W.L.S.), 7.30 p.m., at G6CO., 22, Chipstead Gardens, Humber Road, Cricklewood, N.W.2.
,,	5	Scotland "H" District, 7.30 p.m., in District Clubroom, Bank Street, Kirkcaldy.
,,	5 *	District 1 (Manchester Section), 7.30 p.m., at Brookes Café, 1, Hilton Street, off Oldham Street, Manchester. Discussion on N.F.D.
,,	5	S.L.D.R.T.S., 8 p.m., at Brotherhood Hall, West Norwood.
,,	6	District 6 (Exeter Section), 8 p.m., at Y.W.C.A.
,,	6	District 14 (Colchester Section), 7.30 p.m., at G8PZ, 19-21, Artillery Street, Colchester.
,,	8	Southend Radio Society Meeting.

* Sale of disused apparatus at these meetings

larly the younger ones, liked to see in print the record of their interest in the Society. It was felt that information on this point was even more appreciated by those who had left the district. (The circular clearly stated that the calls of *active* members will be published.—ED.)

It was decided to hold a QRP contest in March, power of H.T. to be limited to 120 volts dry cells, and a committee, consisting of G3KX, 5TN, 6LQ and 3BN was appointed to make the arrangements.

N. Devon.—The B.E.R.U. contest claimed the attention of G6GM and 8US, both doing well within the limits of time available and the prevailing conditions. 6GM and 3GH also took part in the 1.7 Mc. Transatlantic tests, the former with commendable success. 3BO is building a new modulator, and 2ID has changed from battery to A.C. mains supply. Hearty welcome to a new member, BRS1294. All stations report active.

Exeter.—At the meeting on February 9 the total attendance was 17, which included two prospective members. Mr. Overton, of Lympstone, has been granted the call G4CW, and is doing good work on the 1.7 Mc. band. All stations in Exeter report active.

Plymouth.—Seven members attended the February meeting at G8PN, when a large range of topics came under discussion. G2HX, G3TX, G6RF, G8HF, G8PN, 2CJB, 2CZP, 2DLJ, 2FKO, BRS2997 and 3464 report active.

DISTRICT 7 (Southern)

N.F.D. stations have been fixed provisionally for the following areas: 1.7 Mc., Croydon; 3.5 Mc., Guildford; 7 Mc., Reading; 14 Mc., Southsea.

The next Surrey and North Hants meeting will be held at the Tumble Down Dick Hotel, Farnborough, Hants, on Sunday, April, 2, at 2.30 p.m.

Members in the South are asked to reserve June 18 for the Southern P.D.M. The meeting will be held at the Royal Beech Hotel, Southsea, and a bumper attendance is anticipated. Further details will appear in the BULLETIN in due course.

Attention is also drawn to the first Annual Dinner of the East Surrey Club (see Reigate notes).

Kingston.—G6BI, one of the founders of the Kingston Society, is leaving to take up a post in the North of England. We wish him the best of luck.

The T.V.A.R.T.S. having had a "reshuffle" is starting out on a new policy. Congratulations to 2CXI and 2DGY on receiving G4 calls. The following are active: G2GK 2NH, 3DZ, 3NF, 3OR, 3VK, 5MA, 6KP, 8HY, 8SM, 8TX, 2DLX, 2DOK.

Portsmouth.—A meeting of the South Hants R.T.S. was held in the Civil Service Hut, Hilsea, on February 16. Following a short business meeting, G8WC gave an interesting talk on "Servicing Broadcast Receivers." 8JB is trying E.C.O., while 8BD is getting good results on his newly constructed super-het. BRS3427 awaits arrival of his full call.

The Portsmouth members have presented G6NZ with an electric clock on the occasion of his leaving the district for Cranwell.

Guildford.—The following are active: G5RS, 5WP, 5YA, 6GS, 6LK, 6NA, 6YZ, 8IX, 8UG. 8IX is investigating third harmonic suppression.

Reigate.—The East Surrey Short Wave Club, at the end of this month, will have concluded a very successful first year. Seventeen fully licensed amateurs and seven A.A., form part of the keen membership. Sincere thanks are due to Mr. G. R. Wigg (G6JF) for his financial help in paying the Club Room rent for the first year. The first annual dinner is to take place on April 13, on the premises of the "Old Wheel Café," Church Street, Reigate. Assemble 7.30 p.m., dinner 8 p.m. All District members are welcome. The price per head is 3s.

Croydon.—The only report received this month is from 2FJM, who is engaged with receiving problems. This lone report is most discouraging to the newly appointed T.R. Most of the local amateurs are active, but appear too busy to send in a postcard.

DISTRICT 8 (Home Counties)

The District meeting for February, held at the Waffle Café, Cambridge, was well attended, and included parties of members from Bedford, March and Peterborough. It was unfortunate that Mr. W. F. J. Winkley, of the G.P.O., who was to have given a talk on "Interference Problems," was unable to be present through illness. He has promised to give his talk at a later date. Arrangements for Field Day were discussed, and it was decided to appoint the following Station Organisers: G5FO (160), G5JO (80), G3BK (40) and G5DR (20). It is imperative that members willing to operate at one of the N.F.D. stations should notify the D.R., or the Station-Organiser concerned, immediately.

Cambridge.—With the improvement in DX conditions G2XV, 5OV, 5DR, 5JO and 5BQ can be heard "jockeying for position" with 'phone on 14 Mc. The outstanding problem is how to receive incoming signals through the local QRM. This applies especially to mornings, when VK's are audible on the L.F. end of the band. 5DQ concentrates on C.W. with good results, while 2PL and 8SY are also heard on this band occasionally. 8ST, who is with G.E.C. at Wembley, misses being on the air.

Peterborough.—G2NJ, who is now active from his new QRA, tried a centre-fed aerial, but has changed to a Zepp, which he finds very satisfactory for working W's on 7 Mc. 6LX is too busy on radio-research at the Cambridge Cavendish Laboratories to get on the air these days.

March.—G3WW has received a report on his 7 Mc. phone from ZL. He is very pleased with his new Howard 450a receiver, and hopes to have more room for aerial experiments when he moves in April. 3BK is using C.W. on 14 Mc., as is 3DY, of Whittlesey.

Bedford.—G5FO and 5PA are active, and 3JU, of Sandy, is still doing good work with very low power.

Other Areas.—2BCI, of Eynesbury, Hunts., hoped to be on the air this spring, but is prevented by business pressure. Congratulations to Mr. Holt (BRS3359), of Buntingford, who is now 2FZQ.

The D.R. would like to take this opportunity of thanking all those members who kindly replied to his recent circular.

DISTRICT 9 (East Anglia).

The District meeting held at Gt. Yarmouth on February 26 was well attended and proved very enjoyable to all members. With the D.R. in the chair, the principal topic was National Field Day. It was decided that the four stations shall be

located at Norwich (7 Mc.), Yarmouth (3.5 Mc.), and Ipswich (1.7 Mc. and 14 Mc.).

Following the business of the meeting the first junk sale held for some considerable time was voted a great success; a brisk business was done under the guidance of the D.R. Finally, N.F.D. 1938, films were shown and greatly appreciated by all present.

Thanks were offered to the Yarmouth T.R. (G3RW) for kindly making the necessary arrangements, and also to 2CWO for the excellent manner in which the films were projected. The next District meeting will take place on May 14, at Ipswich.

Ipswich.—Most stations are active, but there is little of outstanding interest to report. G8MU is experimenting with a 224 Mc. receiver; 8KB has erected a vertical rotating W8JK beam for 14 Mc.; 2JD is still working QRP DX; 2AN has completed his 56 Mc. final and will shortly be testing; 3OJ and 8AN are active on 1.7 Mc. No reports have been received from 8AG and 8IS.

Gt. Yarmouth.—A supper was held on February 3 to celebrate the increasing popularity of the Yarmouth Short Wave Club; members also attended from Lowestoft, Beccles and Mattishall. Later in the evening a cinema show was given by BRS3366.

AN APPEAL

We again appeal to users of the 7 Mc Band to restrict Telephony operation to a minimum during periods when DX telegraphy stations are audible in Great Britain. This appeal applies particularly to the hours between 0600 and 0900 GMT.

G3RW has finished reconstructing his transmitter for operation on 7 and 1.7 Mc., and has also built a new all-band receiver; congratulations to BRS3256, who is now 2BXJ, and BRS3434, who is now 2BIC; BRS3366 is reconstructing.

Norwich.—G8VW and 2UT are operating on 14 Mc.; 6UA is active on the same band and experimenting with power supplies; 51X is having a mains supply laid on and will soon be able to work under more favourable conditions; 6QZ is working on 28 and 56 Mc.; 2FLC is now a member of the Society.

Lowestoft and Beccles.—We extend a welcome to three new members in these towns, 2APD, 2FFT and BRS3524. G3RK has installed a Sky Champion receiver and is operating daily on 7 Mc.; 2APD and 2FFT are trying to find the quickest way of mastering morse.

Other Areas.—G8FL (North Walsham) is active on 1.7 and 14 Mc.; 5UF (Cromer) on 14 Mc.; 3XT (Stratford) has rebuilt his transmitter and is making numerous contacts with an input of 1 watt; 3UT (Bungay) and 8AX (Mattishall) report activity on 7 Mc. G2XS wishes members to note that he will be on 1.7 Mc. as often as possible on Thursday evenings between 20.30 and 21.30 G.M.T.

DISTRICT 10 (South Wales and Monmouthshire)

While the D.R. has to apologise for the non-appearance of this heading in the February issue, the fact is that no reports reached him; however, as in previous months, something could have been written had not extreme business pressure at the last moment made him too late for the closing date.

As cataloguing call-signs is henceforth banned, *Cardiff* will have now to be content with just a mention of their well-attended meetings at the new club rooms. The *Blackwood* party was a great success and very well supported by members from all over Monmouthshire and the Cardiff area. GW5TJ's magic, which is of no mean order, will from now on be in great demand at all meetings in this part of the world.

[Lists of members who attend local meetings are not now published, but we fail to see why brief details of active stations in Cardiff and other towns cannot be included in the Notes—ED.]

The next thing to look out for is the Western P.D.M., which it is agreed should be held at *Weston* on May 7. Full details will appear in the April issue, which will give all concerned three weeks' notice. In the meantime, make up your mind that you have to get to Weston on the above date.

Almost as important and much more worrying is the problem of N.F.D., now coming close, and for which arrangements must be put in hand very shortly. We all know which areas want what frequencies, but unfortunately there is a great divergence of opinion as to how those two frequencies should be allotted. Since it is much better that a decision be arrived at by agreement, the D.R. will give the T.R.'s in Cardiff, Blackwood and Swansea a fortnight from the appearance of these notes to formulate their proposals. *Newport* is prepared to take any frequency nobody else wants—probably 1.7 Mc., as usual. Perhaps some other area will decide to be equally helpful.

In the event of no agreement being reached, or there being any signs of friction or discontent, the D.R. will exercise his prerogative in the matter and arrange the N.F.D. frequencies in what seems to him the best way in the interests of the District as a whole.

It now rests with G6BK, GW3AX and 2BQB.

DISTRICT 11 (North Wales)

Another very well-attended meeting took place on February 26, at GW6AA, Colwyn Bay. Twenty members and three prospective members were present, this easily beating the record attendance at the previous meeting.

Mr. C. Oliver (GW2NF) gave another talk, explaining the theory underlying a number of commonplace occurrences in R.F. amplifiers. A hearty vote of thanks was given to Mr. Oliver in appreciation of this most instructive lecture.

It was decided that the March meeting should be the last of this winter's series, and that after this there should be a discontinuation of meetings until October. In the past certain members have kindly volunteered to hold the District meetings in their homes, but the average attendance has risen to such an extent that it will be necessary to take a special room next autumn. Any member knowing of suitable accommodation is asked to write to the D.R., giving full particulars.

Congratulations to Messrs. MacFarlane and

Copleston, who now have their radiating permits with the calls 3YP and 4CX respectively.

There are no individual reports of outstanding interest, but the following are known to be active: 1.7 Mc.—3GL, 3KY, 3WY, 3YP, 5FU, 5OD, 5TC, 6AA, 6KY, 8JY. 7 Mc.—3GL, 3KY, 3WY, 3YP, 3YL, 4CX, 6US, 6WB. 14 Mc.—3CW, 3KY, 3JI, 6OK, 6US, 6WB. 28 and/or 56 Mc.—6US, 6WB, 2APW.

DISTRICT 12 (London North and Hertford)

North London.—Mr. Mathews (G6LL), when he gave an informal chat at the February District meeting, dealt with early reminiscences of amateur radio. Some amusing references were made to early B.C.L. complaints regarding his transmissions, which, judging by the letters received, covered a band-width from "Glasgow to Hamburg"! The principal part of the talk dealt with first contacts on 28 Mc. using crystal control.

Arrangements for the District 12 dinner on April 21 are now well in hand and tickets can be obtained from the A.R.s, T.R.s or D.R. Single ticket 4s. 6d. or double ticket 8s. 6d. Please support this event, bring along a friend, and make it a real social evening.

At the March meeting there will again be a sale of apparatus, 5 per cent. of the proceeds going to District funds.

Watford.—The February meeting was well supported, fifteen members being present. A sale of gear took place, as a result of which 5s. was donated towards N.F.D. expenses. Most members are active. G3NR would welcome contacts on 56 Mc., and 8MH wants night-time contacts on 28 Mc.

Central Herts.—Members enjoyed a particularly interesting meeting on February 3, at St. Albans, when G2NO demonstrated a Diversity Receiver and a commercial transmitter. Other intriguing exhibits were a morse practice set operated through an audio oscillator, and a bug key, on which many members tried their hands, generally at the expense of an excessive number of dots!

The local QRP Contest was a great success, and although final results are not yet tabulated, it seems that 6XN is an easy winner. He is believed to have obtained about 5 watts out of the 120-volt battery to which all members were restricted.

Ken Franklin (G2SJ), who was married recently, is setting up a home in Welwyn Garden City. He now brings the number of fully licensed amateurs in that town to seven.

The following members report active: G8PM, 2KQ, 3TL and 5UM on 1.7 Mc.; also 2YN on other frequencies.

DISTRICT 13 (London South)

An Area meeting took place at Norwood on February 23, but unfortunately the T.R. (G2LW) was unable to be present owing to illness. We are glad to report that he has now fully recovered.

Woolwich Area.—The first meeting in this area took place on February 23, and an excellent attendance was recorded. The D.R. regrets his unavoidable absence. Arrangements are being made for technical lectures and demonstrations to be given in the future. Congratulations to BRS3472, who has now received the call G4DZ. 2DPN has now applied for his full licence; whilst 2CHR is still busy building receivers. 3CT complains bitterly of the interference he experienced during the B.E.R.U. Contest. 4AU is still having success with his W3EDP aerial. 8LN is experiencing difficulty with R.F. beam power tetrodes in his PA, as the valves he is using are different to the 6L6 class, and trouble occurred with aerial coupling. 3ZJ is now awaiting the arrival of cards to enable him to claim W.A.C. He has contacted CR4HT, and wonders whether this makes the first G-CR4 contact.

Balham and Tooting Area.—G2JK, who did well in the 1.7 Mc. Contest, received a report from a trawler within the Arctic Circle, about 1,800 miles from London, and also contacted VE. He was successful also in the B.E.R.U. Contest, and appears to be the leading station within South London, in the Junior event. 3DF has been using 'phone on 14 Mc.; whilst 5PY, 3CU and 2UX are all active. A welcome is extended to 3QF, late of the Isle of Man, who has come to reside in District 13.

Wandsworth Area.—No report but G2RC is known to be active.

Wimbledon Area.—No report received this month, probably due to the illness of the T.R. (2BMH). We sincerely hope he will soon be quite fit.

Blackheath Area.—G2WV was pleased to contact SU5KW, late of South London who was anxious to send his 73 to all friends within the District. 3GU is still erecting fresh aerials.

New Cross Area.—G2GZ has been active, and also in bed with 'flu. We hope he has now fully recovered.

By the time these notes appear in print the lists for N.F.D. will have been closed. Details of station sites and operators will appear in due course.

DISTRICT 14 (Eastern)

Brentwood.—The February meeting, held at G3VD, was well attended. Congratulations to 2ATU (now G4AG) and to 2AWK (now G4AK). On the staff of a local paper, 2FUI is acting as our press agent. G3MV and 4AG have joined the R.A.F.C.W.R., the latter has been notified by the G.P.O. that his call is being pirated.

Colchester.—G8PZ and 3VM are in trouble with their 7 Mc. speech amplifiers. Both are rebuilding 1.7 Mc. gear.

East London.—At the February meeting, held at G8AB, Loughton, N.F.D. arrangements were discussed. Station A1, 1.7 Mc. (G6UTP) will be situated at Abbess Roothing, and members wishing to assist should notify the D.R. before the end of March. 2DHD, of Higham's Park, is now G4BZ. G8JM is awaiting cards to obtain W.A.C. G3YF has worked W on 7 Mc., and G3XS on 14 Mc.

Chelmsford.—The February meeting was well attended, 25 being present. The advertised meeting at G2KG, on March 6, was postponed until April 3, as on March 6, a Hamfest was held in its place at "The Angel," Broomfield Road, Chelmsford.

G2KG and 5RV active on 28 Mc. are erecting Beam aerials! 3BS likes his new HRO Senior. 2GN is on 14 Mc., with a neat CO-FD-PA rig. 2SA finds 14 Mc. unreliable, but is very active. 8PB reports the arrival of his new NC44B receiver. He generously offers this and other useful gear for use in NFD. 2BGP is using a new "Sky Champion," and likes it. 2ARA is coming to us from Harrow, and we assure him a hearty welcome.

The T.R. is trying to interest local amateurs in H.T. safety precautions, following the many sad reports from U.S.A. His own station, G5RV, is fitted with a gate switch which cuts off all H.T. when the doors are opened for wave-changing or circuit adjustments.

East Essex.—Eleven members attended the February meeting held at 2CYC, when arrangements for N.F.D. formed the chief topic of discussion. It was decided to use the same site as last year, as this has proved itself to be very good. 2BQN is building the TX, and hopes to have it ready for trial in a few weeks' time. A sub-committee will be formed next meeting to help the T.R. with work connected with N.F.D.

The Southend Radio Society held two meetings in February. The first, a junk sale and general discussion, was not very well attended, due to bad weather conditions. At the second an excellent lecture was given by Mr. Chamney, of the G.P.O., on Telephone Communications.

We are pleased to welcome a new member, BRS3466.

DISTRICT 15 (London West, Middlesex and Buckinghamshire).

Arrangements for N.F.D. have begun, and the same chief operators as last year will take charge of the stations. The sites are not quite definite, but we shall need all the help possible. Will members please write G6CJ and suggest which station they would prefer to attend, at the same time remembering it is a district affair, and that we want just as good men on all stations. The T.V.A.R.T.S. will take the 3.5 Mc. station, so members there can communicate with either G6GB or G5VB.

As only G5JL was nominated for the position of editor of the District magazine he will carry on the good work.

The T.R. for Hayes was very disappointed with the members in his area for their lack of interest in the District meeting held in that section. We thank G8FA, his mother, and YL for the excellent gathering. See Forthcoming Events for next meeting.

Arrangements have been made with G6PR to take over the T.R. duties for Slough, so members there are asked to give him their support. G5SR is busy with local meetings round Wembley.

Reports have reached the D.R. complaining bitterly about the bad spread and over-modulation of some of the telephony stations in this district. As most of the offenders are non-R.S.G.B. members, it is rather an awkward situation. The D.R. knows how bad it is, as he suffers from one station who covers about 100 kc. on the 14 Mc. band.

Only two T.R.'s have sent reports this month, and both say they have received none themselves. One individual report reached the D.R., this after we had made such a good start again. Congratulations to 2CUM, who is now G4BQ.

Reports are as follows:—*West London.*—G4BQ forging ahead. *Wembley.*—G5SR wants accommodation for local meetings. 2TJ will soon be active again. 6WN worked PK1 on 28 Mc. *Hayes.*—G8FA suggests a local transmission and reception contest. What about it? He is now using 25 watts. 5JL worked VE, FA and LY on 1.7 Mc. (Congrats, om.—D.R.)

London West.—G3UQ, 3GY and 6CO are busy with new gear; 4AR and 5FG working DX; 8KZ putting in ground work for N.F.D.; 2BQT passed test, awaits call.

DISTRICT 16 (South-Eastern).

Members are reminded of the "Ham Evening" to be held by the Maidstone Amateur Radio Society on Wednesday, March 29, at their Clubroom, 244, Upper Fant Road, Maidstone. The event commences at 7 p.m., and a display of R.S.G.B. films will be given at 7.45 p.m. Mr. Clarricoats (G6CL) will give a talk during the evening, and it is hoped that as many members as possible, whether in District 16 or not, will make a point of attending what, we are sure, will prove to be a most entertaining evening.

Ashford.—G2QT and 6SY entered the B.E.R.U. contests, and both report making a large number of contacts. The attendance at the February meeting was six, and the subject of the discussion was N.F.D.

Brighton and Hove.—At the last meeting on the C.W.R. a talk was given by a representative from the Air Ministry. This evoked considerable interest, and it is expected that a number of new members will be forthcoming. Active:—G3HP, 3JF, 3WR, 6CY, 6RM, and 8AC. Mr. Marchant is congratulated on receiving the call 2ACU.

Eastbourne.—The E. & D.R.S. received a lecture by Dr. Smith entitled "Telcon High-Frequency Cables" at the last meeting. G2AO has again worked VE1EA on the 1.7 Mc. band, and is also active on 56 Mc. Active:—G3AT, 5BW, 5IH and 2AVQ.

Gravesend.—The Gravesend and District Society again upheld their reputation for interesting lectures last month. On January 30 Mullard's demonstrated "The Cathode Ray Oscillograph as a Testing Instrument," and full details of how that versatile instrument may be employed to analyse transmitter and receiver performance were given. The Group hope, at some future date, to construct an oscillograph for the use of members. Mr. Stevens, of Westinghouse, lectured on "The All-Metal Way" on February 13, and with the use of slides gave members some insight into the use of metal rectifiers in industry, besides their application in radio. A visit has been arranged on Wednesday, March 22, to the research laboratories of the T.C.C. by the kindness of the Manager, Dr. F. C. Stephan. All stations report active. G2IZ has received a report from W1AW on his 1.7 Mc. signals.

Heathfield.—BRS1173 reports making a good score in B.E.R.U., hearing 25 zones. G5JZ is at last on A.C. mains. G5PN, 5PR, and 2CJZ are also active.

Maidstone.—A lecture on cathode ray tubes by Mr. Rich, of Mullard's, was given recently. Construction of the club station, G3WM, is now in progress, and the following report activity:—G5FJ, who has at last forsaken his innumerable accumulators, and is now on A.C., 5XB, 6RQ, 2BHK, 2BXW, 2014, 2763, 2834 and 3552. BRS 3552 is welcomed to the District.

Tunbridge Wells.—Congratulations to 2CUS on receiving his full call, G4DM. All stations are active on various bands, but at the moment have nothing special to report.

Whitstable.—G5CI, who works on 7 and 14 Mc., has erected a W8JK beam, and is hoping for results. 2BJN is congratulated on obtaining the call G4BY.

DISTRICT 17 (Mid-East).

Lincoln.—G5XL is keeping a schedule on 3.5 Mc. every Sunday and requires contacts with District 17 members. The following report active: G2LX, 5XL, 3CL, 3ZC and 4BU.

Cranwell.—G6LU will soon be on 56 Mc. with a Crystal-controlled Transmitter and would appreciate schedules with other stations in the District. G3OI, 6TV, 8FC, 8OL all report active.

Boston.—Congratulations to 2DTU upon the arrival of a junior YL operator; he is celebrating the event by applying for a full licence! BRS3154 is 2BQC and 2BOS is active under the call G4DV. G2UK will be coming to reside in Boston early in March: he is assured of a hearty welcome.

Sleaford.—G8GI reports activity on four bands and informs us that 8RW is now in Sleaford; they were pleased to receive a visit from 3FL, of Swindon, during the month.

Horncastle.—Although there is no great activity in this area, we appreciate the regular reports from 2AAS, who is busy with code practice.

Grimsby Area.—The Grimsby and District Short Wave Society's third annual dinner, held at the King's Head Hotel, Waltham, on February 25, was a great success. Visitors came from as far afield as Worksop, and a very enjoyable evening was spent by all. The local press were represented and reported fully on the proceedings. The toasts of "Amateur Radio" and "The Visitors" were proposed by 2WR and 6AK, 5GS and 5BD responding. The entertainment which followed the dinner was appreciated by those who attended.

All stations in this area are known to be active.

DISTRICT 18 (North and East Yorkshire)

The D.R. takes this opportunity of reminding all members that he will be pleased to make their acquaintance at the Provincial District Meeting, to be held at the Windmill Hotel, York, on Sunday, April 16. This is also the day on which Summertime commences, and it is sincerely hoped that no one will turn up an hour late!

Hull.—There are now definite and encouraging signs of increasing interest in this part of the District. The February meeting was a most enthusiastic one, and certainly the best attended for some time. Several items of importance were discussed, the chief of which was the formation of a Short-Wave Club for Hull and District. A committee was formed to discuss details and report later.

The T.R. has made provisional arrangements for members to spend an evening at the Hull Technical College, when the wireless transmitters, receivers and direction-finders will be demonstrated by the radio master, Mr. G. H. Holmes (G3CH). Another contemplated visit is one to the Hull Telephone Exchange. Full particulars of these visits will be announced later.

After a period of local inactivity, use is being made of the 1.7 Mc. band, G2FS, 3PL, 6OS and 8UL having been heard frequently. Activity on other bands is at the moment spasmodic.

Don't forget to reserve the date, April 16, for the York P.D.M. We want a large contingent from Hull this year.

Driffield and Garton.—G6TG recently paid a visit to 6UJ and 2KO, and found both stations active. The latter has a Trophy 5 receiver, which performs very well on all his 28 Mc. 'phone contacts. 3DW is now back from leave, and BRS566 is understood to be applying for an A.A. licence.

Scarborough.—The Scarborough Short Wave Society (G4BP) has applied for affiliation to the R.S.G.B. The 7 Mc. transmitter is being rebuilt by 2CP in readiness for N.F.D., and experiments are at present on 1.7 Mc. Short talks have been given at different meetings by 2CP on "The Construction of Celluloid Supported Coils," and by 8KU on "Aerial Experiments."

G4DY is the new call of 2AHN, and he is active on 14 Mc. and 7 Mc. 'phone. 3KS finds the 8JK two-section beam very effective on 14 Mc.; whilst 5MV and 2TK both have Reinartz rotary beams for receiving on 28 Mc. 6TG has received a listener's report from U.S.A., enclosing a photograph which displays over 900 QSL cards from 127 different countries heard on 'phone.

York.—Mr. R. Hall (BRS3527) is applying for an A.A. licence. There are at present three other members holding three-letter calls in the city.

The D.R. would be pleased to hear of any activity in Malton, Bridlington and Whitby. There are also known to be amateurs in Northallerton and Dishforth who are attached to District 18. As it is impossible to visit all parts of such a large area, any information for these notes will be appreciated.

DISTRICT 19 (North-Eastern)

District N.F.D. stations have been allocated as follows:—1.7 Mc., Berwick; 3.5 Mc., Newcastle; 7 Mc., Stockton-on-Tees; 14 Mc., South Shields. The necessary arrangements are now being made and it is hoped that as many members as possible will give their assistance.

Newcastle-on-Tyne.—G6IR has just finished a regenerative superhet from *QST* design; G2CR finds 28 Mc. very patchy; 5QY is active on all bands. No reports to hand from other stations.

South Shields.—G5WZ has gear installed at a new QRA, but is having trouble with his aerial system. All other stations are active on 7 and 14 Mc. The local meetings at 5WZ are still suspended but will start again in the next few weeks.

Stockton-on-Tees and Middlesbrough.—G3KY is erecting new directional aerial system and is trying to construct crystal microphone. If this is successful, it is hoped to publish details in the BULLETIN. G2FO had the misfortune to burn out the primaries of all his mains transformers, even in the receiver, but hopes to be on the air again soon. 2BGP has ordered parts for a new transmitter. Other stations active are 5XT, 5QU, 6DR, 8CL, 8OH, 8PS, 2CZO.

Northern Ireland

A well attended meeting of the R.T.U.N.I. was held in Belfast on February 23, to which the R.S.N.I. was invited as a body by the Committee. The company present heard with interest and appreciation a very lucid lecture by Dr. R. H. Sloane, Senior Lecturer in Physics at "Queens." His subject covered many physical phenomena relating to emission and ionisation in "tubes" of all kinds, from simple diodes to gas-filled cathode ray tubes. This was illustrated by many lantern slides and a number of typical exhibits. The warm thanks of the R.T.U.N.I. are due to Dr. Sloane for the trouble he took to make the talk a success. At the close there was a discussion and several questions were answered by the lecturer.

At the next District meeting on Friday, March 31, the 1938 N.F.D. films will be shown. Time and place will be notified to members.

Mr. J. A. Verhoef, who made many friends while at Queen's University, Belfast, and subsequently returned home to Holland, is now PA0CZ. He was QSO GI6WG on 14 Mc. recently, and has our best wishes.

Scotland

"A" District.—At the meeting on February 22, Mr. D. Niven (2CHN) gave a most interesting lecture on "Regenerative R.F. Amplifiers" and exhibited a receiver incorporating points mentioned in the lecture. An appeal was made for N.F.D. operators and crew, and several names were submitted; however, more volunteers are required. Any member requiring Morse instruction should communicate with the D.O. B.E.R.U. was poorly supported from the district, GM5YG scored 505 points in the Senior section, while GM8MJ put up the best score in the Junior section with 159. Several members who are active on 1.7 Mc. would like to see more activity on this band. (Obtain the R.S.G.B. Handbook and read about the possibilities of this interesting band.—D.O.) We were pleased to welcome a visitor to our meeting in G3NO. GM2LQ is to be active on 56 Mc. each Sunday during March, between 11.00-12.00 and 21.00-22.00, 'phone and C.W. alternately will be used and all reports will be acknowledged.

"B" District.—Meetings in future will be held in the Empress Café, Union Street, Aberdeen, at time and dates as in the printed circular of January, 1939. Two meetings have been held since these notes appeared last, and the D.O. regrets to remark on the poor attendance. All members should endeavour to attend future meetings, as there seems likely to be a shortage of operators for N.F.D. Field Day matters will be discussed at every meeting in the future, and a full attendance is requested. Members residing outside of Aberdeen should note that they are invited to take part in N.F.D., and it is hoped that a number will be able to spare the time to join us that week-end. W. Grant (GM4DG) is the first GM4 in the district. General activity is good, stations being heard on all bands. GM8SV is hoping to contact W on 1.7 Mc.

"C" District.—Twelve members attended the meeting on February 21, when N.F.D. was again the chief topic. Locations and personnel for three of the stations were finalised, and alternatives for the fourth discussed. Several communications receivers have been on trial here lately, with varying results. BRS2798, who has been listening on 1.7 M., late at night and in the very early morning, reports hearing FA, OZ, LY, VE and K4, the latter on 'phone. Morse classes have been started at the local wireless college, and a spate of new full tickets is expected in consequence.

"D" District.—Reports are scarce as usual, although meetings are being fairly well attended. N.F.D. preparations were put in hand at the last meeting, but more offers of help are needed from BRS and A.A. men particularly. The following are active: GM3GG, 3UM, YN, 5GK, 5YX, 6LS, 6NO, 6SR and 6XI.

"E" District.—The usual monthly meeting was held on February 15, when a large attendance listened to J. Kirkpatrick (2BIK) speak on the Construction and Use of A.A. Gear. Two transmitters were on view. A successful junk sale followed.

"F" District.—No news at time of writing.

"G" District.—The D.O. would appreciate notes from members. The following are active: GM3ZH, 5FT, 6RG, 8CN, 8NW and 8RV.

"H" District.—No news at time of writing.

The next meeting is arranged for March 22, at 48, Newmarket Street, Ayr.

BRS3198 is now 2ASP. The District Morse class is well supported.

LETTERS TO THE EDITOR

The Editor does not hold himself responsible for opinions expressed by correspondents

CONGESTION AT H.F. END OF 14 Mc.

To the Editor, T. & R. BULLETIN

SIR,—A good deal of comment has appeared recently regarding the apparent migration of all CW stations to the H.F. end of the 14 Mc. band. During the recent B.E.R.U. contests some significant figures were collected, which are appended below in the hope that their message will be understood and acted upon by many of our members.

	H.F. only		L.F.	
Senior	Heard	Worked	Heard	Worked
VK/ZL ...	28	4	32	28
VE5 ...	0	0	4	4
ZS ...	14	6	13	6
Others ...	12	2	15	8
	54	12 or 22%	64	46 or 70%

The crystal frequencies were exactly the same distance from each end, viz., 14,376 and 14,024 kc., but whereas stations were easy to contact on 14,024, it was a very different story at the other end.

The aerials were two two-section W8JK beams, one 50 ft. high, directed on VK/ZL, and the other practically at right-angles, 45 ft. high, directed on ZS1 and VE5. Both were tuned to 14,200 kc. and reports received were equally good for both ends of the band.

In the Junior Contest, it was decided that the frequency of 14,376 was no good, so the crystal was ground to double to 14,392 kc. and another one purchased for 14,322 kc.

However, this appeared to have very little effect on the final results, and although the figures are not so striking as in the Senior Contest, this is principally due to the fact that so few stations were heard at the L.F. end that it was necessary to stick to the H.F. end, even though contacts took much longer to obtain.

	H.F. only		L.F.	
Junior	Heard	Worked	Heard	Worked
VK/ZL ...	37	10	7	5
VE5 ...	3	0	0	0
ZS ...	8	2	4	2
Others ...	28	10	19	6
	76	22 or 29%	30	13 or 43%

As a point of interest, all stations except one were worked with the first call on 14,024, but only half at the other two frequencies.

A final point is the time taken to obtain contacts. In the Senior this was 18 minutes per contact on 14,024 and 67 minutes at the other end; in the Junior the two times are almost alike, since many hours were spent on 14,024 that were really a waste of time, because of the pandemonium on 14,360/14,400.

The remedy is obvious, and if a few real DX stations would follow AC4YN's example and stick to 14,000/14,150 the position would soon be rectified.

Yours faithfully,
F. W. GARNETT (G6XL).

A CORRECTION

To the Editor of T. & R. BULLETIN

DEAR SIR,—In the February issue of THE T. & R. BULLETIN, the article "The Month on the Air" contains the statement that my station participated in the recent All-Continent Round-Table Record. I should be glad if you would kindly have that statement corrected in an early issue as it was SU1AM who took part and not myself.

As SU1AM is the Patron of our Society, I should be glad if the correction could be given suitable prominence so as to avoid any further inconvenience he may have been caused.

Yours sincerely,
W. E. MARSH,
SU1WM.

THE T20 AS A P.A. FOR 56 Mc. WORK

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

DEAR SIR,—I read with interest the article on 56 Mc. transmitters by Mr. N. S. Byers, G8AF, in the January T. & R. BULLETIN, and noticed his remark about the *Taylor* T20 being unsatisfactory as a power amplifier valve on 56 Mc. For some time I have been using this valve with great success on 56 Mc., and think that perhaps a few details of the circuit and layout I employ may be of interest to Mr. Byers and others.

As will be seen from Fig. 1 the valve is grid-neutralised. I find this method to be the most satisfactory both from the point of view of ease of neutralising and stability over a band; a consideration here, as I employ an ECO exciter. A further point in its favour is that one end of the anode coil is at earth potential to RF, which greatly facilitates aerial coupling, and at the same time aerial coupling or tuning has no effect whatever on neutralising, in fact I have had no occasion to

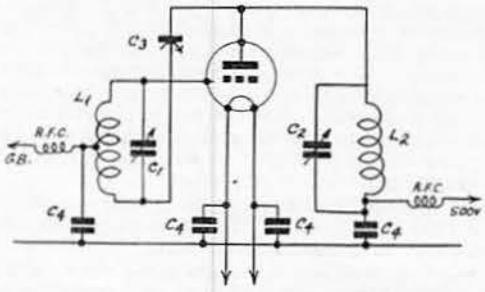


Fig. 1.—Circuit of 56 Mc. P.A. Unit using T20 Valve.
C1, 2, 3. 15μμF Premier (Trolitul).
C4. 100μμF Dubilier (Mica).
L1. Nine turns' ¼-in. diam. 14 S.W.G.
L2. Six turns ¼-in. diam. 14 S.W.G.

re-neutralise the circuit since I put it into use some months ago.

Components values will be found under Fig. 1, while the layout is sketched in Fig. 2. Incidentally, when using a "long" valve such as the T20 it is

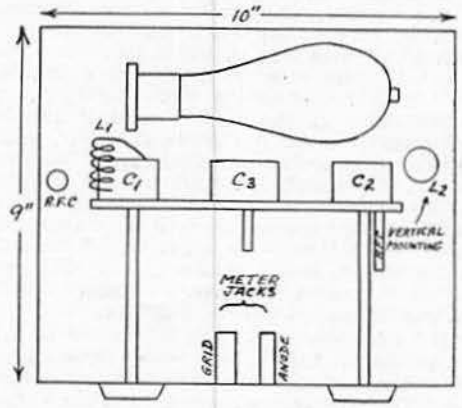


Fig. 2.—Lay-out of 56 Mc. P.A. Unit using T20 Valve.

almost impossible to group the components round it so that all earth leads are both short, and returned to a single point. The insulating strip on which the three variable condensers are mounted is supported by a length of brass angle, and this is used as the earth point for the stage, all earth leads being connected to it by the shortest path. The exciter uses a pair of 6V6G valves. The first (with 200 volts on the plate) is an ECO on 14 Mc., doubling to 28 Mc. in its anode circuit, and this is capacity coupled to the second 6V6G with a plate voltage of 350 acting as a doubler to 56 Mc. Link coupling is used to the T20 grid coil.

The grid current in the T20 under these conditions is of the order of 8 to 9 mA. against a bias

of 45 volts and the anode input 50 mA. at 500 volts. The RF available in the anode circuit is quite surprising when the small drive is considered, and is more than enough to put "paid" to a .35 amp flash-lamp bulb in a 3-inch diameter loop, although the anode coil is only a matter of $\frac{3}{4}$" in diameter. It has been ascertained that no material increase in the RF output is effected by running 20 mA. grid current from a much larger exciter.

Yours sincerely,
W. H. ALLEN (G2UJ).

THE F.O.C. AND PROCEDURE

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

DEAR SIR,—The First Class Operators Club Notes in the February issue raise an interesting point which I feel should not be passed without discussion.

The writer of the notes has had considerable experience of commercial operating. I have had some years training, but more experience of amateur than commercial operating.

We must agree that R1, R24, etc. (the numbers referring to messages), and request for repetitions by means of WA, AB, etc., are almost essential to commercial procedure; but I cannot agree that "R OK solid," "R most OK" and "R part OK" are either "misleading and superfluous" or "quite incorrect" in amateur procedure, although the OK might well be (and often is) omitted.

If a message is important and is written down, the commercial procedure should be used; but the majority of amateur messages are not written down at the receiving end, and hardly any at the transmitting end. Also many subjects are covered in one change over. These two circumstances make the use of WA, AA, etc., impracticable.

A great deal of the work done on amateur bands is of minor importance, and frequently the sense of a conversational QSO can be received without copying solid. When such is the case request for repetition of words would defeat its own object—brevity. The use of "R most" and "R part" then have obvious uses. After "R part" the sending station will repeat carefully only the important parts which have not been answered. If either of these expressions is used, "R solid" seems naturally to follow, although a plain "R" would suffice.

By all means let us cut the "OK" out of "R most OK" and the "solid" out of "R solid" (although it gives a mediocre operator like myself great satisfaction to be able to say "solid"); but are there not far more important things to be cleaned up by the F.O.C.?

For instance: first-class operating in *amateur* radio must include the ham spirit. I was recently horrified to hear a fellow member of the F.O.C. run down amateurs of a certain nationality in revoltingly unnecessary and insulting terms, presumably due to his political feelings. Perhaps I was officious when I called him to task for it, as he replied (over the air) "Nothing I can say is bad enough for them."

That is an isolated case which goes far beyond the F.O.C. and amateur radio, and a very minor effect of such comments would be to kill the F.O.C.

There are several directions in which amateur procedure can be improved; but is it the general opinion that commercialising is one of them? Admitted we can learn a great deal from commercial procedure, but I feel sure that very much of it is not applicable to amateur procedure. It would be interesting to have other opinions on the subject, particularly now there are so many newcomers who must find it confusing to read about "correct" procedure which appears neither used nor practicable.

Yours faithfully,
G. C. TURNER (G5IH. F.O.C.).

FIRST CLASS OPERATORS' CLUB

To the Editor, T. & R. BULLETIN.

DEAR SIR,—The policy which the First-Class Operators' Club has adopted, and which is typified by the behaviour of some of its members, on the air and elsewhere, is one which in our opinion merits considerable criticism. The opinions expressed in this letter are directed at that policy, and should not be construed as constituting a personal attack on any particular officer or member of the club.

Ostensibly formed to facilitate experimental W/T communication by encouraging good operating and developing improved procedure, it has as yet done little more than to form an association of amateurs, who apparently exist solely for the purpose of signing FOC after their calls and of offering unwanted and unauthoritative advice to experimental operators who have something better to do with the limited time at their disposal than to listen to them.

The club does not appear to realise that operating ability is a mere auxiliary to communication research, and that proficiency in that field should be acquired over a buzzer line or elsewhere, and not on an already overcrowded experimental frequency band. The implication associated with the statement repeatedly made, that its membership is largely comprised of ex-commercial operators, is indicative of the existing misguided policy; it is difficult to see just what qualifications an ex-commercial operator possesses which confer on him the right to advise an experimental amateur on any subject other than the use of commercial procedure.

The true objectives of the club appear to have been completely side-tracked in favour of a programme of carping criticism directed at amateur practice in general and a fervent self-congratulation and defence of its own membership and their alleged qualifications. There is no place in this country for an organisation which intends to develop in this fashion.

The status of the British amateur is that of an experimenter, and the value of operating ability, over and above that necessary for the efficient exchange of technical information by W/T, is small compared with the value of technical ability; in this country the only reason for the continued existence of an amateur radio organisation lies in its capacity to assist and encourage communication research and any other objectives it may have are essentially of a subsidiary nature. There is a need for an organisation which will assist in the maintenance of a usefully high standard of operating, and which will develop new operating signals and new codes for the better exchange of technical data by W/T, but the FOC does not appear to be doing any useful work in these directions, and offers little promise of future assistance.

Despite the evidence supporting our contention that the FOC is pursuing a policy detrimental to the interests of the experimental amateur fraternity, there is little doubt that this will be, as it has been, strenuously denied. In this connection we should like to say that we are aware that some of its members possess high technical ability, and we have no doubt that the majority of them engage in a certain amount of experimental work, but this is no indication that the club is pursuing a useful policy. We do know that many FOC members who operate on 7 Mc. are not engaged in advanced experimental work because we have listened to them and logged their transmissions (they were not very edifying).

We recently intercepted a series of transmissions on 7 Mc., from a station operated by a member of FOC in communication with another member which continued for more than thirty minutes without the inclusion of a call-sign or an ending sign, which contained nothing but insinuating remarks directed at those who saw fit to disagree with FOC tactics, and which concluded with a most flattering description of one of the sender's critics, specifically identified by call-sign and location and couched in terms which no gentleman would employ; this transmission, which we logged and filed, seems to us to be in direct and flagrant violation of legal and ethical codes.

It was not evident from the subject-matter of any of the signals logged that the transmissions were of an experimental nature; the text of many of them consisted entirely of gratuitous advice to the receiving operator apparently given in a spirit of wishful flattery or of smug complacency depending on the mood of the sender, and in either case serving as little useful purpose, experimental or otherwise, as the usually inane emanations from a 7 Mc. telephony station. The standard of operating was in many cases surprisingly low, and the electrical characteristics of some of the signals left no doubt as to the deficiency in technical ability of their operators.

This low standard which the club appears to have adopted for its definition of a "First-Class operator" is in itself probably responsible for the fact that few of the country's really good operators are to be found in it, for with all their alleged qualifications we do not know of one member who could even approach the standard of a naval first-class telegraphist, and if we must have a yard-stick by which to measure the quality of a British amateur radio operator, then that is the logical standard to take.

We feel that the club is failing to pursue its true obligations, and that steps should be taken to remedy this unfortunate state of affairs. We believe that there is a useful field which an operators' club might develop, preferably in association with R.E.S., and we suggest that the members of FOC see to it that their club is run on these or similar lines rather than allow it to pursue its present destructive policy.—Yours faithfully,

PETER JONES (G2JT).
D. E. PALIN (G6DP).

Editorial Note.—We should point out that whilst we publish monthly notes from "The First Class Operators' Club," this organisation is in no way officially connected with, or sponsored by, the R.S.G.B.

"UNCLE TOM" GETS GROOMED!

To the Editor, T. & R. BULLETIN

DEAR SIR,—I read with considerable amusement the croakings of our aged Uncle Tom who, suffering as he must do from the loss of his sight, and hence being unable to read, naturally is unaware that in offering his criticism of the use of the "Q" code except during C.W. contacts, has put his aged foot in it, so to speak. His own article is full of such abuse. Why not "contact" for "QSO" "interference," for "QRM," etc.

I suggest too that our aged relative might commit to his memory (unless this be too faulty), at least the headings used in the BULL. He will immediately come on "New QRA's."

Now, to be pedantic, neither "QRA" nor "QTH" mean "address," so why not say "new addresses," and at least be consistent?

It is certainly ridiculous to use the "Q" code when the meaning can be expressed just as easily, and very often more shortly, by an everyday English word, and about the only possible excuse for the use of the "Q" code except during a C.W. contact, is when working telephony with a foreign station who has only a slight knowledge of our language, and of his language we have, as usual, no knowledge at all.

But I don't know the "Q" abbreviation for "your modulation is lousy"!

Yours sincerely,

BRYAN GROOM,
(GM6RG).

RE 56 Mc. T.R.F. RECEIVER AND EXITER UNIT ARTICLES

To the Editor, T. & R. BULLETIN.

DEAR SIR,—I should like to make a little friendly criticism of two pieces of apparatus which have recently appeared in the BULLETIN. The first concerns the 56/28 Mc. A. C. T.R.F. receiver, which appeared in the November issue. On close perusal of the theoretical diagram (Fig. 1), it appears that V_1 (VP4B) has no negative bias on the control grid. I take it that A_1 and R_2 are meant to be the fixed bias resistor, and R.F. gain control respectively. However, it would appear that the only electrode to which they apply bias is the suppressor grid! There is a direct D.C. connection between control grid and cathode *via* L_2. I do not know whether Mr. Walker finds the R.F. gain control effective—if he does it must be due to the change in potential of the suppressor grid. In any case, the writer has seldom found it necessary to reduce R.F. gain on 56 Mc!

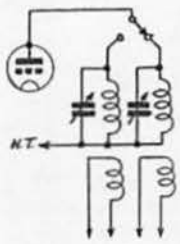
I do not doubt that Mr. Walker obtains good results with his receiver, but I would suggest that the correct biassing of the R.F. stage would result in longer life for the VP4B, and possibly reduced damping on the first tuned circuit.

The second piece of apparatus about which I have a small criticism to make is the exciter described by Mr. Allen in the December issue.

Here I suggest that it might improve the efficiency if the switch (S_2) were removed from its present position (where it has to carry the circulating current of the plate-tuned circuit) and were arranged as shown in the diagram herewith.

Here the switch has to carry a much smaller

R.F. current, while the use of different tuning condensers for each band obviates, to some extent, the necessity for retuning. A further refinement might be to gang with this switch a second (suitably low-loss) switch across the screen-tuned circuit. The band could then be changed purely by the flip of a switch.



The switch which Mr. Allen is using at present looks suspiciously like one of the "long-wave-off-short wave" switches beloved of the makers of early portable receivers, in which case its presence (as some of the "C" and "L" and most of the "R" in the plate-tuned circuit) would not seem altogether desirable!

I hope your contributors will take this criticism from one who is only a humble "A.A. man" in good part.—Yours truly,

E. H. COOKE-YARBOROUGH (2BCQ).

To the Editor, T. & R. BULLETIN.

DEAR SIR,—I thank 2BCQ for pointing out that the grid input circuit of the VP4B valve, as shown in Fig. 1, on page 262 of the November BULLETIN, is not quite as it should be.

To put matters right, the lower ends of L_2 and C_1 should be disconnected from the cathode and the junction of these two components connected directly to the chassis. The ceramic condenser C_4 should be connected between the cathode and the junction of L_2 and C_1.—Yours faithfully,

J. N. WALKER (G5JU).

To the Editor, T. & R. BULLETIN.

DEAR SIR,—I thank you for having given me a sight of Mr. Cooke-Yarborough's letter referring to my article "Something New in Exciter Units," which appeared in the December issue of the BULLETIN.

I quite agree with his view that two separate tuning condensers in the anode circuit would undoubtedly improve the efficiency and output.

As stated in my article on page 348, there was no intention, when the unit was designed, of getting the maximum of R.F. from it, and the arrangements adopted, although admittedly inefficient, produced a compact and economical piece of apparatus, of which the output has been ample for all requirements.

The switch used to change over the two anode coils carries, by its very position in the circuit, quite a large R.F. circulating current, but although it was not designed for that service, it has given no trouble during the year or so that the exciter has been in use.

In conclusion, I would say that I should be very interested to hear from anyone who either builds this circuit with a view to obtaining the maximum efficiency, or incorporates a complete switching scheme for more rapid band changing.

Yours faithfully,

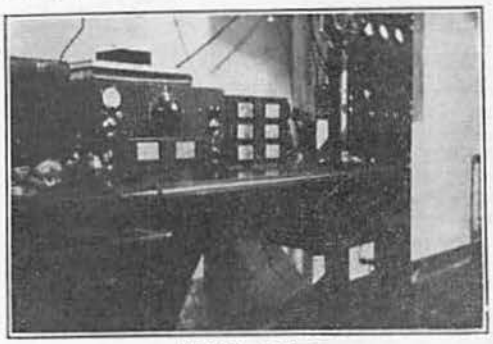
W. H. ALLEN (G2UJ).

British Empire Amateur Stations. No. 3

VS2AR

VS2AR is situated at a colliery company at Batu Arang, about 30 miles from Kuala Lumpur, capital of the Federated Malay States. The location is fairly isolated, being almost entirely surrounded by jungle.

The transmitter consists of a type 47 oscillator with a 7 Mc. crystal used in a straight circuit, followed by an 802 used as a doubler to 14 Mc.; the final stage consists of a pair of RK 25 tubes in push-pull. The whole of the apparatus lies behind the second panel from the top in the photograph; the top panel being used for the double-pole double-throw aerial switch, which enables the same aerial to be used for both transmitting and receiving.



VS2AR, Malaya.

The deck below the transmitter circuits contains the modulator unit. This comprises two 6C6 valves in series, driving two 76 valves in push-pull, which in their turn drive two type 42 in Class AB.

The panel below the modulator contains the power supply for the three radio frequency stages, and employs an 83 rectifier and its associated equipment.

Behind the bottom panel is the power supply for the modulator; the rectifiers used being an 82 and an 83.

The final plate tank circuit is link-coupled to an aerial tuning unit, not visible in the photograph. The receiver is an HRO Senior.

Various aerials have been used, including the Windom and Diamond. At present an aerial of the "two half-waves in phase" type is being tested, and, with the exception of the Diamond, which is a purely directional type, this has been found to be the "pick of the bunch."

British Calls Heard.

ZD2H-G2QN, A. Tomlinson, Posts and Telegraphs, Buea, Cameroons. Under British Mandate. 14 *Mc. January* 14 *to February* 14, 1939 *The figure in brachets denotes QRK :—*

Ei6g (7), g2df (6), 2dk (6), 2ft (5), 2fz (7), 2jk (4), 2lb (7), 2lu (6), 2pw (7), 2 vf (6), 2wv (4), 2yw (6), Gw2ng (6), 3bk (4), 3ci (5), 3dt (6), 3gu (7), 3jr (6), 3kj (5), 3mf (5), 3qd (5), 3tx (5), 3zv (6), gm3ua (5), 5bj (6), 5il (5), 5jf (5), 5km (6), 5lp (6), 5my (6), 5qa (6), 5yv (6), 6ag (8), 6cj (6), 6cl (7), 6dw (6), 6gm (5), 6if (7), 6nb (6), 6py (6), 6qx (6), 6rc (5), 6rh (7), 6sm (6), 6td (8), 6vp (6), 6vx (6), 6xl (6), 6xm (6), 6yr (5), 6zo (6), 8go (5), 8kw (4), 8mu (5), 8 rq(5), 8tc (5), 8ud (7).

BRITISH EMPIRE NEWS AND NOTES

Australia (Western)

By VK6WZ

The B.E.R.U. Contests were not very well supported in VK6, perhaps owing to lack of information. Notification to non-members of the Society is difficult, and (in view of the December-January recess) W.I.A. members did not hear details until after the Contests were over. 6LJ, 6FL, 6AF, and 6WZ were definitely competing in the Senior section, and others were rumoured to be taking part.

Conditions were fair, although contacts with United Kingdom stations were not numerous. Whether by accident or design, the 14 Mc. band seemed almost deserted by W signals during the Senior section, one or two PK and XU signals being the only others besides Empire calls to be heard here.

VK6FL, 6AR, 6EC, and 6TX have recently arrived in Perth, the first two on visits, the latter two settling permanently. 6LJ has not been very active, and is seeking new superhet designs. 6RU is a new call often heard on 7 and 14 Mc. His transmitter has a T55 final running at 50 watts input. 6JS, an old-timer, has made a reappearance on 7 and 14 Mc. 'phone with an 800 in the final. 6JC (Miss J. C. Chinery) has been transferred by the Education Dept. to a country school in the South-West of W.A., and will be operating a small battery-powered rig on 7 Mc. Later, perhaps, she will try 14 Mc. 6GB is experimenting with vertical arrays on 14 Mc.

British West Africa

By ZD2H

Nigeria.—ZD2H in the Cameroons is finding the power problem difficult to solve. In spite of repeated efforts with a hand generator giving about 7 watts, only ZD4AB has been worked. Various aerials are being tried in an endeavour to effect an improvement.

Gold Coast.—ZD4AB has had his leave postponed until the end of May. Although not very active of late, he participated in the B.E.R.U. contests. His first contact in the Senior tests, with VK4BB, gave him W.B.E. and incidentally provided the first VK-ZD4 QSO.

British West Indies (Eastern Group)

By VP2AT

Conditions on 7 Mc. have been unexpectedly good, and the band has been producing a fair amount of DX. The 14 Mc. band continues poor, and out of every 100 calls heard on this band about 99 are from W! These remarks are based on observations between 2100 and 2300 G.M.T. It would be interesting to know what conditions are like at other times, especially around 6 to 7 a.m. local time—1000 to 1100 G.M.T.—when VKs and ZLs and other DX in that direction should be good.

VP4TO and 2AT entered for the B.E.R.U. Contests, but the latter was badly handicapped by limited time. 2AC active again after nearly a year, is now c.c. using a 6A6 oscillator-doubler driving a single 6L6.

ZP-ZA is the call used by the operator (ex-G8DF) on Lord Moyne's yacht (mentioned in last month's notes). The appropriate number, corresponding to the particular VP zone in which he is at the time, is inserted after the VP prefix.

Channel Islands

By 2AOU

G3GS, who is carrying out daily aerial tests on 7 Mc. with G6KB, is collecting interesting fade-out and skip data. He has received reports from U.S.A. on his 7 Mc. transmissions, but has not yet made a Transatlantic contact.

2AOU heard 30 Zones during the B.E.R.U. Contests, although not all produced scoring points. 2DUP is active at a new QRA. 2CNC and 2FDJ are welcomed to membership.

It is hoped to arrange regular meetings during the coming months and those interested are asked to write to 2AOU, Crediton Samares, Jersey. (Tel. 2056.)

Eire

By EI9D

At a meeting of I.R.T.S. in Jury's Hotel, Dublin, on February 3, an interesting talk on Simple Receivers was given by Mr. A. B. Curran. Mr. W. McIlwaine (EI9F) presided.

Several EIs were heard working during the B.E.R.U. tests, and EI9D would like to have information from them relative to their scores as early as convenient.

Congratulations to EI8J who, using 60 watts to an RK20, is now WAC on 'phone and C.W.

An EI network on 3.5 Mc. is being arranged, and further details will be published shortly. Members who received questionnaires are requested to reply to EI8N as soo as possible.

Malaya and Borneo

By VS1AA

Cards still continue to arrive for non-existent Malayan stations, the latest pirate being VS2GW.

The frequencies used by VS2AL are 14,060 and 14,360 kc., not 14,420 kc. as quoted in a recent issue of *Radio*.

VS2AL and BERS444 report active, but the writer would appreciate regular monthly notes from all active VS stations.

Malta

By ZB1E

A slight improvement in conditions on 14 Mc. obtained during the first few days in February, which provided an hour of DX during sunrise and a similar period during sunset in the Senior Contest. These conditions, however, again deteriorated during the Junior, reducing this DX period to a few minutes. The band went "dead" regularly from 1930 to 0500 G.M.T. On the 28 Mc. band only an occasional faint signal was heard.

As a sidelight of the contest a ZB1 entrant suggested that the transmitter power in the Junior be limited to 100 watts input (!). The smile which met this insinuation rather annoyed the proposer, who promptly produced documentary evidence,

a card just received, " . . . 110 watts input to 804 in the PA . . . "

Ex ZB1A writes from England that he has received listeners' cards reporting phone reception on this call. The owner of this call has been away from Malta for over four years, and the call cancelled. It appears that these listeners made a phonetic mistake probably with the call ZB1E.

We lose yet another member from our group, ZB1O, who has just left the island for England. We wish him the best of luck, and hope to contact him again soon.

New Zealand

By ZL3AZ

After a spell of poor conditions, a particularly good day was experienced on January 13, when unusual contacts were effected with KC6CKM (Wake Island), VQ8AT (Chagos Archipelago) and VP7NT (Bahamas). An outstanding feature noticeable in January was the large number of SM, LA and YL stations audible in ZL. Their signals predominated those from other European countries.

At long last the writer has been able to contact Palestine. ZC6EC, who had been audible for some time was eventually raised on January 26. KF6DHW is another unusual station worked on 14 Mc.

At the time of writing, the first day of the B.E.R.U. Test has passed, and although conditions were quite good during the opening hours, they were quieter around 1800 G.M.T. No "rare" Empire stations were heard, excepting ZC6EC, who came through at fine strength, about 0700 G.M.T. on February 4—a most unusual time for stations from that part of the world. Canadian entrants appeared to be on the increase as several were heard calling "B.E.R.U." In view of the activity apparent on the first day, the Contest should have been a success and the revised hours of operation should also have made an appeal to a greater number than before.

CALIBRATION SECTION

Crystals and frequency meters of the heterodyne type can be accepted for calibration and these should be sent **direct** to the Calibration Manager :

Mr. A. D. Gay (G6NF),
156, Devonshire Way,
Shirley,
Croydon, Surrey.

Crystals should be enclosed in a small tin and securely packed to avoid loss in transit, whilst frequency meters should be packed in a wooden box or substantial cardboard container.

Return postage for crystals and frequency meters must be enclosed as stamps and not attached to the postal order. The Society cannot accept responsibility for any loss or breakage that might occur in sending apparatus for calibration through the post.

Calibration Fees

Crystals, 1.7, 3.5 and 7 Mc. types... 1s. 6d. each
Crystals, 100 kc. type ... ... 2s. 6d. „
Heterodyne frequency meters 5 points within the amateur bands ... 5s.
For each extra point at any desired interval 6d.

INDEX TO DISPLAYED ADVERTISEMENTS

QRA Section

Manager: H. A. M. WHYTE (G6WY)

When sending in a new, or changed address members are requested to print their names and addresses in block letters, as frequently signatures and names of streets are illegible. This necessitates reprinting the corrected address in the next issue of the BULLETIN.

New QRA's

G2IF.—J. H. SETTERFIELD, 105, Taggart Avenue, Childwall, Liverpool, 16.
G2RG.—A. T. WEST, 140a, Beaconsfield Road, Hastings, Sussex.
G2XC.—E. J. WILLIAMS, B.Sc., Rochdale, 34, London Road, Purbrook, Portsmouth, Hants.
G3FN.—A. H. B. CROSS, 19, Stradbroke Road, Sheffield, 9.
G3GD.—R. G. PARKER, 25, Mountway, Potters Bar, Middlesex.
G3HZ.—THOS. BENTLEY, 57, Briarlands Avenue, Sale, Cheshire.
G3OJ.—C. W. PACKE, 4, Garrison Lane, Felixstowe, Suffolk.
G3OQ.—B. SNOWDON, B.Sc., 35, High Street, Eston, Middlesbrough, Yorks.
G3PH.—C. W. BASSFORD, 41, White House Road, Dordon, Nr. Tamworth, Staffs.
G3PW.—B. L. P. TERRY, Luccombe Hill, Shanklin, Isle of Wight.
G3QU.—ILFORD AND DISTRICT RADIO SOCIETY, St. Albans Church Room, Albert Road, Ilford, Essex.
G3SD (ex G5LH).—F. THOMPSON, 14, Sandringham Avenue Benton, Newcastle-on-Tyne.
G3SN.—R. P. ELLIS, c/o R. C. Lawes, 9, Guinea Street, Exeter, Devon.
G3UB.—E. H. SCOTT, 105, Second Avenue, Stobhill Gate, Morpeth, Northumberland.
G3UV.—C. CHILTON, 10, Belgrave Road, Bingley, Yorks.
G3VL.—F. C. TURNER, 22, Baliol Road, Hitchin, Herts.
G3XH.—J. H. WHITE, 20, Chalvey Road East, Slough, Bucks.
GM3XO.—J. R. MACPHERSON, 41, Balgarvie Crescent, Cupar, Fife.
G3YW.—H. DAVIES, "West Leigh," Birch Avenue, Romiley, Ches.
G3YY.—C. T. FAIRCHILD, 1a, Dover Road, Brighton, 6, Sussex.
G3ZF.—L. S. DAVIES, 3, Bland Avenue, Clifton Road, Peckham, London, S.E.15.
G3ZY.—J. TWEEDY, 16, Duncan Gardens, Morpeth, Northumberland.
G4AF.—MAJOR R. B. TURBUTT, Ogston Hall, Higham, Derbyshire.
G4AG.—C. F. TURNER, 4, Hammonds Lane, Warley, Essex.
GM4AN.—W. G. HOPCROFT, 3, McKenzie Street, Sinclairtown, Kirkcaldy, Fife.
G4BJ.—W. H. GRAHAM, 157, Sileby Road, Barrow-on-Soar, Near Loughborough.
G4BQ.—R. PETTIGREW, 164, Princes Gardens, West Acton, London, W.3.
G4BV.—W. G. CADMAN, Catlips Farm, Chorley Wood, Herts.
G4CH.—WM. WILDE, 30, Bower Lane, Hollinwood, Near Oldham, Lancs.
G4CI.—D. S. BABBAGE, Northcote, 30, Bodley Road, New Malden, Surrey.
G4CL (ex ZB2A).—C. W. KIRK, 9, "F" Block, M.Q., Bulford Camp, Wilts.
G4CM.—C. G. MIDDLE, 50, Ashley Down Road, Horsfield, Bristol, 7.
G4CN.—K. N. GREENAWAY, 223, Wolverhampton Road, Cannock, Staffs.
G4CO.—A. MCCABE, 11, Dunkley Street, Wolverhampton, Staffs.
G4CP.—C. R. PERKS, "Cross Keys," Hednesford, Staffs.
GM4CV.—W. C. RITSON, 36, Orchardhead Road, Edinburgh, 9.
G4CW.—H. L. OVERTON, 3, Park View, Wotton Lane, Lympstone, Exmouth, Devon.
GW4CX.—T. W. COPLESTON, 27, Borough Grove, Flint, North Wales.
G4DC.—P. W. WINSFORD, 103, Erlanger Road, London, S.E.14.
G4DD.—T. M. CARTER, 32, St. Mary's Avenue, Shortlands, Kent.
G4DF.—B. SLATTER, 5, Cumberland Road, Southport, Lancs.
GM4DG.—WM. GRANT, 55, High Street, Turriff, Aberdeenshire.
G4DK.—W. H. A. MOREHOUSE 2, Beech Avenue, Crosby, Liverpool, 23.
G4DO.—R. W. ASCOMBE, "Fir Croft," Cavendish Avenue, Dore, Sheffield.
G4DW.—D. W. WELLS, Dane Cottage, Knoll Road, Bexley, Kent.
GW5BI.—V. J. BARTLETT, c/o Bank House, Llanidloes, Mont.
G5BW.—R. B. WEBSTER, Steetley Holme, Willingdon Road, Willingdon, Eastbourne, Sussex.
G5DF.—J. D. PINCHBECK, 3, Campden Road, Swindon, Wilts.
G5LG.—A. W. LISTER, R.A. Mess, Woolwich, London, S.E.18.
G5SO.—L. E. H. SCHOLEFIELD, The Cottage, Dudsbury Avenue, Ferndown, Dorset.
G5TQ.—H. RAYNER, 13, Brookfields Avenue, Wyke, Bradford, Yorks.
G6AG.—C. MCCLELLAND, 32, Berkeley Avenue, Bexleyheath, Kent.
GM6JJ.—WM. N. CRAIG, B.Sc., "Kiminnie," Kirkton Road, Burntisland, Fifeshire.
G6JP.—G. R. JESSOP, 32, North View, Eastcote, Pinner, Middlesex.
G6NW.—J. JAMES, 121, Ock Street, Abingdon, Berks.
G6PZ.—R. F. WESTON, 12, Somerset Road, Swindon, Wilts.
G6RP.—R. PARSONS, 35, Liberia Road, Highbury, London, N.5.
G6TY.—A. G. P. BRIGHTMORE, 18, Ranmoor Cliffe Road, Sheffield, 10.
G6WU.—W. E. BRIGDEN, "Taliesin," 131, Winchmore Hill Road, Southgate, London, N.14.
G6ZC.—JAS. TWATT, 8, Cedar Avenue, Chelmsford, Essex.
G6ZW.—A. I. VAN ZWANENBURG, "Loxwood," Upper Carlisle Road, Eastbourne, Sussex.
G8AN.—R. H. BARBROOK, 27, St. Peters Street, Ipswich, Suffolk.
G8KL.—W. O. STURMEY, 27, Wynchcombe Avenue, Penn, Wolverhampton, Staffs.
G8SC.—S/SGT. C. COLLINS, R.A.O.C., Att. M.C. of S., Woolwich, London, S.E.18.
2ACX.—A. W. ROBINSON, Valetta, Queens Road, Felixstowe, Suffolk.
2ADZ.—H. W. PARKER, 28, Rosedale Road, Stoneleigh, Ewell, Surrey.
2ASP.—P. T. MCARTHUR, 66, Eglinton Crescent, Troon, Ayrshire.
2BGL.—F. GRUNDY, 25, Dolphins Road, Folkestone, Kent.
2BIL.—G. F. KEEN, Merriedean, 70, Westbourne Gardens, Hove, Sussex.
2BKO.—R. CRETNEY, 482, Kingsway, Levenshulme, Manchester, 19.
2BKT.—B. T. KING, Kingscotte, 39, Maycross Avenue, Morden, Surrey.
2BMZ.—A. E. BAYLEY, 34, Happaway Road, St. Marychurch, Torquay, Devon.
2BQC.—L. J. COUPLAND, 38, Norfolk Street, Boston, Lincs.
2BQP.—P. E. GULLY, 6, Osborne Avenue, Ashby Down, Bristol, 7.
2BUV.—C. E. TEESDALE, 23, Queen Street, Boston, Lincs.
2BVD.—C. R. BEAVEN, 3, Bedford Place, Horfield Road, Bristol, 2.
2BVX.—V. O. HAWKINS, Top Flat, 158, Blackstock Road, London, N.5.
2CAJ.—A. BRYAN, 31, West Furlong, Retford, Notts.
2CBR.—A. PRINCE, 237, Stanley Road, Bootle, Liverpool, 20.
2COT.—H. T. STOTT, Sylvan Avenue, Mill Hill, London, N.W.7.
2CWY.—R. D. MCMILLAN, 82, The Ridgeway, Golders Green London, N.W.11.
2DBX.—J. TAYLOR, Sandwell Street, Buckhaven, Fife.
2DLM.—H. MARSDEN, 88, Johnson Street, Southall, Middlesex.
2DTC.—A. MILLER, 215, Victoria Avenue, Princes Avenue, Hull, Yorks.
2FDB.—L. M. TRIMMER, Hut X56, "A" Sqdn., No. 1 Wing, E. & W. School, Yalesbury, Wilts.
2FGQ.—GEO. M. JENKINSON, 112, East-Ella Drive, Anlaby Road, Hull, Yorks.
2FIA.—T. W. JOWETT, "Stonegarth," The Mount, Huddersfield, Yorks.
2FND.—R. G. BAIN, Eldenside, Peterculter, Aberdeen.
2FMB.—J. C. GREGORY, "Arlesey," 71b, Brook Street, Stourbridge, Worcs.
2FUD.—A. W. OWEN, "Tan-y-Bryn," North Road, Caerns, North Wales.
2FVP.—R. J. A. KEMP, 29, Capel Street, Calverley, Near Leeds, Yorks.
2FWA.—S. E. JANES, 72, Kimberley Road, Croydon, Surrey.
2FZG.—K. R. BOOT, 77, Beech Tree Lane, Cannock, Staffs.

Cancelled.—G5AS, G5OP, G5ZZ, G8DC, G8GT, 2ABD, 2ACD, 2ADO, 2AIS, 2AKT, 2AMX, 2ATU, 2AUK, 2AWJ, 2BGF, 2BGJ, 2BKI, 2BQF, 2BWT, 2BZG, 2CUM, 2DBY, 2DCU 2DGR, 2DJN, 2DMV 2DNL, 2DUA, 2DVX, 2FAH, 2FAP.

British Isles Calls Heard

D. C. Derry (ex-G8PQ), Signals Section, R.A.F. Station, Lahore Cants., India, on 14 *Mc., between* 12.00-14.00 *G.M.T., December* 22, 1938, *to February* 17, 1939.

G2: dh, ft, fz, hp, lb, nn, oa, pl, pn, qt, zy. G3: ah, bs, bu, cw, yc, zj. G5: bd, bj, dr, gq, hh, lp, ly, mw, my, rs, rv, sr. G6: ag, cl, cw, hl, lk, mk, nf, so, td, wy, xl. G8: ac, bn, hf, hr, ii, it, lu, ms, rq. GI5sj: —. GM2di: —. GW8np: —.

BOOK REVIEWS—(*Continued from page* 524)

1 kW., breadboard and rack-panel types, anything below 50 watts being considered, apparently, as an exciter. An interesting example of the latter is the "Flextal Conversion Exciter," using the beat between a C.O. and a stable low-R.F. oscillator.

One feels that telephony enthusiasts should and will study the automatic modulation control system in the telephony section.

This edition, then, is revised and enlarged, and nearly all the gear described is new; the text is arranged into sections in a much more convenient form than hitherto, and the treatment is in the well-known direct and practical style.

T. P. A.

HELPING HAND—(*Continued from page* 530)

It is important to note that it is not possible to measure the capacity of electrolytic condensers by this method, partly because a polarising voltage is necessary, and partly because condensers of this type are not made to pass alternating current.

Sufficient has been written to show that the scope for serious experimental work is greatly enlarged by the possession of an output meter of the type described. The writer hopes that those who find other applications, of which there are many, will come forward with them. He will also be pleased to hear from those who wish any particular point amplified or clarified.

EXPERIMENTAL SECTION—(*Continued from page* 532)

information about it is infinitely more satisfying than to dabble haphazardly with a multitude of subjects and get nowhere with them.

These remarks should not be taken hardly, but the writer wishes to emphasise that when members join the Transmitter Group they are expected to undertake some serious work and to be equipped to do so. Those who join and, for some reason, such as lack of time, cannot co-operate with their fellow members, only make a lot of work and waste the time of busy people. The running of the E.S. organisation is no simple task, and, whilst those occupied in doing it do not grudge the time, it is only fair to all concerned that definite and worth-while results should be forthcoming.

The recent reorganisation of the Transmitter Group and the elimination of the individual member has depleted the ranks, and the writer would be very glad to hear from keen and active members (who *must* possess a G.P.O. licence for either artificial or full aerial), who would welcome the opportunities presented for serious and co-operative investigation into problems affecting transmitting equipment.

It is evident that a group to deal with problems of a nature more or less independent of frequency would meet with general approval and it is therefore proposed to form such a group (or groups) at the earliest opportunity.

G5JU.

SILENT KEY

We record with deep regret the death on February 16 of J. J. Van der Weele, PA0JA. PA0JA had been a very active amateur and his passing will be mourned by many British Isles stations who have contacted his station.

We offer our condolences to N.V.I.R. and to his relatives.

Aerial Articles Wanted

The Secretary-Editor will be pleased to consider for publication articles dealing with the practical design of aerials for either restricted or unlimited spaces.

EXCHANGE AND MART

(*Continued from Back Cover*)

46 Class B. Modulator, 4 stages, suitable crystal mike, with tubes and output transformer, suitable for plate and screen RK20, or may be used with other tubes. What offers?—G2ZP, Westroyd, The Park, Yeovil.

EXCHANGE AND MART.

RATES.

Members' private advertisements 1d. per word, minimum 1s. 6d, maximum 10/-. Trade advertisements 2d. per word, minimum 3s. First line, if desired, will be printed in capitals. One inch Semi-Display, 10s. per insertion. Terms: Cash with Order. All copy and payments to be sent direct to Advertising Manager, Parrs, 121, Kingsway, London, W.C.2, not later than the 30th of the month for the following month's issue.

BARGAINS.—New Taylor T55, 29s; 4 Raytheon 59's, 3s. each; Osram U8 and Mullard DW30, both F.W. rectifiers (500-0-500 volts), 5s. 6d. each; 2 new Mullard Half-wave Rectifiers UL4 (5,000 v. at 300 mA. each), 15s. pair; Philips' Half-wave Rectifier 1562 (500 v.), 3s. 6d.; Transformers—Heayberd, 550-0-550 v. at 100 mA., 7.5 v. at 2.5 amps. C.T., 12s. 6d.; QCC 3v. at 4 amps. C.T., 5s. 6d.; Chokes—Heayberd, 20H at 100 mA., 5s.; 20H at 200 mA., 7s.; Hydra Condensers, 2 mfd., tested 2,000 v. D.C., 3s. 9d.; 2 mfd., tested 1,000 v. D.C., 2s. 6d.; 2 TCC 2 mfd., working 800 v. D.C., 3s. each; 2 Ferranti 2 mfd., tested 1,500 v. D.C., 2s. 9d. each; Weston Meter, Model 301, 0-500 mA. D.C. (flush). 10s.; 2 Cyldon Transmitting Variable Condensers, 100M. mfd., 4s. 6d. each; Ormond Variable Condensers, 9d. each, etc. Write for list. —HALL, 11, The Inlands, Daventry, Northants.

BARGAIN.—Late 1938 Super Skyrider. Used few hours, £26. R.K. Speaker with Rect, 50s. Kenco Bug-Key, 15s. R.F. 60 Chassis, complete with parts and coils, for 6L6 C.O.T 20. P.A., £4. Morse Instructor with tapes, £3. Two gross Crystal Holders, 5s. each. H.M.V. Radiogram, £5. All bar Receiver, subject to offers.—G3HZ, 57, Briarlands Avenue, Sale, Cheshire

EDC ROTARY CONVERTER 30 D.C./230 A.C. 45-watts, smoothed, in crackle finish, soundproof case. Practically new, £3 5s., carriage paid.—GM8SV, Roadside Cottage, Aboyne, Aberdeenshire.

FOR SALE.—Hallicrafter's SX16 1938 Super Skyrider, with instructions; see page 538 BULLETIN, April, 1938. Used 9 months. Cost £32. Will accept £22 cash.—Write: BRS3004, 27, Station Approach, Hinchley Wood, Surrey.

FOR SALE.—Three more Jones type Preselectors, complete new tube and guaranteed; greatly increases signal strength, reduces second channel, £1 each. Also two De-Luxe Editions, 30s. each.—CARTER, 5, Waterloo Street, Thornes Lane, Wakefield.

G2XV OFFERS FOR SALE, three perfect "Cyldon" .0005 Condensers, suitable double-spacing for 1000v. tanks, 6s. each. .5 amp. Hot Wire Meter, 5s.; another 2 amp. needs new wire, 2s. 6d. Eddystone 982 H.F. Choke, 2s., Two T.C.C 4 mfd. 200 v. wkg., 2s. each. Dubilier 2 mfd. 250 v. wkg., 2s. Lissen 4 mfd. 1000 v. Test, 5s. Bulgin 2½" moving coil Milliammeter 0-2, case cracked but perfect instrument, 12s. Few unmounted Crystals 3520, 3530, 3540, 3550, 3560, 1775 (approx.), all 7s. 6d. each, no certificates. Ferranti AF3 Transformer, 7s. 6d. Mullard SP4, Marconi MSP4, unboxed, 4s. each. 362 type MP4, Top Grid Tetrode, with split anode, ceramic base, new, boxed, 5s. 100 ft. Telestat, 75 ohm low impedance feeder, new, 8s. 6d.; also 50 ft. length new, 4s. 6d., all post free.—89, Perne Road, Cambridge.

G5KT.—Outstanding QSLs. Trial order will convince you cannot do better. Samples. State AA, G, BRS, SWL, 33, Howard Road, Westbury Park, Bristol 6.

G6DS.—Known the world over for quality. QSL Cards and Log Books. Send for samples.—QRA, 14, Lambley Avenue, Mapperley, Nottingham.

"HAM-AID" QSL CARDS are unusual and outstanding in design.—Samples from G6XT, TILLOTSON BROS., Commercial Street, Morley, Yorks.

INSTRUCTOGRAPH. Complete with three tapes and built-in Oscillator, £2. Woden H.T. Transformer, 450-0-450 v., 150 ma., 14s. 6d.—2AAS, Horncastle, Lincs.

LOG BOOKS.—200 pages, 2s. 6d. post free from: G6MN, Worksop.

MORSE CODE easily learnt in spare time by Gramophone Records. All speeds.—Particulars, stamp, C. E. MASTERS, Orchard House, Wokingham.

NATIONAL FB7 SUPERHET, COMPLETE Valves, Bandset, Coils, 180-10 metres. Good condition, £7. What offers? E.D.C. Rotary Converter, 100 D.C. input, 230 A.C. output, 375 watts, silent cabinet. All filters, £17.—K. M. SPILLER, Architectural Association, Bedford Square, London, W.C.1.

NUMISMATISTS-PHILATELISTS.—Old Coins; rare Spanish Stamps, in exchange for H.F. Tx and Test Gear.—C. KIRK, 9, "F" Block, Bulford Camp, Wilts.

PAREX METAL CABINETS, Chassis, Racks, as supplied to Government Departments. Terms moderate.—E. PAROUSSI, 10, Featherstone Buildings, W.C.1. CHAncery 7010.

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